



Programmable Controller  
**MELSEC-F**

**FX3U-16CCL-M**

**USER'S MANUAL**

**CC-Link V2**

**FX<sub>3U</sub>**

FX3U-16CCL-M User's Manual

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## FX3U-16CCL-M

### User's Manual

|                 |             |
|-----------------|-------------|
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#### Foreword

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This manual describes the FX3U-16CCL-M CC-Link master block and should be read and understood before attempting to install the hardware.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

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# 1. Introduction

## 1.1 Outline

### 1.1.1 Outline of CC-Link System

The CC-Link system connects distributed I/O units, intelligent function units, special function units, etc. with dedicated cables, and controls such modules from the PLC.

- By distributing each module to facility equipment such as conveyor lines and machines, necessary wiring can be reduced.
- Simple, high speed communication can be accomplished with modules that handle simple ON/OFF data such as I/Os or numerical data.
- Connections can be made to different types of devices made by partner manufacturers, giving flexibility to the system.

### 1.1.2 Outline of CC-Link Master Block FX3U-16CCL-M

The CC-Link master block FX3U-16CCL-M is a special function block which assigns an FX3G/FX3U/FX3GC/FX3UC Series PLC as the master station of a CC-Link system.

Only one FX3U-16CCL-M unit can be connected to a single programmable logic controller main unit.

- Compatible with CC-Link Ver. 2.00 and Ver. 1.10  
The FX3U-16CCL-M is compatible with CC-Link Ver. 2.00, and enables expanded cyclic transmission to facilitate the handling of applications requiring multiple points of data processing.  
In addition to Ver. 2.00, Ver. 1.10 is also supported by the FX3U-16CCL-M.
- The FX3U-16CCL-M supports connection of intelligent device stations  
Remote I/O stations, remote device stations and intelligent device station can be also connected to the FX3U-16CCL-M.

#### Caution

Local stations can not be connected.

- The FX3U-16CCL-M supports the setting of network parameters.  
The operator can set network parameters for CC-Link using GX Works2. As a result, sequence programs for setting CC-Link parameters are not required.  
Refer to Section 3.2 for applicable PLCs and applicable GX Works2 versions.
- The FX3U-16CCL-M supports the remote device station initialization procedure registration function.  
The operator can initialize remote device stations using GX Works2. As a result, sequence programs for initializing remote device stations are not required.  
Refer to Section 3.2 for applicable PLCs and applicable GX Works2 versions.
- The FX3U-16CCL-M supports the other station access function from CC-Link.  
The operator can execute program writing, program reading, program verification and device batch monitoring to the main unit connected to a FX3U-64CCL from CC-Link using GX Works2.  
Refer to Section 3.2 for applicable PLCs and applicable GX Works2 versions.

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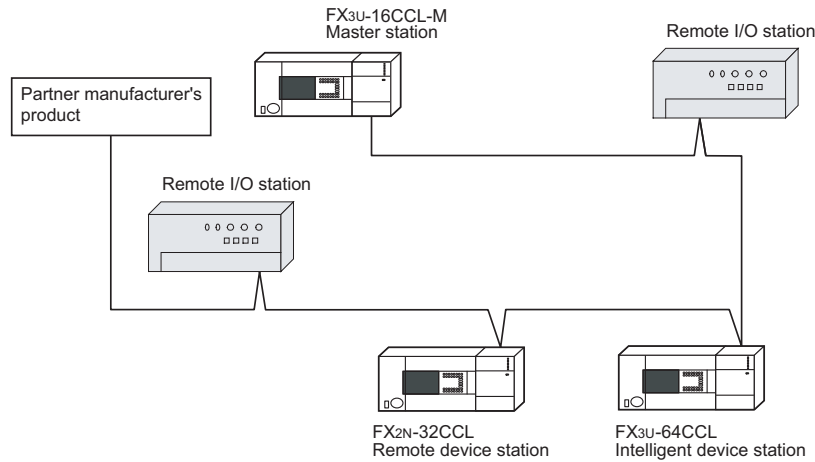
Buffer Memory

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### 1 Introduction

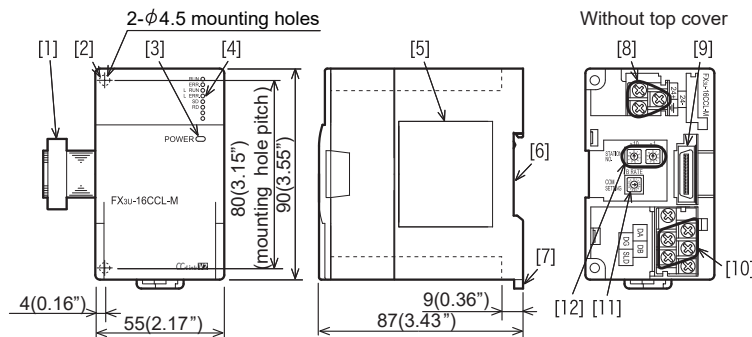
#### 1.2 External Dimensions and Part Names

- By using the CC-Link interface blocks FX2N-32CCL or FX3U-64CCL, two or more FX Series PLCs can be connected as intelligent device station or remote device stations to create a simple distributed system.



- Master station : Station which controls the data link system
- Remote I/O station : Remote station which handles only the 1-bit information
- Remote device station : Remote station which handles both bit information and word information
- Intelligent device station : Stations that can perform transient transmission

## 1.2 External Dimensions and Part Names



Unit : mm (inches)

MASS (Weight) : Approx.0.3 kg (0.66 lbs)

Accessories : Label for indication of special function unit/block number,

Dust proof protection sheet,

Manual supplied with product,

Terminal resistor

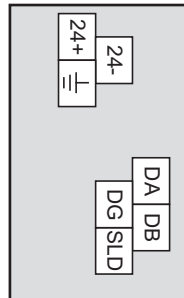
- For CC-Link dedicated cable  
110  $\Omega$  1/2 W (color cable: brown, brown and brown)  $\times$  2 cables
- For CC-Link dedicated high-performance cable  
130  $\Omega$  1/2 W (color cable: brown, orange and brown)  $\times$  2 cables

- |                                                                                                        |                                        |
|--------------------------------------------------------------------------------------------------------|----------------------------------------|
| [1] Extension cable                                                                                    | [7] DIN rail mounting hook             |
| [2] Direct mounting hole (2 - $\phi$ 4.5 mounting screw: M4 screw, tightening torque: 0.83 to 1.11N·m) | [8] Power supply terminal block        |
| [3] Power LED (green)                                                                                  | [9] Extension connector                |
| [4] Status LEDs                                                                                        | [10] CC-Link connection terminal block |
| → Refer to Section 1.4                                                                                 |                                        |
| [5] Name plate                                                                                         | [11] Transmission rate setting switch  |
| [6] DIN rail mounting groove (DIN rail: DIN46277, 35 mm (1.38") width)                                 | [12] Station number setting switch     |

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### 1 Introduction 1.3 Terminal Layout

## 1.3 Terminal Layout



Power supply terminal block

CC-Link connection terminal block

| Terminal name | Description                         |
|---------------|-------------------------------------|
| 24+           | 24 V DC power supply, + side        |
| 24-           | 24 V DC power supply, - side        |
| $\perp$       | Ground terminal (Functional ground) |
| DA            | Send/receive data                   |
| DB            | Send/receive data                   |
| DG            | Data ground                         |
| SLD           | Shield                              |

- Terminal screw and terminal block mounting screw size, and tightening torque

| Terminal screw name                                                    | Terminal screw size | Tightening torque |
|------------------------------------------------------------------------|---------------------|-------------------|
| Terminal screw for power supply, terminal screw for CC-Link connection | M3 screw            | 0.42 to 0.58 N·m  |
| CC-Link connection terminal block mounting screw (black)               | M3.5 screw          | 0.66 to 0.91 N·m  |

### Caution

CC-Link connection terminal block can be detached or attached. Make sure to cut off all phases of the power supply externally.

## 1.4 Power and Status LEDs

| LED display | LED Color | Status  | Description                                                                                                                                                |
|-------------|-----------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POWER       | Green     | OFF     | Power is not being supplied from the external power supply (24 V DC).                                                                                      |
|             |           | ON      | Power is being supplied from the external power supply (24 V DC).                                                                                          |
| RUN         | Green     | OFF     | FX3U-16CCL-M has failed.                                                                                                                                   |
|             |           | ON      | Under FX3U-16CCL-M normal operation.                                                                                                                       |
| ERR.        | Red       | OFF     | No errors.                                                                                                                                                 |
|             |           | Flicker | Communication error has occurred in some stations.                                                                                                         |
|             |           | ON      | Communication error has occurred in all stations, error in the settings, error in the parameter details, error with the communication, error with the H/W. |
| L RUN       | Green     | OFF     | Offline.                                                                                                                                                   |
|             |           | ON      | Data link is being executed (host station).                                                                                                                |
| L ERR.      | Red       | OFF     | No communication error.                                                                                                                                    |
|             |           | Flicker | The switch setting was changed after start.<br>There is no terminating resistor.<br>Influence from noise.                                                  |
|             |           | ON      | There is a data linking error (host station).<br>There is a setting error.                                                                                 |
| SD          | Green     | OFF     | Data is not being sent.                                                                                                                                    |
|             |           | ON      | Data is being sent.                                                                                                                                        |
| RD          | Green     | OFF     | Data is not being received.                                                                                                                                |
|             |           | ON      | Data is being received.                                                                                                                                    |

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## 2. Specification

### DESIGN PRECAUTIONS



- When executing control (data changes) to an operating PLC, construct an interlock circuit in the sequence program so that the entire system operates conservatively.  
In addition, when executing control such as program changes and operation status changes (status control) to an operating PLC, thoroughly read the manual and sufficiently confirm safety in advance.  
Especially in control from external equipment to a PLC in a remote place, problems in the PLC may not be able to be handled promptly due to abnormality in data transfer.  
Construct an interlock circuit in the sequence program. At the same time, determine the actions in the system between the external equipment and the PLC for protection against abnormalities in data transfer.
- Make sure to include the following safety circuits outside the PLC to ensure safe system operation even during external power supply problems or PLC failure.  
Otherwise, malfunctions may cause serious accidents.
  - Above all, the following components should be included: an emergency stop circuit, a protection circuit, an interlock circuit for opposite movements (such as normal vs. reverse rotation), and an interlock circuit (to prevent damage to the equipment at the upper and lower positioning limits).
  - Note that when the PLC main unit detects an error during self diagnosis, such as a watchdog timer error, all outputs are turned off. Also, when an error that cannot be detected by the PLC main unit occurs in an input/ output control block, output control may be disabled.  
External circuits and mechanisms should be designed to ensure safe machinery operation in such cases.

### DESIGN PRECAUTIONS



- Observe the following items. Failure to do so may cause incorrect data-writing through noise to the PLC and result in PLC failure, machine damage or other accident.
  - Do not bundle the control line together with or lay it close to the main circuit or power line. As a guideline, lay the control line at least 100mm (3.94") or more away from the main circuit or power line.  
Noise may cause malfunctions.
  - Ground the shield wire or shield of a shielded cable. Do not use common grounding with heavy electrical systems
- Do not apply excessive pressure to the power supply terminal block or CC-Link connection terminal block.  
Excessive pressure may cause damage or error.

### DISPOSAL PRECAUTIONS



- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

### TRANSPORTATION AND STORAGE PRECAUTIONS



- The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in the general specifications of the PLC main unit manual by using dedicated packaging boxes and shock-absorbing pallettes.  
Failure to do so may cause failures in the PLC.  
After transportation, verify operation of the PLC and check for damage of the mounting part, etc.

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### 2 Specification

#### 2.1 General Specifications

### 2.1 General Specifications

For items not listed below, specifications are the same as the of the PLC main unit.  
For general specifications, refer to the manual of the PLC main unit.

- Refer to FX3G Hardware Edition.
- Refer to FX3U Hardware Edition.
- Refer to FX3GC Hardware Edition.
- Refer to FX3UC Hardware Edition.

| Item                         | Specification                                           |                                           |
|------------------------------|---------------------------------------------------------|-------------------------------------------|
| Dielectric withstand voltage | 500 V AC for one minute                                 | Between all terminals and ground terminal |
| Insulation resistance        | 5 MΩ or higher by 500 V DC insulation resistance tester |                                           |

### 2.2 Power Supply Specifications

|                       | Item                                       | Specification                                                                        |
|-----------------------|--------------------------------------------|--------------------------------------------------------------------------------------|
| External power supply | Power supply voltage                       | 24 V DC +20% -15% Ripple (p-p) within 5%                                             |
|                       | Permitted instantaneous power failure time | Operation continues when the instantaneous power failure is shorter than PS1:1ms.    |
|                       | Current consumption                        | 240 mA                                                                               |
| Internal power supply | Power supply voltage                       | 5 V DC of PLC is not used. (5 V DC is converted from 24 V DC external power supply.) |
|                       | Current consumption                        | Make sure to observe the power-on timing and the procedure.                          |

### 2.3 Performance Specification

| Item                                                       | Specification                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable function                                        | Master station function<br>(The local station and standby master station functions are not provided.)                                                                                                                                                                                                                                                                                                      |
| CC-Link applicable version                                 | Ver. 2.00 (Ver. 1.10 also supported.)                                                                                                                                                                                                                                                                                                                                                                      |
| Station number                                             | 0 (set by rotary switch)                                                                                                                                                                                                                                                                                                                                                                                   |
| Transmission rate                                          | 156 Kbps/625 Kbps/2.5 Mbps/5 Mbps/10 Mbps (set by rotary switch)                                                                                                                                                                                                                                                                                                                                           |
| Maximum total cable length (maximum transmission distance) | 1,200 m maximum (varies depending on the transmission speed.)<br>For details, refer to Section 2.5.                                                                                                                                                                                                                                                                                                        |
| Maximum number of connectable stations                     | 1) Remote I/O stations: 8 maximum<br>(Each station occupies 32 I/O points of the PLC.)<br>2) Remote device stations + Intelligent device stations: 8 maximum<br>(The total number of RX/RX points is 256 or less.)                                                                                                                                                                                         |
| Maximum number of I/O points per system                    | <b>When using an FX3U/FX3UC PLC</b><br>1)+2) total number of points ≤ 384 points<br>1) (Actual number of PLC I/O points) + (Number of points occupied by special function blocks) + (Number of points occupied by the FX3U-16CCL-M: 8 points) ≤ 256 points<br>2) 32 × Number of remote I/O stations ≤ 256 points<br><b>When using an FX3G/FX3GC PLC</b><br>32 × Number of remote I/O stations ≤ 128 points |
| Number of link points per station*1                        | Remote I/O (RX, RY): 32 points<br>Remote register (RWw): 4 points (Master station → Remote device station/intelligent device station)<br>Remote register (RWr): 4 points (Remote device station/intelligent device station) → Master station)                                                                                                                                                              |
| Communication method                                       | Broadcast polling system                                                                                                                                                                                                                                                                                                                                                                                   |
| Synchronous method                                         | Frame synchronization method                                                                                                                                                                                                                                                                                                                                                                               |
| Encoding method                                            | NRZI method                                                                                                                                                                                                                                                                                                                                                                                                |
| Transmission path type                                     | Bus (RS-485)                                                                                                                                                                                                                                                                                                                                                                                               |
| Transmission format                                        | Conforms to HDLC                                                                                                                                                                                                                                                                                                                                                                                           |
| Error control method                                       | CRC(X <sup>16</sup> +X <sup>12</sup> +X <sup>5</sup> +1)                                                                                                                                                                                                                                                                                                                                                   |
| Connection cable                                           | CC-Link dedicated cable/CC-Link dedicated high-performance cable/Ver. 1.10 compatible CC-Link dedicated cable*2                                                                                                                                                                                                                                                                                            |

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### 2 Specification

#### 2.3 Performance Specification

| Item                                         | Specification                                                                                                                                                                |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RAS function                                 | <ul style="list-style-type: none"> <li>Automatic return function</li> <li>Device station cut-off function</li> <li>Error detection by link special relay/register</li> </ul> |
| Communication with PLC                       | By FROM and TO instructions or direct specification of buffer memory (FX3U/FX3UC) via the buffer memory*3                                                                    |
| Number of I/O occupied points                | 8 points                                                                                                                                                                     |
| Number of connectable units to the main unit | 1 (An FX3U-16CCL-M cannot be attached to main unit with an FX2N-16CCL-M and/or FX2N-32ASI-M.)                                                                                |

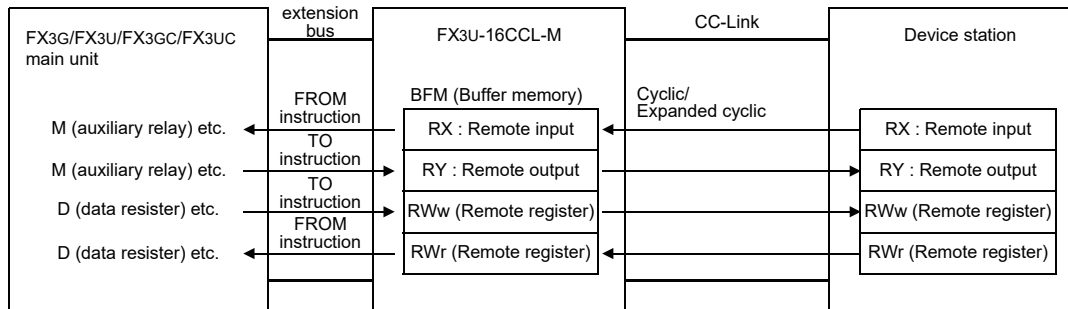
- \*1. Indicates the number of link points for remote net ver.1 mode. For the number of link points for remote net ver.2 mode/remote net additional mode, refer to the following table.
- \*2. CC-Link dedicated cables, Ver. 1.10 compatible CC-Link dedicated cable and CC-Link dedicated high-performance cable cannot be used together. Also attach the terminating resistor which matches the kind of the cable.
- \*3. For details of other applied instructions and methods, refer to the FX3G/FX3U/FX3GC/FX3UC Programming Manual.

- Link points of remote net ver. 2 mode and remote net additional mode

| CC-Link Version         |            | CC-Link Ver. 1.10 | CC-Link Ver. 2.00 |            |            |            |
|-------------------------|------------|-------------------|-------------------|------------|------------|------------|
| Expanded cyclic setting |            | -                 | Single            | Double     | Quadruple  | Octuple    |
| Occupies 1 station      | bit (RX)   | 32 points         | 32 points         | 32 points  | 64 points  | 128 points |
|                         | bit (RY)   | 32 points         | 32 points         | 32 points  | 64 points  | 128 points |
|                         | word (RWw) | 4 points          | 4 points          | 8 points   | 16 points  | 32 points  |
|                         | word (RWr) | 4 points          | 4 points          | 8 points   | 16 points  | 32 points  |
| Occupies 2 stations     | bit (RX)   | 64 points         | 64 points         | 96 points  | 192 points | -          |
|                         | bit (RY)   | 64 points         | 64 points         | 96 points  | 192 points |            |
|                         | word (RWw) | 8 points          | 8 points          | 16 points  | 32 points  |            |
|                         | word (RWr) | 8 points          | 8 points          | 16 points  | 32 points  |            |
| Occupies 3 stations     | bit (RX)   | 96 points         | 96 points         | 160 points | -          | -          |
|                         | bit (RY)   | 96 points         | 96 points         | 160 points |            |            |
|                         | word (RWw) | 12 points         | 12 points         | 24 points  |            |            |
|                         | word (RWr) | 12 points         | 12 points         | 24 points  |            |            |
| Occupies 4 stations     | bit (RX)   | 128 points        | 128 points        | 224 points | -          | -          |
|                         | bit (RY)   | 128 points        | 128 points        | 224 points |            |            |
|                         | word (RWw) | 16 points         | 16 points         | 32 points  |            |            |
|                         | word (RWr) | 16 points         | 16 points         | 32 points  |            |            |

## 2.4 Communication Specification

### 2.4.1 Data transfer between master station and device station



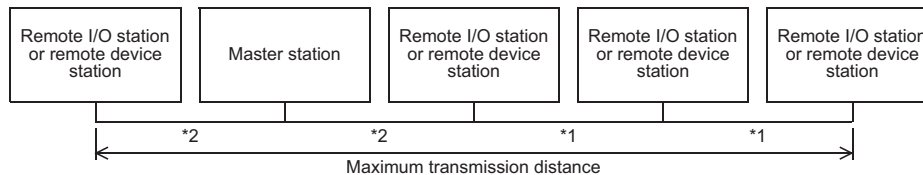
Data is transferred using FROM/TO instructions via the buffer memory (or direct specification of buffer memory) between the FX3G/FX3U/FX3GC/FX3UC PLC and the FX3U-16CCL-M. Data is replaced with internal devices (such as M, R and D), and used in sequence programs. Cyclic transmission and extended cyclic transmission are available between the device station and the FX3U-16CCL-M.

## 2.5 Maximum Transmission Distance

### 2.5.1 Maximum transmission distance (for Ver. 1.00)

This subsection describes the relationship between the transmission speed and the maximum transmission distance.

#### 1. In the system consisting of only remote I/O stations and remote device stations



- \*1. Cable length between remote I/O or remote device stations
- \*2. Cable length between the master station and an adjacent station
- CC-Link dedicated cable (requiring terminal resistor of 110Ω)

| Transmission speed | Cable length between stations |             | Maximum transmission distance |
|--------------------|-------------------------------|-------------|-------------------------------|
|                    | *1                            | *2          |                               |
| 156 kbps           | 30 cm or more                 | 1 m or more | 1200 m                        |
| 625 kbps           |                               |             | 600 m                         |
| 2.5 Mbps           |                               |             | 200 m                         |
| 5 Mbps             | 30 cm to 59 cm <sup>*3</sup>  |             | 110 m                         |
|                    | 60 cm or more                 |             | 150 m                         |
| 10 Mbps            | 30 cm to 59 cm <sup>*3</sup>  |             | 50 m                          |
|                    | 60 cm to 99 cm <sup>*3</sup>  |             | 80 m                          |
|                    | 1 m or more                   |             | 100 m                         |

- \*3. The cable length between remote I/O stations or remote device stations is within this range and if even one location is wired, the maximum overall cable distance will be as indicated above.



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