

MELSEC FX Series

Programmable Controllers

User's Manual
(Detailed Volume)

FX2N-64CL-M
CC-Link/LT Master Block

Foreword

- This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX_{2N}-64CL-M CC-Link/LT Master Block. This Manual should be read and understood before attempting to install or use the unit.
- Further information can be found in the FX_{1N} Series Hardware Manual, FX_{2N} Series Hardware Manual, FX Series Programming Manual II, CL1PAD1 USER'S MANUAL (Detailed Volume) and manual of CC-Link/LT Remote Stations.
- If the user is in any doubt at any stage of the installation of the FX_{2N}-64CL-M CC-Link/LT Master Block always consult a professional electrical engineer who is qualified and trained to local and national standards that apply to the installation site.
- If the user is in any doubt about the operation or use of FX_{2N}-64CL-M CC-Link/LT Master Block please consult the nearest Mitsubishi Electric distributor.
- This manual is subject to change without notice.

FX2N-64CL-M CC-Link/LT Master Block

USER'S MANUAL (Detailed Volume)

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FAX BACK

Mitsubishi has a world wide reputation for its efforts in continually developing and pushing back the frontiers of industrial automation. What is sometimes overlooked by the user is the care and attention to detail that is taken with the documentation. However, to continue this process of improvement, the comments of the Mitsubishi users are always welcomed. This page has been designed for you, the reader, to fill in your comments and fax them back to us. We look forward to hearing from you.

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Safety guidelines for the User and Protection of the FX2N-64CL-M

This manual provides information for the use of the FX_{2N}-64CL-M. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows;

- a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual should be of a competent nature, trained and qualified to the local and national standards required to fulfill that role. These engineers should be fully aware of all aspects of safety with regards to automated equipment.
- b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards required to fulfill that job. These engineers should also be trained in the use and maintenance of the completed product. This includes being completely familiar with all associated documentation for the said product. All maintenance should be carried out in accordance with established safety practices.
- c) All operators of the completed equipment (see Note) should be trained to use that product in a safe manner in compliance to established safety practices. The operators should also be familiar with documentation which is associated with the operation of the completed equipment.

Note : Note: the term ‘completed equipment’ refers to a third party constructed device which contains or uses the product associated with this manual.

Notes on the Symbols Used in this Manual

At various times throughout out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of equipment. Whenever any of the following symbols are encountered its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

Hardware Warnings



- 1) Indicates that the identified danger **WILL** cause physical and property damage.



- 2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.



- 3) Indicates a point of further interest or further explanation.

Software Warnings



- 4) Indicates special care must be taken when using this element of software.



- 5) Indicates a special point which the user of the associate software element should be aware of.



- 6) Indicates a point of interest or further explanation.

- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Please contact a Mitsubishi distributor for more information concerning applications in life critical situations or high reliability.

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Generic Names and Abbreviations

The generic names and abbreviations shown below are used within explanation contained in this manual.

Generic name/abbreviation	Description
FX2N-64CL-M	CC-Link/LT Master block FX2N-64CL-M
Master station	Station which controls the data link system. One master station is required in one system.
Remote I/O station	Remote station which deals with bit information only (to execute I/Os with external equipment) (such as CL1XY2-DT1D5S and CL1X4-D1B2).
Remote station	General name for remote I/O station. Controlled by the master station.
Power adapter	Supply of 24V DC to the CC-Link/LT system. At least one power adapter is required per system.

MEMO

1. Outline

1.1 Product Outline

The CC-Link/LT master block FX_{2N}-64CL-M can be connected to the FX Series PLC.
The CC-Link/LT system can be constructed with an FX Series PLC as the master station.

1.2 Features

The FX_{2N}-64CL-M has the following features:

1) Reduced wiring time

The adoption of flat cabling for CC-Link/LT and special connector allow for reduced wiring times.

2) Simplified programs

Link devices within CC-Link/LT are assigned to X/Y devices in the PLC, therefore, programs can be prepared without recognizing the network.

3) High speed refresh

High speed refresh (128 points/0.3 ms) is realized (as and when the transmission speed is 2.5 Mbps, 16-point mode is selected and eight stations are connected to the network).

4) Slave station disconnection function

Even if some units are down due to an abnormality, communication with the remaining functional units is not affected.

However, if the trunk line cable is broken, data link is disabled for all stations.

5) Automatic return function

When a unit that was disconnected due to an abnormality is restored to its normal status, the unit will return to the data link automatically and continue data transfer.

6) Data link stop/re-start

While data link is being executed, the user can stop and start the link again.

7) Remote station type information storage

In the CONFIG mode, the number of points occupied by remote stations, I/O types, etc. is detected, and stored within the EEPROM.

8) Mode selection

The ONLINE, CONFIG and TEST modes are available.

ONLINE mode : Executes the data link for the CC-Link/LT system.

Select the ONLINE mode usually.

CONFIG mode: Allows automatic assignment of the I/O No.

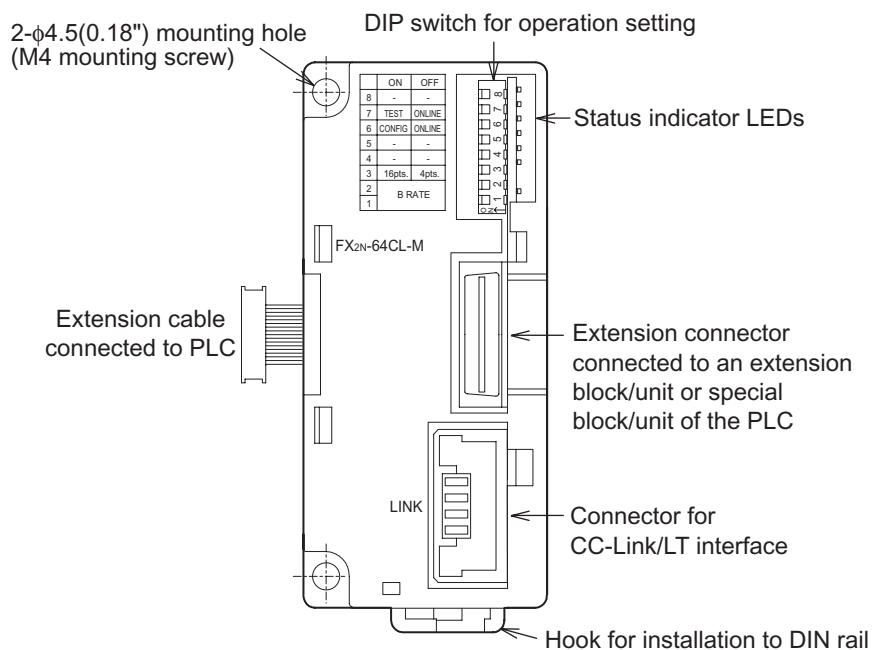
When remote stations are planned to be added in the future, reserved stations can be specified and detailed remote station information can be edited.

After constructing the CC-Link/LT system, make sure to execute the CONFIG mode once to assign the I/O No.

TEST mode : Executes self-diagnosis to judge whether the FX_{2N}-64CL-M itself is in the master station.

If the data link cannot be executed normally, the self-diagnosis function analyses the FX_{2N}-64CL-M itself.

1.3 Name and assignment of each part



Name	Description
Status indicator LEDs	POWER <ONLINE mode/CONFIG mode/TEST mode> Lit :Power is supplied Extinguished :Power is not supplied
	RUN <ONLINE mode> Lit :FX2N-64CL-M is operating normally Extinguished :FX2N-64CL-M is abnormal Power is interrupted EEPROM read error (sum mismatch) occurred <CONFIG mode> Lit :FX2N-64CL-M is operating normally Extinguished :FX2N-64CL-M is abnormal Power is interrupted <TEST mode> Lit :FX2N-64CL-M is operating normally Extinguished :FX2N-64CL-M is abnormal Power is interrupted

Name	Description
Status indicator LEDs	<p>ERR.</p> <p><ONLINE mode> Lit :Communication speed setting error occurred EEPROM read error (sum mismatch) occurred Flickering :Power supplied for communication is abnormal DIP switch for operation setting was changed during operation Extinguished :FX2N-64CL-M is operating normally</p> <p><CONFIG mode> Lit :Communication speed setting error occurred EEPROM write error occurred Flickering :Power supplied for communication is abnormal DIP switch for operation setting was changed during operation Extinguished :FX2N-64CL-M is operating normally</p> <p><TEST mode> Lit :Communication speed setting error occurred Flickering :Power supplied for communication is abnormal DIP switch for operation setting was changed during operation Extinguished :FX2N-64CL-M is operating normally</p>
	<p>L RUN</p> <p><ONLINE mode/CONFIG mode> Lit :Data link is executed Extinguished :Data link is stopped</p> <p><TEST mode> Lit :Self-loop back Test was finished normally Extinguished :Self-loop back Test was finished abnormally (Extinguished while the self-loop back Test is executed)</p>
	<p>L ERR.</p> <p><ONLINE mode> Lit :Use station number discrepancy (when BFM#32(20h) to #95(5Fh) is edited, the station numbers are checked.) Outside-control-range station error occurred Flickering :Stations are abnormal Extinguished :Data link is executed normally</p> <p><CONFIG mode> Lit :Use station number discrepancy (When the power is turned ON while a remote module is attached and the following setting is made: number of connected stations varies by editing BFM#32(20h) to #95(5Fh)) Flickering :All stations are abnormal (When power is turned ON while no remote module is attached and then BFM#32(20h) to #95(5Fh) is edited) Extinguished :Data link is executed normally</p> <p><TEST mode> Lit :Self-loop back Test was finished abnormally Extinguished :Self-loop back Test was finished normally (Extinguished while the self-loop back Test is executed)</p>
	<p>SD</p> <p><ONLINE mode/CONFIG mode/TEST mode> Lit: Data is currently being sent</p>
<p>RD</p>	<p><ONLINE mode/CONFIG mode/TEST mode> Lit: Data is currently being received</p>
<p>Interface</p>	<p>Connector for the flat cable dedicated to the CC-Link/LT (24G/DB/DA/+24 V)</p>

Name		Description															
DIP switch for operation setting	1	Communication speed setting <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Communication speed</th> <th>SW1</th> <th>SW2</th> </tr> </thead> <tbody> <tr> <td>156 kbps</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>625 kbps</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>2.5 Mbps</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>Setting disabled</td> <td>ON</td> <td>ON</td> </tr> </tbody> </table>	Communication speed	SW1	SW2	156 kbps	OFF	OFF	625 kbps	ON	OFF	2.5 Mbps	OFF	ON	Setting disabled	ON	ON
	Communication speed		SW1	SW2													
	156 kbps		OFF	OFF													
	625 kbps		ON	OFF													
	2.5 Mbps		OFF	ON													
	Setting disabled	ON	ON														
	B RATE																
	2																
3	16pts/4pts Point mode setting (Select the number of I/O points per station.) OFF:4-point mode (4 input points and 4 output points in each station) ON :16-point mode (16 input points and 16 output points in each station)																
4	--	Setting is disabled. (Make sure that it is OFF during operation.)															
5	--	Setting is disabled. (Make sure that it is OFF during operation.)															
6	CONFIG/ONLINE	CONFIG mode OFF: ONLINE mode (normal operation) ON : CONFIG mode (The information on the connected stations is saved to the EEPROM.)															
7	TEST/ONLINE	TEST mode OFF: ONLINE mode (normal operation) ON : TEST mode (Self-loop back Test)															
8	--	Setting is disabled. (Make sure that it is OFF during operation.)															

- Factory default, DIP switches are set OFF.
- The Test mode is selected when both the CONFIG and TEST modes are set ON simultaneously.
- For each setting, the status at the time of power ON is valid.
(If a setting is changed after the power is set ON, such a change is invalid.)

CONFIGMODE

- Values held in BFM #32 (20h) to #95 (5Fh) that are changed online will cause a L ERR.
- No remote module attached during power ON will result in no L ERR.
- Remote module removed during operation will result in no L ERR.

2. Specifications

This section explains the specifications of the FX_{2N}-64CL-M.



DESIGN PRECAUTIONS

When a remote I/O unit fails, outputs may randomly set ON or OFF, therefore, build an external monitoring circuit that will monitor any input signals that could cause a serious accident.



DESIGN PRECAUTIONS

- Do not bind control and flat cables dedicated to CC-Link/LT together with power cables. Keep control and flat cables dedicated to CC-Link/LT away from major circuits and power cables by 100 mm (3.93") or more. It may cause a malfunction due to noise interference.
- Use the FX_{2N}-64CL-M in such status that any force is not applied on connectors for CC-Link/LT interface and flat cables dedicated to CC-Link/LT. If any force is applied, wire breakage and failure may be caused.



STARTING AND MAINTENANCE PRECAUTIONS

- Do not touch the terminals while the power is ON. It may cause an electric shock or malfunction.
- Shut down all phases of the power supply outside the master block before starting any cleaning procedures. If the power is not disconnected from all sources, the FX_{2N}-64CL-M may fail or malfunction.



STARTING AND MAINTENANCE PRECAUTIONS

- Do not disassemble or modify the FX_{2N}-64CL-M. Doing so may cause failure, malfunction, injury, or fire.
- The case of the FX_{2N}-64CL-M is made of resin. Do not drop or apply strong impacts to the FX_{2N}-64CL-M.



DISPOSAL PRECAUTIONS

- Treat the FX_{2N}-64CL-M as industrial waste when disposing of the product.

2.1 General specifications

Item	Specification				
Operating temperature	0 to 55°C (32 to 131°F)				
Storage temperature	-20 to 70°C (-4 to 158°F)				
Operating humidity	35 to 85%RH (Dew condensation should not be allowed.)				
Vibration resistance	Conforming to EN68-2-6	Direct mounting		Number of sweep times 10 times in each of the X, Y and Z directions (for 80 min)	
		Frequency	Acceleration		Half amplitude
		10 to 57Hz	--		0.075mm
		57 to 150Hz	9.8m/s ²		--
		DIN rail mounting			
		Frequency	Acceleration		Half amplitude
		10 to 57Hz	--		0.035mm
		57 to 150Hz	4.9m/s ²	--	
Shock resistance	In conformance to EN 68-2-27 (147 m/s ² , working time: 11 ms, half sine wave, three times in each of X, Y and Z directions)				
Noise immunity	By noise simulator of noise voltage = 1,000 Vp-p, noise width = 1 μs, rising = 1 ns, cycle = 30 to 100 Hz				
Dielectric withstand voltage	500V AC for 1 min		In conformance to JEM-1021 Between case and PLC grounding terminal		
Isolation resistance	5 MW or more by 500V DC megger				
Operating ambience	Do not use in a corrosive gas, flammable gas or conductive dust environment.				
Grounding	Grounding resistance 100W or less (Common grounding with strong electrical systems.)				

2.2 Network wiring specifications

Item	Specification			Remarks
Communication speed	2.5Mbps	625kbps	156kbps	--
Distance between stations	No restriction			--
Maximum number of modules connected in 1 drop line	8 units			Maximum number of remote I/O units connected per branch in a drop line
Maximum trunk length	35m (114' 9")	100m (328' 1")	500m (1640' 5")	Cable length between terminating resistors
T-branch interval	No restriction			--
Maximum drop length	4m (13' 1")	16m (52' 5")	60m (196' 10")	Cable length per branch
Cumulative drop line length	15m (49' 2")	50m (164' 0")	200m (656' 2")	Sum of all drop lines

2.3 Performance specifications

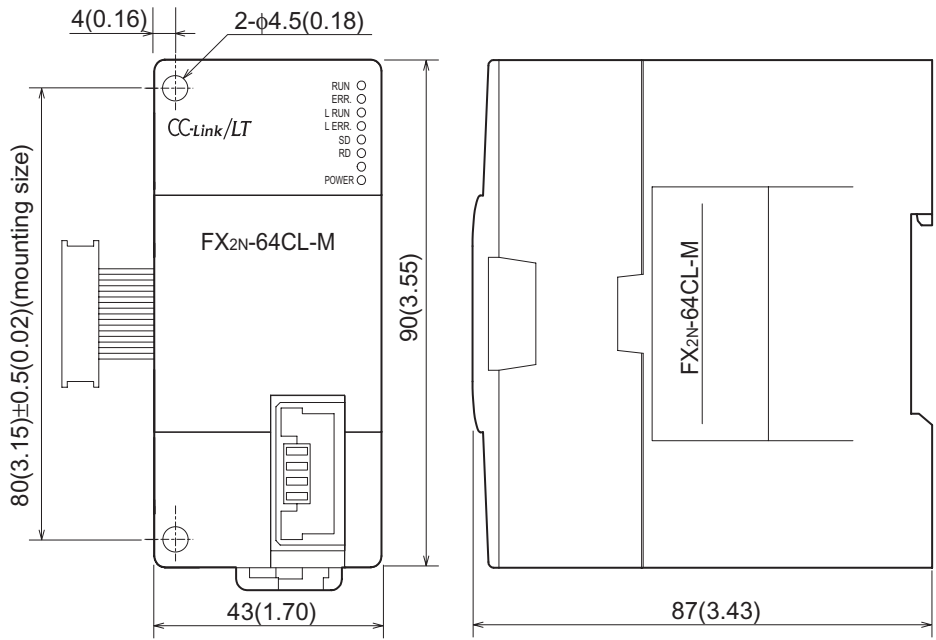
Item		Specification			
Applicable PLC		FX1N/FX2N/FX2NC Series PLC (Section 4.3) (FX2NC-CNV-IF is required when FX2NC Series PLC is connected.)			
Number of connectable master blocks		FX1N Series: Up to 4 *1 FX2N Series: Up to 8 *2 FX2NC Series: Up to 3 *2			
Applicable point mode		4-point mode and 16-point mode (selectable by DIP switch)			
Control specifications	Maximum number of link points	4-point mode	16-point mode		
		Connected to FX1N Series PLC: 128 points Connected to FX2N/FX2NC Series PLC: 256 points (including I/O points in PLC in each case)			
	Number of link points per station () shows the number of link points when composite I/O module is used.		4 points (8 points)	16 points (32 points)	
	Link scan time	32 stations	Points	128 points	256 points
			2.5Mbps	0.7ms	1.0ms
			625kbps	2.2ms	3.8ms
			156kbps	8.0ms	14.1ms
	64 stations	Points	256 points	256 points	
		2.5Mbps	1.2ms	2.0ms	
		625kbps	4.3ms	7.4ms	
156kbps		15.6ms	27.8ms		
Communication specifications	Communication speed		2.5 Mbps, 625 kbps and 156 kbps (selectable by DIP switch)		
	Protocol		BITR method (Broadcastpolling + Interval Timed Response)		
	Network topology		T-branch		
	Error control method		CRC		
	Number of connected stations		64 stations maximum		
	Remote station numbers		1 to 64		
	Master station connection position		Connected at end of trunk line		
	RAS function		Communication error detection, automatic return to system, slave station disconnection and internal loop back diagnosis		
	Connection cable		Dedicated flat cable (0.75 mm ² × 4)		
Number of occupied I/O points		8 points (fixed) + Number of connected remote I/O points			
Current consumption inside 5V DC		190 mA (Supplied by PLC via extension connector)			
24V DC power supply	Voltage	20.4V to 28.8V DC			
	Current consumption	25 mA			
	Initial current	35 mA			
Mass (weight)		0.15 kg (0.33 lbs)			

*1 When connected to an FX1N Series PLC, up to two FX2N-64CL-M can be connected to each of the main and extension units.

*2 The FX2N-64CL-M draws 190mA from the 5V DC source.

The total 5V consumption of all special function blocks connected to a main unit or extension unit must not exceed the 5V source capacity of the system.
(Refer to the Hardware manual of the applicable PLC)

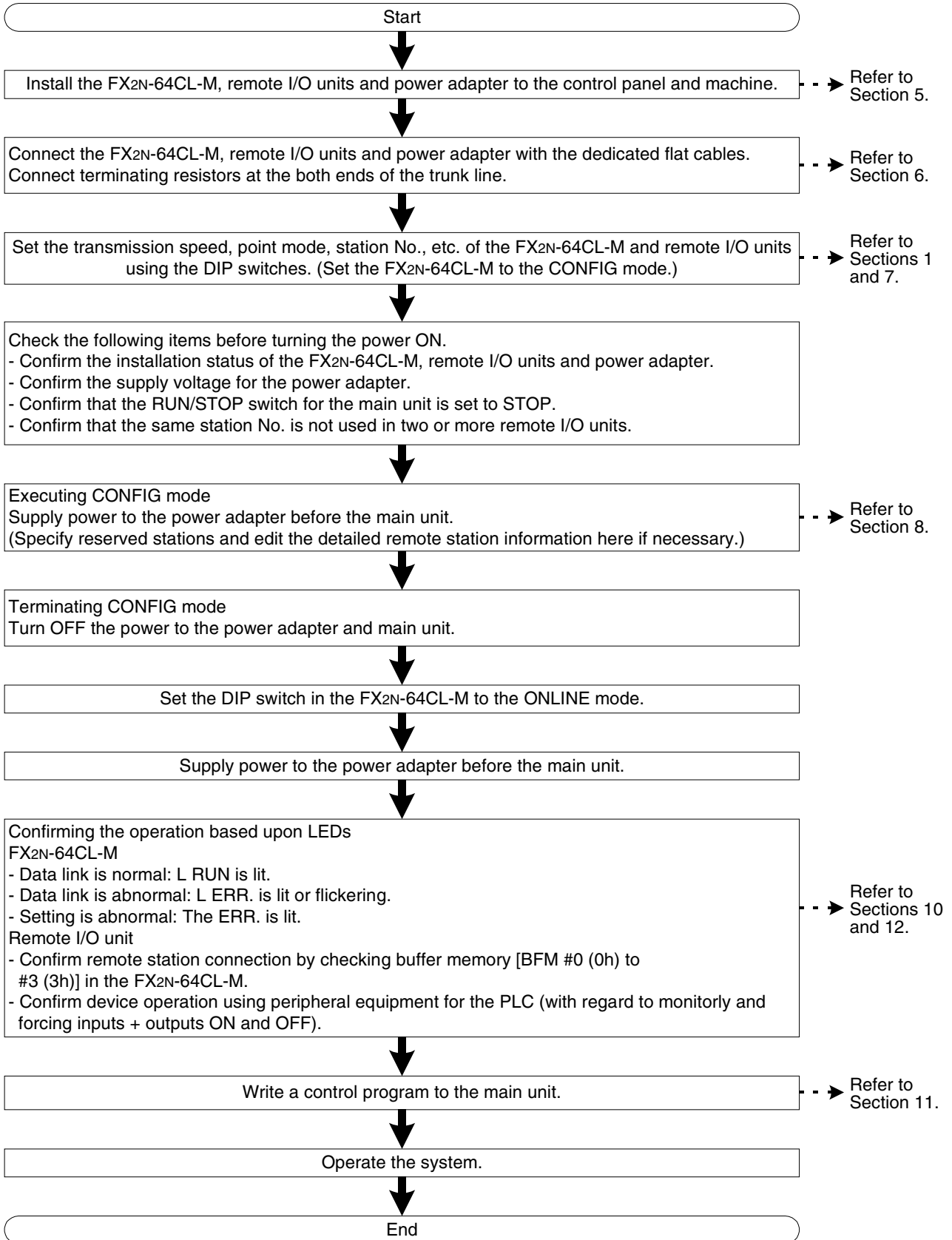
2.4 Outside Dimensions



Unit: mm(inches)

3. System Startup Procedure

Start up the CC-Link/LT system using the following procedure.



MEMO

4. System Configuration

This section explains the CC-Link/LT system configuration.



DESIGN PRECAUTIONS

When a remote I/O unit fails, outputs may randomly turn ON or OFF, therefore, build an external monitoring circuit that will protect from any input signals that could cause a serious accident.

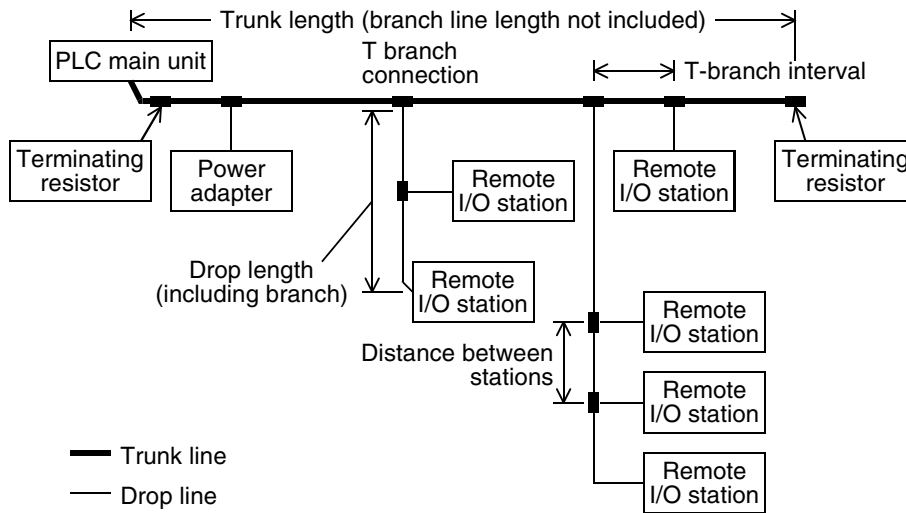


DESIGN PRECAUTIONS

- Do not bind control cables and flat cables dedicated to CC-Link/LT together with power cables.
Keep control cables and flat cables dedicated to CC-Link/LT away from major circuits and power cables by 100 mm (3.93") or more.
It may cause a malfunction due to noise interference.
- Use the FX_{2N}-64CL-M in an environment status that any force is not directly applied on connectors for CC-Link/LT interface and flat cables dedicated to CC-Link/LT.
If any force is applied, wire breakage and failure may occur.

4.1 Total configuration

This paragraph describes the system configuration and cautions for CC-Link/LT.



- Connect the master station, power adapter and remote stations using the flat cables dedicated to CC-Link/LT and the connectors for dedicated flat cables.
- The connection order of remote stations has no relevance to the station No. Even if the station No. of remote stations is not consecutive, no error will occur in the data link.
- In the CC-Link/LT system, terminating resistors should be connected to both ends of the trunk line. Connect the terminating resistor on the FX_{2N}-64CL-M side to a position within 200 mm (7.87") from the FX_{2N}-64CL-M.
- Make sure to lay out the master block on one side of the trunk line.
- Up to 64 remote stations can be connected to one FX_{2N}-64CL-M as far as the condition shown in the table below are satisfied.

Item	Specification			Remarks
	2.5Mbps	625kbps	156kbps	
Communication speed	2.5Mbps	625kbps	156kbps	--
Distance between stations	No restriction			--
Maximum number of modules connected in 1 drop line	8 units			Maximum number of remote I/O units connected per branch in a drop line
Maximum trunk length	35m (114' 9")	100m (328' 1")	500m (1640' 5")	Cable length between terminating resistors (excluding drop line length)
T-branch interval	No restriction			--
Maximum drop length	4m (13' 1")	16m (52' 5")	60m (196' 10")	Cable length per branch
Cumulative drop line length	15m (49' 2")	50m (164' 0")	200m (656' 2")	Sum of all drop lines

- Equipment for CC-Link cannot be connected to the CC-Link/LT system. On the contrary, equipment for CC-Link/LT cannot be connected to the CC-Link system.
- Refer to the respective instruction manuals when installing the power adapter or remote I/O units.
- Refer to the homepage of the CC-Link Partner Association (CLPA) "<http://www.cc-link.org/>" for details concerning flat cabling, terminating resistors and connector for CC-Link/LT.

4.2 PLC connection

This paragraph explains which PLC series are connectable with the FX_{2N}-64CL-M and cautions on the number of connectable FX_{2N}-64CL-M.

4.2.1 Applicable PLC and number of connectable FX_{2N}-64CL-M

Applicable PLC	FX1N/FX2N/FX2NC Series PLC (FX2NC-CNV-IF is required when FX2NC Series PLC is connected.)
Number of connectable master blocks	FX1N Series: Up to 4 FX2N Series: Up to 8 FX2NC Series: Up to 3

- Connect the FX_{2N}-64CL-M to the right side of the PLC using an extension cable.
- The number of occupied I/O points is "8 (either input or output) points + Number of connected remote I/O points".
The total number of I/O points including extended points must not exceed 128 points for the FX_{1N} Series or 256 points for the FX_{2N} or FX_{2NC} Series.
- The FX_{2N}-64CL-M consumes 190 mA at 5V DC.
The total current consumption at 5V for special blocks connected to the PLC must not exceed the 5 V power capacity of the main and extension units.
When connecting to the FX_{1N} Series PLC, a maximum of two FX_{2N}-64CL-M can be connected to each of the main and extension units.

4.3 Power adapters installation concept

At least one power adapter is required per CC-Link/LT system.

When constructing a system using only one power adapter, the following three conditions should be satisfied:

- 1) Total current consumption of remote I/O units, I/O equipment and master unit receiving power from power adapter ≤ 5 A
- 2) To operate the system in a stable environment, the voltage drop should be equivalent to or less than 3.6V.
- 3) Because the minimum operating voltage of each remote I/O unit connected to the power adapter is 20.4 V, therefore, Supply voltage to power adapter - Voltage drop ≥ 20.4 V

If the total current consumption or voltage drop is large, the power adapter position should be changed or additional power adapters should be installed.

For further details, refer to the "CL1PAD1 (Power Adapter) USER'S MANUAL (Detailed Volume)" offered separately.

4.4 Power adapter installation condition

For further details on power adapter installation conditions, refer to the "CL1PAD1 (Power Adapter) USER'S MANUAL (Detailed Volume)" offered separately.

The conditions for installing power adapters to the CC-Link/LT system depend on connected equipment and wiring length.

MEMO

5. Handling Cautions



INSTALLATION PRECAUTIONS

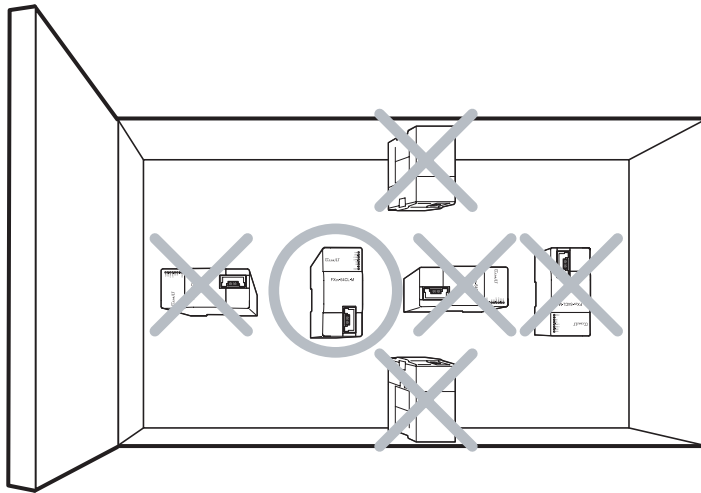
- Use the FX_{2N}-64CL-M in an environment with the general specifications described in this manual.
If the FX_{2N}-64CL-M is used in any other environment, thus, electrical shock, fire, malfunction, product damage or product deterioration may occur.
- Do not directly touch the conductive area of the FX_{2N}-64CL-M, otherwise, the FX_{2N}-64CL-M may malfunction or fail.
- Shut down all power supplies before attaching/removing the FX_{2N}-64CL-M to/from the panel, otherwise, the FX_{2N}-64CL-M may fail or malfunction.
- Securely fix the FX_{2N}-64CL-M with DIN rail or mounting screws. When using mounting screws, securely tighten them within the specified torque range.
If the screws are too loose, the module may detach from its installed position, short circuit, or malfunction. If the screws are too tight, the screws may be damaged, which may cause the module to detach from its installed position or short circuit.
- Install the FX_{2N}-64CL-M on to a flat surface.
If the installation surface is not flat, an excessive force may be applied on the PCBs, leading to nonconformity.

5.1 Installation

The FX2N-64CL-M can be attached via DIN rail or attached directly with screws.
The installation procedure in each case is described below.

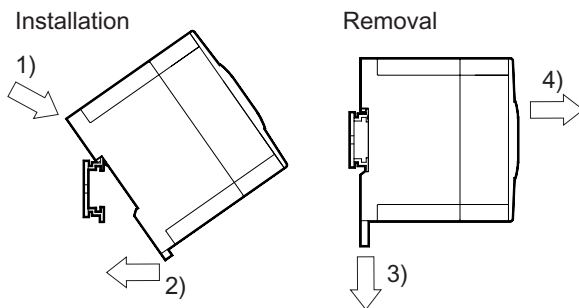
5.1.1 Installation direction

- Do not install the master block on floor surfaces, ceiling surfaces or in a horizontal direction. If the master block is installed in such a way, its temperature may rise. Install the master block vertically on wall surfaces as shown in the figure below.
- Secure a space of 50 mm (1.96") or more between the master block and other equipment or structures. Keep the master block off high voltage cables, high voltage equipment and power equipment as much as possible.



5.1.2 DIN rail installation

Align the upper DIN rail installation groove in the module with the DIN rail 1), and press the module in that position 2).
When removing the module, pull the installation hook downwards 3), then remove the module 4).



Applicable DIN rail	TH35-7.5Fe and TH35-7.5Al (conforming to JIS C2812)
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5.1.3 Direct installation

Fix the FX2N-64CL-M on to the panel surface by tightening M4 screws inserted in two (upper and lower) mounting holes provided on the master block.
Install the FX2N-64CL-M and other units so that a clearance of 1 to 2 mm is assured among each unit.

Applicable screw	M4 height: 16mm(0.63") or more (Tightening torque range: 78 to 108 N-cm)
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6. Connection of Cables, Connectors and Terminating Resistors

Connect the master station, power adapter and remote stations with flat cables dedicated to CC-Link/LT and connectors for dedicated flat cables.

Lay out the master block on one side of the trunk line.



WIRING PRECAUTIONS

- Shut down all power supplies before starting installation or wiring work.
If the power is not disconnected from all sources an electric shock or serious product damage may occur.



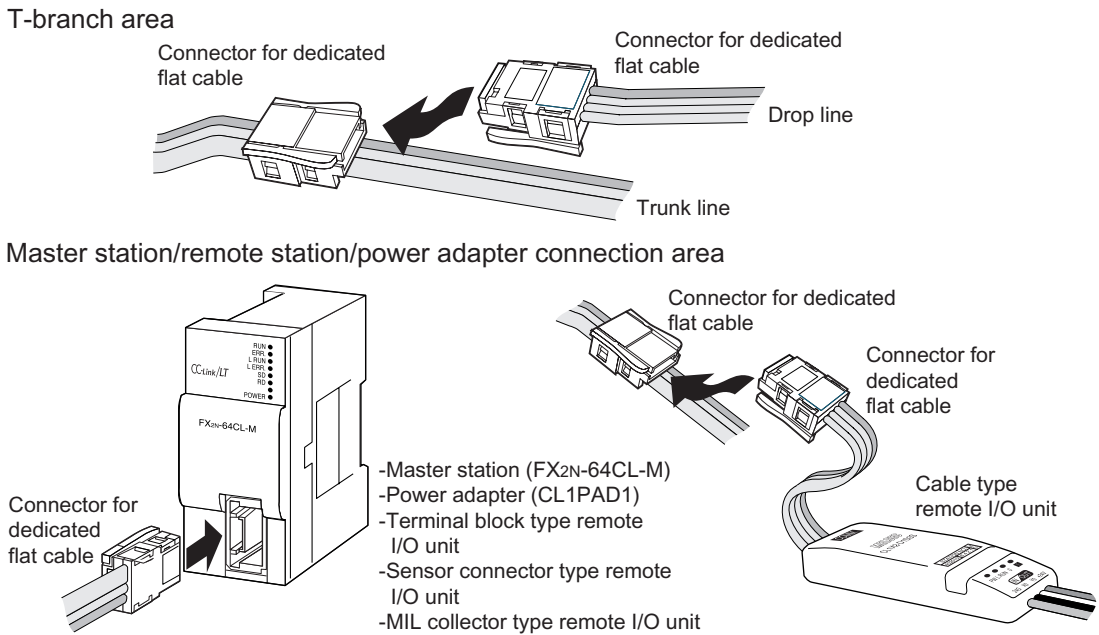
WIRING PRECAUTIONS

- Correctly wire the master block while confirming the rated voltage and terminal arrangement of the FX_{2N}-64CL-M.
If a power supply different from the rated supply is connected or wiring is performed incorrectly, fire or failure may be caused.
- Correctly wire the master block while confirming the rated voltage and terminal arrangement of the FX_{2N}-64CL-M.
If a power supply different from the rated supply is connected or wiring is performed incorrectly, fire or failure may occur.
- Pay attention to foreign objects such as cuttings or wiring chips do not enter the FX_{2N}-64CL-M, otherwise, fire, product failure or malfunction may occur.

6.1 Connection of units using flat cables dedicated to CC-Link/LT

This paragraph explains the connection method using flat cables dedicated to CC-Link/LT.

- 1) The connection order of dedicated flat cables has no relevance to the station No.
- 2) Lay out the FX2N-64CL-M at either end of the trunk line.
Connect a terminating resistor on the FX2N-64CL-M side in a position that is within 20 cm from the FX2N-64CL-M.
- 3) Make sure to connect a terminating resistor to each end of the trunk line the CC-Link/LT.
Connect T-branches and remote I/O units using the connectors for dedicated flat cable.

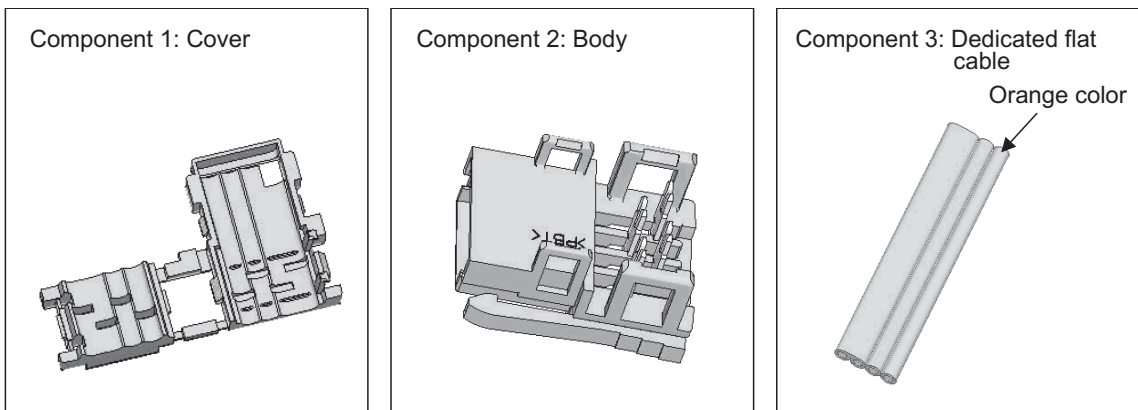


6.2 How to attach connectors used for dedicated flat cable

This paragraph explains how to attach connectors used for the dedicated flat cable.

- 1) Components

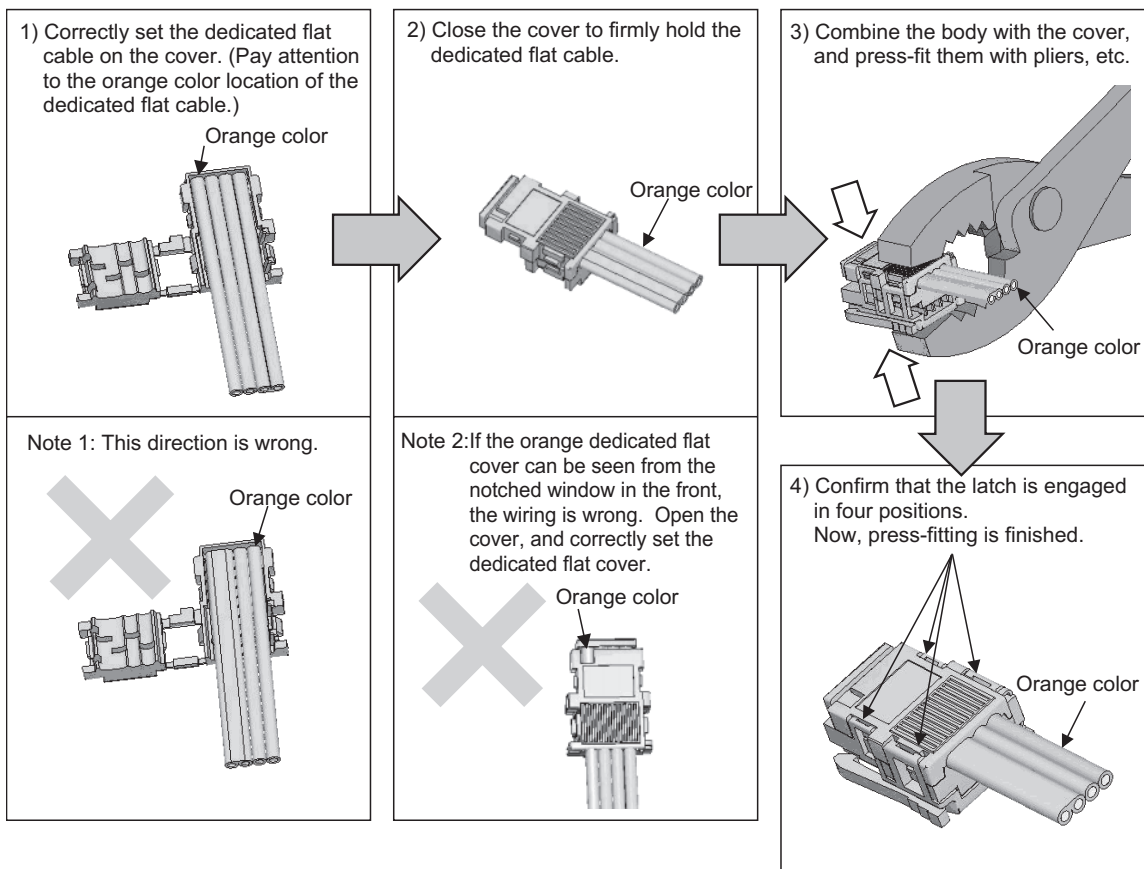
The components are as shown below.



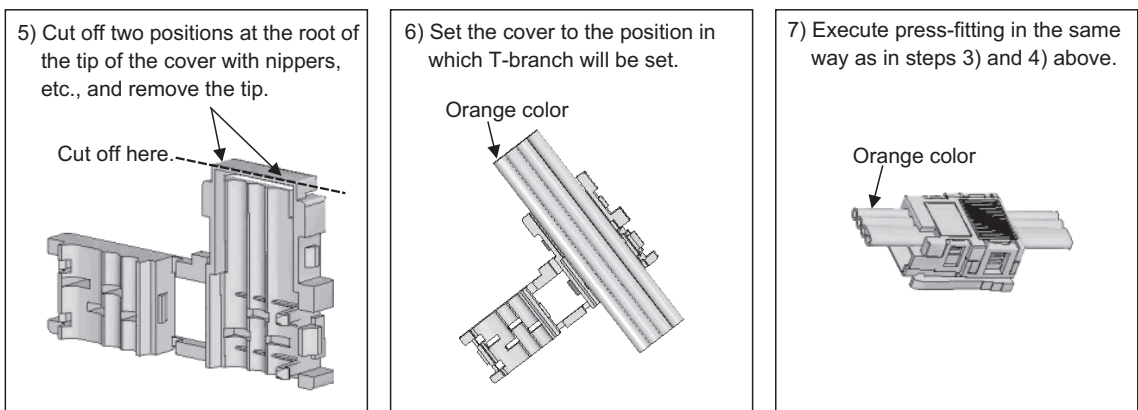
2) Attachment procedure

The procedure is shown below.

a) Terminal processing procedure



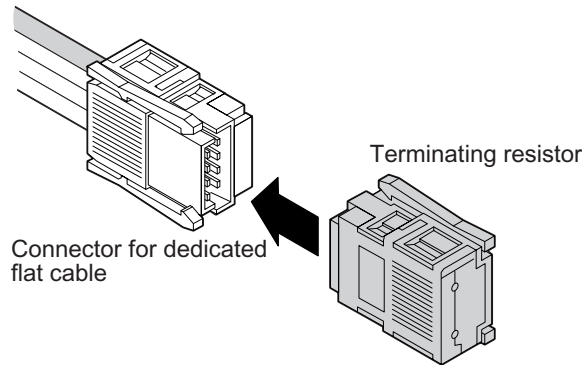
b) T-branch processing procedure



6.2.1 How to attach terminating resistor

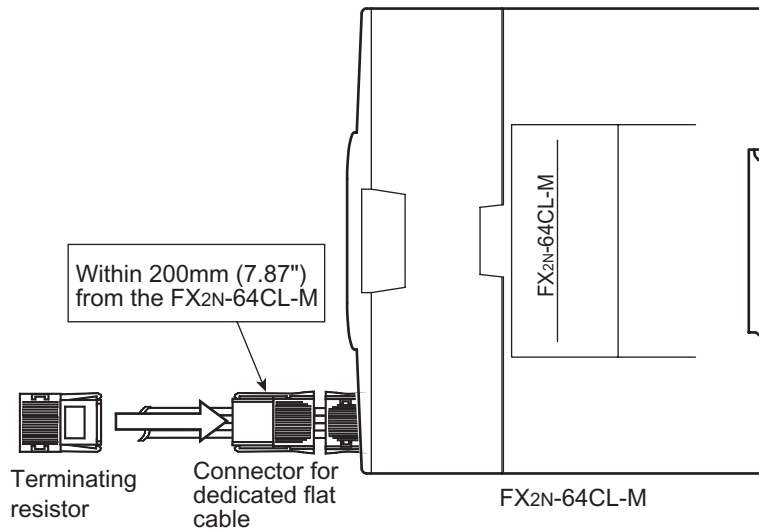
This paragraph explains how to attach terminating resistors to either end of the CC-Link/LT system.

Attach terminating resistors to the connectors placed to flat cables dedicated to CC-Link/LT.



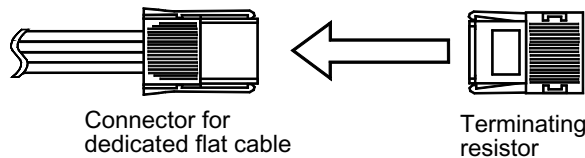
1) How to attach a terminating resistor on the FX_{2N}-64CL-M side

The method to attach a terminating resistor on the FX_{2N}-64CL-M side is shown below. Connect a terminating resistor in a position within 200mm (7.87") from the FX_{2N}-64CL-M.



2) How to attach a terminating resistor on the trunk line side

The method to attach a terminating resistor on the opposite side of the FX_{2N}-64CL-M is shown below.

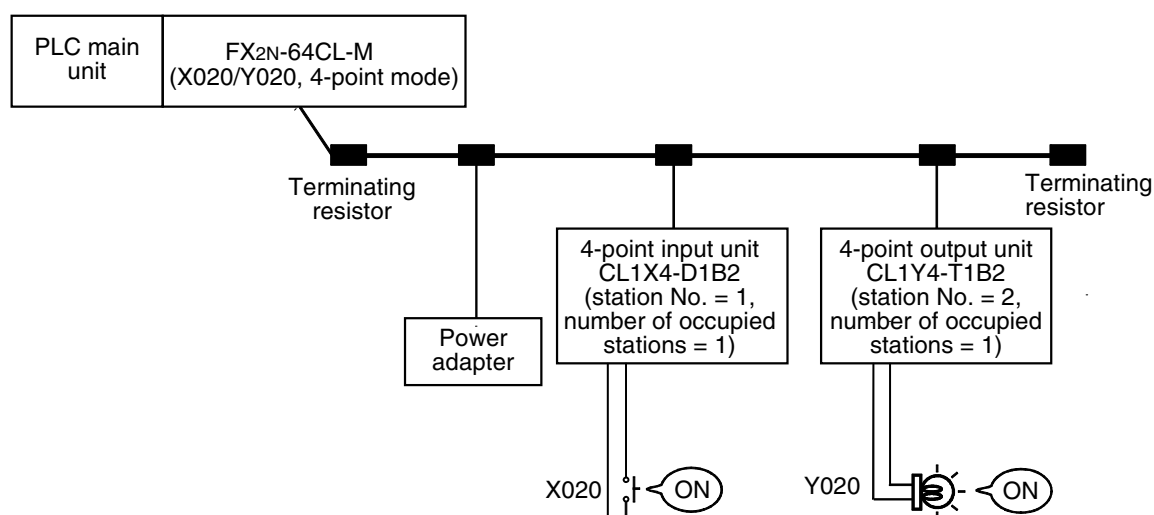


6.2.2 Wiring check

Confirm the wiring between remote I/O units and external equipment.

Example of wiring check

The figure below shows an example in which the head I/O No. in the FX₂N-64CL-M is X020/Y020 and 4-point mode is selected.



Operating procedure

- 1) Connect the FX₂N-64CL-M, power adapter and remote I/O units using the dedicated cables. Set the transmission speed, point mode, station No., etc. using the DIP switches in the FX₂N-64CL-M and remote I/O units. At this time, select the CONFIG mode in the FX₂N-64CL-M (by setting bit 6 ON and setting bit 7 OFF).
- 2) Supply power to the power adapter before the PLC unit.
- 3) When the acquisition of remote I/O unit information is completed in the CONFIG mode (that is, when b4 of the BFM #28 (1Ch) turns ON), turn the power OFF.
- 4) Set the FX₂N-64CL-M to ONLINE mode (by setting bit 6 OFF and bit 7 OFF). Supply power to the power adapter before the FX₂N-64CL-M. Then, execute step a) or b) below.
 - a) Checking the wiring between the input unit and external equipment
 - Turn ON the switch corresponding to "X020" of the external equipment connected to the input unit with station No. is 1.
 - Monitor X020 from peripheral equipment.
 - If X020 is ON, connection between the input unit and external equipment is normal.
 - b) Check the wiring between the output unit and external equipment
 - Turn Y020 ON/OFF from peripheral equipment using the forced ON/OFF operation.
 - If the connection between the output unit and external equipment is normal, a lamp corresponding to "Y020" in the external equipment will light.

MEMO

7. Various Modes

The FX_{2N}-64CL-M has ONLINE, CONFIG and TEST modes.
Each mode can be selected using the appropriate DIP switch.
(Turn OFF the power to the PLC before setting the DIP switches.)

7.1 ONLINE mode (DIP switch bit 6 = OFF, bit 7 = OFF)

In ONLINE mode, the FX_{2N}-64CL-M will execute the data link in the CC-Link/LT system.
Select this mode for normal use.

7.2 CONFIG mode (DIP switch bit 6 = ON, bit 7 = OFF)

In CONFIG mode, the FX_{2N}-64CL-M assigns the station No. and I/O Nos. for remote stations.
The FX_{2N}-64CL-M acquires the information (I/O type and number of points) on the connected remote stations, then stores it to the buffer memory [BFM #32 (20h) to #95 (5Fh)] and built-in memory (EEPROM).

After constructing the CC-Link/LT system, execute the CONFIG mode to automatically assign the I/O Nos.

(After constructing the CC-Link/LT system, assign the I/O Nos. by executing the CONFIG mode.)

If remote stations are to be extended in the future, the I/O Nos. can be assigned while skipping some I/O Nos.

For the details of assignment of the I/O Nos., refer to "8. Assignment of I/O Nos."

7.3 TEST mode (self-loop-back test) (DIP switch bit 6 = OFF, bit 7 = ON)

In TEST mode (for the self-loop-back test), the FX_{2N}-64CL-M checks whether it is fully functional by receiving data sent by itself.

In this test, it is not necessary to connect remote stations.

(Connect the FX_{2N}-64CL-M to the power adapter, then turn ON the communication power.)

For details on the self-loop-back test, refer to "12.4 Self-loop-back test".

- When the FX_{2N}-64CL-M is set to the TEST mode while it is connected to a FX_{1N} Series PLC, the PLC is stopped.
(The self-loop-back test will be executed normally, and the test result will be indicated by the status indicator LEDs.)

MEMO

8. Assignment of I/O Nos.

The FX_{2N}-64CL-M assigns I/O information for remote I/O units to devices X (input) and Y (output) in the PLC.

The I/O Nos. are assigned in CONFIG mode.

At this time, the I/O Nos. are assigned in octal serial Nos. following the I/O No. occupied by the PLC while eight points are handled as one block.

(For further details, refer to "8.2 Example of I/O No. assignment")

For a station No. to which a remote I/O unit will be connected to in the future, the I/O No. can be secured by "specifying it as a reserved station" and "editing the detailed remote station information on it".

8.1 Relationship between I/O No. and point mode

The I/O No. is equivalent between the 4-point mode and 16-point mode, but the station No. of each remote station is different between 4-point mode and 16-point mode.

When using remote I/O units of more than 4 I/O points, more I/O points can be used if the 16-point mode is selected due to the restriction in the number of connected stations (64 stations maximum).

Example: When sixty-three CL1XY2-DT1D5S units (cable type remote unit having 1 input point and 1 output point) (station No.: 1 to 63) and one CL2X8-D1B2 unit (terminal block type remote I/O unit having 8 input points) are to be connected to the FX_{2N}-16MR, a system can be constructed in the 16-point mode, but cannot be constructed in the 4-point mode due to the CL2X8-D1B2 unit occupying two stations and the number of remote stations exceeds 64.

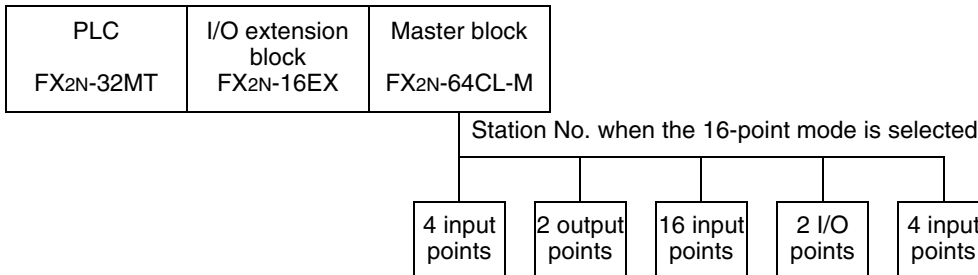
However, if the number of stations is equivalent, the link scan time is longer in the 16-point mode than in the 4-point mode.

(For further details of the link scan, refer to "9. Data Link Processing Time".)

- 1) When connecting all remote I/O units and assigning their I/O Nos., refer to "8.3 Automatic I/O No. assignment".
 - 2) When assigning the I/O Nos. without connecting remote I/O units and preparing a sequence program or connecting additional remote I/O units in the future, refer to "8.3 Automatic I/O No. assignment" and "8.4 Specification of reserved station" and "8.5 Edition of detailed remote station information".
- In CONFIG mode, the FX_{2N}-64CL-M does not occupy I/O points for remote stations. (It occupies only 8 points as a special block.)
I/O extension blocks/units of the PLC connected after the FX_{2N}-64CL-M do not operate.

8.2 Example of I/O No. assignment

This paragraph describes I/O No. assignment in the configuration example shown below.



When the FX2N-64CL-M is set to the CONFIG mode and the PLC is powered ON, the FX2N-64CL-M checks for connected remote stations, and assigns the I/O No. to each remote station. Though the I/O No. is equivalent between the 4-point mode and 16-point mode, the station No. of each remote station is different between the 4-point mode and 16-point mode.

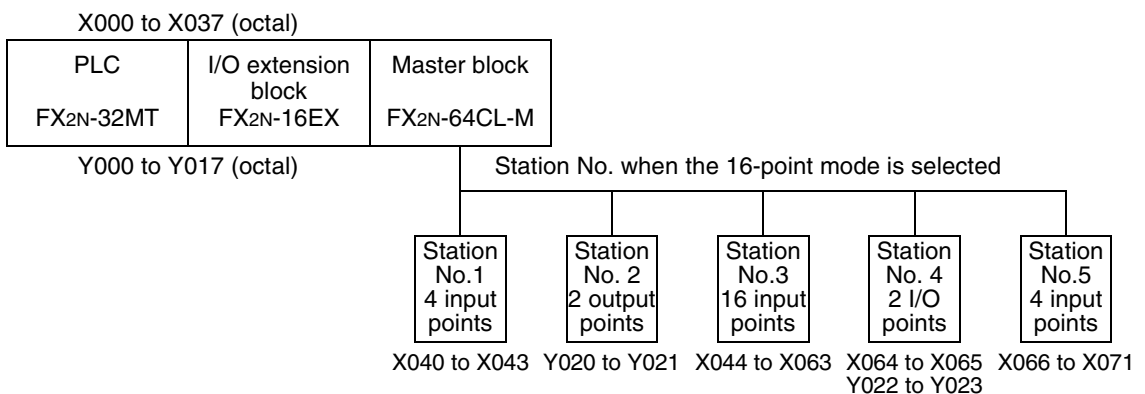
In the configuration example above, the link scan time is longer in the 16-point mode than in the 4-point mode.

(For the details of the link scan, refer to "9. Data Link Processing Time".)

Station No.		Number of points	I/O assignment (X)	I/O assignment (Y)
4-point mode	16-point mode			
Station No.1	Station No.1	4 input points	X040 to X043	--
Station No.2	Station No.2	2 output points	--	Y020 to Y021
Station No.3	Station No.3	16 input points	X044 to X063	--
Station No.7	Station No.4	2 input points/ 2 output points	X064 to X065	Y022 to Y023
Station No.8	Station No.5	4 input points	X066 to X071	--
Unused I/O*1			X072 to X077	Y024 to Y027

*1 With regard to X and Y, 8 points are occupied as 1 block. As a result, if the number of I/O points occupied by a station is a number which cannot be divided by "8", unused Nos. are generated.

In the configuration example above, the I/O Nos. are assigned as shown below.



8.3 Automatic I/O No. assignment

The I/O Nos. can be assigned automatically in the CONFIG mode.
Parameter settings and sequence programs are not necessary for this assignment.

8.3.1 Automatic I/O No. assignment procedure

Execute the steps 1) to 3) below to automatically assign the I/O Nos.

- 1) Connect each remote I/O unit to the FX_{2N}-64CL-M. In the FX_{2N}-64CL-M, set bit 6 of the DIP switch to ON, and set bit 7 (to select the CONFIG mode) to OFF. Power up, first, the power adapter, then, the PLC.
The FX_{2N}-64CL-M acquires the information (I/O type and number of points) on connected remote stations, and stores it to the buffer memory [BFM #32 (20h) to #95 (5Fh)] and built-in memory (EEPROM).
- 2) Confirm that the contents of the buffer memory [BFM #32 (20h) to #95 (5Fh)] are consistent with the actual system configuration.
- 3) Set bit 6 of the DIP switch in the FX_{2N}-64CL-M to OFF. Reset the power to the PLC.
The FX_{2N}-64CL-M reads the information on connected remote stations from the built-in memory (EEPROM), and assigns the I/O No.

8.4 Specification of reserved station

The FX_{2N}-64CL-M assigns the I/O No. in the CONFIG mode. If remote stations will be added in the future, temporary I/O Nos. can be assigned (specification of reserved stations).
By this function, even if remote stations are added, it is not necessary to change the I/O Nos. assigned to other remote stations and extension blocks/units connected to the PLC.
If remote stations are connected in places for reserved station, the connected remote stations can operate with the existing setting, but errors such as wire breakage cannot be detected.
After connecting remote additional stations, execute automatic I/O No. assignment in the CONFIG mode again. The system will update the detailed remote station information, and the new remote stations will be able to be used normally (errors will be detected).

8.4.1 Reserved station setting method

Set reserved stations using the steps 1) to 4) below.

- 1) Set the FX_{2N}-64CL-M to the CONFIG Mode (by setting bit 6 of the DIP switch to ON and setting bit 7 to OFF). Power up the FX_{2N}-64CL-M.
(The FX_{2N}-64CL-M will assign the I/O Nos.)
- 2) Write the information (station type and number of I/O points) for the station to be added in the detailed remote station information buffers [BFM #32 (20h) to #95 (5Fh)]. Set the reserved station flag (bit 15) to ON in the appropriate BFM.
(If the bit for reserved station is set to OFF, errors such as wire breakage are detected while a remote station is not connected.)
- 3) Give the instruction to write to the EEPROM [by setting from OFF to ON b4 of the BFM #27 (1Bh)].
- 4) After setting reserved stations, confirm that write to the EEPROM is completed by checking b4 of the BFM #28 (1Ch). Then, set the power of the FX_{2N}-64CL-M ON using the normal procedure (setting the bit 6 of the DIP switch to OFF), and confirm that the detailed remote station information [BFM #32 (20h) to #95 (5Fh)] is updated.

Buffer memory No.	Description
BFM #32(20h)	Remote station information area for the station No.1
BFM #33(21h)	Remote station information area for the station No.2
⋮	⋮
BFM #95(5Fh)	Remote station information area for the station No.64

Configuration of detailed remote station information

Bit	Function	1(ON)	0(OFF)
b0	Number of I/O points	00001:1point	00101:5points
b1		01101:13points	00010:2points
b2		01010:10points	01110:14points
b3		00111:7points	01011:11points
b4		00100:4points	01000:8points
		10000:16points	
		The bits above are in the order "b4, b3, b2, b1, b0".	
b5 to b7	(Setting prohibited)	Set these bits to 0.	
b8	Input flag	Input is given.	Input is not given.
b9	Output flag	Output is given.	Output is not given.
b10	(Setting prohibited)	Set these bits to 0.	
b11	Head station flag	This is the head station.	This is not the head station.
b12	Input filter setting	High-speed input	General-purpose input
b13	Output hold/clear setting	HOLD	CLEAR
b14	(Setting prohibited)	Set these bits to 0.	
b15	Reserved station flag	This is specified as reserved station.	This is not specified as reserved station.

8.5 Editing the detailed remote station information

After assigning the I/O Nos. in the CONFIG mode, the I/O No. assignment in each station No. can be edited.

With this function, the number of I/O points can be changed, and the I/O Nos. can be assigned to unconnected station Nos. for future use. If remote stations are added in the future, it is not necessary to change the I/O Nos. in other remote stations and extension blocks/units connected to the PLC.

If a remote station is not connected to an edited station No., errors such as wire breakage error will occur.

If a remote station is connected to an edited station No. the remote station will operate with the existing setting.

8.5.1 How to edit detailed remote station information

Edit the detailed remote station information using the steps 1) to 4) below.

- 1) Set the FX_{2N}-64CL-M to the CONFIG Mode (by setting bit 6 of the DIP switch to ON and setting bit 7 to OFF). Set the power of the FX_{2N}-64CL-M to ON.
(The FX_{2N}-64CL-M will assign the I/O Nos.)
- 2) Write the information (station type and number of I/O points) for the station to be added in the detailed remote station information buffers [BFM #32 (20h) to #95 (5Fh)]. Set the reserved station flag (bit 15) to OFF in the appropriate BFM.
(If the bit for reserved station is set to ON, the station is regarded as a reserved one, and errors such as wire breakage error cannot be detected.)
- 3) To the detailed remote station information on every remote station to be edited, write the information on the remote station. Then, give the instruction for write to the EEPROM [by setting b4 of the BFM #27 (1Bh) from OFF to ON].
- 4) After editing the remote station information, confirm that write to the EEPROM is completed by checking b4 of the BFM #28 (1Ch). Then, set the power of the FX_{2N}-64CL-M to ON using the normal procedure (by setting bit 6 of the DIP switch to OFF), and confirm that the detailed remote station information [BFM #32 (20h) to BFM #95 (5Fh)] is updated.

Buffer memory No.	Description
BFM #32(20h)	Remote station information area for the station No.1
BFM #33(21h)	Remote station information area for the station No.2
⋮	⋮
BFM #95(5Fh)	Remote station information area for the station No.64

Configuration of detailed remote station information

Bit	Function	1(ON)		0(OFF)
b0	Number of I/O points	00001:1point	00101:5points	01001: 9points
b1		01101:13points	00010:2points	00110:6points
b2		01010:10points	01110:14points	00011:3points
b3		00111:7points	01011:11points	01111:15points
b4		00100:4points	01000:8points	01100:12points
		10000:16points The bits above are in the order "b4, b3, b2, b1, b0".		
b5 to b7	(Setting prohibited)	Set these bits to 0.		
b8	Input flag	Input is given.	Input is not given.	
b9	Output flag	Output is given.	Output is not given.	
b10	(Setting prohibited)	Set these bits to 0.		
b11	Head station flag	This is the head station.	This is not the head station.	
b12	Input filter setting	High-speed input	General-purpose input	
b13	Output hold/clear setting	HOLD	CLEAR	
b14	(Setting prohibited)	Set these bits to 0.		
b15	Reserved station flag	This is specified as reserved station.	This is not specified as reserved station.	

9. Data Link Processing Time

This section explains the link scan time and transmission delay time.

9.1 Link scan time

This paragraph explains the link scan time for the CC-Link/LT network.

9.1.1 Link scan time calculation formula

$$\text{Link scan time} = a + (b \times N) \times c \text{ [\mu s]}$$

a: Constant (depends on the transmission speed)

Transmission speed	2.5Mbps	625kbps	156kbps
Value a	22	88	353

b: Constant (depends on the transmission speed and point mode)

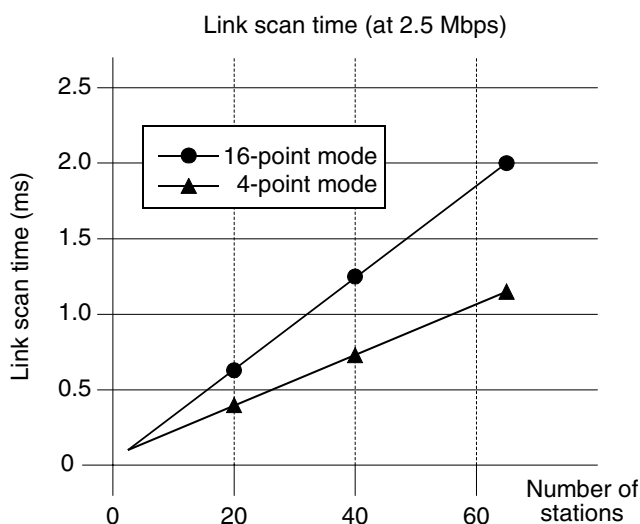
Transmission speed		2.5Mbps	625kbps	156kbps
Value b	4-point mode	46	41	37
	16-point mode	76	71	67

c: Constant (depends on the transmission speed)

Transmission speed	2.5Mbps	625kbps	156kbps
Value c	0.4	1.6	6.4

N: Final station No.

As shown in the formula above, if the number of stations is held constant, the link scan time is shorter in the 4-point mode than in the 16-point mode.



9.1.2 Transmission delay time

The transmission delay time (the time until data is received) (including the time for communication between the main unit and FX2N-64CL-M) can be calculated by the following formula.

1) Master station ← Remote station (input)

Time until a device (X) in the main unit turns ON or OFF after a signal is input to the remote station

Calculation formula

$$SM \times 2 + (2 - n)^{*1} \times LS + \text{Remote station input response time [ms]}$$

SM: Scan time of master station PLC

LS: Link scan time

n: SM/LS (whose decimals are omitted)

*1: 0 if the value "2-n" is 0 or less

Example:

The scan time of the master station PLC is 5 ms, the link scan time is 1.2 ms, and the input response time of the remote I/O station is 1.5 ms

$$\begin{aligned} & SM \times 2 + (2 - n)^{*1} \times LS + \text{Remote station input response time [ms]} \\ & = 5 \times 2 + (2 - 4) \times 1.2 + 1.5 \quad [n = 4 \text{ (} 5/1.2 = 4.16\dots, \text{ then decimals are omitted)}] \\ & = 11.5 \text{ [ms]} \end{aligned}$$

2) Master station → Remote station (output)

Time until an output in the remote station turns ON or OFF after a device (Y) in the main unit is set to ON or OFF

Calculation formula

$$SM + LS \times 2 + \text{Remote station output response time [ms]}$$

SM: Scan time of master station PLC

LS: Link scan time

Example:

The scan time of the master station PLC is 5 ms, the link scan time is 1.2 ms, and the output response time of the remote I/O station is 0.5 ms

$$\begin{aligned} & SM + LS \times 2 + \text{Remote station output response time [ms]} \\ & = 5 + 1.2 \times 2 + 0.5 \\ & = 7.9 \text{ [ms]} \end{aligned}$$

10. Assignment of Buffer Memory

Data transfer between the PLC main unit and FX_{2N}-64CL-M is executed by a program in the PLC.

Use the FROM instruction to read data saved in the FX_{2N}-64CL-M to the main unit.

The FROM instruction reads the data saved in the buffer memory (BFM) in the FX_{2N}-64CL-M to devices (such as D and M) in the main unit.

Use the TO instruction to write data from the main unit to the FX_{2N}-64CL-M.

The TO instruction writes data from devices (such as D and M) in the main unit to the buffer memory (BFM) in the FX_{2N}-64CL-M.

10.1 Buffer memory list

Buffer memory No.		Name	Description	R: Read W: Write
DEC	HEX			
0 to 3	0h to 3h	Remote station connection information	Stores the connection status of each remote station. (When a remote station is connected, a corresponding bit is ON.)	R
4 to 7	4h to 7h	Link error station information	Stores the data link status of each remote station.	R
8 to 11	8h to Bh	Remote I/O error information	Stores the I/O error occurrence status of each remote station. For the contents of error, refer to the instruction manual of each remote station.	R
12 to 15	Ch to Fh	(Prohibited to use)	--	--
16 to 19	10h to 13h	Reserved station information	Stores the reserved station setting status.	R
20	14h	Number of required input blocks	Stores the number of input blocks (in the unit of 8 points) required to assign the I/O Nos.	R
21	15h	Number of required of output blocks	Stores the number of output blocks (in the unit of 8 points) required to assign the I/O Nos.	R
22	16h	Data link final station information	Stores the final station No. available in the data link. (This information is set according to the station information stored in the EEPROM.)	R
23 to 25	17h to 19h	(Prohibited to use)	--	--
26	1Ah	External switch information	Stores the DIP switch setting status.	R
27	1Bh	Command	Gives instructions to the FX _{2N} -64CL-M for stopping or starting up again the data link and writing data to the EEPROM.	R/W
28	1Ch	Status information	Stores the status information such as RUN and data link.	R
29	1Dh	Detailed error information	Stores the detailed information on errors detected by the FX _{2N} -64CL-M.	R
30	1Eh	Model code	K7120	R
31	1Fh	(Prohibited to use)	--	--
32	20h	Detailed remote station information (station No.1)	Stores the information (I/O type and number of points) on the remote station No.1. The information can be edited in the CONFIG mode.	R/W*1
⋮	⋮	⋮	⋮	⋮
95	5Fh	Detailed remote station information (station No.64)	Stores the information (I/O type and number of points) on the remote station No.64. The information can be edited in the CONFIG mode.	R/W*1

*1 "W" is enabled only in the CONFIG mode.

10.2 Details of buffer memory

10.2.1 Remote station connection information [BFM #0 (0h) to #3 (3h)]

The connection status of remote stations connected in the system are stored in BFM #0 to BFM #3 (bits for connected stations are ON).

Once a bit for a remote station turns ON, it remains ON even if communication error occurs in the remote station due to wire breakage, etc (this information cannot be used to confirm the communication).

The station No. of each remote station is assigned to each bit of the buffer memory [BFM #0 (0h) to #3 (3h)]. Connection/disconnection is indicated by the 0 (OFF)/1 (ON) status of each bit.

0 (OFF): Corresponding remote station is not connected.

1 (ON): Corresponding remote station is connected.

Buffer memory No.	Bit						
	b15	b14	b13	...	b2	b1	b0
BFM #0 (0h)	Station No.16	Station No.15	Station No.14	...	Station No.3	Station No.2	Station No.1
BFM #1 (1h)	Station No.32	Station No.31	Station No.30	...	Station No.19	Station No.18	Station No.17
BFM #2 (2h)	Station No.48	Station No.47	Station No.46	...	Station No.35	Station No.34	Station No.33
BFM #3 (3h)	Station No.64	Station No.63	Station No.62	...	Station No.51	Station No.50	Station No.49

10.2.2 Link error station information [BFM #4 (4h) to #7 (7h)]

The data link status of remote stations is stored here (bits for stations having link error are ON).

Among remote stations whose I/O Nos. are written in the EEPROM (e.g. remote stations connected in the CONFIG mode or remote stations whose information is written by editing of the detailed remote station information), remote stations with which communication is disabled are regarded as data link error stations, and corresponding bits are set to ON. When communication with a remote station is restored, the ON status is cleared.

However, unused stations and reserved stations are not regarded as data link error stations.

If a remote station whose parameters are not written in the EEPROM gives a response, it is regarded as control disability (due to I/O non-assignment), and regarded as a data link error.

Inconsistency of the station type is not checked (even if the station type is inconsistent, it is not regarded as data link error).

The station No. of each remote station is assigned to each bit of the buffer memory [BFM #4 (4h) to #7 (7h)]. Normal status/data link error is indicated by the 0 (OFF)/1 (ON) status of each bit.

0 (OFF): The station is normal.

1 (ON): Data link error has occurred in the station.

Buffer memory No.	Bit						
	b15	b14	b13	...	b2	b1	b0
BFM #4 (4h)	Station No.16	Station No.15	Station No.14	...	Station No.3	Station No.2	Station No.1
BFM #5 (5h)	Station No.32	Station No.31	Station No.30	...	Station No.19	Station No.18	Station No.17
BFM #6 (6h)	Station No.48	Station No.47	Station No.46	...	Station No.35	Station No.34	Station No.33
BFM #7 (7h)	Station No.64	Station No.63	Station No.62	...	Station No.51	Station No.50	Station No.49

Handling in the CONFIG mode

In the CONFIG mode, if the detailed remote station information [BFM #32 (20h) to #95 (5Fh)] is edited, and if the detailed remote station information is inconsistent with remote stations actually connected at the time of power ON as a result of the editing, there will be a data link error.

While the detailed remote station information is being edited, the consistency with actually connected stations is checked.

If the power is set to ON while all remote stations are unconnected or if remote stations are disconnected after the power was set to ON, data link error is not detected, as far as the detailed remote station information is not edited.

(For the details on editing the detailed remote station information, refer to "8.5 Editing the detailed remote station information".)

10.2.3 Remote I/O error information [BFM #8 (8h) to #11 (Bh)]

The remote I/O error occurrence status is stored here. (Bits for stations having I/O error are ON.)

For the type of error, refer to the instruction manual of each remote station.

The station No. of each remote station is assigned to each bit of the buffer memory [BFM #8 (8h) to #11 (Bh)]. The absence/presence of remote I/O errors are indicated by a 0 (OFF)/1 (ON) status of each bit.

0 (OFF): Remote I/O error is absent. 1 (ON): Remote I/O error is present. (Initial value: 0)

Buffer memory No.	Bit						
	b15	b14	b13	...	b2	b1	b0
BFM #8 (8h)	Station No.16	Station No.15	Station No.14	...	Station No.3	Station No.2	Station No.1
BFM #9 (9h)	Station No.32	Station No.31	Station No.30	...	Station No.19	Station No.18	Station No.17
BFM #10 (Ah)	Station No.48	Station No.47	Station No.46	...	Station No.35	Station No.34	Station No.33
BFM #11 (Bh)	Station No.64	Station No.63	Station No.62	...	Station No.51	Station No.50	Station No.49

10.2.4 Reserved station information [BFM #16 (10h) to #19 (13h)]

Station Nos. specified as reserved stations are stored here.

(Bits for stations specified as reserved ones are ON.)

Specify reserved stations by editing the detailed remote station information [BFM #32 (20h) to 95 (5Fh)] in the CONFIG mode.

(For the details of specification of reserved station, refer to "8.4 Specification of reserved station".)

The station No. of each remote station is assigned to each bit of the buffer memory [BFM #16 (10h) to #19 (13h)]. Whether or not a station is specified as a reserved one is indicated by the 0 (OFF)/1 (ON) status of each bit.

0 (OFF): The station is not specified as a reserved one.

1 (ON): The station is specified as a reserved one.

(Initial value: 0)

Buffer memory No.	Bit						
	b15	b14	b13	...	b2	b1	b0
BFM #16(10h)	Station No.16	Station No.15	Station No.14	...	Station No.3	Station No.2	Station No.1
BFM #17(11h)	Station No.32	Station No.31	Station No.30	...	Station No.19	Station No.18	Station No.17
BFM #18 (12h)	Station No.48	Station No.47	Station No.46	...	Station No.35	Station No.34	Station No.33
BFM #19 (13h)	Station No.64	Station No.63	Station No.62	...	Station No.51	Station No.50	Station No.49

10.2.5 Number of required input blocks [BFM #20 (14h)]

The number of input blocks (8 points/block) required to assign the I/O Nos. of remote stations is stored here.

10.2.6 Number of required output blocks [BFM #21 (15h)]

The number of output blocks (8 points/block) required to assign the I/O Nos. of remote stations is stored here.

10.2.7 Data link final station information [BFM #22 (16h)]

The final station No. available in the data link is stored here.
(The available final station No. is set by the station information stored in the EEPROM.)
If the final station No. is specified as reserved station, the reserved station is included.

10.2.8 External switch information [BFM #26 (1Ah)]

The DIP switch setting (at the time of power ON) is stored here.
Each bit No. of the DIP switch is assigned to each bit of the buffer memory [BFM #26 (1Ah)].
The ON/OFF status of each bit of the DIP switch is indicated by the 0 (OFF)/1 (ON) status of each bit of the buffer memory.

0 (OFF): The bit of the DIP switch is OFF. 1 (ON): The bit of the DIP switch is ON.

Bit	Bit No. of DIP switch	Description
b0	Bit 1	The setting of each bit of the DIP switch is stored. 0: The bit of the DIP switch is OFF. 1: The bit of the DIP switch is ON.
b1	Bit 2	
b2	Bit 3	
b3	Bit 4	
b4	Bit 5	
b5	Bit 6	
b6	Bit 7	
b7	Bit 8	
b8 to b15	(Prohibited to use)	--

10.2.9 Command [BFM #27 (1Bh)]

Command gives the FX_{2N}-64CL-M instructions to stop/restart the data link and write data to the EEPROM.

A function is assigned to each bit of the buffer memory [BFM #27 (1Bh)]. Each function is executed according to the 0 (OFF)/1 (ON) status of each bit.

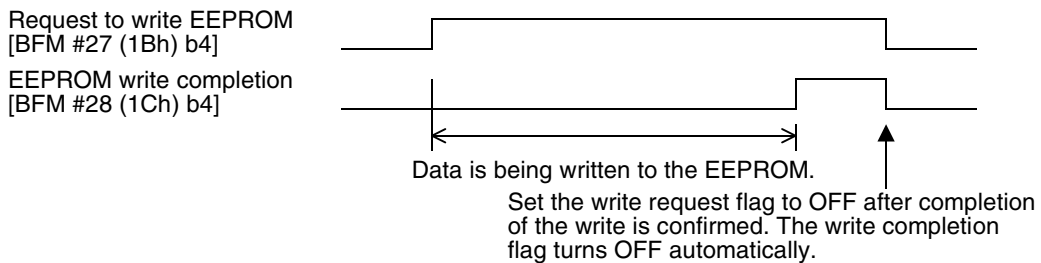
Bit	Function	Description
b0 to b3	(Prohibited to use)	--
b4	Request to write EEPROM	Writes the contents of the detailed remote station information [BFM #32 (20h) to #95 (F5h)] stored in the buffer memory to the built-in EEPROM when it is set from OFF to ON. After the write to the EEPROM is completed (completion is indicated by turning ON of b4 of the BFM #28), set this bit to OFF.
b5	Request to stop data link	Stops the data link when it is set from OFF to ON. Restarts the data link when it is set from ON to OFF.
b15 to b6	(Prohibited to use)	--

Request to write to EEPROM

When this bit is set to ON, the contents of the detailed remote station information [BFM #32 (20h) to #95 (F5h)] are written to the built-in EEPROM.

This write is unnecessary when reserved stations are not specified or when the detailed remote station information is not edited.

The operation is as shown below.

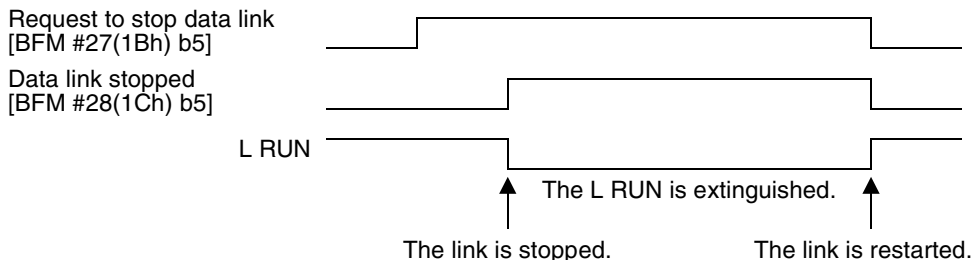


Request to stop data link

The data link is stopped when this bit [BFM #27 (1Bh) b5] is set to ON while the data link is being executed.

The data link is restarted when this bit is set to OFF.

The operation is as shown below.



10.2.10 Status information [BFM #28 (1Ch)]

Status information such as the RUN and link status is stored here.

Bits in the buffer memory contains status information for the FX_{2N}-64CL-M.

The status is indicated by the 0 (OFF)/1 (ON) status of each bit.

Bit	Function	Description
b0	Data link status	Remains ON while the I/O image in the FX _{2N} -64CL-M is updated by the data link.
b1	Initial communication status	Turns ON when acquisition of the remote station information is completed.
b2	RUN status	Remains ON while the unit is operating normally. (Indicates the same contents as the LED.)
b3	CONFIG mode	Remains ON while the CONFIG mode is selected.
b4	EEPROM write completion	Turns ON when write to the EEPROM is completed, then turns OFF when write is completed and the write request flag [BFM #27 (1Bh) b4] is set to OFF.
b5	Data link stopped	Remains ON while the data link is stopped by the request to stop data link.
b6 to b15	(Prohibited to use)	--

Initial communication: When the power of the PLC is set to ON, the PLC acquires the information on connected remote stations from the FX_{2N}-64CL-M.

10.2.11 Detailed error information [BFM #29 (1Dh)]

Each type of error is assigned to a bit of the buffer memory [BFM #29 (1Dh)]. The status is indicated by the 0 (OFF)/1 (ON) status of each bit.

Bit	Function	Description	Error flag restoration operation
b0	Link error in some stations	Turns ON when link error has occurred in some stations. [Turns ON when any bit in BFM #4 (4h) to 7 (7h) have turned ON.] For the station No. in which error has occurred, refer to the link error station information [BFM #4 (4h) to 7 (7h)].	When the cause of the error is eliminated, the error flag is automatically restored.
b1	Link error in all stations	Turns ON when data link error has occurred in all stations.	
b2	Remote I/O error	Turns ON when remote I/O error has occurred. [Turns ON when any bit in BFM #8 (8h) to 11 (Bh) have turned ON.] For the station No., refer to the remote I/O error information [BFM #8 (8h) to 11 (Bh)]. For type of error, refer to the instruction manual of each remote station.	
b3	Out-of-control-range station error	Turns ON when a remote station not registered in the detailed remote station information [BFM #32 (20h) to #95 (5Fh)] is connected to the network.	When the station No. of the connected remote station is smaller than the final station No., the error flag is automatically restored when the cause of the error is eliminated. When the station No. of the connected remote station is larger than the final station No., the error flag is restored when the cause of the error is eliminated and is followed by a power reset.
b4	Transmission speed setting error	Turns ON when the transmission speed setting DIP switch is set to a incompatible position.	When the cause of the error is eliminated, and power is reset, the error flag is automatically restored.
b5	Communication power down	Turns ON at communication power down.	When the cause of the error is eliminated, the error flag is automatically restored.
b6	(Prohibited to use)	--	--

Bit	Function	Description	Error flag restoration operation
b7	EEPROM error	Turns ON when EEPROM write error or read error has occurred or when the request to write EEPROM is given in any mode other than the CONFIG mode.	In the case that a request to write to the EEPROM is given in any mode other than the CONFIG mode, the error flag is automatically restored when the request to write EEPROM is cleared. In the case of EEPROM write error or read error, the error flag is not restored.
b8	DIP switch changed	Turns ON when the DIP switch setting is changed during operation.	When the DIP switch setting is returned to the status at the time of power ON, the error flag is automatically restored. If change of the DIP switch setting is necessary, set to OFF the power, then set it to ON again.
b to b14	(Prohibited to use)	--	--
b15	Hardware error	Turns ON when an abnormality is detected in the self-loop-back test. (When the FX2N-64CL-M is connected to the FX1N Series PLC, check for hardware errors in the status indicator LEDs.)	This error flag is not restored because something is wrong with the hardware.

10.2.12 Model code [BFM #30 (1Eh)]

The model code (K7120) of the FX₂N-64CL-M is stored here.

10.2.13 Detailed remote station information [BFM #32 (20h) to #95 (5Fh)]

The information (I/O type, number of points) on remote stations is stored here.

In the CONFIG mode, the contents of these buffers can be changed.

(For the details of content changes, refer to "8.4 Specification of reserved station" and "8.5 Editing the detailed remote station information".)

Buffer memory assignment

Buffer memory No.	Description
BFM #32 (20h)	Remote station information area for the station No.1
BFM #33 (21h)	Remote station information area for the station No.2
⋮	⋮
BFM #95 (5Fh)	Remote station information area for the station No.64

Configuration of detailed remote station information

Bit	Function	1(ON)	0(OFF)
b0	Number of I/O points	00001:1point	00101:5points
b1		01101:13points	00010:2points
b2		01010:10points	01110:14points
b3		00111:7points	01011:11points
b4		00100:4points	01000:8points
b5		10000:16points	
b5 to b7	(Setting prohibited)	Set these bits to 0.	
b8	Input flag	Input is given.	Input is not given.
b9	Output flag	Output is given.	Output is not given.
b10	(Setting prohibited)	Set these bits to 0.	
b11	Head station flag	This is the head station.	This is not the head station.
b12	Input filter setting	High-speed input	General-purpose input
b13	Output hold/clear setting	HOLD	CLEAR
b14	(Setting prohibited)	Set these bits to 0.	
b15	Reserved station flag	This is specified as reserved station.	This is not specified as reserved station.

Details of each item of detailed remote station information**1) Number of I/O points**

The number of I/O points used in each station No. assigned to each buffer memory is stored here.

The maximum number of points is 4 or 16 according to the number of points per station set by the DIP switch.

For example, when a remote I/O unit having 16 I/O points is used in the 4-point mode, the number of points per buffer memory is 4, and the I/O points of the remote I/O station are assigned to four buffer memories.

In the case of composite I/O type remote unit, the larger amount between the number of input points and the number of output points is stored.

2) Input flag and output flag

Whether a corresponding I/O unit is an input unit, output unit or composite I/O unit, it is stored here.

b9: Output flag	b8: Input flag	Unit type
0	1	Input unit
1	0	Output unit
1	1	Composite I/O unit

3) Head station flag

When the station is an head of a unit occupying two or more stations or when the unit occupies only one station, "1 (ON)" is stored.

When the station is not the head of a unit occupying two or more stations, "0 (OFF)" is stored.

b11	Head station flag
0	This is not the head station of a unit occupying two or more stations.
1	This is the head station of a unit occupying two or more stations, or a unit occupying only one station.

4) Input filter setting

When the remote station is an input type, the input filter setting status of the remote I/O unit is stored here when the power is set to ON in the CONFIG mode.

(If the setting of the remote I/O unit is changed after the power was set to ON in the CONFIG mode, the remote I/O unit operates with the new setting, but the new setting is not reflected on the buffer memory in the master block.)

If the remote station is a remote I/O unit not equipped with the input filter setting function, "0 (OFF)" is stored.

b12	Input filter setting
0	General-purpose input
1	High-speed input

5) Output clear/hold setting

When the remote station is an output unit or composite I/O unit, the output hold setting status of the remote I/O unit is stored here when the power is set to ON in the CONFIG mode.

(If the setting of the remote I/O unit is changed after the power was set to ON in the CONFIG mode, the remote I/O unit operates with the new setting after change, but the new setting is not reflected on the buffer memory in the master block.)

If the remote station is a remote I/O unit not equipped with the output clear/hold setting function, "0 (OFF)" is stored.

b13	Clear/hold setting
0	Clear
1	Hold

6) Reserved station flag

Specification as a reserved station is stored here.

When specifying the station as reserved in the CONFIG mode, write "1 (ON)".

(For the details on reserved stations, refer to "8.4 Specification of reserved station".)

b15	Reserved station flag
0	This station is not specified as a reserved one.
1	This station is specified as a reserved one.

11. Program Example

This section describes a program in the PLC for the configuration shown in "11.2 System configuration".

In this example, the I/O Nos. are assigned automatically in the CONFIG mode.

The specification as reserved station and the detailed remote station information are not changed. Parameter settings and programs for assigning the I/O Nos. are not necessary.



DESIGN PRECAUTIONS

- When a remote I/O unit fails, outputs may randomly become ON or OFF, therefore an external monitoring circuit that will monitor any input signals that could cause a serious accident is necessary.



DESIGN PRECAUTIONS

- Do not bind control cables and flat cables dedicated to CC-Link/LT together with power cables.
Keep control cables and flat cables dedicated to CC-Link/LT away from major circuits and power cables by 100 mm (3.93") or more.
There may be malfunction due to noise interference.
- Install the FX_{2N}-64CL-M in such away that no force is applied to connectors on the CC-Link/LT interface and the flat cables dedicated to CC-Link/LT.
If any force is applied, wire breakage and failure may occur.



INSTALLATION PRECAUTIONS

- Use the FX_{2N}-64CL-M in an environment with the general specifications described in this manual.
If the FX_{2N}-64CL-M is used in any other environment, electrical shock, fire, malfunction, product damage or product deterioration may occur.
- Do not touch the conductive area of the FX_{2N}-64CL-M.
If the conductive area is touched directly, the FX_{2N}-64CL-M may malfunction or fail.
- Shut down all power supplies before attaching/removing the FX_{2N}-64CL-M to/from the panel.
If the power is not disconnected from all sources, the FX_{2N}-64CL-M may fail or malfunction.
- Securely fix the FX_{2N}-64CL-M with DIN rail or mounting screws. When using mounting screws, securely tighten them within the specified torque range.
If the screws are too loose, the module may detach from its installed position, short circuit, or malfunction. If the screws are too tight, the screws may be damaged, which may cause the module to detach from its installed position or short circuit.
- Install the FX_{2N}-64CL-M on a flat surface.
If the installation surface is not flat, an excessive force may be applied on the PCBs, leading to nonconformity.

**WIRING PRECAUTIONS**

- Make sure to shut down all power supplies before starting the installation or wiring work. If the power is not disconnected from all sources an electric shock or serious product damage may occur.

**WIRING PRECAUTIONS**

- Correctly wire the master block while confirming the rated voltage and terminal arrangement of the FX_{2N}-64CL-M.
If a power supply different from the rating is connected or wiring is performed incorrectly, fire or failure may be caused.
- Correctly wire the master block while confirming the rated voltage and terminal arrangement of the FX_{2N}-64CL-M.
If a power supply different from the rating is connected or wiring is performed incorrectly, fire or failure may be caused.
- Pay attention that foreign objects such as cuttings or wiring chips do not enter the FX_{2N}-64CL-M.
It may cause fire, product failure or malfunction.

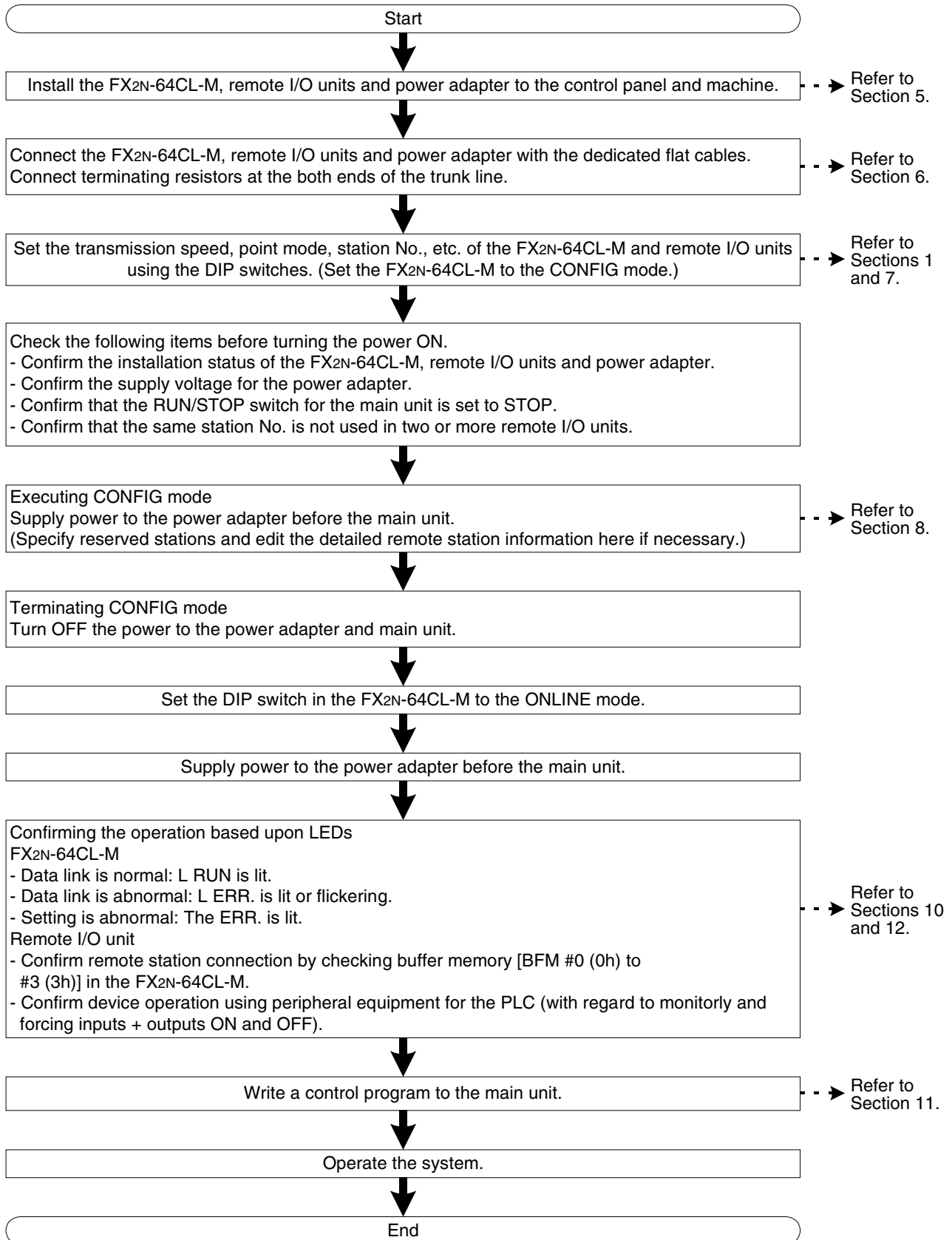
**STARTING AND MAINTENANCE PRECAUTIONS**

- Do not touch the terminals when the power is ON. It may cause an electric shock or malfunction.

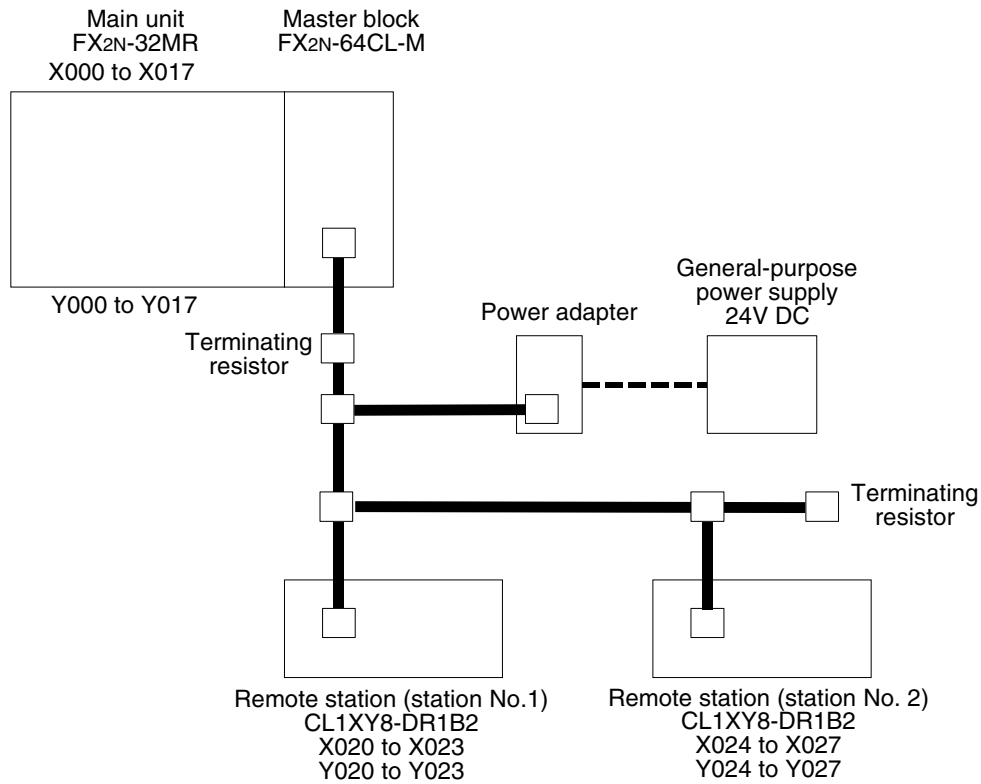
**STARTING AND MAINTENANCE PRECAUTIONS**

- Do not disassemble or modify the FX_{2N}-64CL-M. Doing so may cause failure, malfunction, injury, or fire.
- The case of the FX_{2N}-64CL-M is made of resin. Do not drop or apply strong impacts to the FX_{2N}-64CL-M.

11.1 System Startup Procedure



11.2 System configuration



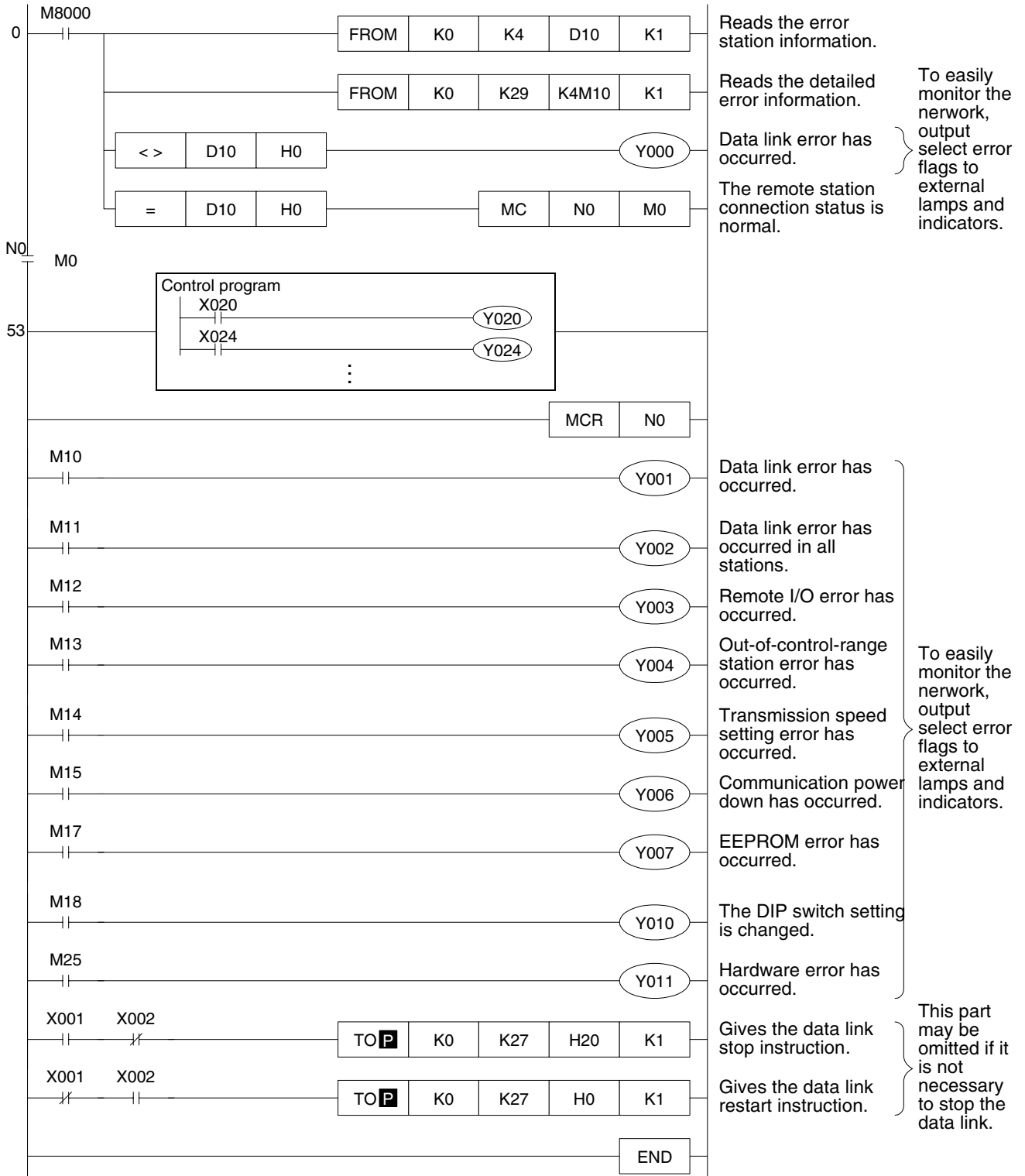
- In the case of system configuration above, twelve connectors for dedicated flat cable are needed.

11.3 Device assignment

In this example, devices in the PLC are used as follows.

Device		Description
Input (X)	X000	CC-Link/LT control start signal
	X001	Data link stop instruction signal
	X002	Data link restart instruction signal
Output (Y)	Y000	Remote station connection error occurrence
	Y001	Data link error occurrence
	Y002	All-station data link error occurrence
	Y003	Remote I/O error occurrence
	Y004	Out-of-control-range station error occurrence
	Y005	Transmission speed setting error occurrence
	Y006	Communication power down occurrence
	Y007	EEPROM error occurrence
	Y010	DIP switch changed
	Y011	Hardware error occurrence
Auxiliary relay (M)	M0	For controlling the master
	M10 to M25	For reading the detailed error information
	M10	Data link error occurrence
	M11	All-station data link error occurrence
	M12	Remote I/O error occurrence
	M13	Out-of-control-range error occurrence
	M14	Transmission speed setting error occurrence
	M15	Communication power down occurrence
	M17	EEPROM error occurrence
	M18	DIP switch changed
M25	Hardware error occurrence	
Data register (D)	D10	Remote station connection information read

11.4 Program example



- When preparing the control program above, pay attention not to use devices twice.
- When using the control program above for a PLC installed in a machine, confirm that the machine will operate safely, and not harm the user, others, or itself, before operating the program.

12. Troubleshooting

12.1 Status of each station during abnormal operation

The table below shows the status of each station when an abnormal operation has occurred.

Data link status			Status of each station			
			Master station		Remote station	
			Remote input	Remote output	Input	Output
When an abnormality has occurred in the master station PLC, the PLC is stopped. (The data link in the entire system is continued.)	Program error	FX1N	--	Holds the status.	Continues the operation. (Input LED is lit.)	Holds the status.
		FX2N, FX2NC	--	Clears.		Clears.
	CPU error	FX1N	--	Clears.		Clears.
		FX2N, FX2NC	--	Clears.		Clears.
When a remote station becomes abnormal (by data link error, etc.) (The data link in the entire system is continued.)			Clears inputs from a remote station in the abnormal status.	Continues the operation.	Continues the operation, but disables data transfer to the master station. (Input LED is lit.)	Depends on the DIP switch status.
When the power is interrupted in a remote station (The data link in the entire system is continued.)			Clears inputs from a remote station where the power is interrupted.	Continues the operation.	Depends on the external signal.	Turns OFF all points.

Holds the status.

Holds the ON/OFF status just before abnormality occurrence.

Continues the operation.

Executes the same operation as that in the normal status even if abnormality has occurred.

Clears.

Turns OFF inputs or outputs when abnormality has occurred.

If monitoring a remote station and a program error has occurred in the master station PLC, inputs on the monitoring device may turn ON and OFF repeatedly. When the program error is cleared, the inputs will return to their correct state.

12.2 Confirmation of status based on status indicator LEDs and countermeasures

12.2.1 ONLINE mode

The table below shows the descriptions of errors during in the ONLINE mode (bits 6 and 7 of the DIP switches are OFF in the FX_{2N}-64CL-M), indicated by the status indicator LEDs and their countermeasures.

	Name	Description	Countermeasures
Status indicator LEDs	POWER	Lit: Power is supplied Extinguished: Power is not supplied	Extinguished <ul style="list-style-type: none"> Confirm the capacity of the power for the PLC and the supplied 5V DC power.
	RUN	Lit: FX _{2N} -64CL-M is operating normally Extinguished: FX _{2N} -64CL-M is abnormal Power is interrupted EEPROM read error (sum mismatch) occurred	Extinguished <ul style="list-style-type: none"> Confirm the capacity of the power for the PLC and the supplied 5 VDC power. Set the FX_{2N}-64CL-M to the CONFIG mode. If necessary, edit the detailed remote station information, and write it to the EEPROM. If the system is not restored even after confirming the items above, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD.
	ERR.	Lit: Communication speed setting error occurred EEPROM read error (sum mismatch) occurred Flickering: Power supplied for communication is abnormal DIP switch for operation setting was changed during operation Extinguished: FX _{2N} -64CL-M is operating normally	Lit <ul style="list-style-type: none"> Confirm the DIP switch setting, reset power. Set the FX_{2N}-64CL-M to the CONFIG mode. If necessary, edit the detailed remote station information, and write it to the EEPROM. Flickering <ul style="list-style-type: none"> Return the DIP switch setting to the status at the time of power ON. If the DIP switch setting should be changed, change the DIP switch setting, then execute the CONFIG mode again. Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.)
	L RUN	Lit: Data link is being executed Extinguished: Data link is stopped	Extinguished <ul style="list-style-type: none"> Take proper countermeasures according to the status of other LEDs.
	L ERR.	Lit: Use station number discrepancy (when BFM#32(20h) to #95(5Fh) is edited, the station numbers are checked.) Outside-control-range station error occurred Flickering: Stations are abnormal Extinguished: Data link is being executed normally	Lit <ul style="list-style-type: none"> Securely connect the FX_{2N}-64CL-M and remote I/O units. Make sure that connected remote I/O units are consistent with the detailed remote station information. Flickering <ul style="list-style-type: none"> Securely connect the FX_{2N}-64CL-M and remote I/O units. Make sure that connected remote I/O units are consistent with the detailed remote station information.

12.2.2 CONFIG mode

The table below shows the descriptions of errors during in the CONFIG mode (bit 6 of the DIP switches are ON and the bit 7 is OFF in the FX2N-64CL-M) indicated by the status indicator LEDs and their countermeasures.

Name	Description	Countermeasures
Status indicator LEDs	POWER	Lit: Power is supplied Extinguished: Power is not supplied Countermeasures: Extinguished • Confirm the capacity of the power for the PLC and the supplied 5V DC power.
	RUN	Lit: FX2N-64CL-M is operating normally Extinguished: FX2N-64CL-M is abnormal Power is interrupted Countermeasures: Extinguished • Confirm the capacity of the power for the PLC and the supplied 5V DC power. • If there is no problem in the capacity of the power for the PLC and the supplied 5V DC power, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD.
	ERR.	Lit: Communication speed setting error occurred EEPROM write error occurred Flickering: Power supplied for communication is abnormal DIP switch for operation setting was changed during operation Extinguished: FX2N-64CL-M is operating normally Countermeasures: Lit • Confirm the DIP switch setting, reset power. Flickering • Return the DIP switch setting to the status at the time of power ON. • If the DIP switch setting should be changed, change the DIP switch setting, then execute the CONFIG mode again. • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.)
	L RUN	Lit: Data link is being executed Extinguished: Data link is stopped Countermeasures: Extinguished • Take proper countermeasures according to the status of other LEDs.
	L ERR.	Lit: Use station number discrepancy (when BFM#32(20h) to #95(5Fh) is edited, the station numbers are checked.) Flickering: All stations are abnormal Extinguished: Data link is being executed normally Countermeasures: Flickering • Securely connect the FX2N-64CL-M and remote I/O units.

- In the CONFIG mode, the L ERR. indicator LED lights or starts to flicker when the detailed remote station information becomes inconsistent with remote stations connected at the time of power ON due to a change in the detailed remote station information. If the power is set to ON while all remote stations are unconnected or if remote stations are disconnected after the power was set to ON, the L ERR. indicator LED does not light or start to flicker as far as the detailed remote station information is not edited.

12.2.3 TEST mode (self-loop-back test)

The table below shows the descriptions of errors during in the TEST mode (bit 6 of the DIP switches are OFF and the bit 7 is ON in the FX_{2N}-64CL-M) indicated by the status indicator LEDs and their countermeasures.

	Name	Description	Countermeasures
Status indicator LEDs	POWER	Lit: Power is supplied Extinguished: Power is not supplied	Extinguished • Confirm the capacity of the power for the PLC and the supplied 5V DC power.
	RUN	Lit: FX _{2N} -64CL-M is operating normally Extinguished: FX _{2N} -64CL-M is abnormal Power is interrupted	Extinguished • Confirm the capacity of the power for the PLC and the supplied 5V DC power. • If there is no problem in the capacity of the power for the PLC and the supplied 5V DC power, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD.
	ERR.	Lit: Communication speed setting error occurred Flickering: Power supplied for communication is abnormal DIP switch for operation setting was changed during operation Extinguished: FX _{2N} -64CL-M is operating normally	Lit • Confirm the operation setting switch setting, reset power. Flickering • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.) • Return the DIP switch setting to the status at the time of power ON.
	L RUN	Lit: Self-loop back Test was finished normally Extinguished: Self-loop back Test was finished abnormally (Extinguished while the self-loop back Test is being executed)	Extinguished • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.) • If the system is not restored even after confirming the item above, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD.
	L ERR.	Lit: Self-loop back Test was finished abnormally Extinguished: Self-loop back Test was finished normally (Extinguished while the self-loop back Test is being executed)	Lit • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.) • If the system is not restored even after confirming the item above, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD.

- When the FX_{2N}-64CL-M is set to TEST mode while it is connected to the FX_{1N} Series PLC, the PLC is stopped.
(The self-loop-back test will be executed normally, and the test result will be indicated by the status indicator LEDs.)

12.3 Countermeasures based on detailed error information

The contents of error flags indicated by the BFM #29 (1Dh) and countermeasures against them are as shown below.

Bit	Description	Countermeasures
b0	Turns ON when link error has occurred in some stations. [Turns ON when either or some bits among BMF #4 (4h) to 7 (7h) have turned ON.] For the station No. in which error has occurred, refer to the link error station information [BFM #4 (4h) to 7 (7h)].	Securely connect the FX2N-64CL-M and remote I/O units. <ul style="list-style-type: none"> • Make the detailed remote station information consistent with connected remote I/O units. • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.)
b1	Turns ON when data link error has occurred in all stations.	Securely connect the FX2N-64CL-M and remote I/O units. <ul style="list-style-type: none"> • Make the detailed remote station information consistent with connected remote I/O units. • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.)
b2	Turns ON when remote I/O error has occurred. [Turns ON when either or some bits among BMF #8 (8h) to 11 (Bh) have turned ON.] For the station No., refer to the remote I/O error information [BFM #8 (8h) to 11 (Bh)]. For the description of error, refer to the instruction manual of each remote station.	<ul style="list-style-type: none"> • Refer to the instruction manual of each remote station.
b3	Turns ON when a remote station not registered in the detailed remote station information [BFM #32 (20h) to #95 (5Fh)] is connected to the network.	<ul style="list-style-type: none"> • Make the detailed remote station information consistent with connected remote I/O units.
b4	Turns ON when the transmission speed setting DIP switch is set to an incompatible position.	<ul style="list-style-type: none"> • Confirm the transmission speed, then correctly set the DIP switch.
b5	Turns ON when the power for communication is downed.	<ul style="list-style-type: none"> • Confirm that power is correctly input to the power adapter. • Securely connect the FX2N-64CL-M, power adapter and remote I/O units.
b6	--	--
b7	Turns ON when EEPROM write error or read error has occurred or when the request to write EEPROM is given in any mode other than the CONFIG mode.	<ul style="list-style-type: none"> • Set the FX2N-64CL-M to the CONFIG mode, and write data to the EEPROM again.

Bit	Description	Countermeasures
b8	Turns ON when the DIP switch setting is changed during operation.	<ul style="list-style-type: none">• Return the DIP switch setting to the status at the time of power ON.• If the DIP switch setting should be changed, change the DIP switch setting, reset power.
b9 to b14	--	--
b15	Turns ON when abnormality is detected in the self-loop-back test. (When the FX2N-64CL-M is connected to the FX1N Series PLC, check for hardware errors in the status indicator LEDs.)	<ul style="list-style-type: none">• Refer to "12.4 Self-loop-back test".

12.4 Self-loop-back test

In the self-loop-back test, the FX_{2N}-64CL-M checks whether it is operating normal by receiving data sent by itself.

In this test, it is not necessary to connect remote stations.

(Connect the FX_{2N}-64CL-M to the power adapter, then set to ON the communication power.)

- When the FX_{2N}-64CL-M is set to TEST mode, while it is connected to the FX_{1N} Series PLC, the PLC is stopped.
(The self-loop-back test will be executed normally, and the test result will be indicated by the status indicator LEDs.)

12.4.1 Operating procedure

The operating procedure is as described below.

- 1) Set the FX_{2N}-64CL-M to TEST mode (by setting bit 7 of the DIP switch to ON). Set the power of the PLC to ON.
At this time, set the communication power to ON (the power to the power adapter) also.
- 2) The system automatically starts the self-loop-back test.
- 3) When the self-loop-back test is completed, the result is indicated by the status indicator LEDs.
If the FX_{2N}-64CL-M is operating normally, the RUN LED lights. If it is not the L ERR. LED lights.
- 4) For returning to the normal operation, return the FX_{2N}-64CL-M to ONLINE mode (by setting the bit 7 of the DIP switch to OFF), reset power.

Status indicator LEDs when the self-loop-back test is completed

		Name	Description	Countermeasures against abnormality
Status indicator LEDs	POWER	Lit	:Power is supplied	Extinguished <ul style="list-style-type: none"> • Confirm the capacity of the power for the PLC and the supplied 5V DC power.
		Extinguished	:Power is not supplied	
	RUN	Lit	:FX2N-64CL-M is operating normally	Extinguished <ul style="list-style-type: none"> • Confirm the capacity of the power for the PLC and the supplied 5V DC power. • If there is no problem in the capacity of the power for the PLC and the supplied 5V DC power, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD.
		Extinguished	:FX2N-64CL-M is abnormal Power is interrupted	
	ERR.	Lit	:Communication speed setting error occurred	Lit <ul style="list-style-type: none"> • Confirm the operation setting switch setting, reset power. Flickering <ul style="list-style-type: none"> • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.) • Return the DIP switch setting to the status at the time of power ON.
		Flickering	:Power supplied for communication is abnormal DIP switch for operation setting was changed during operation	
Extinguished		:FX2N-64CL-M is operating normally		
L RUN	Lit	:Self-loop back Test finished normally	Extinguished <ul style="list-style-type: none"> • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.) • If the system is not restored even after confirming the item above, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD. 	
	Extinguished	:Self-loop back Test finished abnormally (Extinguished while the self-loop back Test is being executed)		
L ERR.	Lit	:Self-loop back Test finished abnormally	Lit <ul style="list-style-type: none"> • Confirm connection to the power adapter and the power supplied to the power adapter. (For the details of power adapter, refer to the User's Manual (Detailed Volume) of the power adapter.) • If the system is not restored even after confirming the item above, contact an office of MITSUBISHI ELECTRIC SYSTEM & SERVICE, CO., LTD. 	
	Extinguished	:Self-loop back Test finished normally (Extinguished while the self-loop back Test is being executed)		
	SD	Lit: Data is being sent.		--
	RD	Lit: Data is being received.		--

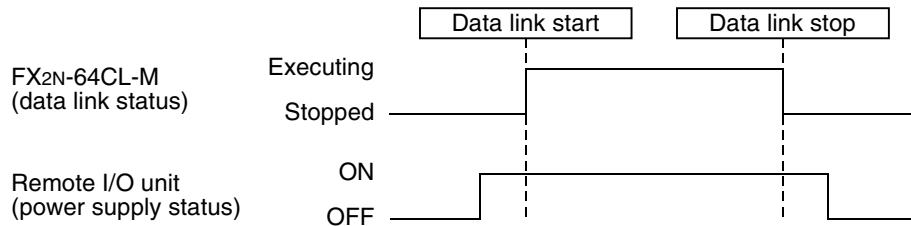
12.5 Prevention of erroneous inputs to and outputs from remote I/O unit

In order to prevent erroneous inputs to and outputs from remote I/O units, design the system under consideration of the contents described below.

1) When setting the power to ON or OFF

Set the power of remote I/O units to ON (the power of the power adapter) first, then start the data link.

Stop the data link first, then set the power of remote I/O units to OFF (the power of the power adapter).



2) When the power is interrupted instantaneously in a remote I/O unit

When the power (24V DC) supplied to a remote I/O unit is interrupted instantaneously, erroneous inputs may occur.

a) Cause of erroneous inputs due to instantaneous power interruption

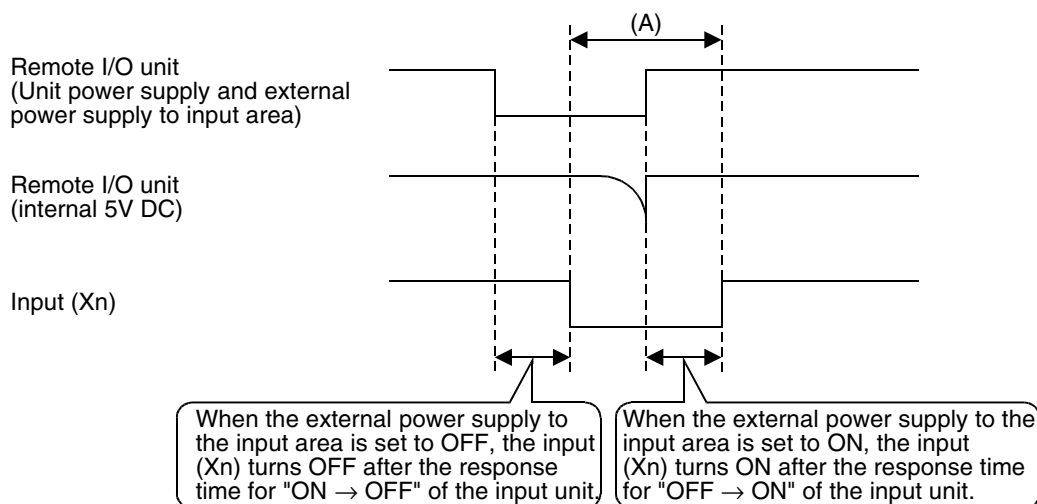
The hardware of a remote I/O unit converts the unit power (24 VDC) into 5V DC inside, then uses it.

If instantaneous power interruption occurs in a remote I/O unit,

$$(\text{Time until 5V DC inside remote I/O unit turns OFF}) > (\text{Response time for "ON} \rightarrow \text{OFF" of input unit})$$

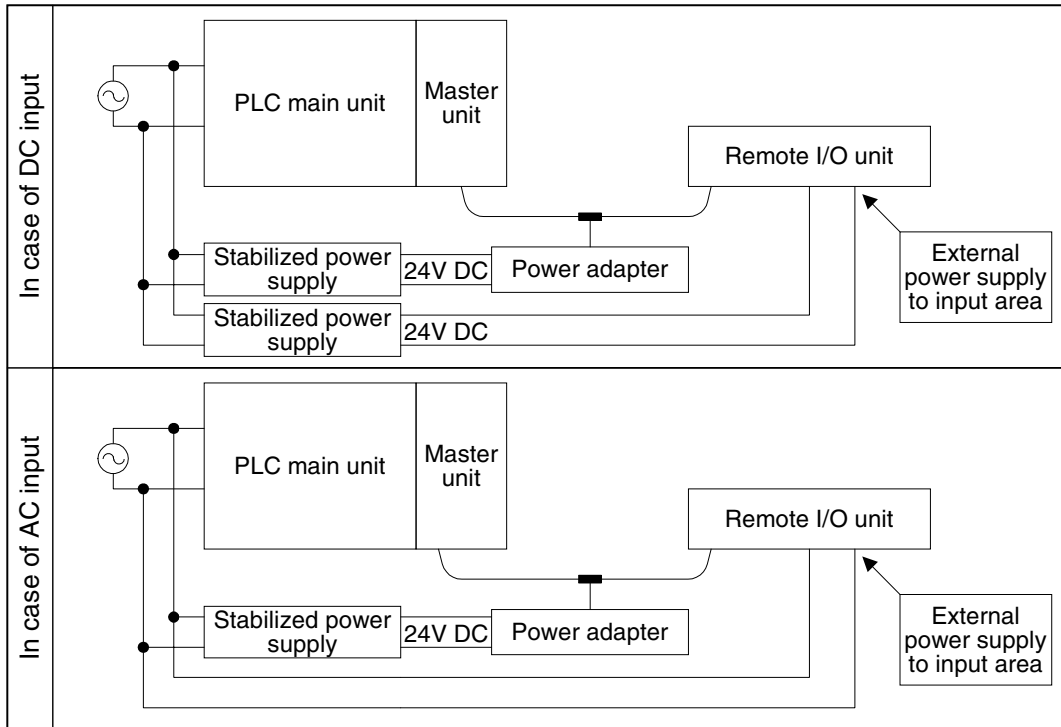
As a result, if refresh is executed in the period shown in (A) below, erroneous inputs occur.

(Erroneous inputs may occur especially while the input response time is set to high-speed input type.)



b) Countermeasures against erroneous input

From the same power supply, wire the power supply unit, the stabilized power supply and the external power supply to the input area for AC inputs.



USER'S MANUAL (Detailed Volume)

FX2N-64CL-M CC-Link/LT Master Block



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Specifications are subject
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