



INVERTER

Plug-in option

FR-A8NCG

INSTRUCTION MANUAL (CC-Link IE TSN)

CC-Link*IE***TSN** Class B/A
communication function

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Safety instructions

Thank you for choosing this Mitsubishi Electric inverter plug-in option.

This Instruction Manual provides handling information and precautions for use of this product. Incorrect handling might cause an unexpected fault. Before using this product, read all relevant instruction manuals carefully to ensure proper use.

Please forward this Instruction Manual to the end user.

Do not attempt to install, operate, maintain or inspect this product until you have read this Instruction Manual and supplementary documents carefully. Do not use this product until you have a full knowledge of this product mechanism, safety information and instructions. In this Instruction Manual, the safety instruction levels are classified into "WARNING" and "CAUTION".

 **WARNING** Incorrect handling may cause hazardous conditions, resulting in death or severe injury.

 **CAUTION** Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

Note that even the  **CAUTION** level may lead to a serious consequence depending on conditions. Be sure to follow the instructions of both levels as they are critical to personnel safety.

◆ Electric shock prevention

WARNING

- Do not remove the front cover or the wiring cover of the inverter while the inverter power is ON. Do not operate the inverter with any cover or wiring cover removed, as accidental contact with exposed high-voltage terminals and internal components may occur, resulting in an electrical shock.
 - Even if power is OFF, do not remove the front cover of the inverter except for wiring or periodic inspection as you may accidentally touch the charged circuits and get an electric shock.
 - Before wiring or inspection, check that the display of the inverter operation panel is OFF. Any person who is involved in wiring or inspection shall wait for 10 minutes or longer after power OFF and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.
 - Any person who is involved in wiring or inspection of this product shall be fully competent to do the work.
 - This product must be installed before wiring. Otherwise you may get an electric shock or be injured.
 - Do not touch this product or handle the cables with wet hands. Doing so may cause an electric shock.
 - Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Doing so may cause an electric shock.
-

◆ Injury prevention

CAUTION

- The voltage applied to each terminal must be as specified in the Instruction Manual. Otherwise an explosion or damage may occur.
 - The cables must be connected to the correct terminals. Otherwise an explosion or damage may occur.
 - The polarity (+ and -) must be correct. Otherwise an explosion or damage may occur.
 - While power is ON or for some time after power OFF, do not touch the inverter as it will be extremely hot. Doing so may cause burns.
-

◆ Additional instructions

The following instructions must be also followed. If this product is handled incorrectly, it may cause unexpected fault, an injury, or an electric shock.

CAUTION

Transportation and installation

- Do not install or operate this product if it is damaged or has parts missing.
- Do not stand or place heavy objects on this product.
- Ensure the mounting orientation of this product is correct.
- Foreign conductive objects must be prevented from entering the inverter. That includes screws and metal fragments or other flammable substance such as oil.
- If halogens (including fluorine, chlorine, bromine, and iodine) contained in fumigants for wood packages enter this product, the product may be damaged. Prevent the entry of fumigant residuals or use an alternative method such as heat disinfection. Note that sterilization or disinfection of wood packages should be performed before packing the product.

Test operation

- Before starting operation, confirm or adjust the parameter settings. Failure to do so may cause some machines to make unexpected motions.
-

WARNING

Usage

- Do not modify this product.
 - Do not remove any part which is not instructed to be removed in the Instruction Manuals. Doing so may lead to a failure or damage of this product.
-

CAUTION

Usage

- As all parameters return to their initial values after Parameter clear or All parameter clear is performed, the needed parameters for operation of the inverter and this product must be set again before the operation is started.
- To avoid damage to this product due to static electricity, static electricity in your body must be discharged before you touch this product.
- To maintain the security (confidentiality, integrity, and availability) of the inverter and the system against unauthorized access, DoS*1 attacks, computer viruses, and other cyberattacks from external devices via network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions. We shall have no responsibility or liability for any problems involving inverter trouble and system trouble by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.
- Depending on the network environment, the inverter may not operate as intended due to delays or disconnection in communication. Carefully consider what type of environment the inverter will be used in and any safety issues related to its use.

Maintenance, inspection and parts replacement

- Do not carry out a megger (insulation resistance) test.

Disposal

- This product must be treated as industrial waste.

*1 DoS: A denial-of-service (DoS) attack disrupts services by overloading systems or exploiting vulnerabilities, resulting in a denial-of-service (DoS) state.

General instruction

- For clarity, illustrations in this Instruction Manual may be drawn with covers or safety guards removed. Ensure all covers and safety guards are properly installed prior to starting operation.
-

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1 PRE-OPERATION INSTRUCTIONS

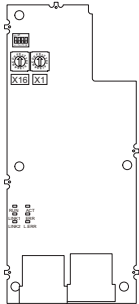
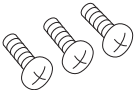
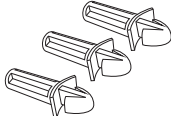
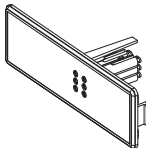
This Instruction Manual explains the CC-Link IE TSN communication. For the CC-Link IE Field Network communication, refer to the FR-A8NCG Instruction Manual (CC-Link IE Field Network).

1.1 Unpacking and product confirmation

Take the product out of the package, check the product name, and confirm that the product is as you ordered and intact. This product is a plug-in option made for the FR-A800/F800 series.

1.1.1 Product confirmation

Check the enclosed items.

<p>Plug-in option: 1</p> 	<p>Mounting screw (M3 × 8 mm): 3 (Refer to page 21.)</p> 	<p>Spacer: 3 (Refer to page 21.)</p> 	<p>Communication option LED display cover: 1 (Refer to page 19.)</p> 	<p>Earth plate: 1 (Refer to page 21.)</p> 
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1.1.2 Model name

FR-A8NCG-

Symbol	Circuit board coating*1
None	Without
60	With

*1 Conforming to IEC 60721-3-3:1994 3C2/3S2

1.1.3 SERIAL number check

The CC-Link IE TSN communication is available by installing the FR-A8NCG to the inverters which have the following SERIAL number. Check the SERIAL number printed on the rating plate or on the package of the inverter. For information on how to read the SERIAL number, refer to the inverter Instruction Manual.

FR-A800 series

Model	Country of origin indication	SERIAL number
FR-A820-00046(0.4K) to 04750(90K) FR-A840-00023(0.4K) to 06830(280K) FR-A842-07700(315K) to 12120(500K) FR-A846-00023(0.4K) to 03610(132K)	MADE in Japan	□96○○○○○○ or later
	MADE in China	□97○○○○○○ or later

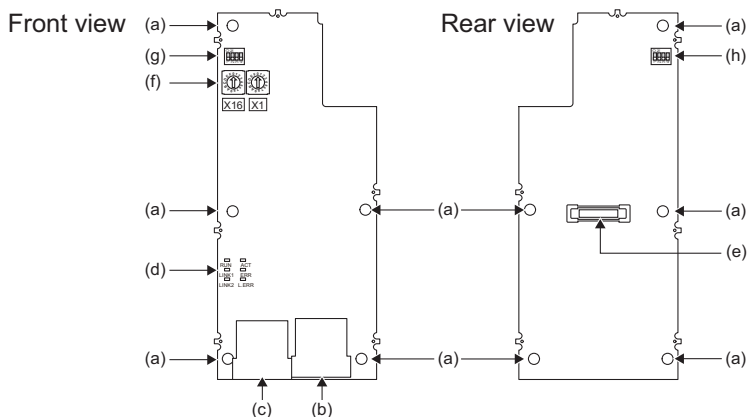
FR-A800 Plus series

Model	Country of origin indication	SERIAL number
FR-A820-00046(0.4K) to 04750(90K)-CRN FR-A840-00023(0.4K) to 06830(280K)-CRN FR-A842-07700(315K) to 12120(500K)-CRN	MADE in Japan	□96○○○○○○ or later
	MADE in China	□97○○○○○○ or later

FR-F800 series

Model	Country of origin indication	SERIAL number
FR-F820-00046(0.75K) to 04750(110K) FR-F840-00023(0.75K) to 06830(315K) FR-F842-07700(355K) to 12120(560K) FR-F846-00023(0.75K) to 03610(160K)	MADE in Japan	□96○○○○○○ or later
	MADE in China	□97○○○○○○ or later

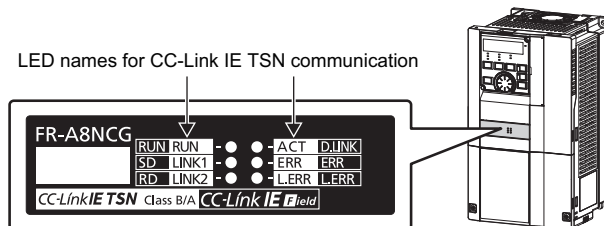
1.2 Parts



Symbol	Name	Description	Refer to page
a	Mounting hole	Used to fix this product to the inverter by inserting a mounting screw or a spacer.	21
b	Connector for communication (PORT 1)	For an Ethernet cable which connects to the network.	33
c	Connector for communication (PORT 2)	For an Ethernet cable which connects to the network.	33
d	Operation status indication LED	Indicates operation/communication status of the inverter by turning ON or blinking.	13
e	Board mounted option connector	Used to connect this product to the option connector on the inverter.	21
f	Station number switches 1 and 2	Enter the station number. (In the initial setting, "0" is set.)	61

Symbol	Name	Description	Refer to page
g	Switch assembly for user setting (SW1)	Use the switch 1 for switching between the CC-Link IE TSN communication and the CC-Link IE Field Network communication. In the initial setting, the switch is set to OFF (CC-Link IE TSN communication). Use the switch 4 to select the CC-Link IE TSN authentication Class. In the initial setting, the switch is set to OFF (authentication Class B). For the switches 2 and 3, do not change the initial setting (OFF).	15
h	Switches for manufacturer setting (SW2)	Not used.	-

◆ Operation status LEDs



LED name	Description	ON	Blinking	OFF
RUN	Operation status	Normal operation (normal 5 V internal voltage) ^{*1}	-	Hardware failure
LINK1	Connector for communication (PORT1) status	Link-up	Data transmission in progress	Link-down
LINK2	Connector for communication (PORT2) status	Link-up	Data transmission in progress	Link-down
ACT	SLMP command request message reception status	-	Inverter identification in progress ^{*2}	Inverter identification paused
ERR	Node failure status ^{*3}	Node failure	-	Normal operation
L.ERR	Link error	Received data error	IP address error ^{*4}	Received data normal

^{*1} Also lit in no-communication state.

^{*2} This LED blinks when the MAC address and IP address of the inverter match to MAC address and IP address specified by using engineering software such as FR Configurator2.

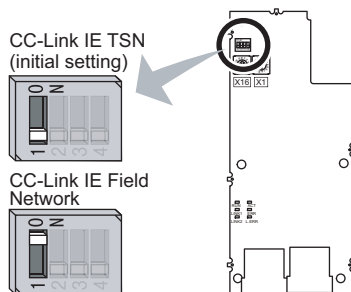
^{*3} This LED indicates a communication break between the master station and the FR-A8NCG (due to cable disconnection or breakage, power-OFF of the master power supply, and reset, etc.)

^{*4} "d1 P" (duplicate IP address) or "1 P" (IP address error) will appear on the operation panel.

◆ Communication switching

Use the switch assembly (SW1) on the circuit board of the FR-A8NCG for switching between the CC-Link IE TSN communication and the CC-Link IE Field Network communication.

When the switch 1 is set to ON, the CC-Link IE Field Network communication is selected at next power-ON. In the initial setting, the switch is set to OFF (CC-Link IE TSN communication).



NOTE

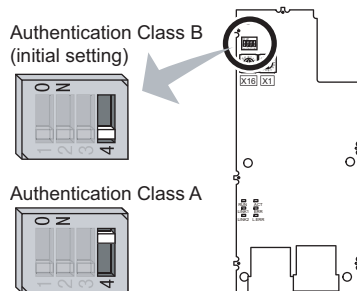
- Set the switch before turning ON the inverter. Do not change the setting while the power is ON. Doing so may cause an electric shock.
- Switches 2 and 3 are not used. Do not change the initial setting (OFF).
- For the CC-Link IE Field Network communication, refer to the Instruction Manual (CC-Link IE Field Network).

◆ CC-Link IE TSN authentication Class selection

Select the authentication Class using the switch assembly (SW1) on the circuit board of the FR-A8NCG.

Turn ON/OFF the switch 4 to switch the authentication Class between A and B.

In the initial setting, the switch is set to OFF (authentication Class B).



NOTE

- Set the switch before turning ON the inverter. Do not change the setting while the power is ON. Doing so may cause an electric shock.
- Switches 2 and 3 are not used. Do not change the initial setting (OFF).

1.3 CC-Link IE TSN communication specifications

The communication specification varies depending on the specification of the master.

Item		Description
Communication speed		1 Gbps 100 Mbps ^{*1}
CC-Link IE TSN authentication Class		B (Compatible with protocol version 2.0 ^{*2*3} or 1.0) A ^{*2} (Compatible with protocol version 2.0)
Cycle time ^{*4}		CC-Link IE TSN authentication Class B: 125 μ s to 10000 μ s (1 Gbps) / 500 μ s to 10000 μ s (100 Mbps ^{*1}) CC-Link IE TSN authentication Class A: 1000 μ s to 6400000 μ s
Communication method		CC-Link IE TSN authentication Class B: Time sharing method CC-Link IE TSN authentication Class A: Time-managed polling method
Time synchronization		CC-Link IE TSN authentication Class B: Supported (compliant with IEEE 802.1AS and IEEE 1588v2) CC-Link IE TSN authentication Class A: Not supported
Maximum number of connected units		121 units (sum of master and remote stations)
Maximum distance between nodes		100 m
Maximum number of branches		No upper limit within the same Ethernet system
Topology		CC-Link IE TSN authentication Class B: Line, star, ring, or a combination of line and star CC-Link IE TSN authentication Class A: Line, star, or a combination of line and star
Connection cable		Ethernet cable (IEEE 802.3 1000BASE-T compliant cable and ANSI/TIA/EIA-568-B (Category 5e) compliant shielded 4-pair branched cable)
Connector		Shielded RJ-45
Node type		Remote station
Maximum cyclic size (of one node)	RX	64 bits
	RY	64 bits
	RWr	128 words
	RWw	128 words

- *1 Supported by the FR-A8NCG manufactured in September 2020 or later.
- *2 Supported by the FR-A8NCG manufactured in October 2022 or later.
- *3 Protocol version 2.0 is compatible with version 1.0.
- *4 Consider the scaling factor in the multiple period setting to change the basic period setting on the engineering software (GX Works3).

2 INSTALLATION

2.1 Pre-installation instructions

Check that the inverter's input power and the control circuit power are both OFF.

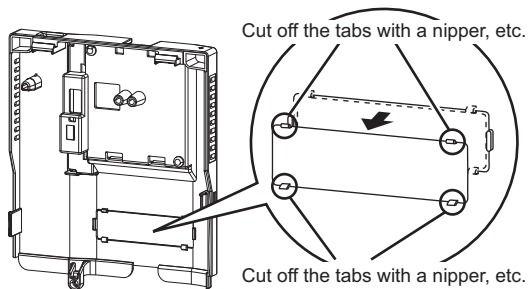
CAUTION

- Do not install or remove this product while the inverter power is ON. Doing so may damage the inverter or this product.
 - To avoid damage due to static electricity, static electricity in your body must be discharged before you touch this product.
-

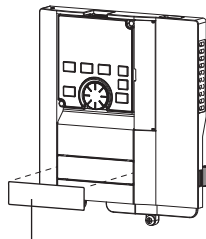
2.2 Installation procedure

◆ Installing the communication option LED display cover

1. Remove the inverter front cover. (Refer to Chapter 2 of the Instruction Manual (Detailed) of the inverter for instructions for removing the front cover.)
2. Cut off the tabs on the rear of the inverter front cover with nipper, etc. and remove the separate part to make space for fitting the LED display cover.



3. Fit the communication option LED display cover to the front side of the front cover. Align the LED display cover with the LED position on the circuit board of the option. Push the LED display cover until it is fixed with the clips.



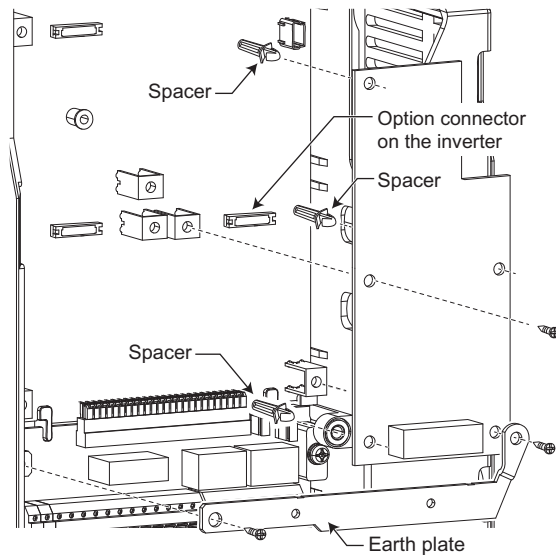
Communication option LED display cover

⚠ CAUTION

- Take care not to hurt your hand and such with portions left by cutting tabs of the rear of the front cover.
-

◆ Installing the option

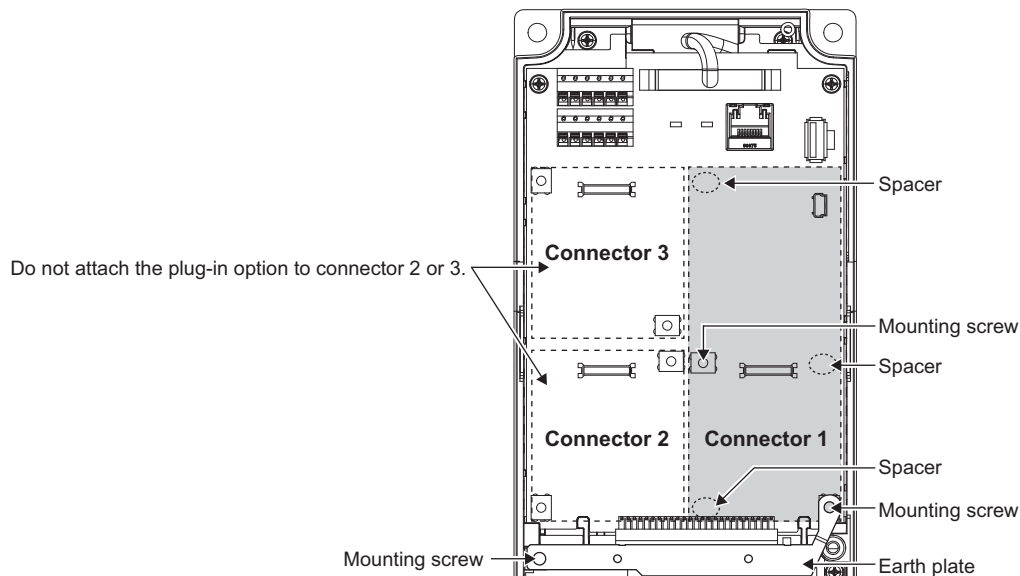
1. Insert three spacers into the mounting holes that will not be filled with mounting screws (page 23).
2. Fit the board mounted option connector on this product to the guide of the option connector on the inverter and insert the plug-in option as far as it goes. (Select option connector 1 on the inverter.)
3. Fasten the earth plate to the inverter using the one mounting screw through the hole on the left side (page 23) (tightening torque 0.33 N·m to 0.40 N·m).
4. Fasten this product to the inverter using the one mounting screw through the hole on the left side. Fasten the earth plate and this product to the inverter using the last screw through the hole on the right side of the earth plate and this product (tightening torque 0.33 N·m to 0.40 N·m). If the screw holes do not line up, the connector may not be inserted deep enough. Check the connector.



NOTE

- When a communication option is installed to the FR-A800-E/FR-F800-E series inverter, use the earthing (grounding) cable supplied with the inverter instead of the earth plate supplied with the communication option. (For details of the installation method, refer to the Instruction Manual of the inverter.)

◆ Insertion positions for screws and spacers





NOTE

- When installing/removing the plug-in option, hold the sides of the option. Do not press on the parts on the option circuit board. Stress applied to the parts by pressing, etc. may cause a failure.
- Be careful not to drop mounting screws during the installation or removal of the plug-in option.
- Attach this product to option connector 1 on the inverter. If it is attached to option connector 2 or 3, the protective function (E.2 or E.3) is activated and the inverter will not operate. Even if this product is attached to option connector 1, when the inverter cannot recognize that the option is mounted due to improper installation, etc., the protective function (E.1) is activated.

Mounted position	Fault indication
Option connector 1	E. 1
Option connector 2	E. 2
Option connector 3	E. 3

- When removing the plug-in option, remove the two screws on either side, and then pull it straight out. Pressure applied to the option connector and to the option board may break the option.
- Always attach the earth plate because a malfunction due to noises may occur without it.

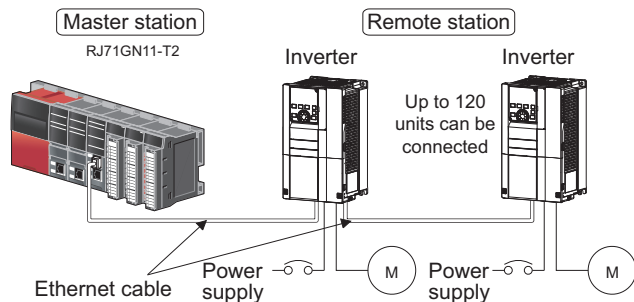
3 WIRING

3.1 System configuration example

1. Programmable controller side
Mount the "RJ71GN11-T2" type CC-Link IE TSN master/local module on the main or extension base unit having the programmable controller CPU used as the master station.
2. Inverter side
Mount the option (FR-A8NCG) on the inverter.
3. Connect the CC-Link IE TSN programmable controller (master station) to FR-A8NCG with an Ethernet cable.

Instruction manual regarding
the CC-Link IE TSN master station

RJ71GN11-T2 type
· MELSEC iQ-R CC-Link IE TSN User's
Manual (Startup)
.....SH-082127ENG
· MELSEC iQ-R CC-Link IE TSN User's
Manual (Application)
.....SH-082129ENG



3.2 Network configuration

◆ Network topology

The network can be wired into star topology, line topology, and ring topology. A network can consist of a combination of star and line topologies, but the ring topology cannot be combined with star or line topology.

Item	Description
Star topology	Modules are configured into a star using a switching hub and Ethernet cables. Remote stations can be easily added in a star topology. Furthermore, data link continues among normally-operating stations in a star topology. *1
Line topology	Modules are configured into a line with Ethernet cables and without a switching hub. If an error occurs, the station in error and the stations after that will be disconnected from the network. *1
Ring topology	Modules are configured into a ring using Ethernet cables. Data link continues among normally-operating stations without a switching hub. *1

*1 Add/remove remote stations one by one. If multiple remote stations are added/removed at a time, all stations on the network will be reconnected, resulting in a momentarily error in all the stations.

◆ Station number and connection position

Modules can be connected in any order regardless of the station number.

◆ Cascade connection

Up to 20-layer connection is available for the cascade connection.

◆ Replacing CC-Link IE TSN devices

For star topology, remote stations can be replaced without powering off the whole system.



NOTE

- Refer to the Master Module User's Manual for detailed network configurations.

◆ Combination with the master station

- When all remote stations are authentication Class B products

Master station	Master station communication speed	Network configuration
<ul style="list-style-type: none"> MELSEC iQ-R series master/local module RJ71GN11-T2/RJ71GN11-EIP MELSEC iQ-F series master/local module FX5-CCLGN-MS Master station that supports both 1 Gbps and 100 Mbps communication speeds 	1 Gbps	<ul style="list-style-type: none"> Line topology / star topology / ring topology^{*1*2} / combination of line topology and star topology For star topology, use a Class B switch^{*4}.
	100 Mbps	<ul style="list-style-type: none"> Line topology / star topology / ring topology^{*1*2} / combination of line topology and star topology
<ul style="list-style-type: none"> MELSEC iQ-R series Motion module RD78G[]/GH[] MELSEC iQ-F series Motion module FX5-[]SSC-G 	1 Gbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology For star topology, use a Class B switch^{*4}.
	100 Mbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology

- When all remote stations are authentication Class A products

Master station	Master station communication speed	Network configuration
<ul style="list-style-type: none"> MELSEC iQ-R series master/local module RJ71GN11-T2 / RJ71GN11-EIP MELSEC iQ-F series master/local module FX5-CCLGN-MS Master station that supports both 1 Gbps and 100 Mbps communication speeds 	1 Gbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology^{*3} Connection sequence: Master station → Remote station (communication speed: 1 Gbps) → Class A switch^{*5} → Remote station (communication speed: 100 Mbps^{*2})
	100 Mbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology Remote station (communication speed: 100 Mbps^{*2})
<ul style="list-style-type: none"> MELSEC iQ-R series Motion module RD78G[]/GH[] MELSEC iQ-F series Motion module FX5-[]SSC-G 	1 Gbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology^{*3} Connection sequence: Master station → Remote station (communication speed: 1 Gbps) → Class A switch^{*5} → Remote station (communication speed: 100 Mbps^{*2})
	100 Mbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology Remote station (communication speed: 100 Mbps^{*2})

- When both authentication Class B and Class A products are used as remote stations

Master station	Master station communication speed	Network configuration
<ul style="list-style-type: none"> MELSEC iQ-R series master/local module RJ71GN11-T2 / RJ71GN11-EIP MELSEC iQ-F series master/local module FX5-CCLGN-MS Master station that supports both 1 Gbps and 100 Mbps communication speeds 	1 Gbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology^{*3} Connection sequence: Master station → Remote station (authentication Class B, communication speed: 1 Gbps) → Class A switch^{*5} → Remote station (authentication Class A, communication speed: 100 Mbps^{*2})
	100 Mbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology Connection sequence: Master station → Remote station (authentication Class B) → Remote station (authentication Class A)
<ul style="list-style-type: none"> MELSEC iQ-R series Motion module RD78G[]/GH[] MELSEC iQ-F series Motion module FX5-[]SSC-G 	1 Gbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology^{*3} Connection sequence: Master station → Remote station (authentication Class B, communication speed: 1 Gbps) → Class A switch^{*5} → Remote station (authentication Class A, communication speed: 100 Mbps^{*2})
	100 Mbps	<ul style="list-style-type: none"> Line topology / star topology / combination of line topology and star topology Connection sequence: Master station → Remote station (authentication Class B) → Remote station (authentication Class A)

^{*1} Supported by the RJ71GN11-T2 whose firmware version is 10 or later.

^{*2} Supported by the FR-A8NCG and FR-A800-GN manufactured in September 2020 or later.

^{*3} Line topology is available for the products whose communication speed settings are the same.

^{*4} Industrial switch (CC-Link IE TSN Class B compatible).

^{*5} Industrial switch (CC-Link IE TSN Class A compatible). Use the product that supports 1 Gbps / 100 Mbps.

**NOTE**

- When all remote stations are either authentication Class B or Class A products, up to 120 units can be connected.
- When both authentication Class B and Class A products are used, the maximum number of connectable remote stations differs depending on the protocol version. For calculation of the cyclic data size, refer to the Master Module User's Manual.

Protocol version	Maximum number of connected units
2.0	120 units (total of the authentication Class A and Class B products)
1.0	The total size of cyclic data of all Class A units must not exceed 2k bytes per port on the master station.

Class A units should be connected starting from the remotest Class B unit.

- Compatible firmware version of the master station

Model	Compatible with protocol version 2.0	Compatible with protocol version 1.0
RJ71GN11-T2	15 or later	12 or later
RJ71GN11-EIP	01 or later	
FX5-CCLGN-MS	1.010 or later	1.001 or later
RD78G[]/GH[]	20 or later	
FX5-[]SSC-G	1.002 or later	

- Manufacture date of the compatible FR-A8NCG

SERIAL	Description
□2X○○○ or later	Switching the authentication Class between A and B is available. Only the protocol version 2.0 is available.
□29○○○ or earlier	Only the authentication Class B products are available. Only the protocol version 1.0 is available. Protocol version of the master station is automatically set or set to 1.0.

- Compatible version of the engineering software

Name	Version	Description
GX Works3	1.080J or later	Compatible with protocol version 2.0

- Related manuals

For details of network configurations, refer to the Master Module User's Manual.

Name	Manual number
MELSEC iQ-R CC-Link IE TSN User's Manual (Startup)	SH-082127ENG
MELSEC iQ-R CC-Link IE TSN User's Manual (Application)	SH-082129ENG
MELSEC iQ-F FX5 User's Manual (CC-Link IE TSN)	SH-082215ENG
MELSEC iQ-R Motion Module User's Manual (Startup)	IB-0300406ENG
MELSEC iQ-R Motion Module User's Manual (Application)	IB-0300411ENG

3.3 Network components

This section describes components comprising the CC-Link IE TSN.

3.3.1 Connection cable

For wiring, use the 1000BASE-T compliant Ethernet cables.

Ethernet cable	Connector	Type
Category 5e or higher (Double shielded/STP) Straight cable	RJ-45 connector	<ul style="list-style-type: none">• IEEE802.3 (1000BASE-T)• ANSI/TIA/EIA-568-B (Category 5e)

- Recommended products (as of April 2023)

Model	Manufacturer
SC-E5EW series ^{*1}	Mitsubishi Electric System & Service Co., Ltd.

^{*1} SC-E5EW cable is for in-enclosure and indoor uses. SC-E5EW-L cable is for outdoor use.

NOTE

- For CC-Link IE TSN wiring, use the recommended wiring components by CC-Link Partner Association.
- Some cable connector shapes are not compatible with FR-A8NCG.

3.3.2 Hubs

To connect only the authentication Class B devices in star topology when the communication speed of the master station is 1 Gbps, use a CC-Link IE TSN compatible switching hub (industrial switch (CC-Link IE TSN Class B compatible)).

- CC-Link IE TSN compatible switching hub

Name	Description
Industrial switch (CC-Link IE TSN Class B compatible)	Authentication Class B CC-Link IE TSN compatible switching hub certified by the CC-Link Partner Association.

3.4 Wiring

This section describes the cable wiring and precautions. For network configuration, cables, and hubs used for the wiring, refer to [page 26](#) and subsequent pages.

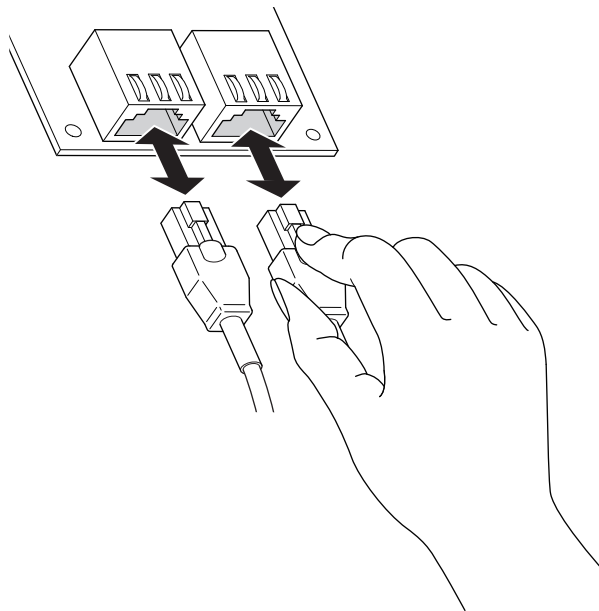
3.4.1 Ethernet cable connection

◆ Connecting the cable

1. Turn OFF the inverter power supply.
2. Remove the front cover.
3. Check the direction of the Ethernet cable connector. Insert the connector to the communication connector of FR-A8NCG until it clicks.

◆ Disconnecting the cable

1. Turn OFF the inverter power supply.
2. Remove the front cover.
3. Hold down the latch on the Ethernet cable connector, and pull out the cable while holding the latch.



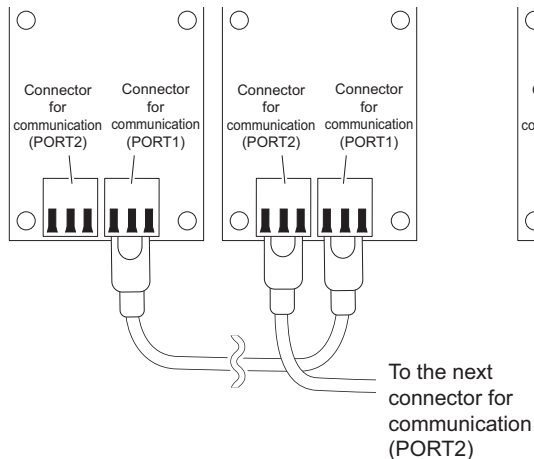


NOTE

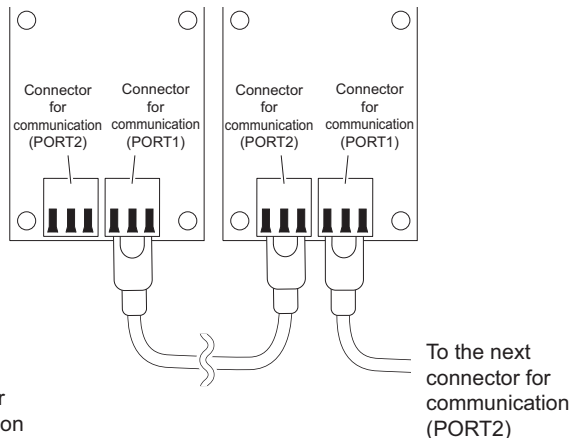
PORT1 and PORT2 do not need to be distinguished.

- When only one connector is used in star topology, either PORT1 or PORT2 is applicable.
- When using two connectors for line topology and ring topology, an Ethernet cable can be connected to the connectors in any combination. For example, the cable can be connected across two of PORT1 or across PORT1 and PORT2.

Connection between PORT1 and PORT1, PORT2 and PORT2



Connection between PORT1 and PORT2



3.4.2 Precautions

This section describes wiring precautions.

◆ Handling of the Ethernet cable

Do not touch the core of the cable-side or module-side connector, and protect it from dirt or dust. If oil from your hand, dirt or dust is attached to the core, it can increase transmission loss, arising a problem in data link.

Check the following:

- Is any Ethernet cable disconnected?
- Is any of the Ethernet cables shorted?
- Are the connectors securely connected?

◆ Broken Ethernet cable latch

Do not use Ethernet cables with broken latches. Doing so may cause the cable to unplug or malfunction.

◆ Connecting and disconnecting the Ethernet cable

Hold the connector part when connecting and disconnecting the Ethernet cable. Pulling a cable connected to the module may damage the module or cable, or result in malfunction due to poor contact.

◆ Maximum station-to-station distance (maximum cable length)

The maximum station-to-station distance is 100 m. However, the distance may be shorter depending on the operating environment of the cable. For details, contact your cable manufacturer.

◆ Network configuration

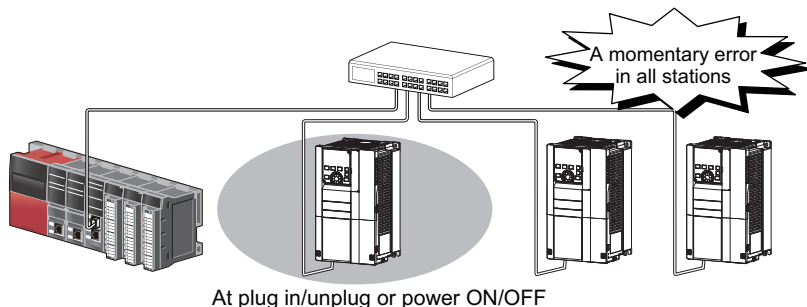
Check the instructions on [page 26](#) before wiring, and perform correct wiring.

◆ Connecting/disconnecting a cable and powering ON/OFF a device

When the operations listed below are performed, all stations on the network may be reconnected. At that time, a data link error may momentarily occur in all the stations, and the communication error E.OP1 may occur in the connected inverters.

Network configuration	Operation
Star topology	<ul style="list-style-type: none"> Powering ON/OFF a remote station or the switching hub Connecting/disconnecting an Ethernet cable connected to the switching hub Disconnecting an Ethernet cable from a remote station and connecting it to another remote station or to the switching hub Disconnecting ten stations or more, or disconnecting half the number of remote stations in the system or more Changing the network topology when adding a remote station
Line topology, ring topology	<ul style="list-style-type: none"> Simultaneously powering ON/OFF multiple stations Simultaneously connecting/disconnecting Ethernet cables to/from multiple stations (When a data link faulty station returns, a data link error will occur in all the stations.) Disconnecting ten stations or more, or disconnecting half the number of remote stations in the system or more Changing the network topology when adding a remote station

3



To keep outputting a data link error (inverter communication error), set **Pr.500 Communication error execution waiting time** or **Pr.502 Stop mode selection at communication error**. (Refer to [page 53](#).)



NOTE

- When wiring cables to the inverter's RS-485 terminals with a plug-in option mounted, take caution not to let the cables touch the circuit board of the option or of the inverter. Otherwise, electromagnetic noises may cause malfunctions.



CAUTION

- After wiring, wire offcuts must not be left in the inverter. Wire offcuts can cause an alarm, failure or malfunction.

4 CC-LINK IE TSN CONFIGURATION

4.1 Procedure

◆ Before communication

1. Turn OFF the inverter power.
2. Connect each unit with an Ethernet cable. (Refer to [page 25](#).)
3. Select the CC-Link IE TSN communication using the switch assembly (SW1) on the circuit board of the FR-A8NCG. (Refer to [page 14](#).)

CC-Link IE TSN
(initial setting)



4. Select the authentication Class using the switch assembly (SW1) on the circuit board of the FR-A8NCG. (Refer to [page 15](#).)

Authentication Class B
(initial setting)



5. Set the station number using the station number switches on the circuit board of the FR-A8NCG. (Refer to [page 61](#).)

Example: 1 (H01)



6. Turn ON the inverter power and perform All parameter clear.

◆ Registering a profile

1. Start the engineering software (GX Works3).
2. On the menu bar, select [Tool] → [Profile Management] → [Register...].
3. Select a CSP+ file to be registered on the "Register Profile" screen, and click the [Register] button.



NOTE

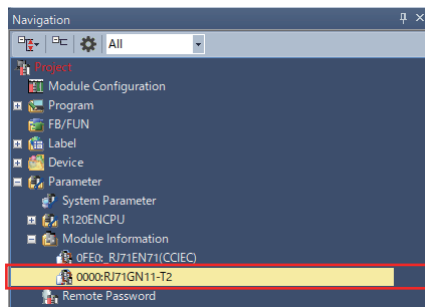
- A profile is a compressed file (such as *.zip, *.ipar, and *.cspp). Register a profile without decompressing the file.

◆ Creating a project file

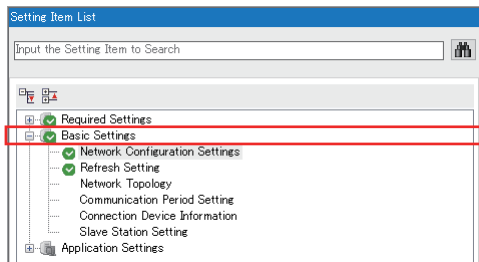
1. For information on creating and opening a project, go to [Help] → [GX Works3 Help].

◆ Detecting an Inverter

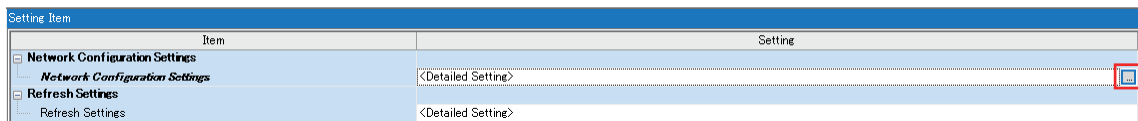
1. In the "Navigation" window, select [Parameter] → [Module Information] then select the module name.



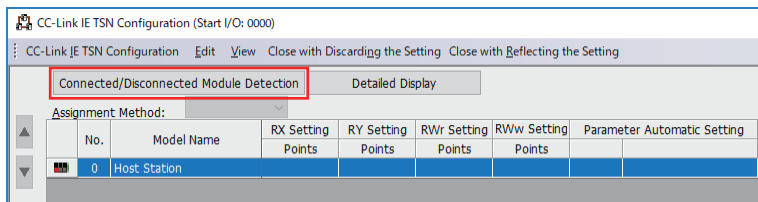
2. Select [Basic Settings] in the "Setting Item List" window.



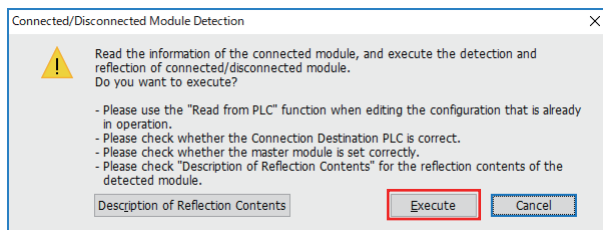
3. In the "Setting Item" window, go to [Network Configuration Settings] then click "..." next to the [Detailed Setting] field.



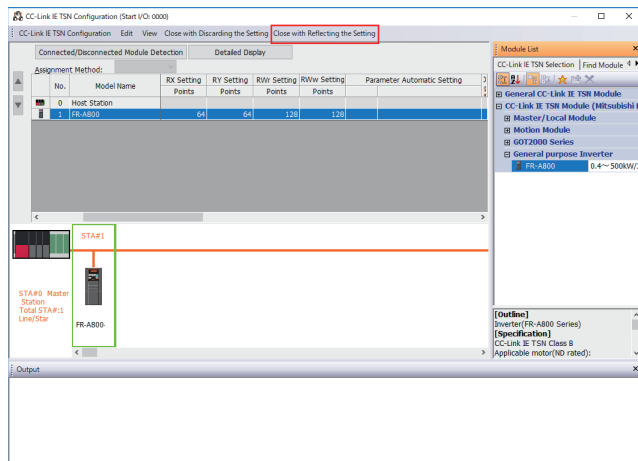
4. Click [Connected/Disconnected Module Detection] in the "CC-Link IE TSN Configuration" window.



5. Read the cautions in the "Connected/Disconnected Module Detection" window and click [Execute].



6. The inverter model will appear on the screen when it is detected. (FR-A800 inverters are displayed in the following example.) Click [Close with Reflecting the Setting] to close the window.



◆ Checking communication

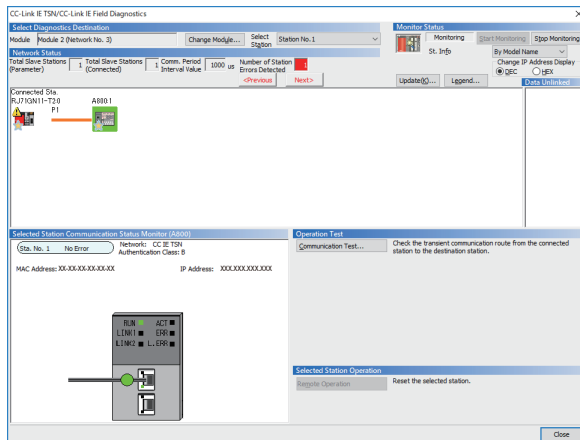
The following table shows the status of the LEDs when communication is established between the programmable controller and the inverter.

RUN	LINK1	LINK2
ON	Blinking ^{*1}	

^{*1} The LED on either LINK1 or LINK2 will blink depending on the port (port 1 or 2) the Ethernet cable is connected to.

NOTE

- If the inverter cannot be detected, on the menu bar select [Diagnostics (D)] → [CC Link IE TSN / CC Link IE Field Diagnostics]. The "CC Link IE TSN / CC Link IE Field Diagnostics" window will be displayed. Broken or disconnected wires can be detected.



- If the "L.ERR" LED blinks and "d1 P" (duplicate IP address) or "1 P" (IP address error) appears on the operation panel, check the station number switch setting. (Refer to [page 61.](#))

5 INVERTER SETTING

5.1 List of related parameters

The following parameters are used for the plug-in option (FR-A8NCG). Set the values according to need. For the parameter details, which depend on the applicable model of the inverter, refer to the Instruction Manual (Detailed) of the inverter.

Pr.	Pr. group	Name	Setting range	Minimum setting increments	Initial value	Refer to page
52	M100	Operation panel main monitor selection	The setting range depends on the inverter.	1	0	^{*4}
79	D000	Operation mode selection	0 to 4, 6, 7	1	0	50
313 ^{*1}	M410 ^{*1}	DO0 output selection	The setting range depends on the inverter.	1	9999	86
314 ^{*1}	M411 ^{*1}	DO1 output selection				
315 ^{*1}	M412 ^{*1}	DO2 output selection				
338	D010	Communication operation command source	0, 1	1	0	^{*4}
339	D011	Communication speed command source	0 to 2	1	0	^{*4}
340	D001	Communication startup mode selection	0 to 2, 10, 12	1	0	50
342	N001	Communication EEPROM write selection	0, 1	1	0	^{*4}
349 ^{*1}	-	Communication reset selection/Ready bit status selection/Reset selection after inverter faults are cleared/DriveControl writing restriction selection	0, 1, 100, 101, 1000, 1001, 1100, 1101, 10000, 10001, 10100, 10101, 11000, 11001, 11100, 11101	1	0	59
	N010 ^{*1}	Communication reset selection	0, 1	1	0	59

Pr.	Pr. group	Name	Setting range	Minimum setting increments	Initial value	Refer to page
500 ^{*2}	N011 ^{*2}	Communication error execution waiting time	0 to 999.8 s	0.1 s	0 s	53
501 ^{*2}	N012 ^{*2}	Communication error occurrence count display	0	1	0	54
502	N013	Stop mode selection at communication error	0 to 4, 11 ^{*5} , 12 ^{*5}	1	0	54
541 ^{*1}	N100 ^{*1}	Frequency command sign selection	0, 1	1	0	67
550 ^{*3}	D012 ^{*3}	NET mode operation command source selection	0, 1, 5 ^{*6} , 9999	1	9999	*4
779	N014	Operation frequency during communication error	0 to 590 Hz, 9999	0.01 Hz	9999	54
804	D400	Torque command source selection	0, 1, 3 to 6	1	0	98
810	H700	Torque limit input method selection	0 to 2	1	0	98
1006	E020	Clock (year)	2000 to 2099	1	2000	*4
1007	E021	Clock (month, day)	Jan. 1 to Dec. 31	1	101	*4
1008	E022	Clock (hour, minute)	0:00 to 23:59	1	0	*4

*1 The setting is available for the FR-A800-E or FR-F800-E, or when the FR-A8NCG is installed.

*2 The setting is available when the FR-A8NCG is installed.

*3 The setting is reflected after inverter reset or at the next power-ON.

*4 Refer to the Instruction Manual (Detailed) of the inverter for the parameter details.

*5 The setting is available only for the FR-A800 series.

*6 The setting is available for the FR-A800-E or FR-F800-E.

5.2 List of parameters for the CC-Link IE TSN communication function

The following parameters for the CC-Link IE TSN communication function are used when the FR-A8NCG is installed. Change the settings as required. The setting is reflected after inverter reset or at the next power-ON.

Pr.	Pr. group	Name	Setting range	Minimum setting increments	Initial value	Refer to page
434 ^{*1}	N700 ^{*1}	IP address 1	0 to 255	1	0 (192 ^{*3})	62
435 ^{*1}	N701 ^{*1}	IP address 2	0 to 255	1	0 (168 ^{*3})	62
436 ^{*1}	N702 ^{*1}	IP address 3	0 to 255	1	0 (50 ^{*3})	62
437 ^{*1}	N703 ^{*1}	IP address 4	0 to 255	1	0 (2 ^{*3})	62
438 ^{*1}	N710 ^{*1}	Subnet mask 1	0 to 255	1	0 (255 ^{*3})	64
439 ^{*1}	N711 ^{*1}	Subnet mask 2	0 to 255	1	0 (255 ^{*3})	64
440 ^{*1}	N712 ^{*1}	Subnet mask 3	0 to 255	1	0 (255 ^{*3})	64
441 ^{*1}	N713 ^{*1}	Subnet mask 4	0 to 255	1	0	64
1130 ^{*1}	N741 ^{*1}	Link speed selection	0, 1	1	0	64
1442 ^{*2}	N760 ^{*2}	IP filter address 1 (Ethernet)	0 to 255	1	0	65
1443 ^{*2}	N761 ^{*2}	IP filter address 2 (Ethernet)	0 to 255	1	0	65
1444 ^{*2}	N762 ^{*2}	IP filter address 3 (Ethernet)	0 to 255	1	0	65
1445 ^{*2}	N763 ^{*2}	IP filter address 4 (Ethernet)	0 to 255	1	0	65
1446 ^{*2}	N764 ^{*2}	IP filter address 2 range specification (Ethernet)	0 to 255, 9999	1	9999	65
1447 ^{*2}	N765 ^{*2}	IP filter address 3 range specification (Ethernet)	0 to 255, 9999	1	9999	65
1448 ^{*2}	N766 ^{*2}	IP filter address 4 range specification (Ethernet)	0 to 255, 9999	1	9999	65
1459 ^{*1}	N746 ^{*1}	Clock source selection	0 to 2	1	0	69

- *1 Available when the FR-A8NCG is installed (and the CC-Link IE TSN communication is selected).
- *2 Available for the FR-A800-E or FR-F800-E, or when the FR-A8NCG is installed (and the CC-Link IE TSN communication is selected).
- *3 Initial value after Parameter clear or All parameter clear is performed when the FR-A8NCG is installed (and the CC-Link IE TSN communication is selected).

5.3 Operation mode setting

5.3.1 Operation mode switching and communication startup mode (Pr.79, Pr.340)

◆ Operation mode switching conditions

Check the following before switching the operation mode.

- The inverter is at a stop;
- Both the STF and STR signals are off; and
- The **Pr.79 Operation mode selection** setting is correct. (Check the setting on the operation panel of the inverter.)

◆ Operation mode selection at power ON and at restoration from instantaneous power failure

The operation mode at power ON and at restoration from instantaneous power failure can be selected.

Set a value other than "0" in **Pr.340 Communication startup mode selection** to select the network operation mode.

After started in network operation mode, parameter write from the network is enabled.

(Refer to [page 111](#) for a program example for parameter write.)



NOTE

- Change of the **Pr.340** setting is valid when powering on or resetting the inverter.
 - **Pr.340** can be changed with the operation panel independently of the operation mode.
 - Ensure that the communication setting of the inverter is completed before setting **Pr.340** ≠ "0".
 - Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.79, Pr.340**.
-

Pr.340 setting	Pr.79 setting	Operation mode at power-ON, at power restoration, or after a reset	Operation mode switchover
0 (initial value)	0 (initial value)	External operation mode	Switching among the External, PU, and NET operation mode is enabled.*1*4
	1	PU operation mode	PU operation mode fixed
	2	External operation mode	Switching between the External and Net operation mode is enabled.*4 Switching to the PU operation mode is disallowed.
	3, 4	External/PU combined operation mode	Operation mode switching is disallowed.
	6	External operation mode	Switching among the External, PU, and NET operation mode is enabled while running.*4
	7	X12 (MRS) signal ON: external operation mode	Switching among the External, PU, and NET operation mode is enabled.*1*4
		X12 (MRS) signal OFF: external operation mode	External operation mode fixed (Forcibly switched to External operation mode.)
1, 2*2	0	NET operation mode	Same as when Pr.340 = "0"
	1	PU operation mode	
	2	NET operation mode	
	3, 4	External/PU combined operation mode	
	6	NET operation mode	
	7	X12 (MRS) signal ON: NET operation mode	
		X12 (MRS) signal OFF: external operation mode	

Pr.340 setting	Pr.79 setting	Operation mode at power-ON, at power restoration, or after a reset	Operation mode switchover
10, 12 ^{*2}	0	NET operation mode	Switching between the PU and NET operation mode is enabled. ^{*3*4}
	1	PU operation mode	Same as when Pr.340 = "0"
	2	NET operation mode	NET operation mode fixed
	3, 4	External/PU combined operation mode	Same as when Pr.340 = "0"
	6	NET operation mode	Switching between the PU and NET operation mode is enabled while running. ^{*3 *4}
	7	External operation mode	Same as when Pr.340 = "0"

*1 Operation mode cannot be directly changed between the PU operation mode and Network operation mode.

*2 The **Pr.340** settings "2 or 12" are mainly used for communication operation using the inverter RS-485 terminal. When a value other than "9999" (selection of automatic restart after instantaneous power failure) is set in **Pr.57 Restart coasting time**, the inverter will resume the same operation state which was in before after power has been restored from an instantaneous power failure. When **Pr.340** = "1 or 10", a start command turns off if power failure has occurred and then restored during a start command is on.

*3 Switching between the PU and NET operation modes is available with the key on the operation panel or the X65 signal.

*4 Refer to [page 93](#) for a switching method from the network.

5.4 Operation at communication error occurrence

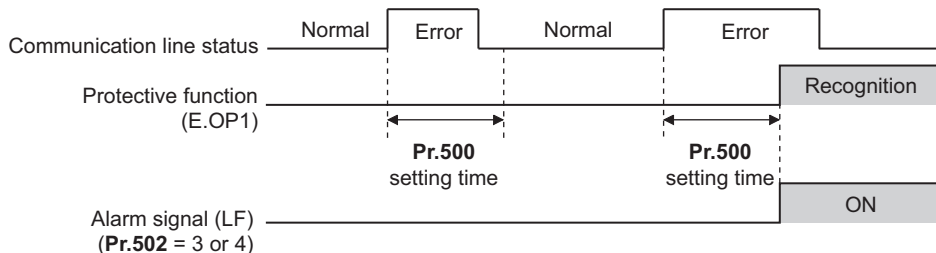
5.4.1 Operation selection at communication error occurrence (Pr.500 to Pr.502, Pr.779)

You can select operations at communication error occurrences by setting **Pr.500 to Pr.502, Pr.779** under network operation.

◆ Waiting time for the communication line error output after a communication error

Waiting time for the communication error output after a communication line error occurrence can be set.

Pr.	Name	Setting range	Minimum setting increments	Initial value
500	Communication error execution waiting time	0 to 999.8 s	0.1 s	0 s

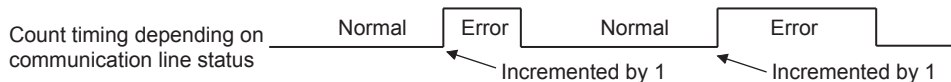


When a communication line error occurs and lasts longer than the time set in **Pr.500**, it is recognized as a communication error. If the communication returns to normal within the time, it is not recognized as a communication error, and the operation continues.

◆ Displaying and clearing the communication error count

The cumulative count of communication error occurrences can be displayed. Write "0" to clear this cumulative count.

Pr.	Name	Setting range	Minimum setting increments	Initial value
501	Communication error occurrence count display	0	1	0



At the point of communication line error occurrence, **Pr.501 Communication error occurrence count display** is incremented by 1.

The cumulative count of communication error occurrences is counted from 0 to 65535. When the count exceeds 65535, the displayed value is cleared and the counting starts over from 0 again.

NOTE

- Communication error count is temporarily stored in the RAM memory. The error count is stored in EEPROM only once per hour. If power reset or converter reset is performed, **Pr.501** setting will be the one that is last stored to EEPROM depending on the reset timing.

◆ Inverter operation at a communication error occurrence

How the inverter operates at a communication line error or an option unit fault can be set.

Pr.	Name	Setting range	Description
502	Stop mode selection at communication error	0 (Initial value) to 4, 11, 12	Refer to page 55 .
779 ^{*1}	Operation frequency during communication error	0 to 590 Hz	When a communication error occurs, the inverter operates at the set frequency.
		9999 (Initial value)	The inverter operates at the frequency set before the communication error occurs.

*1 Valid when **Pr.502** = "3 or 4".

◆ About setting

- Operation at an error occurrence

Fault description	Pr.502 setting	Operation	Indication	Fault output
Communication line	0	Continued ^{*1}	Normal ^{*1}	Not output ^{*1}
	1, 11			
	2, 12			
	3			
	4			
Communication option	0, 3	Output shutoff	"E.1"	Provided
	1, 2, 11, 12	Output to decelerate and stop the motor	"E.1" after stop	Provided after stop
	4	Continued	"CF" warning	Not output

^{*1} When the communication returns to normal within the time period set in **Pr.500**, the protective function (E.OP1) is not activated.

- Operation after the time in **Pr.500** elapses after an error occurrence

Fault description	Pr.502 setting	Operation	Indication	Fault output
Communication line	0	Output shutoff	"E.OP1"	Provided
	1, 11	Output to decelerate and stop the motor	"E.OP1" after stop	Provided after stop
	2, 12			Not output
	3	Continues operation with the Pr.779 setting. ^{*3}	Normal	
	4		"CF" warning	
Communication option itself	0, 3	Output stop status continues. ^{*2}	"E.1" kept ^{*2}	Kept provided ^{*2}
	1, 2, 11, 12			
	4	Continues operation with the Pr.779 setting. ^{*3}	"CF" warning	Not output

^{*2} When an error occurs, the inverter outputs a command to decelerate the motor or shuts off the output, and outputs the fault, independently of the **Pr.500** setting.

^{*3} Under position control, the operation is continued to the target position.

- Operation at error removal

Fault description	Pr.502 setting	Operation	Indication	Fault output
Communication line	0	Output stop status continues.	"E.OP1" kept	Kept provided
	1, 11			
	2, 12	Restart ^{*4}	Normal	Not output
	3	Normal		
	4			
Communication option itself	0, 3	Output stop status continues.	"E.1" kept	Kept provided
	1, 2, 11, 12			
	4	Continues operation with the Pr.779 setting.	"CF" warning	Not output

*4 When the communication error is removed during deceleration, the motor re-accelerates. Under position control, the motor does not re-accelerates even when the communication error is removed during deceleration.

- The motor is decelerated to a stop according to the setting of **Pr.111 Third deceleration time** when an error occurs while **Pr.502** = "11 or 12". (Only for the FR-A800 series)

Pr.502 setting	Operation to a stop at a communication error occurrence
0	Output shutoff
1 to 4	Deceleration stop according to the selected deceleration time (selectable using the RT or X9 signal)
11, 12	Deceleration stop according to the setting of Pr.111



NOTE

- The protective function [E.OP1 (fault data: HA1)] is activated at error occurrences on the communication line. The protective function [E.1 (fault data: HF1)] is activated at error occurrences in the communication circuit inside the option.
- Fault output indicates the fault (ALM) signal and fault bit output.
- When the fault output setting is active, fault records are stored in the fault history. (A fault record is written to the fault history at a fault output.)
- When the fault output setting is not active, fault record is overwritten to the fault history temporarily but not stored. After the error is removed, the fault indication is reset, changing the display back to normal, and the last fault is displayed in the fault history.
- When **Pr.502** is set to "1 to 4", the normal deceleration time setting (such as **Pr.8/Pr.44/Pr.45** setting) is applied.
- When a communication line error occurs while **Pr.502** = "2 or 12", the motor re-accelerates if the error is removed during deceleration. The operation command and the speed command before the fault occurred will be applied for restarting. The normal acceleration time setting (such as **Pr.7/Pr.44** setting) is applied for restart. (Acceleration is not restarted if the error is that of the option unit itself.)



CAUTION

- When **Pr.502** = "3" and a communication line error occurs, or **Pr.502** = "4" and a communication line error or a communication option fault occurs, the operation continues. When setting "3 or 4" in **Pr.502**, provide a safety stop countermeasure other than via communication. For example, input a signal through an external terminal (RES, MRS, or X92) or press the PU stop on the operation panel.

5.4.2 Fault and measures

◆ Inverter operation in each operation mode at error occurrences

Location	Status		Operation mode		
			Network operation	External operation	PU operation
Inverter	Inverter operation		Output shutoff	Output shutoff	Output shutoff
	Data communication		Continued	Continued	Continued
Communication line	Inverter operation		Output shutoff ^{*1}	Continued	Continued
	Data communication		Stop	Stop	Stop
Communication option	Communication option connection error	Inverter operation	Output shutoff ^{*1}	Output shutoff ^{*1}	Output shutoff ^{*1}
		Data communication	Continued	Continued	Continued
	Error of communication option itself	Inverter operation	Output shutoff ^{*1}	Continued	Continued
		Data communication	Stop	Stop	Stop

^{*1} Depends on the Pr.502 setting.

◆ Measures at error occurrences

Fault indication	Fault description	Measures
E.OP1	Communication line error	<ul style="list-style-type: none"> Check the LED status of the option unit and remove the cause of the alarm (Refer to page 13 for LED indication status). Inspect the master.
E.1, E.2, E.3	Option fault	<ul style="list-style-type: none"> Insert the communication option to the inverter option connector 1. Check the connection between the inverter and option unit for poor contact, etc. and remove the cause of the error.

^{*1} When faults other than the above are displayed, refer to the Instruction Manual (Detailed) of the inverter and remove the cause of the error.

5.5 Inverter reset

◆ Operation conditions of inverter reset

Which resetting method is allowed or not allowed in each operation mode is described below.

Resetting method			Operation mode		
			Network operation	External operation	PU operation
Reset from the network	Inverter reset (Refer to page 93.)* ¹		Allowed	Disallowed	Disallowed
	Error reset at inverter fault (Refer to page 84.)* ²	Pr.349 = 0, 100, 1000, 1100, 10000, 10100, 11000, 11100* ³	Allowed	Allowed	Allowed
		Pr.349 = 1, 101, 1001, 1101, 10001, 10101, 11001, 11101* ³		Disallowed	Disallowed
Turn on the RES signal (terminal RES) of the inverter			Allowed	Allowed	Allowed
Switch off inverter power			Allowed	Allowed	Allowed
Reset from the PU/ DU	Inverter reset		Allowed	Allowed	Allowed
	Reset at inverter fault		Allowed	Allowed	Allowed

*¹ Inverter reset can be made any time.

*² Reset can be made only when the protective function of the inverter is activated.

*³ The same operation is performed regardless of the setting value.



NOTE

- When a communication line error has occurred, reset cannot be made from the network.
- The inverter is set to the External operation mode if it has been reset in Network operation mode in the initial status. To resume the network operation, the inverter must be switched to the Network operation mode again. Set a value other than "0" in **Pr.340** to start in the Network operation mode. (Refer to [page 50](#).)
- Communication continues during inverter reset. The inverter cannot be controlled for about 1 s after release of a reset command.
- Refer to [page 116](#) for an inverter reset program example.

◆ Error reset operation selection at inverter fault

An error reset command from communication option can be invalid in the External operation mode or PU operation mode. Use RY3A for an error reset command from network. (Refer to [page 84](#).)

Pr.	Name	Initial value	Setting range	Function
349	Communication reset selection/Ready bit status selection/Reset selection after inverter faults are cleared/DriveControl writing restriction selection	0	0, 100, 1000, 1100, 10000, 10100, 11000, 11100 ^{*1}	Error reset is enabled independently of operation mode.
			1, 101, 1001, 1101, 10001, 10101, 11001, 11101 ^{*1}	Error reset is enabled only in the network operation mode.

*1 The same operation is performed regardless of the setting value.

5.6 CC-Link IE TSN communication function setting

5.6.1 IP address setting

For CC-Link IE TSN communication, the IP address of the inverter is set using the station number switches on the circuit board of the FR-A8NCG or inverter parameters. Note that the station number switch setting has a higher priority than the parameter setting (when the station number switch settings are "1 to 254").

For CC-Link IE TSN communication, the third octet of the inverter's IP address is used as the network No. and the fourth octet is used as the station number. (Enter the IP address assigned by the network administrator.)

◆ Setting the IP address with the station number switches

Set a value other than "0 (H00)" or "255 (HFF)" to specify a station number using the station number switches. The setting range is from "1 (H01)" to "254 (HFE)". The setting is applied after an inverter reset or at the next power-ON.

IP address	Description
First octet	The settings of the master station are used. (The settings from Pr.434 to Pr.436 are invalid.)
Second octet	
Third octet	
Fourth octet	The station number switch setting is enabled regardless of the setting in Pr.437 .

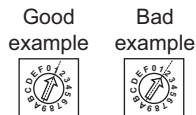
Set the arrow (↑) of each switch to the number or letter (0-9, A-F) corresponding to the desired station number.

• Setting example

<p>Setting for station number 1 (H01): Set the arrow (↑) of X16 to "0" and the arrow (↑) of X1 to "1".</p>  <p>X16 X1</p>	<p>Setting for station number 254 (HFE): Set the arrow (↑) of X16 to "F" and the arrow (↑) of X1 to "E".</p>  <p>X16 X1</p>
--	--

NOTE

- Set the station number switches before turning ON the inverter. Do not change the setting while the power is ON. Doing so may cause an electric shock.
- Set the switch exactly onto one of the numbers. Otherwise normal data communication cannot be established.



- Set a unique station number. (If different devices have the same station number, communication cannot be performed properly. If an error occurs due to a duplicated number, assign the station number correctly, then reset the master or the inverter power.)
- Station numbers do not have to be consecutive numbers.
- The station number switch setting can be displayed on the operation panel when "45" is set in **Pr.52 Operation panel main monitor selection**. (The value can be set in **Pr.774** to **Pr.776**, or **Pr.992**.)

◆ Setting the IP address with parameters (Pr.434 to Pr.437)

Set the station number switches to "0 (H00) or 255 (HFF)" to specify the IP address of the inverter using **Pr.434** to **Pr.437**. The setting is applied after an inverter reset or at the next power-ON.

IP address	Description
First octet	Pr.434
Second octet	Pr.435
Third octet	Pr.436
Fourth octet	Pr.437

■ Network number setting (Pr.436)

Set the inverter network number in **Pr.436**.

Pr.	Name	Initial value	Setting range
436	IP address 3	0 (50 ^{*1})	0 to 255 ^{*2}

*1 Initial value after Parameter clear or All parameter clear is performed when the FR-A8NCG is installed (and the CC-Link IE TSN communication is selected).

*2 Although the setting range of **Pr.436** is "0 to 255", "1 to 239" are available for the network number setting on the engineering software.

■ Station number setting (Pr.437)

Specify the inverter station number in **Pr.437**.

Pr.	Name	Initial value	Setting range
437	IP address 4	0 (2 ^{*1})	0 to 255 ^{*2}

*1 Initial value after Parameter clear or All parameter clear is performed when the FR-A8NCG is installed (and the CC-Link IE TSN communication is selected).

*2 Although the setting range of **Pr.437** is "0 to 255", "1 to 120" are available for the station number setting on the engineering software.

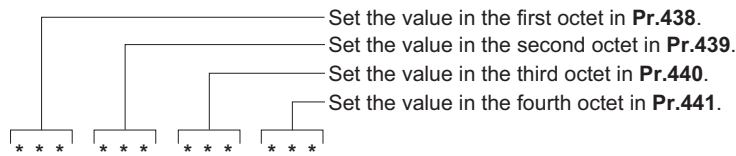


NOTE

- Set a unique station number. (If different devices have the same station number, communication cannot be performed properly. If an error occurs due to a duplicated number, assign the station number correctly, then reset the master or the inverter power.)
- Station numbers do not have to be consecutive numbers.

5.6.2 Subnet mask setting (Pr.438 to Pr.441)

When the inverter station number is specified using the station number switches on the circuit board of the FR-A8NCG, the setting in the master is used for the subnet mask setting. (The settings from **Pr.438 to Pr.441** are invalid.) When the station number switches are set to "0 (H00) or 255 (HFF)", enter the subnet mask of the network to which the inverter belongs in **Pr.438 to Pr.441**.



5.6.3 Selecting the communication speed (Pr.1130)

Set the communication speed using **Pr.1130 Link speed selection**.

Pr.1130 setting	Communication speed
0 (initial value)	1 Gbps
1	100 Mbps

5.6.4 IP filtering function (Ethernet) (Pr.1442 to Pr.1448)

- Set the IP address range for connectable network devices (**Pr.1442 to Pr.1448**) to limit the connectable devices. The IP address setting range depends on the settings in **Pr.1443** and **Pr.1446**, **Pr.1444** and **Pr.1447**, and **Pr.1445** and **Pr.1448**. (Either of the settings can be larger than the other in **Pr.1443** and **Pr.1446**, **Pr.1444** and **Pr.1447**, and **Pr.1445** and **Pr.1448**.)

[Setting example 1]

	Pr.1442	Pr.1443	Pr.1444	Pr.1445
IP filter address (Ethernet)	192	168	1	100
	The range is between the values set in both parameters.			The range is between the values set in both parameters.
			Pr.1447	Pr.1448
IP filter address range specification (Ethernet)	—	9999	3	150

In this case, the IP address range in which Ethernet communication is permitted is "192.168.x (1 to 3).xxx (100 to 150)".

[Setting example 2]

	Pr.1442	Pr.1443	Pr.1444	Pr.1445
IP filter address (Ethernet)	192	168	2	100
			The range is between the values set in both parameters.	
			Pr.1447	Pr.1448
IP filter address range specification (Ethernet)	—	9999	9999	50

In this case, the IP address range in which Ethernet communication is permitted is "192.168.2.xxx (50 to 100)".

- When **Pr.1442 to Pr.1445** = "0 (initial value)", the function is invalid.
- When **Pr.1446 to Pr.1448** = "9999 (initial value)", the range is invalid.

CAUTION

- The IP filtering function (Ethernet) (**Pr.1442 to Pr.1448**) is provided as a means to prevent unauthorized access, DoS attacks, computer viruses, or other cyberattacks from external devices, but the function does not prevent such access completely. In order to protect the inverter and the system against unauthorized access by external systems, take additional security measures. We shall have no responsibility or liability for any problems involving inverter trouble and system trouble by DoS attacks, unauthorized access, computer viruses, and other cyberattacks. The following are examples of measures to prevent them.
 - Install a firewall.
 - Install a personal computer as a relay station, and control the relaying of transmission data using an application program.
 - Install an external device as a relay station to control access rights. (For the details of external devices used to control access rights, contact the distributors of the external devices.)
-

5.6.5 Frequency command with sign (Pr. 541)

By frequency command with sign, start command (forward rotation/reverse rotation) can be inversed to operate. Make selection of sign for the frequency command from RWw0.

Pr.	Name	Initial value	Setting range
541	Frequency command sign selection	0	0, 1

Speed setting using Pr.37 and Pr.144	Pr.541 setting	Sign	Setting range	Actual frequency command
Not used	0	Without	0 to 59000	0 to 590.00 Hz
	1	With	-32768 to 32767 (two's complement)	-327.68 to 327.67 Hz
Used	0	Without	0 to 65535	It depends on Pr. 37 , Pr. 144 , Pr. 811 ^{*1} . (in 1 or 0.1 increments)
	1	With	-32768 to 32767 (two's complement)	

*1 The setting is available only for the FR-A800 series.

- Relationship between the start command and sign (**Pr. 541** = "1")

Start command	Sign of the frequency command	Actual run command
Forward rotation	+	Forward rotation
	-	Reverse rotation
Reverse rotation	+	Reverse rotation
	-	Forward rotation



NOTE

- When **Pr. 541** = 1 (with sign)

When EEPROM write is specified with the RY22, write mode error (error code H01) will occur.

When both RY21 and RY22 are turned ON, RY21 has precedence.

When power is turned ON (inverter reset), the initial setting status of the sign bit is "positive" and the set frequency is "0 Hz".

(The motor does not operate at the frequency set before turning OFF the power (inverter reset).)

When set frequency is written with the instruction code of HED and HEE, the sign of the frequency command is not changed.

- Setting "1 or 11" in **Pr.811 Set resolution switchover** changes the increments from 1 r/min to 0.1 r/min. (Only for the FR-A800 series)

5.6.6 Time synchronization (Pr.1459)

The internal clocks of connected devices on the CC-Link IE TSN Network can be synchronized (real time clock function). The clock source will change depending on the setting of **Pr.1459 Clock source selection** and whether the FR-LU08 is installed or not.

Pr.1459 setting	FR-LU08	Clock source
0 (initial value)	Installed	FR-LU08
	Not installed	Master
1	Installed	FR-LU08
	Not installed	No synchronization
2	Installed ^{*1}	Master
	Not installed	

*1 The clock of the FR-LU08 is not synchronized with the master.



NOTE

- To adjust the clock in the FR-LU08, set **Pr.1006 to Pr.1008** on the FR-LU08. For the details, refer to the Instruction Manual (Detailed) of the inverter.
- The clock of the inverter is adjusted every minute according to the received clock data.
- The time of the master must be set when the master is used as the clock source. The setting values must be within the following range.

Date	Range
Year	2010 to 2099
Month	1 to 12
Day	1 to 31 (The maximum value differs depending on the month.)

6 FUNCTIONS

6.1 Output from the inverter through the network

Main items which can be output from the inverter to the master and their descriptions are explained below.

Item	Description	Refer to page
Inverter status monitor	The output terminal status of the inverter can be monitored.	86
Output frequency monitor	The output frequency can be monitored.	91, 93
Output current monitor	The output current can be monitored.	93
Output voltage monitor	The output voltage can be monitored.	
Special monitor	The monitor data selected can be checked.	
Fault history	Fault records can be checked.	91, 93
Data at alarm occurrence	The inverter status at alarm occurrence can be checked.	91
Operation mode	The current operation mode can be checked.	93
Parameter read	Parameter settings can be read.	
Read of set frequency	The current set frequency can be read.	



NOTE

- Refer to the Instruction Manual (Detailed) of the inverter for functions controllable through the network in each operation mode.

6.2 Input to the inverter through the network

Main commands which can be input from the master to the inverter and their descriptions are explained below.

Item	Description	Refer to page
Forward rotation command	Give the forward rotation command.	84
Reverse rotation command	Give the reverse rotation command.	
Input terminal function command	Execute functions assigned to the inverter input terminals.	
Inverter output stop command	Stop the inverter output.	
Error reset	Reset the inverter only when an inverter alarm occurs.	88, 93
Frequency setting	Set the frequency.	
Torque command / torque limit *1	Set the torque command or the torque limit.	88, 98
Monitor command	Specify the description monitored.	91, 93
Operation mode specification	Set the operation mode.	93
Fault history clear	Erase past eight fault records.	
All parameter clear	Return the parameter descriptions to the initial value.	
Inverter reset	Reset the inverter.	
Parameter write	Write parameter settings.	88
PID control	PID set point, PID measured value and PID deviation can be input from the network.	

*1 The setting is available only for the FR-A800 series.

NOTE

- Refer to the Instruction Manual (Detailed) of the inverter for functions controllable through the network in each operation mode.
- The system configuration affects the time period from when the power of the inverter is turned ON until when the communication between the inverter and the master station is established and either "LINK1" or "LINK2" LED is lit. (It will take less than 20 seconds.) Design the program so that data communication starts after the master confirms that communication with the inverter has been established.

6.3 Cyclic transmission

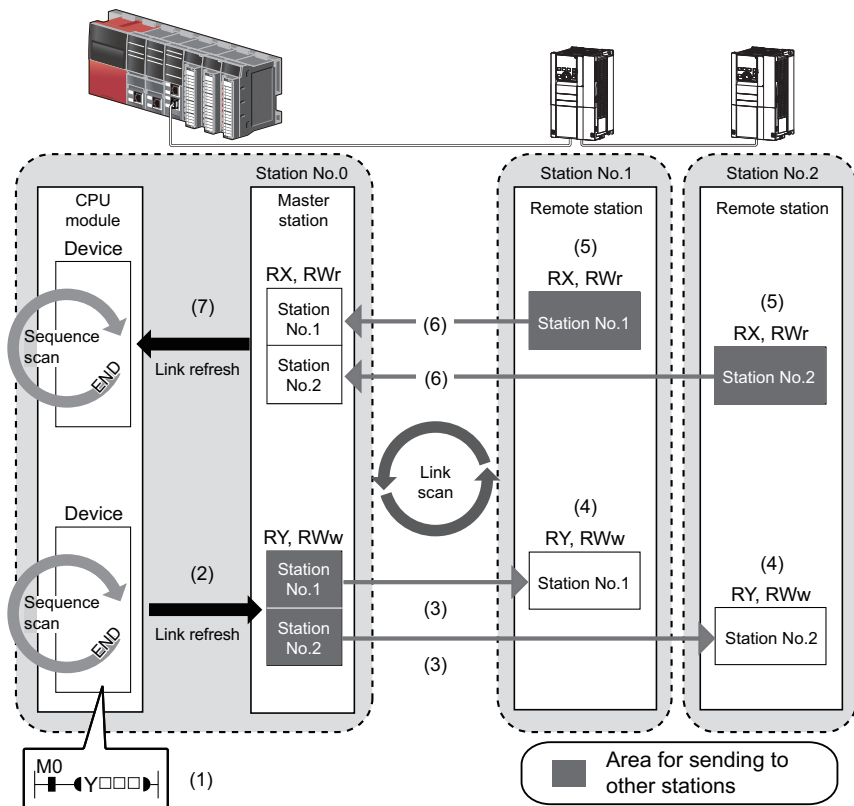
Data communication is available periodically among stations on the same network. Link devices (RX, RY, RWr, and RWw) are used.

6.3.1 Data flow and link device assignment

◆ Master and remote stations

One-to-one communication is possible between the master and remote stations.

The status information of the link devices (RY and RWw) of the master station is output to the external device of the remote station, and the input status information from the external device of the remote station is stored in the link devices (RX and RWr) of the master station.



- Output from the master station
 1. The device of the CPU module turns ON.
 2. The device status data of the CPU module are stored in the link devices (RY and RWw) of the master station by link refresh.
 3. The status data of the link devices (RY and RWw) of the master station are stored in the link devices (RY and RWw) of each remote station by link scan.
 4. The inverter starts according to the link device (RY and RWw) conditions (input signals such as STF and STR) of the remote station.
- Input from the remote station
 5. Inverter conditions (output signals such as RUN and SU, monitoring) are stored in the link devices (RX and RWr) of the remote station.
 6. The status data of the link devices (RX and RWr) of the remote station are stored in the link devices (RX and RWr) of the master station by link scan.
 7. The status data of the link devices (RX and RWr) of the master station are stored in the devices of the CPU module by link refresh.



NOTE

- Refer to the MELSEC iQ-R CC-Link IE TSN User's Manual for detailed assignment methods for the link devices and link refresh.

7 I/O SIGNAL

7.1 I/O SIGNAL LIST

7.1.1 Remote I/O (64 points fixed)

Device No. *6	Signal	Refer to page
RYn0	Forward rotation command *3	84
RYn1	Reverse rotation command *3	
RYn2	High-speed operation command (terminal RH function) *1	
RYn3	Middle-speed operation command (terminal RM function) *1	
RYn4	Low-speed operation command (terminal RL function) *1	
RYn5	Jog operation selection (terminal Jog function) *1	
RYn6	Second function selection (terminal RT function) *1	
RYn7	Current input selection (terminal AU function) *1	
RYn8	Selection of automatic restart after instantaneous power failure (terminal CS function) *1*2	

Device No. *6	Signal	Refer to page
RXn0	Forward running	86
RXn1	Reverse running	
RXn2	Running (terminal RUN function) *4	
RXn3	Up to frequency (terminal SU function) *4	
RXn4	Overload alarm (terminal OL function) *4	
RXn5	Instantaneous power failure (terminal IPF function) *4	
RXn6	Frequency detection (terminal FU function) *4	
RXn7	Error (terminal ABC1 function) *4	
RXn8	— (terminal ABC2 function) *4	

Device No. *6	Signal	Refer to page
RYn9	Output stop (terminal MRS function) *1	84
RYnA	Start self-holding selection (terminal STOP function) *1	
RYnB	Reset (terminal RES function) *1	
RYnC to RYnF	Reserved	—
RY(n+1)0 to RY(n+1)2		
RY(n+1)3 to RY(n+1)F	Reserved	—
RY(n+2)0	Monitor command	84
RY(n+2)1	Frequency setting command (RAM)	
RY(n+2)2	Frequency setting command (RAM, EEPROM)	
RY(n+2)3	Torque command / torque limit *7 (RAM)	
RY(n+2)4	Torque command / torque limit *7 (RAM, EEPROM)	
RY(n+2)5	Instruction code execution request	—
RY(n+2)6 to RY(n+3)9	Reserved	
RY(n+3)A	Error reset request flag	84
RY(n+3)B to RY(n+3)F	Reserved	—

Device No. *6	Signal	Refer to page
RXn9 to RXnF	Reserved	—
RX(n+1)0	Pr.313 assignment function (DO0) *5	86
RX(n+1)1	Pr.314 assignment function (DO1) *5	
RX(n+1)2	Pr.315 assignment function (DO2) *5	
RX(n+1)3 to RX(n+1)F	Reserved	—
RX(n+2)0	Monitoring	86
RX(n+2)1	Frequency setting completion (RAM)	
RX(n+2)2	Frequency setting completion (RAM, EEPROM)	
RX(n+2)3	Torque command / torque limit setting completion *7 (RAM)	
RX(n+2)4	Torque command / torque limit setting completion *7 (RAM, EEPROM)	
RX(n+2)5	Instruction code execution completion	—
RX(n+2)6 to RX(n+3)9	Reserved	
RX(n+3)A	Error status flag	86
RX(n+3)B	Remote station ready	
RX(n+3)C to RX(n+3)F	Reserved	—

- *1 These signals are set in the initial values. Using **Pr.180 to Pr.189**, you can change input signal functions. Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.180 to Pr.189**.
- *2 For the FR-F800 series, no function is assigned in the initial setting.
- *3 The signals are fixed. They cannot be changed using parameters.
- *4 These signals are set in the initial values. Using **Pr.190 to Pr.196**, you can change output signal functions. Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.190 to Pr.196**.
- *5 Output signal can be assigned using **Pr.313 to Pr.315**.
The settings of **Pr.313 to Pr.315** are the same as those of **Pr.190 to Pr.196 (output terminal function selection)**. Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.313 to Pr.315**.
- *6 "n" indicates a value determined according to the station number setting.
- *7 The signal is valid only for the FR-A800 series.

7.1.2 Remote register (128 words fixed)

Address *5	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWwn	Set frequency (0.01 Hz increments)		88
RWwn+1	Reserved		—
RWwn+2	Torque command / torque limit **1*2		88
RWwn+3	Reserved		—
RWwn+4	PID set point (0.01% increments) *3		88
RWwn+5	PID measured value (0.01% increments) *3		
RWwn+6	PID deviation (0.01% increments) *3		
RWwn+7 to RWwn+F	Reserved		—
RWwn+10	Link parameter extended setting	Instruction code *4	88
RWwn+11	Write data		
RWwn+12	Link parameter extended setting	Instruction code *4	
RWwn+13	Write data		
RWwn+14	Link parameter extended setting	Instruction code *4	
RWwn+15	Write data		
RWwn+16	Link parameter extended setting	Instruction code *4	
RWwn+17	Write data		
RWwn+18	Link parameter extended setting	Instruction code *4	
RWwn+19	Write data		

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWrn	Reply code		91
RWrn+1	Reserved		—
RWrn+2	Reply code ^{*1}		91
RWrn+3	Reserved		—
RWrn+4	Reply code		91
RWrn+5	Reply code		
RWrn+6	Reply code		
RWrn+7 to RWrn+F	Reserved		—
RWrn+10	Reply code		91
RWrn+11	Read data ^{*4}		
RWrn+12	Reply code		
RWrn+13	Read data ^{*4}		
RWrn+14	Reply code		
RWrn+15	Read data ^{*4}		
RWrn+16	Reply code		
RWrn+17	Read data ^{*4}		
RWrn+18	Reply code		
RWrn+19	Read data ^{*4}		

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWwn+1A	Link parameter extended setting	Instruction code ^{*4}	88
RWwn+1B	Write data		
RWwn+1C to RWwn+1F	Reserved		—
RWwn+20	Reserved		—
RWwn+21	Fault history No.		88
RWwn+22 to RWwn+25	Reserved		—
RWwn+26	Monitor code 1		88
RWwn+27	Monitor code 2		
RWwn+28	Monitor code 3		
RWwn+29	Monitor code 4		
RWwn+2A	Monitor code 5		
RWwn+2B	Monitor code 6		
RWwn+2C	Monitor code 7		
RWwn+2D	Monitor code 8		
RWwn+2E	Monitor code 9		
RWwn+2F	Monitor code 10		

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWrn+1A	Reply code		91
RWrn+1B	Read data ^{*4}		
RWrn+1C to RWrn+1F	Reserved		—
RWrn+20	Error status		91
RWrn+21	Fault history No.	Fault record (fault data)	
RWrn+22	Fault record (output frequency)		
RWrn+23	Fault record (output current)		
RWrn+24	Fault record (output voltage)		
RWrn+25	Fault record (energization time)		
RWrn+26	First monitor value		
RWrn+27	Second monitor value		
RWrn+28	Third monitor value		
RWrn+29	Fourth monitor value		
RWrn+2A	Fifth monitor value		
RWrn+2B	Sixth monitor value		
RWrn+2C	Seventh monitor value		
RWrn+2D	Eighth monitor value		
RWrn+2E	Ninth monitor value		
RWrn+2F	Tenth monitor value		

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWwn+30 to RWwn+40	Reserved		—

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWrn+30	Output frequency		91
RWrn+31	Reserved		—
RWrn+32	Output current		91
RWrn+33	Output voltage		
RWrn+34	Reserved		—
RWrn+35	Frequency setting value		91
RWrn+36	Running speed		
RWrn+37	Motor torque		
RWrn+38	Converter output voltage		
RWrn+39	Regenerative brake duty		
RWrn+3A	Electric thermal relay function load factor		
RWrn+3B	Output current peak value		
RWrn+3C	Converter output voltage peak value		
RWrn+3D	Input power		
RWrn+3E	Output power		
RWrn+3F	Input terminal status		
RWrn+40	Output terminal status		

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWwn+41 to RWwn+54	Reserved		—

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWwn+41	Load meter		91
RWwn+42	Motor excitation current		
RWwn+43	Position pulse ^{*1}		
RWwn+44	Cumulative energization time		
RWwn+45	Reserved		—
RWwn+46	Orientation status ^{*1}		91
RWwn+47	Actual operation time		
RWwn+48	Motor load factor		
RWwn+49	Cumulative power		
RWwn+4A	Position command (lower digits) ^{*1}		
RWwn+4B	Position command (upper digits) ^{*1}		
RWwn+4C	Current position (lower digits) ^{*1}		
RWwn+4D	Current position (upper digits) ^{*1}		
RWwn+4E	Droop pulse (lower digits)		
RWwn+4F	Droop pulse (upper digits) ^{*1}		
RWwn+50	Torque command ^{*1}		
RWwn+51	Torque current command ^{*1}		
RWwn+52	Motor output		
RWwn+53	Feedback pulse ^{*1}		
RWwn+54	Torque (positive polarity for driving torque/ negative polarity for regenerative braking torque) ^{*1}		

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWwn+55 to RWwn+6C	Reserved	—	RWrn+55
			Heat sink temperature
			RWrn+56
			Trace status
			RWrn+57
			Reserved
			RWrn+58
			PLC function user monitor 1
			RWrn+59
			PLC function user monitor 2
			RWrn+5A
			PLC function user monitor 3
			RWrn+5B
			Station number (RS-485 terminals)
			RWrn+5C
			Station number (PU)
			RWrn+5D
			Station number (CC-Link / CC-Link IE TSN)
			RWrn+5E
			Motor temperature ^{*1}
			RWrn+5F to RWrn+61
			Reserved
			RWrn+62
			Power saving effect
			RWrn+63
			Cumulative saving power
			RWrn+64
			PID set point
			RWrn+65
			PID measured value
			RWrn+66
			PID deviation
			RWrn+67 to RWrn+69
			Reserved
			RWrn+6A
			Option input terminal status 1
			RWrn+6B
			Option input terminal status 2
			RWrn+6C
			Option output terminal status

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWwn+6D to RWwn+7F	Reserved		—

Address ^{*5}	Description		Refer to page
	Upper 8 bits	Lower 8 bits	
RWrn+6D	Motor thermal load factor		91
RWrn+6E	Inverter thermal load factor		
RWrn+6F	Reserved		—
RWrn+70	PTC thermistor value		91
RWrn+71	Reserved		—
RWrn+72			
RWrn+73	PID measured value 2		91
RWrn+74	Emergency drive status		
RWrn+75	PID input pressure value ^{*6}		—
RWrn+76	Reserved		
RWrn+77	Cumulative pulse ^{*1}		91
RWrn+78	Cumulative pulse carrying-over times ^{*1}		
RWrn+79	Cumulative pulse (control terminal option) ^{*1}		
RWrn+7A	Cumulative pulse carrying-over times (control terminal option) ^{*1}		
RWrn+7B	Multi-revolution counter ^{*1}		
RWrn+7C to RWrn+7F	Reserved		—

^{*1} Valid only for the FR-A800 series.

^{*2} The torque limit is available only when the inverter supports this function. (Refer to [page 98](#).)

^{*3} Validity depends on the **Pr.128**, **Pr.609**, and **Pr.610** settings. For the details, refer to the Instruction Manual (Detailed) of the inverter. If the data outside the range is set, the previous setting is retained.

^{*4} Instructions will be processed in the order they are received. Thus, the read value of an instruction may differ at different timings if other writing requests are being made.

^{*5} "n" indicates a value determined according to the station number setting.

^{*6} Valid only for the FR-F800 series.

7.2 Details of remote input and output signals

The following device No. are those for station 1.

For stations 2 and later, the device No. are different. (Refer to the master module manual for correspondence between the device No. and station number)

7.2.1 Output signals (master module to inverter (FR-A8NCG))

The output signals from the master module are indicated. (Input signals to inverter)

Device No.	Signal	Description	
RY0	Forward rotation command	0: Stop command 1: Forward rotation start	• When "1" is set, a start command is input to the inverter. When "1" is set in RY0 and RY1, a stop command is input. • The signals are fixed. They cannot be changed using parameters.
RY1	Reverse rotation command	0: Stop command 1: Reverse rotation start	
RY2	High-speed operation command (terminal RH function)	• Functions assigned to terminals RH, RM, RL, JOG, RT, AU, CS, MRS, STOP and RES are activated. • Signal names are initial values. Using Pr.180 to Pr.189 , you can change input signal functions. Note that some of signals do not accept a command from the network according to the Pr.338 and Pr.339 settings. For example, RYB reset (terminal RES function) cannot be controlled via network. Refer to the Instruction Manual (Detailed) of the inverter for the details of Pr.180 to Pr.189, Pr.338, and Pr.339 .	
RY3	Middle-speed operation command (terminal RM function)		
RY4	Low-speed operation command (terminal RL function)		
RY5	Jog operation selection (terminal JOG function)		
RY6	Second function selection (terminal RT function)		
RY7	Current input selection (terminal AU function)		
RY8	Selection of automatic restart after instantaneous power failure (terminal CS function) *1		
RY9	Output stop (terminal MRS function)		
RYA	Start self-holding selection (terminal STOP function)		
RYB	Reset (RES terminal function)		

Device No.	Signal	Description
RY20	Monitor command	When "1" is set in the monitor command (RY20), the monitored value is set in the remote register RWr26 to RWr2F, and "1" is set in the monitoring (RX20). While "1" is set in the monitor command (RY20), the monitored data is always updated.
RY21	Frequency setting command (RAM)	When "1" is set in the frequency setting command (RY21), the set frequency (RWw0) is written to RAM of the inverter. While "1" is set, the set frequency (RWw0) is always applied. After the writing completes, "1" is set in the frequency setting completion (RX21).
RY22	Frequency setting command (RAM, EEPROM)	When "1" is set in the frequency setting command (RY22), the set frequency (RWw0) is written to RAM and EEPROM of the inverter. After the writing completes, "1" is set in the frequency setting completion (RX22). To change the frequency consecutively, be sure to write data only to the inverter RAM.
RY23	Torque command / torque limit (RAM) ^{*2}	When "1" is set in the torque command / torque limit (RY23), the set torque command / torque limit (RWw2) is written to RAM of the inverter. After the writing completes, "1" is set in the torque command / torque limit setting completion (RX23). The following value is written to RAM. <ul style="list-style-type: none"> • During torque control ^{*3}: Torque command value • During speed control / position control: Torque limit value
RY24	Torque command / torque limit (RAM, EEPROM) ^{*2}	When "1" is set in the torque command / torque limit (RY24), the set torque command / torque limit (RWw2) is written to RAM and EEPROM of the inverter. After the writing completes, "1" is set in the torque command / torque limit setting completion (RX24). The following value is written to RAM and EEPROM. <ul style="list-style-type: none"> • During torque control ^{*3}: Torque command value • During speed control / position control: Torque limit value To change the torque command or the torque limit consecutively, be sure to write data to the inverter RAM.
RY25	Instruction code execution request	When "1" is set in the instruction code execution request (RY25), processes corresponding to the instruction codes set to RWw10, 12, 14, 16, 18 and 1A are executed. "1" is set in the instruction code execution request (RX25) after completion of instruction codes. When an instruction code execution error occurs, a value other than "0" is set in the reply code (RWr10, 12, 14, 16, 18 and 1A).
RY3A	Error reset request flag	When "1" is set in the error reset request flag (RY3A) at an inverter fault, the inverter is reset, then "0" is set in the error status flag (RX3A). Refer to page 59 for operation conditions of inverter reset.

*1 For the FR-F800 series, no function is assigned in the initial setting.

*2 The signal is valid only for the FR-A800 series.

*3 Torque control cannot be performed with a PM motor.

7.2.2 Input signals (inverter (FR-A8NCG) to master module)

The input signals to the master module are indicated. (Output signals from inverter)

Device No.	Signal	Description
RX0	Forward running	0 : Other than forward running (during stop or reverse rotation) 1 : Forward running
RX1	Reverse running	0 : Other than reverse running (during stop or forward rotation) 1 : Reverse running
RX2	Running (terminal RUN function)	<ul style="list-style-type: none">• Functions assigned to terminals RUN, SU, OL, IPF, FU, ABC1 and ABC2 activate.• Signal names are initial values. Using Pr.190 to Pr.196, you can change output signal functions. Refer to the Instruction Manual (Detailed) of the inverter for details of Pr.190 to Pr.196.
RX3	Up to frequency (terminal SU function)	
RX4	Overload alarm (terminal OL function)	
RX5	Instantaneous power failure (terminal IPF function)	
RX6	Frequency detection (terminal FU function)	
RX7	Fault (terminal ABC1 function)	
RX8	— (terminal ABC2 function)	<ul style="list-style-type: none">• Functions assigned to Pr.313 to Pr.315 are activated.• No signal is assigned in the initial setting. Use Pr.313 to Pr.315 to assign signals to the devices RX10 to RX12. The settings of Pr.313 to Pr.315 are the same as those of Pr.190 to Pr.196 (output terminal function selection). Refer to the Instruction Manual (Detailed) of the inverter for details of Pr.313 to Pr.315.
RX10	— (DO0 function)	
RX11	— (DO1 function)	
RX12	— (DO2 function)	

Device No.	Signal	Description
RX20	Monitoring	After "1" is set in the monitor command (RY20), and the monitored value is set in the remote register RWr26 to RWr2F, "1" is set in this signal. When "0" is set in the monitor command (RY20), "0" is set in this signal.
RX21	Frequency setting completion (RAM)	After "1" is set in the frequency setting command (RY21) and the set frequency is written to the inverter RAM, "1" is set in this signal. When "0" is set in the frequency setting command (RY21), "0" is set in this signal.
RX22	Frequency setting completion (RAM, EEPROM)	After "1" is set in the frequency setting command (RY22) and the set frequency is written to the inverter RAM and EEPROM, "1" is set in this signal. When "0" is set in the frequency setting command (RY22), "0" is set in this signal.
RX23	Torque command / torque limit setting completion (RAM) *1	After "1" is set in the torque command / torque limit (RY23) and the torque command / torque limit value is written to the inverter RAM, "1" is set in this signal. When "0" is set in the torque command / torque limit (RY23), "0" is set in this signal.
RX24	Torque command / torque limit setting completion (RAM, EEPROM) *1	After "1" is set in the torque command / torque limit (RY24) and the torque command / torque limit value is written to the inverter RAM and EEPROM, "1" is set in this signal. When "0" is set in the torque command / torque limit (RY24), "0" is set in this signal.
RX25	Instruction code execution completion	After "1" is set in the instruction code execution request (RY25) and the processes corresponding to the instruction codes (RWw10, 12, 14, 16, 18 and 1A) are executed, "1" is set in this signal. When "0" is set in the instruction code execution request (RY25), "0" is set in this signal.
RX3A	Error status flag	When an inverter error occurs (protective function is activated), "1" is set in this signal.
RX3B	Remote station ready	When the inverter is ready for communication upon completion of initial setting after power-ON or a hardware reset, "1" is set in this signal. When an inverter error occurs (protective function is activated), "0" is set in this signal.

*1 The signal is valid only for the FR-A800 series.

7.3 Details of remote register

7.3.1 Remote register (master module to inverter (FR-A8NCG))

◆ Remote register definition

Device No.	Signal	Description
RWw0	Set frequency ^{*1*2}	<ul style="list-style-type: none"> Specify the set frequency or rotations per minute (machine speed). At this time, whether to write to RAM or EEPROM is decided with the RY21 and RY22 settings. After setting the set frequency in this register, set "1" in RY21 or RY22 to write the frequency. After writing of frequency is completed, "1" is set in RX21 or RX22 in response to the input command. The setting range is 0 to 590.00 Hz (0.01 Hz increments). Write "59000" when setting 590.00 Hz.
RWw2 ^{*5*6}	Torque command value	Specify the torque command value / torque limit value. Set Pr.804 Torque command source selection = "1, 3, 5, or 6" to activate this signal under Real sensorless vector control, vector control, and PM sensorless vector control. The value is written to the inverter either by RY23 or RY24. Pr.805 Torque command value (RAM) and Pr.806 Torque command value (RAM, EEPROM) are updated as well. The setting range and setting increments depend on the Pr.804 setting. (Refer to page 98 .)
	Torque limit value ^{*7}	
RWw4	PID set point ^{*3}	Set the PID set point Setting range: "0 to 100.00%"
RWw5	PID measured value ^{*3}	Set the PID measured value Setting range: "0 to 100.00%"
RWw6	PID deviation ^{*3}	Set the PID deviation. Setting range: "-100.00% to 100.00%"
RWw10, RWw12, RWw14, RWw16, RWw18, RWw1A	Link parameter extended setting/ Instruction code	Set an instruction code (refer to page 93) for an operation such as operation mode switching, parameter read/write, alarm reference, and alarm clear in the lower eight bits. The instructions are executed in the following order by setting "1" in RY25 after completing the register setting: RWw10, 12, 14, 16, 18, then 1A. After completing the execution up to RWw1A, "1" is set in RX25. Set HFFF to disable an instruction by RWw10 to 1A. Set the link parameter extended setting in the upper eight bits. Example) When reading Pr.160 , instruction code is H0200.

Device No.	Signal	Description
RWw11, RWw13, RWw15, RWw17, RWw19, RWw1B	Write data	Set the data specified by the instruction code of RWw10, 12, 14, 16, 18 and 1A (when required). RWw10, 12, 14, 16, 18, and 1A correspond to RWw11 13, 15, 17, 19, and 1B, respectively. Set "1" in RY25 after setting the instruction codes (RWw10, 12, 14, 16, 18, and 1A) and the corresponding register. Set "0" when the write code is not required.
RWw21	Fault history No. *4	Set the individual fault number of the fault history that you want to read. Up to the 8th previous fault can be read. Last two digits: H00 (Latest fault) to H07 (8th latest fault) Set H08 to HFF to make the fault history No. to "0."
RWw26	Monitor code 1 *4	Set the monitor code to be monitored (refer to page 97). By setting "1" in RY20 after setting, the specified monitored data is stored in RWw26 to RWw2F. If a monitor code out of the setting range is set, no item is monitored (the monitor value is fixed to 0).
RWw27	Monitor code 2 *4	
RWw28	Monitor code 3 *4	
RWw29	Monitor code 4 *4	
RWw2A	Monitor code 5 *4	
RWw2B	Monitor code 6 *4	
RWw2C	Monitor code 7 *4	
RWw2D	Monitor code 8 *4	
RWw2E	Monitor code 9 *4	
RWw2F	Monitor code 10 *4	

- *1 Setting increment differs according to the combination of **Pr.37**, **Pr.144**, and **Pr.811**. (**Pr.811** is only available for the FR-A800 series.) Refer to the Instruction Manual (Detailed) of the inverter for the details.
- *2 When **Pr.541 Frequency command sign selection** = "1", the setting value has either + or -. When the setting value is negative, the command is the inverse from the command.
Setting range: -327.68 Hz to 327.67 Hz (-327.68 to 327.67) 0.01 Hz increments.
For details refer to [page 67](#).
- *3 Validity depends on the **Pr.128**, **Pr.609**, and **Pr.610** settings. For the details, refer to the Instruction Manual (Detailed) of the inverter. If the data outside the range is set, the previous setting is retained.
- *4 Write data is in hexadecimal, and only two digits are valid. (The upper two digits are ignored.)
- *5 The signal is valid only for the FR-A800 series.
- *6 The value in RWw2 is used as the torque limit value during speed control or position control, and as the torque command value during torque control. (Torque control cannot be performed with a PM motor.) To use the value as the torque limit value, set **Pr.810** = "2".
- *7 This setting is available only when the inverter supports this function. (Refer to [page 98](#).)

7.3.2 Remote register (inverter (FR-A8NCG) to master module)

◆ Remote register definition

Device No.	Signal	Description
RWr0	Reply code	When "1" is set in RY21 or RY22, the following reply codes are set for the frequency setting command. The setting value "0" is set normally, and a value other than "0" is set at an error. H0000: Normal H0001: Write mode fault H0003: Setting range fault
RWr2	Reply code *1	When "1" is set in RY23 or RY24, the following reply codes are set for the torque command / torque limit. The setting value "0" is set normally, and a value other than "0" is set at an error. H0000: Normal H0003: Setting range fault
RWr4, RWr5, RWr6	Reply code	When the PID command (RWw4 to RWw6) is set, the following reply code is set for the PID command. The setting value "0" is set normally, and a value other than "0" is set at an error. H0000: Normal H0003: Setting range fault
RWr10, RWr12, RWr14, RWr16, RWr18, RWr1A	Reply code	When "1" is set in RY25, the following reply codes corresponding to the instruction code RWw10, 12, 14, 16, 18, and 1A are set. The setting value "0" is set normally, and a value other than "0" is set at an error. H0000: Normal H0001: Write mode fault H0002: Parameter selection fault H0003: Setting range fault
RWr11, RWr13, RWr15, RWr17, RWr19, RWr1B	Read data	For a normal reply, the reply data to the instruction specified by the instruction code is set.
RWr20	Error status	The setting value "0" is set during normal inverter operation, and the data code of the corresponding error is set at an error. (For the data codes or details of fault records, refer to the Instruction Manual (Detailed) of the inverter.)
RWr21	Fault record (fault data)	The data code of fault history No. specified by RWw21 is stored in the lower 8bits. Lower 8 bits of RWw21 will be reverted back to the upper 8 bits.

Device No.	Signal	Description
RWr22	Fault record (output frequency)	Output frequency of the fault history No. specified in RWw21 is stored.
RWr23	Fault record (output current)	Output current of the fault history No. specified in RWw21 is stored.
RWr24	Fault record (output voltage)	Output voltage of the fault history No. specified in RWw21 is stored.
RWr25	Fault record (energization time)	Energization time of the fault history No. specified in RWw21 is stored.
RWr26	First monitor value	When "1" is set in RY20, the monitored data specified by the monitor code RWw26 to RWw2F is saved. Output frequency, output current, and output voltage monitors are held at an inverter failure.
RWr27	Second monitor value	
RWr28	Third monitor value	
RWr29	Fourth monitor value	
RWr2A	Fifth monitor value	
RWr2B	Sixth monitor value	
RWr2C	Seventh monitor value	
RWr2D	Eighth monitor value	
RWr2E	Ninth monitor value	
RWr2F	Tenth monitor value	
RWr30 to RWr7F	Monitor value	Fixed monitored data are saved regardless of the RY20 setting. Output frequency, output current, and output voltage monitors are held at an inverter failure.

*1 The signal is valid only for the FR-A800 series.

7.3.3 Instruction codes

◆ Instruction code definition

Set the instruction code using a remote register (RWw) (refer to [page 88](#)).

The definition read by the instruction code is stored in the remote register (RWr) (refer to [page 91](#)).

Item		Read/ write	Code number	Description
Operation mode		Read	H7B	H0000: Network operation mode H0001: External operation mode, External JOG operation mode H0002: PU operation mode, External/PU combined operation modes 1 and 2, PUJOG operation mode
		Write	HFB	H0000: Network operation mode H0001: External operation mode H0002: PU operation mode (Pr.79 = "6", Pr.340 = "10 or 12")
Monitor	Output frequency *1*2	Read	H6F	H0000 to HFFFF: Running frequency: 0.01 Hz increments *3 Speed (machine speed): 1 increments *3
	Output current	Read	H70	H0000 to HFFFF: Output current (hexadecimal): Increments 0.01 A/0.1 A *5
	Output voltage	Read	H71	H0000 to HFFFF: Output voltage (hexadecimal): Increments 0.1 V
	Special monitor	Read	H72	H0000 to HFFFF: Check the data of the monitor selected by the instruction code HF3.
	Special monitor selection No.	Read	H73	H01 to HFF: Selection of the monitored item (monitor code) (Refer to page 97 .) If a monitor code out of the range is set, a range error occurs.
		Write	HF3 *4	

Item		Read/ write	Code number	Description
Monitor	Fault history	Read	H74 to H77	H0000 to HFFFF: Last two fault records <div><div><div>b15b8b7b0</div><div>H74<div>Second latest fault</div><div>Latest fault</div></div><div>H75<div>Fourth latest fault</div><div>Third latest fault</div></div><div>H76<div>Sixth latest fault</div><div>Fifth latest fault</div></div><div>H77<div>Eighth latest fault</div><div>Seventh latest fault</div></div></div> <div>For instruction code H74, read data H30A0 <div><div>b15b8b7b0</div><div><div>0011000010100000</div></div></div><div><div>Second latest fault (H30)</div><div>Latest fault (HA0)</div></div><div><div>↓</div></div><div><div>Second latest fault THT</div><div>Latest fault OPT</div></div></div><p>For the data codes or details of fault records, refer to the Instruction Manual (Detailed) of the inverter.</p></div>
	Set frequency (RAM)			Read
Set frequency (EEPROM)	H6E	• H0000 to H270E (0 to 9998): Speed (machine speed) in 1 increments *3		

Item	Read/ write	Code number	Description
Set frequency (RAM) * ⁶	Write	HED	Write set frequency/speed (machine speed) to RAM or EEPROM. • H0000 to HE678 (0 to 590.00 Hz): Set frequency in 0.01 Hz increments * ³
Set frequency (RAM and EEPROM) * ⁶	Write	HEE	• H0000 to H270E (0 to 9998): Speed (machine speed) 1 increments * ³ • To change the set frequency consecutively, write data to the inverter RAM. (Instruction code: HED)
Parameter	Read	H00 to H6B	<ul style="list-style-type: none"> • Refer to the instruction code in the Instruction Manual (Detailed) of the inverter to read and write as required. Write to Pr.77 and Pr.79 is disabled. When setting Pr.100 and later, set link parameter extended setting. • Set 65520 (HFFF0) as a parameter value "8888" and 65535 (HFFFF) as "9999". • When changing the parameter values frequently, set "1" in Pr.342 to write them to the RAM. (Refer to the Instruction Manual (Detailed) of the inverter for the details of Pr.342.)
	Write	H80 to HEB	
Fault history batch clear	Write	HF4	H9696: Clears the fault history as a batch.
Parameter clear All parameter clear	Write	HFC	<p>All parameters return to the initial values. Whether communication parameters are also cleared or not depends on the data.</p> <ul style="list-style-type: none"> • Parameter clear H9696: Communication parameters are cleared. H5A5A*⁷: Communication parameters are not cleared. • All parameter clear H9966: Communication parameters are cleared. H55AA*⁷: Communication parameters are not cleared. <p>Refer to the Instruction Manual (Detailed) of the inverter for Parameter clear, All parameter clear, and communication parameters. When clear is executed with H9696 or H9966, communication parameters also return to the initial values. When resuming operation, set the parameters again. Executing clear will clear the instruction code HEC, HF3, and HFF settings.</p>
Inverter reset	Write	HFD	H9696: Resets the inverter.

Item	Read/ write	Code number	Description
Second parameter changing *8	Read	H6C	Read or write of bias and gain parameters (instruction codes H5E to H61 and HDE to HE1 with the link parameter extended setting = "1", H11 to H23 and H91 to HA3 with the link parameter extended setting = "9"). H00: Frequency *9 H01: Analog value set in parameters H02: Analog value input from the terminal
	Write	HEC	

- *1 When "100" is set in **Pr.52 Operation panel main monitor selection**, set frequency is monitored during a stop and output frequency is monitored during running.
- *2 When position control is selected for the FR-A800 series, the number of pulses is monitored when **Pr.430** ≠ "9999".
- *3 Displayed increments differ according to the combination of **Pr.37**, **Pr.144**, and **Pr.811**. (**Pr.811** is only available for the FR-A800 series.) For the details, refer to the Instruction Manual (Detailed) of the inverter.
- *4 Write data is in hexadecimal, and only two digits are valid. (The upper two digits are ignored.)
- *5 Differs according to capacities.
- *6 Setting from remote registers (RWw0) can be made.
- *7 Turning OFF the power supply while clearing parameters with H5A5A or H55AA sets back the communication parameter settings back to the initial values.
- *8 Reading or writing is available when the link parameter extended setting = "1 or 9".
- *9 Gain frequencies can be written using **Pr. 125** (instruction code H99) and **Pr. 126** (instruction code H9A) also.



NOTE

- When the 32-bit parameter setting or monitor description are read and the read value exceeds HFFFF, the reply data will be HFFFF.

7.3.4 Monitor codes

Information about the inverter can be monitored by setting the special monitor selection No. of the instruction code and monitor code using the remote registers, RWw26 to 2F.



NOTE

- The monitor codes (monitor items) are the same as those of the Mitsubishi inverter protocol (computer link communication) dedicated monitor of the inverter. For the details of the monitor code and monitor description, refer to the section of the monitor display in the Instruction Manual (Detailed) of the inverter.
- When the remote registers RWw26 to 2F are used for monitoring, H01 (output frequency) and H05 (set frequency) always indicate the frequency regardless of the settings of **Pr.37**, **Pr.144**, and **Pr.811**. (**Pr.811** is only available for the FR-A800 series.)

7.4 Torque command / torque limit through CC-Link IE TSN communication (only for the FR-A800 series)

Torque commands can be given or the torque can be limited via CC-Link IE TSN under Real sensorless vector control, vector control, or PM sensorless vector control. The value is used to limit the torque during speed control or position control, and to give a torque command during torque control. To limit the torque, set **Pr.810** = "2". The torque command / torque limit setting method can be selected using **Pr.804 Torque command source selection**. (Torque control cannot be performed with a PM motor.)

Pr.	Name	Initial value	Setting range	Description
804	Torque command source selection	0	0	Torque command by terminal 1 analog input
			1	Torque command / torque limit through CC-Link IE TSN communication (FR-A8NCG) • Torque command / torque limit (-400% to 400%) by the parameter setting (Pr.805 or Pr.806) ^{*1*2}
			3	• Torque command / torque limit (-400% to 400%) by the remote register R _{Ww2} ^{*2}
			4	Torque command by 16-bit digital input (FR-A8AX)
			5	Torque command / torque limit through CC-Link IE TSN communication (FR-A8NCG) • Torque command / torque limit (-327.68% to 327.67%) by the parameter setting (Pr. 805 or Pr. 806) ^{*1*2}
			6	• Torque command / torque limit (-327.68% to 327.67%) by the remote register R _{Ww2} ^{*2}
810	Torque limit input method selection	0	0	Internal torque limit (torque limited by parameter settings)
			1	External torque limit (torque limited by terminals 1 and 4)
			2	Internal torque limit 2 (torque limited by communication options)

*1 Can also be set from operation panel or parameter unit.

*2 When a negative value is set as the torque limit, the torque is limited by the absolute value.

◆ RWw2 function according to the parameter settings and the control mode

Set the torque command value or the torque limit value in RWw2. The RWw2 function is switched according to the **Pr.804** and **Pr.810** settings and the control mode.

Pr.804 setting	Pr.810 setting	RWw2 function	
		Speed control / position control	Torque control
1, 3, 5, 6	2	Torque limit	Torque command
	0, 1	RWw2 disabled	Torque command
0, 4	—	RWw2 disabled	RWw2 disabled

◆ Relationship between the Pr.804 setting, the setting range, and the actual torque command / torque limit (when setting is made from CC-Link IE TSN communication)

Pr.804 setting	Setting range	Actual torque command	Actual torque limit
1, 3	600 to 1400 (1% increments) *1	-400 to 400%	0 to 400%
5, 6	-32768 to 32767 (two's complement) *1	-327.68 to 327.67%	0 to 327.67%

*1 The torque limit setting is defined as an absolute value.

◆ Torque command / torque limit setting method

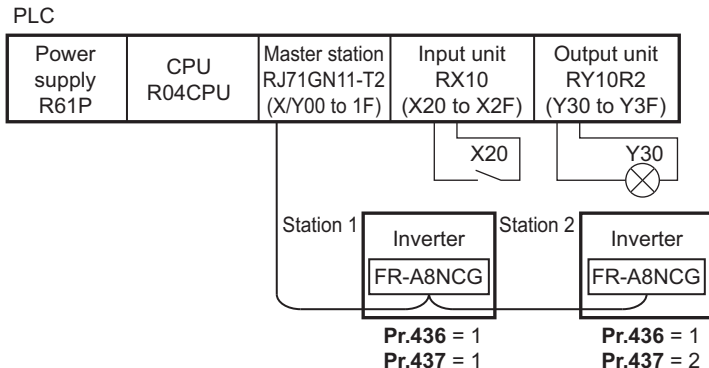
Setting method	Setting procedure
Writing in RWw2	<ol style="list-style-type: none"> 1. Set the torque command / torque limit value in RWw2. 2. Set "1" in RY23 (or RY24).
Writing in Pr.805 or Pr.806	<ol style="list-style-type: none"> 1. Set link parameter extended setting = H08 for RWw10 (12, 14, 16, 18, 1A). 2. Set instruction codes H85 or H86 3. Set the torque command / torque limit value in RWw11 (13, 15, 17, 19, 1B). 4. Set "1" in RY25.

8 PROGRAMMING EXAMPLES

This chapter provides programming examples which control the inverter with sequence programs.

Item	Program example	Refer to page
Reading the inverter status	Reading the inverter status from the buffer memory of the master station	105
Setting the operation mode	Selecting the Network operation mode	106
Setting the operation commands	Commanding the forward rotation and middle speed signals	107
Setting the monitoring function	Monitoring the output frequency	108
Reading a parameter value	Reading the value of Pr.7 Acceleration time	109
Writing a parameter value	Setting "3.0 s" in Pr.7 Acceleration time	111
Setting the running frequency (running speed)	Setting to 50.00 Hz	113
Reading the fault records	Reading the inverter faults	115
Inverter reset	Perform inverter reset at an inverter alarm occurrence.	116

◆ System configuration for programming example



◆ Module parameter setting of the master station

In the programming example, module parameter are set as below.

- Module Information

Item	Setting condition
Station Type	CC-Link IE TSN (master station)
Start I/O	0000
Network No.	1
No.	2
Network Configuration Settings	Refer to the following.
Refresh Setting	Refer to the following.

- Network configuration (assignment method: start/end)

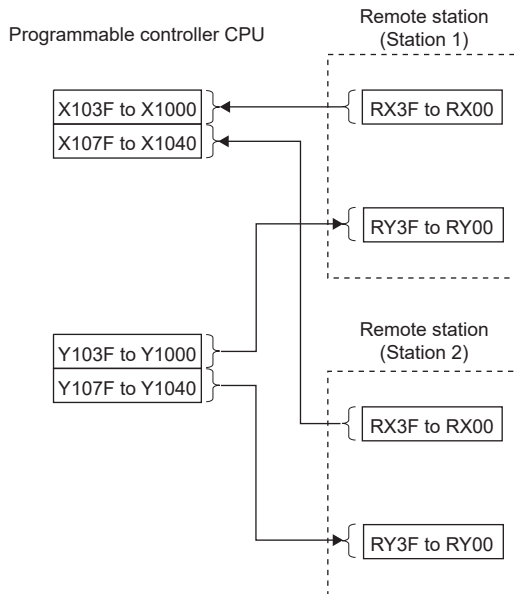
Item		Setting condition	
		Module 1	Module 2
Station number		1	2
Station type		Remote station	Remote station
RX/RX setting	Start	0000	0040
	End	003F	007F
RWw/RWr setting	Start	0000	0080
	End	007F	00FF
Reserved station/error invalid station		No setting	No setting

- Refresh Setting (assignment method: start/end)

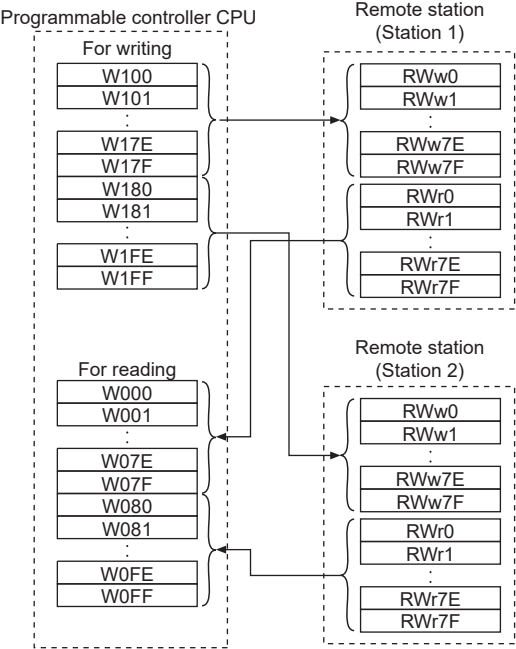
Link side			Master side		
Device name	Start	End	Device name	Start	End
SB	0000	01FF	SB	0000	01FF
SW	0000	01FF	SW	0000	01FF
RX	0000	007F	X	1000	107F
RY	0000	007F	Y	1000	107F
RWr	0000	00FF	W	000000	0000FF
RWw	0000	00FF	W	000100	0001FF

◆ Schematic diagram of remote I/O and remote register

- The remote I/O (RX, RY) transmitted between the programmable controller CPU and remote stations

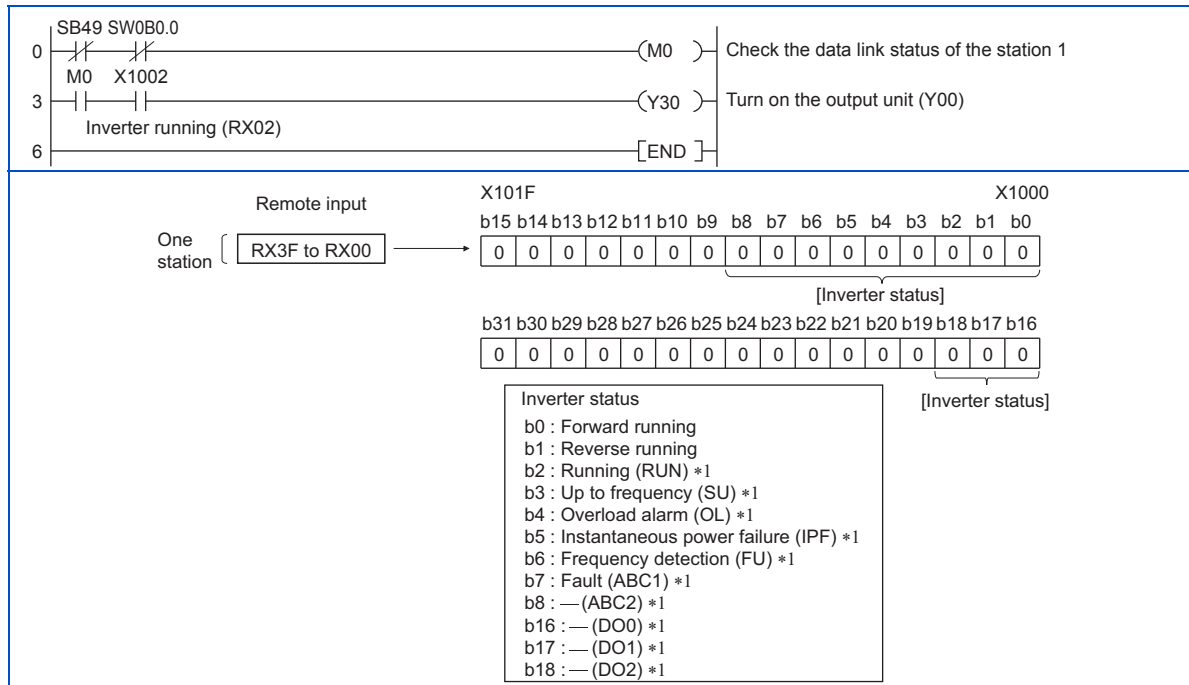


- The remote registers (RWw, RWr) transmitted between the programmable controller CPU and remote stations



8.1 Programming example for reading the inverter status

The following program turns ON Y00 of the output unit when station 1 inverter is running.



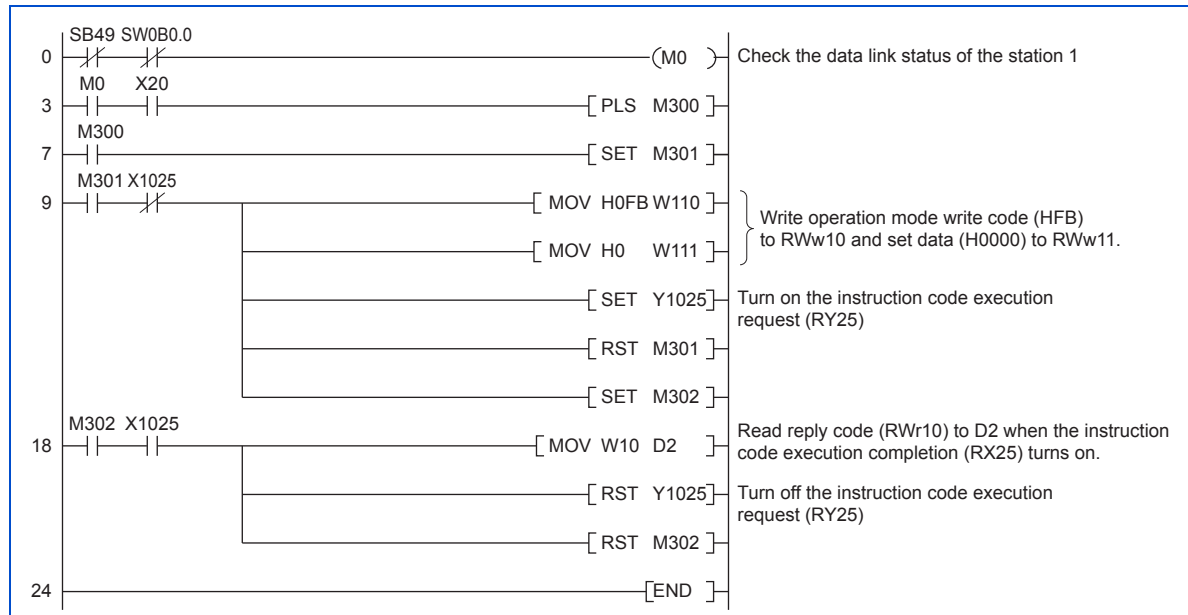
*1 These signals are initial values. You can change output signals using **Pr.190 to Pr.196, Pr.313 to Pr.315 (output terminal function selection)**.

8.2 Programming example for setting the operation mode

The following explains a program to write various data to the inverter.

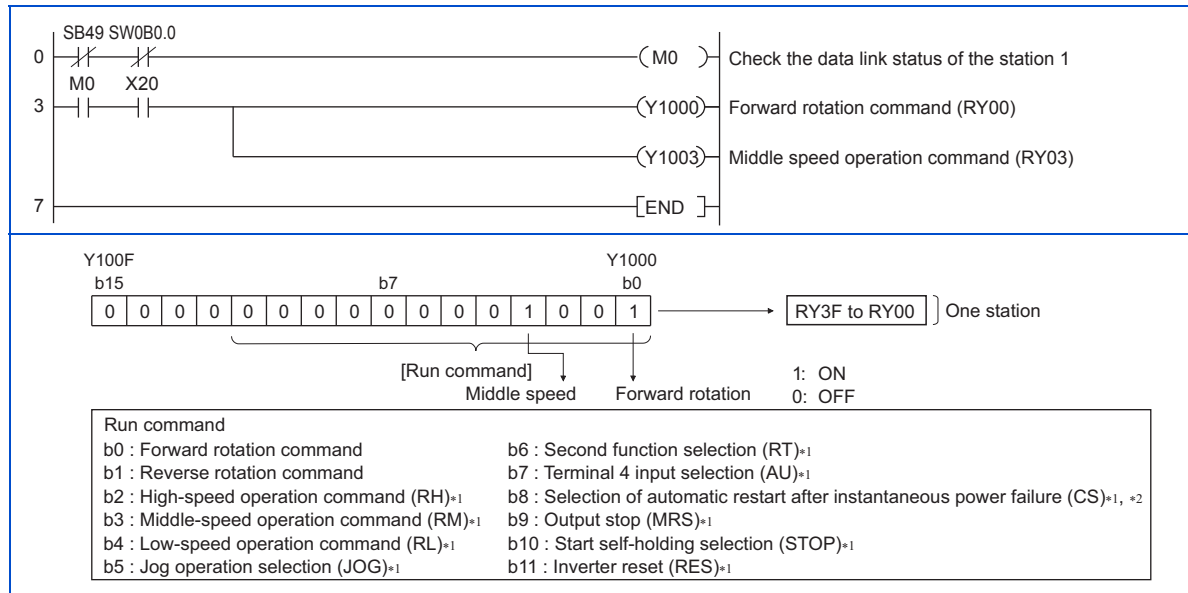
The following explains a program to change the operation mode of station 1 inverter to network operation.

- Operation mode write code: HFB (hexadecimal)
- Network operation set data: H0000 (hexadecimal) (Refer to [page 93](#))
- The reply code at the time of instruction code execution is set to D2. (RWr10: Refer to [page 91](#))



8.3 Programming example for setting the operation commands

The following program gives a forward command and middle speed command to station 1 inverter



*1 These signals are initial values. You can change input signals using **Pr.180 to Pr.189 (input terminal function selection)**. Note that some of the signals do not receive a command from the programmable controller depending on the setting. (Refer to the Instruction Manual (Detailed) of the inverter for the details.)

*2 For the FR-F800 series, no function is assigned in the initial setting.

8.4 Programming example for monitoring the output frequency

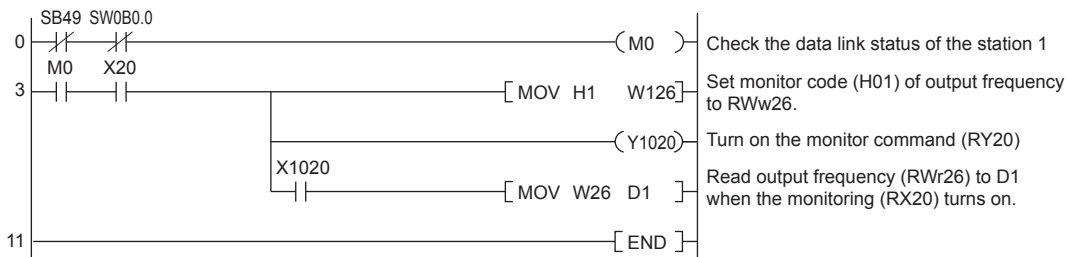
The following explains a program to read monitor functions of the inverter.

The following program reads the output frequency of station 1 inverter to D1.

Output frequency read code: H0001 (hexadecimal)

For the monitor codes, refer to [page 97](#).

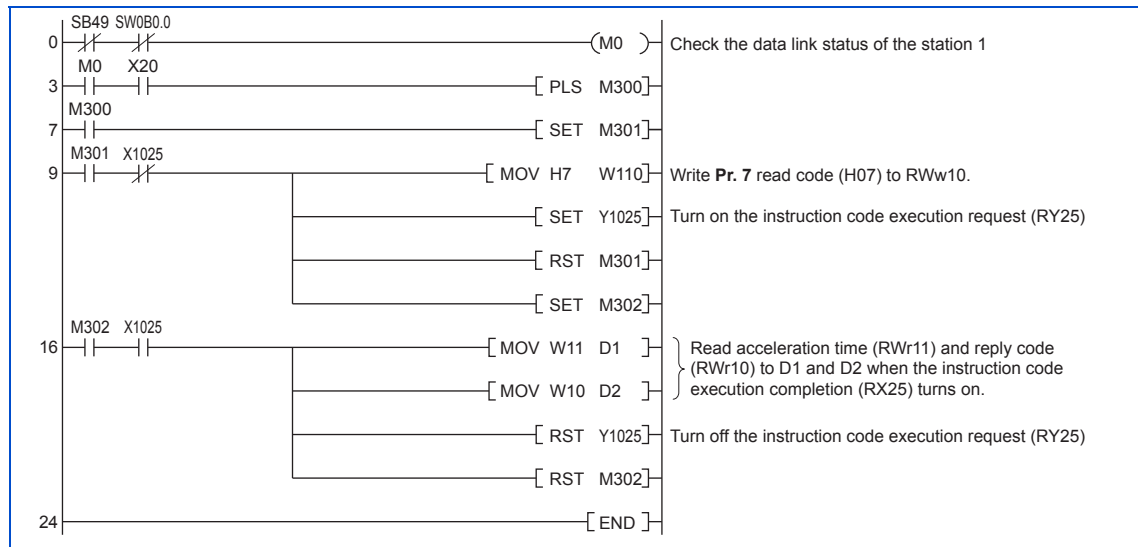
(Example) The output frequency of 60 Hz is indicated as H1770 (6000).



8.5 Programming example for parameter reading

The following program reads **Pr.7 Acceleration time** of station 1 inverter to D1.

- **Pr.7 Acceleration time** reading instruction code: H07 (hexadecimal)
- Refer to the Instruction Manual (Detailed) of the inverter for details of the parameter instruction code.
- The reply code at the time of instruction code execution is set to D2. (RWr10: Refer to [page 91](#))





NOTE

- For parameters having numbers 100 and later, change their link parameter extended settings (set them to other than H00). Refer to the Instruction Manual (Detailed) of the inverter.
-

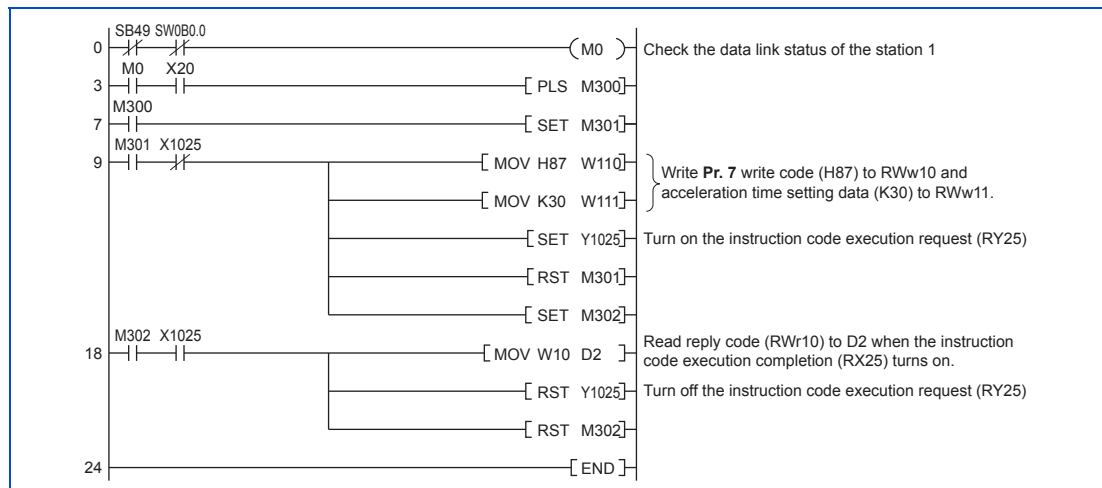
8.6 Programming example for parameter writing

The following program changes the setting of **Pr.7 Acceleration time** of inverter to 3.0 s.

- Acceleration time writing instruction code: H87 (hexadecimal)
- Acceleration time set data: K30 (decimal)

For the parameter instruction code, refer to the Instruction Manual (Detailed) of the inverter.

The reply code at the time of instruction code execution is set to D2. (RWr10: Refer to [page 91](#))





NOTE

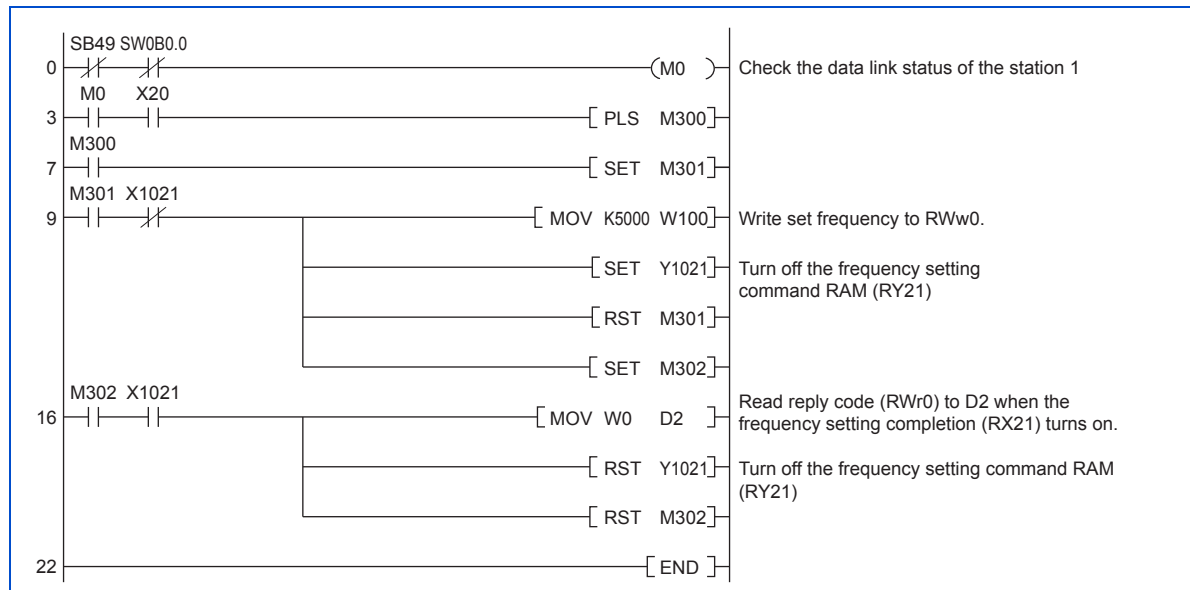
- For parameters having numbers 100 and later, change their link parameter extended settings (set them to other than H00). Refer to the parameter list of the Instruction Manual (Detailed) of the inverter for settings.
 - For other functions, refer to the instruction codes (Refer to [page 93](#)).
-

8.7 Programming example for setting the running frequency

◆ The following program example changes the running frequency of station 1 inverter to 50.00 Hz

Set frequency: K5000 decimal

The reply code at the time of instruction code execution is set to D2. (RWr0: Refer to [page 91](#))



◆ To continuously change the running frequency from the programmable controller

After the frequency setting complete (for example, X1021) turns ON, check that the reply code from the remote register is H0000, then change the setting data (for example, W100) continuously.

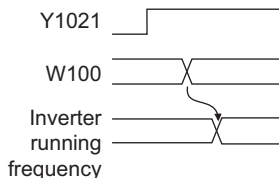
◆ Program example for writing data to EEPROM

Modify the following commands of the programming example on [page 113](#).

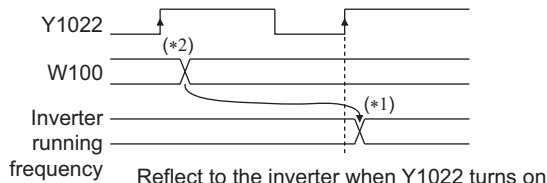
Frequency setting command Y1021 → Y1022

Frequency setting completion X1021 → X1022

<Timing chart when writing to RAM>



<Timing chart when writing to EEPROM>



*1 For EEPROM, write is made only once when Y1022 is switched on.

*2 If the set data is changed with Y1022 on, it is not reflected on the inverter.

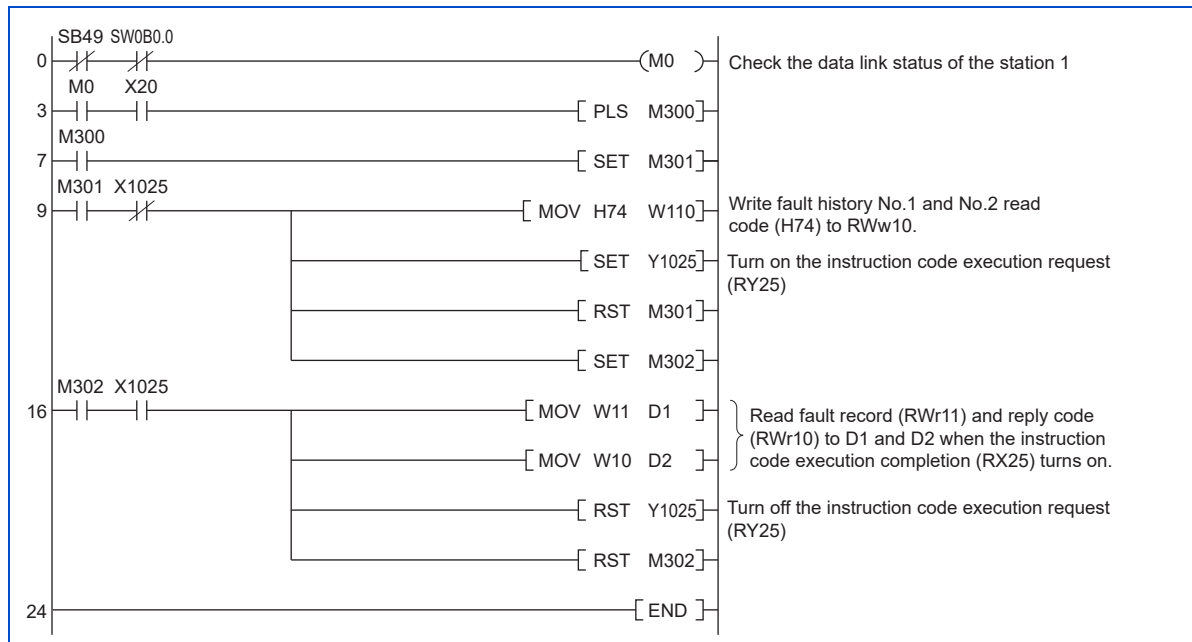
8.8 Programming example for fault record reading

The following program reads fault records of station 1 inverter to D1.

- Fault history No. 1, No. 2 reading instruction code: H74 (hexadecimal)

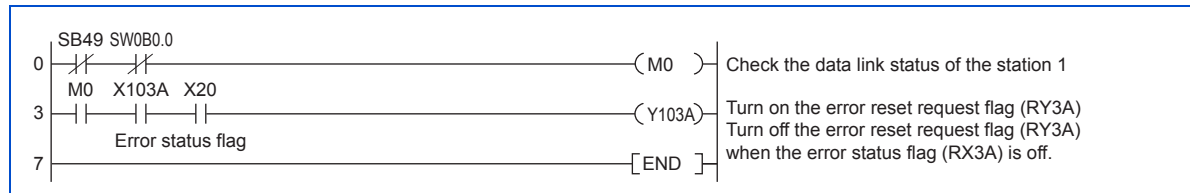
For the error code, refer to the Instruction Manual (Detailed) of the inverter.

The reply code at the time of instruction code execution is set to D2. (RWr10: Refer to [page 91](#))



8.9 Programming example for resetting the inverter at inverter error

The following is a program example for resetting station 1 inverter at inverter error.



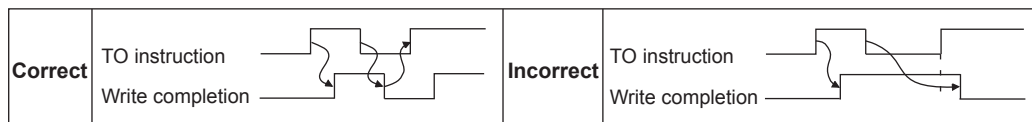
NOTE

- The above inverter reset using RY3A may be made only when an inverter error occurs. When **Pr.349 Communication reset selection/Ready bit status selection/Reset selection after inverter faults are cleared/DriveControl writing restriction selection** is set to "0, 100, 1000, 1100, 10000, 10100, 11000, or 11100", inverter reset is available in any operation mode.
- When using the instruction code execution request (RY25) with the instruction code (HFD) and data (H9696) to reset the inverter, set a value other than "0" in **Pr.340 Communication startup mode selection** or change the operation mode to the Network operation mode. (For the program example, refer to [page 106](#))
- Refer to [page 59](#) for operation conditions of inverter reset.

8.10 Instructions

◆ Programming instructions

- Since the buffer memory data of the master station is kept transferred (refreshed) to/from the inverters, the TO instruction need not be executed every scan in response to data write or read requests. The execution of the TO instruction every scan does not pose any problem.
- If the FROM/TO instruction is executed frequently, data may not be written reliably. When transferring data between the inverter and sequence program via the buffer memory, perform the handshake to confirm that data has been written without error.



◆ Operating and handling instructions

- Command only from the programmable controller can be accepted during CC-Link IE TSN communication. The run command from external and parameter unit is ignored.
- If different inverters have the same station number, the communication cannot be performed properly.
- The inverter protective function (E.OP1) is activated if data communication stops for more than the time set in **Pr.500 Communication error execution waiting time** due to a programmable controller fault, an open Ethernet cable etc. during CC-Link IE TSN operation.
- If the programmable controller (master station) is reset during CC-Link IE TSN operation or if the programmable controller is powered OFF, data communication stops and the inverter protective function (E.OP1) is activated. To reset the programmable controller (master station), switch the operation mode to the External operation once, then reset the programmable controller.
- When **Pr.340** = "0 (initial value)", any inverter whose main power is restored is reset to return to the External operation mode. To resume the Network operation, therefore, set the operation mode to the Network operation using the programmable controller program. Set a value other than "0" in **Pr.340** to start in the Network operation mode after inverter reset.

◆ Troubleshooting

Description	Check point
Operation mode does not switch to the Network operation mode	Check that the option unit (FR-A8NCG) and Ethernet cables are fitted properly. (Check for contact fault, break in the cable, etc.)
	Check if Pr.436 IP address 3 and Pr.437 IP address 4 are correctly set. (Check that their settings match with the program, that the network number is set within the range, that no overlapping stations exist, and that the station number is set within the range.)
	Check that the inverter is in the External operation mode.
	Check that the operation mode switching program is running.
	Check that the operation mode switching program has been written correctly.
Inverter does not start in the Network operation mode	Check that the inverter starting program is running.
	Check that the inverter starting program has been written correctly.
	Check that Pr.338 Communication operation command source is not set to external.

9 PROTECTIVE FUNCTIONS

The causes of warnings and faults and corrective actions to be taken are as follows.

◆ Warning

When the protective function is activated, the inverter does not shut off the output.

Operation panel indication	DIP		FR-LU08	DIP
Name	Duplicate IP address			
Description	Appears when a duplicate IP address is detected.			
Check point	Check if the IP address is set to other devices on the network.			
Corrective action	Set a unique IP address. (Refer to page 61 .)			

Operation panel indication	IP		FR-LU08	IP
Name	IP address fault			
Description	Appears when the station number switches are set to "0 or 255" and the value set for IP address or subnet mask is out of range.			
Check point	<ul style="list-style-type: none">• Check if the same station number is set to other devices on the network.• Check that the subnet mask setting value is appropriate.			
Corrective action	<ul style="list-style-type: none">• Set a unique station number. (Refer to page 61.)• Set the subnet mask (Pr.438 to Pr.441) correctly. (Refer to page 64.)			

APPENDIX

Appendix 1 Instructions for EAC

The product certified in compliance with the Eurasian Conformity has the EAC marking on the packaging plate.

Note: EAC marking

In 2010, three countries (Russia, Belarus, and Kazakhstan) established a Customs Union for the purposes of revitalizing the economy by forming a large economic bloc by abolishing or reducing tariffs and unifying regulatory procedures for the handling of articles.

Products to be distributed over these three countries of the Customs Union must comply with the Customs Union Technical Regulations (CU-TR), and the EAC marking must be affixed to the products.

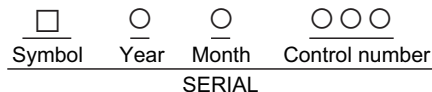
For information on the country of origin, manufacture year and month, and authorized sales representative (importer) in the CU area of this product, refer to the following:

- Country of origin indication
Check the package of this product.

Example: MADE IN JAPAN

- Manufactured year and month

Check the SERIAL number indicated on this product.



The SERIAL consists of one symbol, two characters indicating the production year and month, and three characters indicating the control number. The last digit of the production year is indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).

- Authorized sales representative (importer) in the CU area

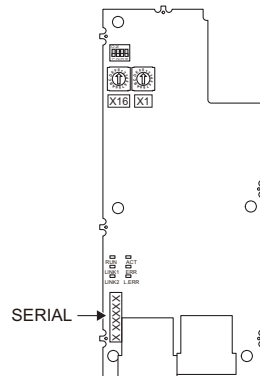
The authorized sales representative (importer) in the CU area is shown below.

Name: Mitsubishi Electric Turkey A.S. Head Office

Address: Serifali Mahallesi Kale Sokak. No:41 34775 Umraniye, Istanbul, Turkey

Phone: +90-216-969-25-00

Fax: +90-216-661-44-47



Appendix 2 Restricted Use of Hazardous Substances in Electronic and Electrical Products

The mark of restricted use of hazardous substances in electronic and electrical products is applied to the product as follows based on the "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products" of the People's Republic of China.

电器电子产品有害物质限制使用标识要求



本产品中所含有的有害物质的名称、含量、含有部件如下表所示。

产品中有害物质的名称及含有的信息表										
部件名称 *2	有害物质 *1									
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBBs)	多溴二苯醚 (PBDEs)	邻苯二甲酸 二正丁酯 (DBP)	邻苯二甲酸 二异丁酯 (DIBP)	邻苯二甲酸 丁苄酯 (BBP)	邻苯二甲酸二 (2-乙基)己酯 (DEHP)
电路板组件（包括印刷电路板及其构成的零部件，如电阻、电容、集成电路、连接器等）、电子部件	×	○	○	○	○	○	○	○	○	○
金属壳体、金属部件	×	○	○	○	○	○	○	○	○	○
树脂壳体、树脂部件	○	○	○	○	○	○	○	○	○	○
螺丝、电线	○	○	○	○	○	○	○	○	○	○
注 1：○：表示该有害物质在该部件所有均质材料中的含量均不超出电器电子产品有害物质限制使用国家标准要求。 ×：表示该有害物质至少在该部件的某一均质材料中的含量超出电器电子产品有害物质限制使用国家标准要求。 注 2：以上未列出的部件，表明其有害物质含量均不超出电器电子产品有害物质限制使用国家标准要求。										

*1 即使表中记载为 ×，根据产品型号，也可能会有有害物质的含量为限制值以下的情况。

*2 根据产品型号，一部分部件可能不包含在产品中。

Appendix 3 Referenced Standard (Requirement of Chinese standardized law)

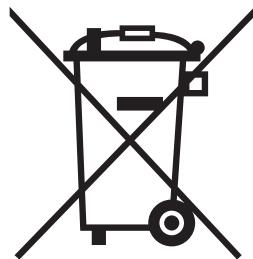
This Product is designed and manufactured accordance with following Chinese standards.

EMC: GB/T 12668.3

Appendix 4 Regarding Directive on Waste Electrical and Electronic Equipment

This symbol mark is for EU countries only, and is according to the directive 2012/19/ EU Article 14 Information for users and Annex IX.

This symbol mark means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from your household waste.



Appendix 5 Compliance with the UK certification scheme

We declare that this product conforms with the related technical requirements under UK legislation when installed in a compatible inverter, and affix the UKCA (UK Conformity Assessed) marking on the packaging plate.

Approval conditions are the same as those for the EU Directives. (Refer to the Instruction Manual enclosed with the plug-in option.)



UKCA marking:

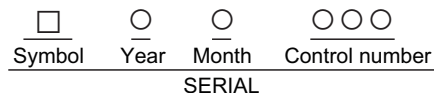
The UKCA marking is used for products sold in the markets of Great Britain (England, Wales, and Scotland) from January 1, 2021 after the departure of the UK from the EU on January 31, 2020.

Appendix 6 How to check specification changes

Check the SERIAL number indicated on the inverter rating plate or packaging. For how to read the SERIAL number, refer to the Instruction Manual of the inverter.

Check the board of the FR-A8NCG for its SERIAL number.

- SERIAL number of the FR-A8NCG



The SERIAL consists of one symbol, two characters indicating the production year and month, and three characters indicating the control number. The last digit of the production year is indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).

◆ **Functions/specifications available for the FR-A8NCG manufactured in September 2020 or later**

- Ring topology (Available for inverters supporting the FR-A8NCG regardless of their SERIALs.)
- Transmission speed of 100 Mbps
- Backup/restore function (For details, refer to the Instruction Manual (Detailed) of the inverter.)

Use the FR-A8NCG in the inverters which have the following SERIAL.

FR-A800 series

Model	Country of origin indication	SERIAL number
FR-A820-00046(0.4K) to 04750(90K) FR-A840-00023(0.4K) to 06830(280K) FR-A842-07700(315K) to 12120(500K) FR-A846-00023(0.4K) to 03610(132K)	MADE in Japan	□09○○○○○○ or later
	MADE in China	□0X○○○○○○ or later

FR-A800 Plus series

Model	Country of origin indication	SERIAL number
FR-A820-00046(0.4K) to 04750(90K)-CRN FR-A840-00023(0.4K) to 06830(280K)-CRN FR-A842-07700(315K) to 12120(500K)-CRN	MADE in Japan	□09○○○○○○ or later
	MADE in China	□0X○○○○○○ or later

FR-F800 series

Model	Country of origin indication	SERIAL number
FR-F820-00046(0.75K) to 04750(110K) FR-F840-00023(0.75K) to 06830(315K) FR-F842-07700(355K) to 12120(560K) FR-F846-00023(0.75K) to 03610(160K)	MADE in Japan	□09○○○○○○ or later
	MADE in China	□0X○○○○○○ or later

◆ **Functions/specifications available for the FR-A8NCG manufactured in October 2022 or later**

- CC-Link IE TSN authentication Class A
- Protocol version 2.0

◆ **Functions/specifications available for the FR-A8NCG manufactured in December 2025 or later**

- CC-Link IE Field Network mode

REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision Date	*Manual Number	Revision
Apr. 2019	IB(NA)-0600837ENG-A	First edition
Aug. 2020	IB(NA)-0600837ENG-B	Added <ul style="list-style-type: none">• Ring topology• Transmission speed of 100 Mbps
Sep. 2022	IB(NA)-0600837ENG-C	Added <ul style="list-style-type: none">• CC-Link IE TSN authentication Class A• Protocol version 2.0
Aug. 2023	IB(NA)-0600837ENG-D	Added <ul style="list-style-type: none">• Regarding Directive on Waste Electrical and Electronic Equipment
Nov. 2025	IB(NA)-0600837ENG-E	Added <ul style="list-style-type: none">• CC-Link IE Field Network mode

INVERTER

mitsubishi electric corporation

HEAD OFFICE: TOKYO BUILDING 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN