# MITSUBISHI ELECTRIC

INVERTER
Plug-in option
# FR-A8NC
INSTRUCTION MANUAL

CC-Link *communication function*

800 series

**Thank you for choosing this Mitsubishi inverter plug-in option.**
**This Instruction Manual provides handling information and precautions for use of the equipment. Incorrect handling might cause an unexpected fault. Before using this inverter, always read this Instruction Manual carefully to use the equipment to its optimum performance.**
**Please forward this Instruction Manual to the end user.**

<table>
<tr><td colspan="2" align="center">Safety instructions</td></tr>
<tr><td colspan="2">Do not attempt to install, operate, maintain or inspect the product until you have read through this Instruction Manual and appended documents carefully and can use the equipment correctly. Do not use this product until you have a full knowledge of the equipment, safety information and instructions. In this Instruction Manual, the safety instruction levels are classified into "WARNING" and "CAUTION".</td></tr>
<tr><td>⚠ **Warning**</td><td>Incorrect handling may cause hazardous conditions, resulting in death or severe injury.</td></tr>
<tr><td>⚠ **Caution**</td><td>Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.</td></tr>
<tr><td colspan="2">The ⚠ **Caution** level may even lead to a serious consequence according to conditions. Both instruction levels must be followed because these are important to personal safety.</td></tr>
</table>

◆ **Electric Shock Prevention**

### ⚠ Warning

- While the inverter power is ON, do not open the front cover or the wiring cover. Do not run the inverter with the front cover or the wiring cover removed. Otherwise you may access the exposed high voltage terminals or the charging part of the circuitry and get an electric shock.
- Do not remove the inverter front cover even if the power supply is disconnected. The only exception for this would be when performing wiring and periodic inspection. You may accidentally touch the charged inverter circuits and get an electric shock.
- Before wiring or inspection, LED indication of the inverter unit operation panel must be switched OFF. Any person who is involved in wiring or inspection shall wait for at least 10 minutes after the power supply has been switched OFF and check that there is no residual voltage using a tester or the like. For a short time after the power-OFF, a high voltage remains in the smoothing capacitor, and it is dangerous.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The plug-in option must be installed before wiring. Otherwise you may get an electric shock or be injured.
- Do not touch the plug-in option or handle the cables with wet hands. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise you may get an electric shock.

◆ **Injury Prevention**

### ⚠ Caution

- The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise a burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise a burst, damage, etc. may occur.
- The polarity (+ and -) must be correct. Otherwise a burst 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. Touching these devices may cause a burn.

1

◆ **Additional Instructions**

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

---

## ⚠ Caution

**Transportation and mounting**
- Do not install or operate the plug-in option if it is damaged or has parts missing.
- Do not stand or rest heavy objects on the product.
- The mounting orientation must be 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 halogen-based materials (fluorine, chlorine, bromine, iodine, etc.) infiltrate into a Mitsubishi product, the product will be damaged. Halogen-based materials are often included in fumigant, which is used to sterilize or disinfest wooden packages. When packaging, prevent residual fumigant components from being infiltrated into Mitsubishi products, or use an alternative sterilization or disinfection method (heat disinfection, etc.) for packaging. Sterilization of disinfection of wooden package should also be performed before packaging the product.

**Trial run**
- Before starting operation, each parameter must be confirmed and adjusted. A failure to do so may cause some machines to make unexpected motions.

---

## ⚠ Warning

**Usage**
- Do not modify the equipment.
- Do not perform parts removal which is not instructed in this manual. Doing so may lead to fault or damage of the product.

---

## ⚠ Caution

**Usage**
- When parameter clear or all parameter clear is performed, the required parameters must be set again before starting operations. Because all parameters return to their initial values.
- Static electricity in your body must be discharged before you touch the product.

**Maintenance, inspection and parts replacement**
- Do not carry out a megger (insulation resistance) test.

**Disposal**
- The inverter must be treated as industrial waste.

---

### General instruction

- Many of the diagrams and drawings in this Instruction Manual show the inverter without a cover or partially open for explanation. Never operate the inverter in this manner. The cover must be reinstalled and the instructions in the Instruction Manual must be followed when operating the inverter.

# — CONTENTS —

# 5 FUNCTION OVERVIEW       41

# 6 I/O SIGNAL LIST       44

# 7 DETAILS OF INPUT AND OUTPUT SIGNALS       55

# 8 PROGRAMMING EXAMPLES 74

# 9 HOW TO CHECK FOR ERROR USING THE LEDS 89

# 1 PRE-OPERATION INSTRUCTIONS

## 1.1 Unpacking and product confirmation

Take the plug-in option 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 for the FR-A800 series.

### ◆ Product confirmation

Check the enclosed items.

| Plug-in option ............................................ 1 | Mounting screw (M3 × 8 mm) ............ 3 (Refer to **page 12**.) | Spacer ............ 2 (Refer to **page 12**.) | Communication option LED display cover ............ 1 (Refer to **page 11**.) |
|---|---|---|---|
|  |  |  |  |

| Earth plate ............ 1 (Refer to **page 12**.) | | | |
|---|---|---|---|
|  | | | |

## 1.2    Component names



Pin assignment

SLD    DG DB DA

Connector 1

Connector 2

Front view

Rear view
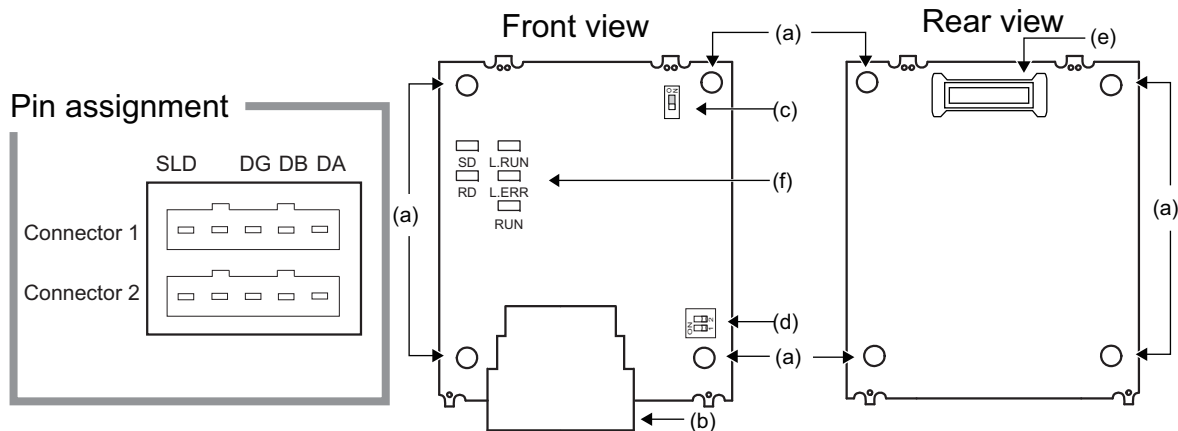
| Symbol | Name | Description | Refer to page |
|--------|------|-------------|---------------|
| a | Mounting hole | Fixes the option to the inverter with screws, or installs spacers. | **12** |
| b | CC-Link communication one-touch connector | CC-Link communication can be performed with the CC-Link communication connector. | **20** |
| c | Switch for manufacturer setting | Switch for manufacturer setting. Do not change the initially-set status (OFF ▭). | — |
| d | Terminating resistor selection switch | Select the resistor value of the terminating resistor. | **15** |
| e | Connector | Connects to the inverter option connector. | **12** |
| f | LED (operation status indicator) | Stays ON or flickers to indicate the operating status. | **8** |

#### ◆ Operation status indication LED

| | |
|---|---|
| L.RUN | Lit when refresh data is properly received. Turns off when a data transmission is stopped for a certain period of time. |
| L.ERR | • Lit when a communication error occurs in the own station and flickers when settings of switch, etc. are changed while power is on.<br>• Flickers when the **Pr.542** or **Pr.543** setting is changed.<br>  Turn the power on again or turn the RES signal on. (Refer to **page 37**, **38**.) |
| RUN | Lit during normal operation (5V is supplied in the board) (Lit even in the non-communication status.)<br>Flickers when the master station is CC-Link Ver.1 and the FR-A8NC is CC-Link Ver.2 compatible. (Refer to **page 9**.) |
| SD | Turns off when no data is transmitted. |
| RD | Lit when the received data carrier is detected. |

・・・・ **NOTE** ・・・・

     • Set the station number using **Pr.542 Communication station number (CC-Link)**. (Refer to **page 37**.)
     • Set transmission baud rate using **Pr.543 Baud rate selection (CC-Link)**. (Refer to **page 38**.)

## 1.3    Inverter option specifications

| | |
|---|---|
| Type | Inverter plug-in option type, one-touch connector connection, online connector (T type (2 to 1)) supported |
| Power supply | Supplied from the inverter |
| Number of units connected | 42 units max. (Refer to **page 44** for the number of stations occupied), May be used with other equipment. |
| Station type | Remote device station |
| Number of stations occupied | CC-Link Ver.1: occupies one station, CC-Link Ver.2: occupies one station (selectable from among double, quadruple and octuple) |
| Communication cable | CC-Link dedicated cable, CC-Link Ver. 1.10 compatible CC-Link dedicated cable |

# 1.4    CC-Link version

## 1.4.1    CC-Link Ver. 1.10

The conventional CC-Link products, whose inter-station cable lengths have equally been changed to 20 cm or more to improve the inter-station cable length restriction, are defined as CC-Link Ver. 1.10. In comparison, the conventional products are defined as CC-Link Ver. 1.00.

Refer to the CC-Link Master Module Manual for the maximum overall cable lengths and inter-station cable lengths of CC-Link Ver. 1.00 and Ver. 1.10.

| **CC-Link Ver. 1.10 compatibility conditions** |
| --- |
| • All modules that comprise a CC-Link system should be compatible with CC-Link Ver. 1.10.<br>• All data link cables should be CC-Link Ver. 1.10 compatible, CC-Link dedicated cables.<br><br> (CC-Link Ver. 1.10 compatible cables have a $CC$-$Link$ logo or Ver. 1.10 indication.) |

> **NOTE**
> • In a system that uses the CC-Link Ver. 1.00 and Ver. 1.10 modules and cables together, the maximum overall cable length and inter-station cable length are as specified for CC-Link Ver. 1.00.

## 1.4.2    CC-Link Ver. 2

The FR-A8NC is compatible with CCLink Ver.2. When using the CC-Link Ver.2 setting  with the FR-A8NC, the master station needs to be compatible with the CCLink Ver.2.

For CC-Link Ver.2, double, quadruple and octuple settings can be used to increase the remote register (RWr/w) points.

Master station (CC-Link Ver.1)          Master station (CC-Link Ver.2)

| CC-Link Ver.1 setting | CC-Link Ver.2 setting | CC-Link Ver.1 setting | CC-Link Ver.2 setting |
| --- | --- | --- | --- |
| ○ | ✕ | ○ | ○ |
| Communication enabled | Communication disabled ("RUN" LED flickers) | Communication enabled | Communication enabled |
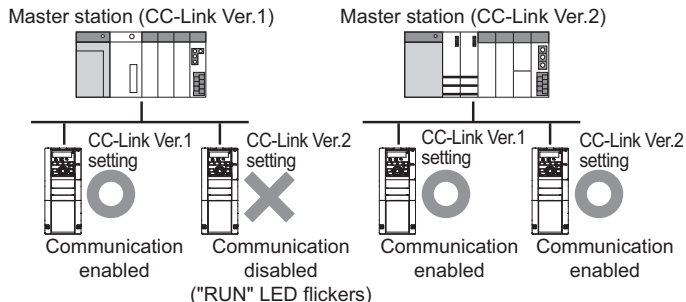
# **2** INSTALLATION

## 2.1　Pre-installation instructions

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

⚠**Caution**

- **With input power ON, do not install or remove the plug-in option. Otherwise, the inverter and plug-in option may be damaged.**
- **To avoid damage due to static electricity, static electricity in your body must be discharged before you touch the product.**

## 2.2    Installation procedure

### ◆ Installation of 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 details on how to remove the front cover.)
Mount the cover for displaying the operation status indication LED for the communication option on the inverter front cover.

(2) Cut off hooks on the rear of the inverter front cover with nipper, etc. and open a window for fitting the LED display cover.



Cut off with a nipper, etc.

Cut off with a nipper, etc.
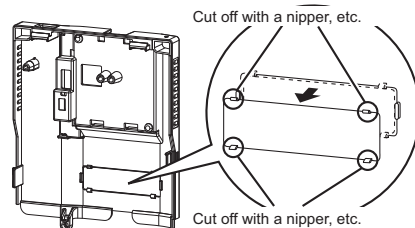
(3) Fit the communication option LED display cover to the front of the inverter front cover and push it into until fixed with hooks.



∗ Fit it so that the position of lenses is in the upper-right of the LED display cover.
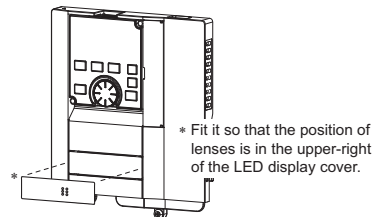
**• ▲ NOTE :**

• The protective structure (JEM1030) changes to the open type (IP00).

---

**⚠Caution**

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

---

#### ◆ Installing the option

(1) For the two mounting holes (as shown in the next page) that will not be tightened with mounting screws, insert spacers.

(2) Fit the connector of the plug-in option to the guide of the connector on the inverter unit side, and insert the plug-in option as far as it goes. (Insert it to the inverter option connector 1.)

(3) Fit the one location on the left of the earth plate (as shown in the next page) securely to the inverter unit by screwing in the supplied mounting screw. (tightening torque 0.33 N·m to 0.40 N·m)

(4) Fit the one location on the left of the plug-in option securely to the inverter unit and the right of the plug-in option to the inverter unit together with the earth plate by screwing in the supplied mounting screws. (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.



Inverter side option connector
Spacer
Spacer
Earth plate

**Insertion positions for screws and spacers**

Do not insert the plug-in option to the connector 2 or 3.

Connector 3

Connector 2

Connector 1

Mounting screw

Spacer

Spacer

Mounting screw

Earth plate

Mounting screw

<div style="border: 2px dotted; padding: 8px; display: inline-block;">🔘 <strong>NOTE</strong></div>

- When mounting/removing the plug-in option, hold the sides of the circuit board. Do not press on the parts on the circuit board. Stress applied to the parts by pressing, etc. may cause a failure.
- Caution must be applied to mounting screws falling off when removing and mounting the plug-in option.
- When using this plug-in option, insert it to the inverter option connector 1. If it is inserted to the option connector 2 or 3, the protective function (E.2 or E.3) is activated and the inverter will not operate.
  Even if the option is inserted to the 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 the left and right, then pull it straight out. Pressure applied to the 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.

## 2.3 Setting of the terminating resistor selection switch

Always set the terminating resistor selection switch (refer to **page 7**) or connect the one-touch connector plug with terminating resistor (refer to **page 20**) to the inverter that is the end station (FR-A8NC) in advance.
The following table lists the specifications of the terminating resistor selection switch.
(In the initial setting, no terminating resistor is set (1: OFF and 2: OFF).)

| Setting | 1 | 2 | Description |
|---------|-----|-----|-------------|
| 1 O 2 N | OFF | OFF | Without terminating resistor (initial setting) |
| 1 O 2 N | ON | OFF | Do not use. |
| 1 O 2 N | OFF | ON | 130 $\Omega$ (resistance value with the CC-Link Ver. 1.00 dedicated high performance cable) |
| 1 O 2 N | ON | ON | 110 $\Omega$ |

# **3** WIRING

## 3.1 Connecting the CC-Link dedicated cable

### 3.1.1 Fabricating the connection cable

In the CC-Link system, use CC-Link dedicated cables.
If the cable used is other than the CC-Link dedicated cable, the performance of the CC-Link system is not guaranteed.
For the specifications of the CC-Link dedicated cable, refer to the website of the CC-Link Partner Association.
 • Website of the CC-Link Partner Association http://www.cc-link.org/
 • One-touch communication connector plug (as of July 2013)
   Refer to the following table for the plug required to fabricate a cable on your own.
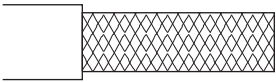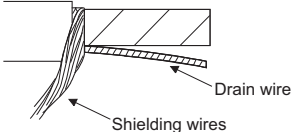
| Model | Manufacturer |
|---|---|
| A6CON-L5P | Mitsubishi Electric Corporation |
| 35505-6000-B0M GF | Sumitomo 3M Limited |

(1) Cable-end treatment
Apply the following treatment to the CC-Link dedicated cable that is inserted to a one-touch communication connector plug.

| 1. Cut the sheath | 2. Separate shielding wires from the drain wire. Cut the shielding wires. |
|---|---|
|  | <br>Drain wire<br>Shielding wires |

| 3. Cut the aluminum tape and braid. | 4. Straighten the drain wire and twist it from the root. (Twist seven times or more per 3 cm.) |
|---|---|
| DA (Blue)<br>DB (White)<br>DG (Yellow)<br>Drain wire | DA (Blue)<br>DB (White)<br>DG (Yellow)<br>Drain wire (AWG20)<br>3 cm |
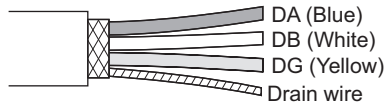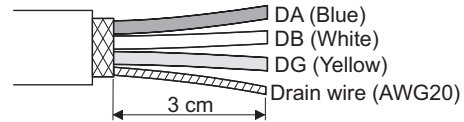
**⚠ NOTE**

- Where possible, round the cable tip that is cut off with a tool such as nippers. If the cable is not rounded, it may get caught in the middle of a plug, without fully entering into the plug.
- If required, apply an insulation treatment to the shielding wire area where it is not covered by the one-touch communication connector plug.

(2) Plug cover check
Check that a plug cover is snapped into a plug
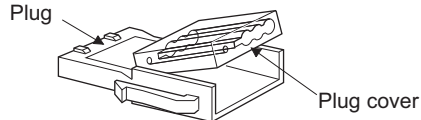
Plug

Plug cover

**⚠ NOTE**

- Do not push the plug cover onto the plug before inserting a cable. Once crimped, the plug cover cannot be reused.

(3) Cable insertion
Lift up the tail of the plug cover, and fully insert a cable.
Insert different signal wires to the one-touch
communication connector plug as shown in the right
figure.



Signal name
DA (Blue)
DB (White)
DG (Yellow)
Not used
SLD (Drain wire)
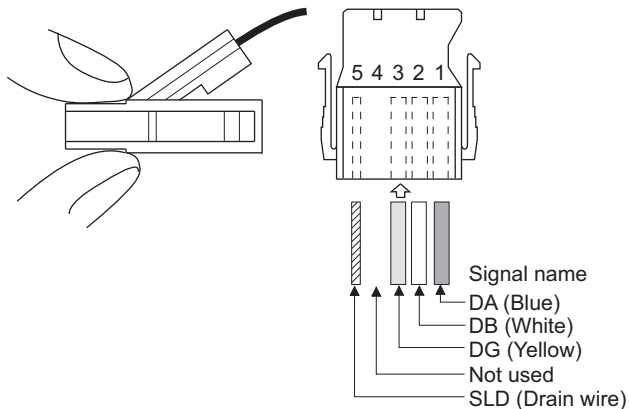
**NOTE**

- Insert the cable fully. Failure to do so may cause a crimping failure.
- A cable sometimes comes out of the head of the cover. In that case, pull the cable a little so that the cable stays under the plug cover.

(4) Crimping the plug cover
Push the plug cover onto the plug with a tool such as pliers. After crimping, check that the plug cover is securely snapped into the plug as shown in the right figure.



**NOTE**

- Misaligned latches between the plug cover and the plug may keep the cover lifted. The plug cover is not sufficiently crimped in this condition. Push the plug cover until it snaps into the plug.
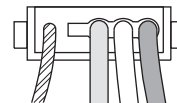
### 3.1.2 Connection to the connector

Connect the CC-Link dedicated cable to the CC-Link communication connector.



CC-Link communication connector

CC-Link dedicated cable
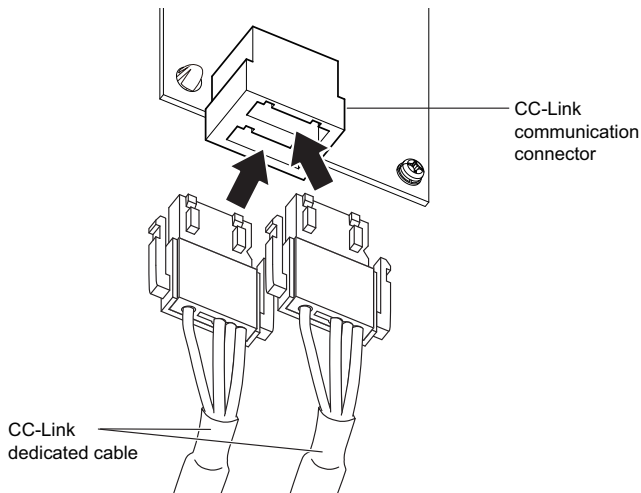
**⟍ NOTE ⟋**

- When wiring cables to the inverter's RS-485 terminals while a plug-in option is 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**

- **Take caution not to subject the cables to stress.**
- **After wiring, wire offcuts must not be left in the inverter. Wire offcuts can cause an alarm, failure or malfunction.**

### 3.1.3 Unit replacement while online

Connect an online communication connector to the CC-Link communication connector. The online communication connector enables a unit replacement without interrupting the communication. Always connect the online communication connector to connector 1 (front side) of the CC-Link communication connector. (Do not connect it to connector 2 (back side) of the CC-Link communication connector. Doing so will cause a failure or breakage of the inverter and the connectors.)
Also connect a one-touch connector plug with terminating resistor to the CC-Link communication connector of FR-A8NC at the end.
(A replacement while online is not available for the units, which are using the built-in terminating resistor selection switches. (Refer to **page 15**.))
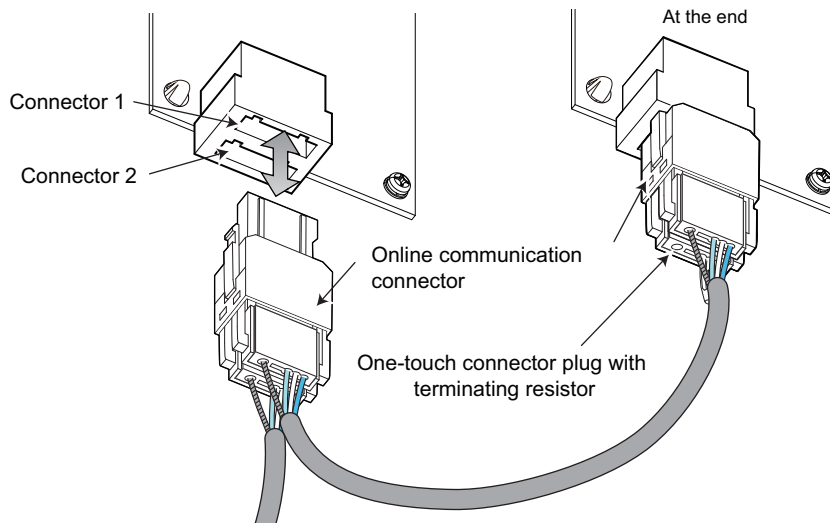
Use the following online communication connector and one-touch connector plug with terminating resistor.
• Online communication connector (as of July 2013)

| Model | Manufacturer |
|---|---|
| 35715-L010-B00 AK | Sumitomo 3M Limited |

• One-touch connector plug with terminating resistor (as of July 2013)

| Model | Manufacturer |
|---|---|
| A6CON-TR11N | Mitsubishi Electric Corporation |

**⟁ NOTE**

• Do not use the online communication connector A6CON-LJ5P (Mitsubishi Electric Corporation) and 35720-L200-B00 AK (Sumitomo 3M Limited) for this product. Doing so will cause a failure or breakage of the inverter and the connectors.

**3**

## 3.2    System configuration example

(1) Programmable controller side
Load the "QJ61BT11N", "L26CPU-BT", "L26CPU-PBT", "LJ61BT11", "A1SJ61QBT11" or "A1SJ61BT11" "CC-Link system 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 plug-in option (FR-A8NC) on the inverter.

(3) Connect the master station of the CC-Link programmable controller unit to the CC-Link communication connector of FR-A8NC with the CC-Link dedicated cable.



Manual of the CC-Link master station
· QJ61BT11N type
  CC-Link System Master/Local Module
  User's Manual ...SH-080394E
· L26CPU-BT type/L26CPU-PBT type/LJ61BT11 type
  CC-Link System Master/Local Module
  User's Manual ...SH-080895E
· A1SJ61QBT11 type
  CC-Link System Master/Local Module
  User's Manual ...IB-66722
· A1SJ61BT11 type
  CC-Link System Master/Local Module
  User's Manual ...IB-66721
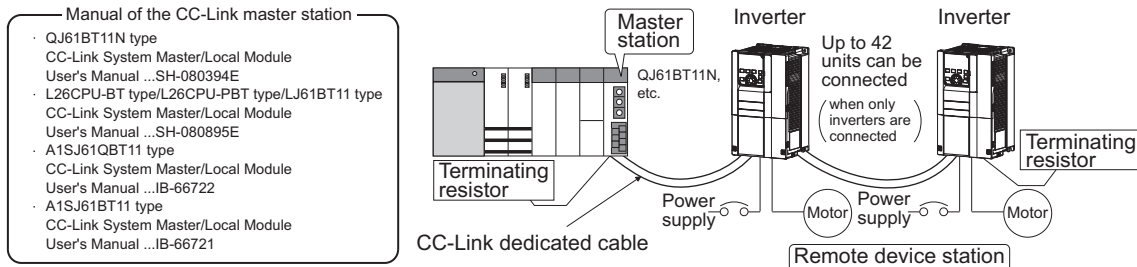
**NOTE**

- When the CPU has automatic refresh function (example: QnA series CPU)
  When the END instruction is executed by the programmable controller CPU, the buffer memory is automatically refreshed to enable communication with a remote device.
- When the CPU does not have automatic refresh function (example: AnA series CPU)
  Sequence ladder logic is configured to perform direct communication with the buffer memory of the master station and to enable communication with a remote device

## 3.3 Connection of several inverters

An inverter can join the link system as a CC-Link remote device station, and such device stations can be controlled and monitored with a user program of a programmable controller. These devices can be useful components of an automated factory.

Connect shielding wires of the CC-Link dedicated cable to "SLD" of each unit.
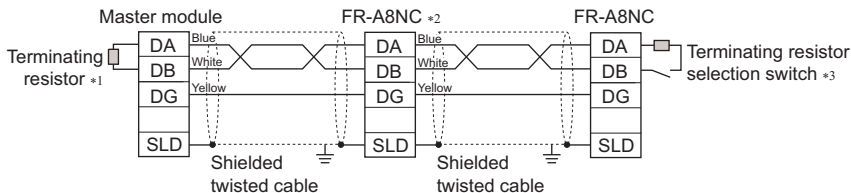


*1 Use the terminating resistors supplied with the programmable controller.
*2 Set "1" and "2" of the terminating resistor selection switch to OFF (without terminating resistor) in the middle units. (Refer to **page 15**.)
*3 Set the terminating resistor selection switch. (Refer to **page 15**.)
  Do not use the built-in terminating resistor selection switch when using a one-touch connecter plug with terminating resistor. (1-OFF, 2-OFF) (Refer to **page 20** for the details of the one-touch connector plug with terminating resistor.)

• Maximum number of units connected to one master station (CC-Link Ver.1.10)
  42 units (when connections are inverters only)

If any other units are included, the number of stations occupied depends on the unit and therefore the following conditions must be satisfied:

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

  a: Number of units occupying 1 station    c: Number of units occupying 3 stations
  b: Number of units occupying 2 stations   d: Number of units occupying 4 stations

$\{(16 \times A) + (54 \times B) + (88 \times C)\} \leq 2304$

  A: Number of remote I/O $\leq 64$
  B: Number of remote device stations $\leq 42$
  C: Number of local, standby master and intelligent device stations $\leq 26$

- Maximum number of units connected to one master station (CC-Link Ver.2.00)
  42 units (when connections are inverter only)

  If any other units are included, the number of stations occupied depends on the unit and therefore the following conditions must be satisfied:
  - $\{(a + a2 + a4 + a8) + (b + b2 + b4 + b8) \times 2 + (c + c2 + c4 + c8) \times 3 + (d + d2 + d4 + d8) \times 4\} \leq 64$
  - $\{(a \times 32 + a2 \times 32 + a4 \times 64 + a8 \times 128) + (b \times 64 + b2 \times 96 + b4 \times 192 + b8 \times 384) + (c \times 96 + c2 \times 160 + c4 \times 320 + c8 \times 640) + (d \times 128 + d2 \times 224 + d4 \times 448 + d8 \times 896)\} \leq 8192$
  - $\{(a \times 4 + a2 \times 8 + a4 \times 16 + a8 \times 32) + (b \times 8 + b2 \times 16 + b4 \times 32 + b8 \times 64) + (c \times 12 + c2 \times 24 + c4 \times 48 + c8 \times 96) + (d \times 16 + d2 \times 32 + d4 \times 64 + d8 \times 128)\} \leq 2048$

    a: Number of single setting devices occupying one station
    b: Number of single setting devices occupying two stations
    c: Number of single setting devices occupying three stations
    d: Number of single setting devices occupying four stations
    a2: Number of double setting devices occupying one station
    b2: Number of double setting devices occupying two stations
    c2: Number of double setting devices occupying three stations
    d2: Number of double setting devices occupying four stations
    a4: Number of quadruple setting devices occupying one station
    b4: Number of quadruple setting devices occupying two stations
    c4: Number of quadruple setting devices occupying three stations
    d4: Number of quadruple setting devices occupying four stations
    a8: Number of octuple setting devices occupying one station
    b8: Number of octuple setting devices occupying two stations
    c8: Number of octuple setting devices occupying three stations
    d8: Number of octuple setting devices occupying four stations
  - $16 \times A + 54 \times B + 88 \times C \leq 2304$

    A: Numbers of remote I/O $\leq 64$
    B: Number of remote device stations $\leq 42$
    C: Number of local and intelligent device stations $\leq 26$

# **4**INVERTER SETTING

## 4.1 Parameter list

The following parameters are used for the plug-in option (FR-A8NC).
Set the values according to need.

| Pr. | Pr. group | Name | Setting range | Minimum setting increments | Initial value | Refer to page |
|---|---|---|---|---|---|---|
| 79 | D000 | Operation mode selection | 0 to 4, 6, 7 | 1 | 0 | **27** |
| 313*1 | M410*1 | DO0 output selection | 0 to 8, 10 to 20, 22, 25 to 28, 30 to 36, 38, 39, 41 to 54, 56, 57, 61, 63, 64, 68, 70, 84 to 99, 100 to 108, 110 to 116, 120, 122, 125 to 128, 130 to 136, 138, 139, 141 to 154, 156, 157, 161, 163, 164, 168, 170, 184 to 199, 200 to 205, 300 to 305, 9999 | 1 | 9999 | **57** |
| 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, 1, 2 | 1 | 0 | *4 |
| 340 | D001 | Communication startup mode selection | 0, 1, 2, 10, 12 | 1 | 0 | **27** |
| 342 | N001 | Communication EEPROM write selection | 0, 1 | 1 | 0 | *4 |
| 349*1 | N010*1 | Communication reset selection | 0, 1 | 1 | 0 | **36** |
| 500*1 | N011*1 | Communication error execution waiting time | 0 to 999.8 s | 0.1 s | 0 s | **30** |

**4**

| Pr. | Pr. group | Name | Setting range | Minimum setting increments | Initial value | Refer to page |
|---|---|---|---|---|---|---|
| 501[*1] | N012[*1] | Communication error occurrence count display | 0 | 1 | 0 | **31** |
| 502 | N013 | Stop mode selection at communication error | 0 to 3 | 1 | 0 | **31** |
| 541[*1] | N100[*1] | Frequency command sign selection (CC-Link) | 0, 1 | 1 | 0 | **39** |
| 542[*1], [*2], [*3] | N101[*1], [*2], [*3] | Communication station number (CC-Link) | 1 to 64 | 1 | 1 | **37** |
| 543[*1], [*2], [*3] | N102[*1], [*2], [*3] | Baud rate selection (CC-Link) | 0 to 4 | 1 | 0 | **38** |
| 544[*1], [*2] | N103[*1], [*2] | CC-Link extended setting | 0, 1, 12, 14, 18, 100, 112, 114, 118 | 1 | 0 | **44** |
| 550[*2] | D012[*2] | NET mode operation command source selection | 0, 1, 9999 | 1 | 9999 | [*4] |
| 779 | N014 | Operation frequency during communication error | 0 to 590 Hz, 9999 | 0.01 Hz | 9999 | **31** |
| 804 | D400 | Torque command source selection | 0, 1, 3 to 6 | 1 | 0 | **71** |

*1 Parameters which can be displayed when the plug-in option (FR-A8NC) is mounted.
*2 The setting is reflected after inverter reset or at the next power-on.
*3 "L.ERR" LED flickers if the setting is changed. If the inverter is reset, the setting is reflected and the LED turns off.
*4 Refer to the Instruction Manual (Detailed) of the inverter for the parameter details.

## 4.2　Operation mode setting

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

#### ◆ Operation mode switching conditions
Operation mode switching conditions
• The inverter is at a stop;
• Both the STF and STR signals are off; and
• The **Pr.79 Operation mode selection** setting is correct.
　(Set with 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 82** 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.
> • When setting a value other than 0 in **Pr.340**, make sure that the initial settings of the inverter are correct.
> • Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.79, Pr.340**.

**4**

| Pr.340 setting | Pr.79 setting | Operation mode at power ON or power restoration | 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 or power restoration | 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 can not be directly changed between the PU operation mode and Network operation mode.

∗2 The **Pr.340** settings "2, 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, 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 $\boxed{\frac{PU}{EXT}}$ key on the operation panel (FR-DU08) and the X65 signal.

∗4 Refer to **page 66** for a switching method from the network.

**4**

## 4.3 Operation at communication error occurrence

### 4.3.1 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 |
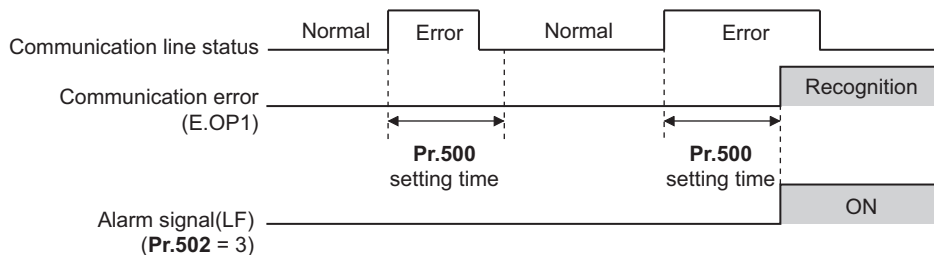


When a communication line error occurs and lasts longer than the time set in **Pr.500**, it is recognized as a communication error. If the communication returns to normal within the time, it is not recognized as a communication error, and the operation continues.

#### ◆ 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 |

Count timing depending on communication line status

| | Normal | Error | Normal | Error | |
|---|---|---|---|---|---|

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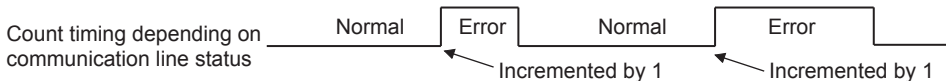
At the point of communication line error occurrence, **Pr.501 Communication error occurrence count display** is incremented by 1.

```
          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.

**4**

#### ◆ 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), 1, 2, 3 | Refer to **page 32** |
| 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 before the communication error occurs. |

∗1   Valid when **Pr.502**="3"

#### ◆ About setting
• Operation at an error occurrence

| Error definition | Pr.502 setting | Operation | Indication | Fault output |
|---|---|---|---|---|
| Communication line | 0 | Continued∗1 | Normal indication∗1 | Not provided∗1 |
| | 1 | | | |
| | 2 | | | |
| | 3 | | | |
| Communication option itself | 0, 3 | Coast to stop | E. 1 lit | Provided |
| | 1, 2 | Decelerated to stop | E. 1 lit after stop | Provided after stop |

∗1   When the communication returns to normal within the time period set in **Pr.500**, the communication option error (E.OP1) does not occur.

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

| Error definition | Pr.502 setting | Operation | Indication | Fault output |
|---|---|---|---|---|
| Communication line | 0 | Coast to stop | E.OP1 lit | Provided |
| | 1 | Decelerated to stop | E.OP1 lit after stop | Provided after stop |
| | 2 | | | Not provided |
| | 3 | Continues operation with the **Pr.779** setting. | Normal indication | |
| Communication option itself | 0, 3 | Kept stopped∗2 | E.OP1 kept lit∗2 | Kept provided∗2 |
| | 1, 2 | | | |

∗2   When an error occurs, the motor is decelerated or coasts to stop with the fault output independently of the **Pr.500** setting.

• Operation at error removal

| Error definition | Pr.502 setting | Operation | Indication | Fault output |
|---|---|---|---|---|
| Communication line | 0 | Kept stopped | E.OP1 kept lit | Kept provided |
| | 1 | | | |
| | 2 | Restart | Normal indication | Not provided |
| | 3 | Normal operation | | |
| Communication option itself | 0, 3 | Kept stopped | E. 1 kept lit | Kept provided |
| | 1, 2 | | | |

**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 faults history. (A fault record is written to the faults history at a fault output.)
  When the fault output setting is not active, fault record is overwritten to the faults 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 faults history.
- When the **Pr.502** setting is "1" or "2", the deceleration time is the ordinary deceleration time setting (e.g. **Pr.8, Pr.44, Pr.45**).
- The acceleration time at a restart is the ordinary acceleration time setting (e.g. **Pr.7, Pr.44**).
- When the **Pr.502** setting is "2", the operation/speed command at a restart is the one given before the error occurrence.
- When a communication line error occurs at the **Pr.502** setting of "2", removing the error during deceleration causes acceleration to restart at that point. (Acceleration is not restarted if the error is that of the option unit itself.)
- In order to continue the operation even if a communication line error occurs when **Pr.502** = "3", provide a safety stop measure other than via communication, for example by inputting a signal to the terminal RES.

**4**

## 4.3.2 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 | | Inverter trip | Inverter trip | Inverter trip |
| | Data communication | | Continued | Continued | Continued |
| Communication line | Inverter operation | | Inverter trip *1 | Continued | Continued |
| | Data communication | | Stop | Stop | Stop |
| Communication option | Communication option connection error | Inverter operation | Inverter trip *1 | Inverter trip *1 | Inverter trip *1 |
| | | Data communication | Continued | Continued | Continued |
| | Error of communication option itself | Inverter operation | Inverter trip *1 | Continued | Continued |
| | | Data communication | Stop | Stop | Stop |

∗1   Depends on the **Pr.502** setting.

◆ Measures at error occurrences

| Fault indication | Error definition | Measures |
|---|---|---|
| E.OP1 | Communication line error | • Check the LED status of the option unit and remove the cause of the alarm. (Refer to **page 89** for LED indication status)<br>• Inspect the master. |
| E.1, E.2, E.3 | Option fault | • Insert the communication option to the inverter option connector 1.<br>• Check the connection between the inverter and option unit for poor contact, etc. and remove the cause of the error. |

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

## 4.4 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 68**)∗1 | | Allowed | Disallowed | Disallowed |
| | Error reset (RY1A) at inverter fault (Refer to **page 56**)∗2 | **Pr.349** = 0 | Allowed | Allowed | Allowed |
| | | **Pr.349** = 1 | | Disallowed | Disallowed |
| Turn on the inverter RES signal (terminal RES) | | | 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.

> **⚠ 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 27**.)
> - Communication continues during inverter reset. (The inverter can not be controlled for about 1 s after release of a reset command.)
> - Refer to **page 86** for an inverter reset program example.

#### ◆ Error reset operation selection at inverter fault

When used with the communication option, an error reset command from network can be invalid in the External operation mode or PU operation mode.
Use RY1A for an error reset command from network. (Refer to **page 56**.)

| Pr. | Name | Initial value | Setting range | Function |
|-----|------|---------------|---------------|----------|
| 349 | Communication reset selection | 0 | 0 | Error reset is enabled independently of operation mode |
|     |      |   | 1 | Error reset is enabled only in the network operation mode |

## 4.5 CC-Link function setting

### 4.5.1 Station number setting (Pr.542)

Use **Pr.542 Communication station number (CC-Link)** to set station number of the inverter. Set this parameter within the range of 1 to 64.

| Pr. | Name | Initial value | Setting range |
|-----|------|---------------|---------------|
| 542 | Communication station number (CC-Link) | 1 | 1 to 64 |

> **NOTE**
> • Use different station numbers for different devices. (If different devices have the same station number, the communication cannot be performed properly.)

◆ Connection example



CC-Link master module — Station 00

Programmable controller remote I/O station (occupies one station) — Station 01

Inverter No.1 (FR-A8NC) Remote device station — Station 02

Inverter No.2 (FR-A8NC) Remote device station — Station 03

Inverter No.3 (FR-A8NC) Remote device station — Station 04

Number of stations connected is 4

**4**
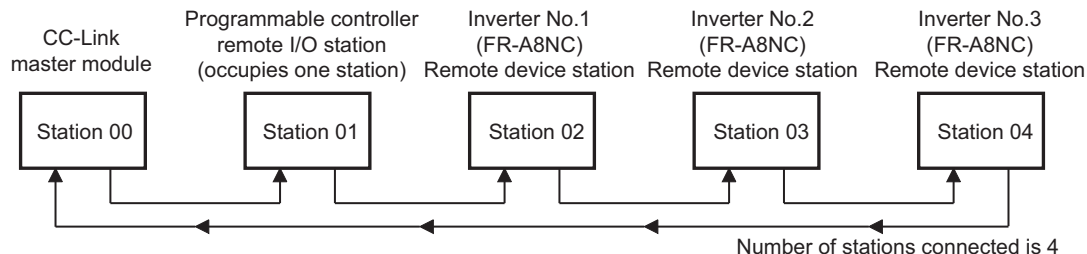
- Set consecutive numbers for the station numbers. (Do not skip a number in sequence like "station number 1 - station number 2- station number 4".)
  The station number does not have to match with the physical connection sequence. (There is no problem with having the physical connection sequence like "station number 1 - station number 3 - station number 4 - station number 2".)
- One inverter occupies one station. (One remote device station)
- "L.ERR" LED flickers if the setting is changed. When power is switched on again or the RES signal is turned on, the setting value is reflected and the LED turns off.

## 4.5.2 Baud rate setting (Pr.543)

Set the transmission speed. (Refer to the manual for the CC-Link master module for details of transmission speed.)

| Pr. | Name | Initial value | Setting range | Transmission speed |
|-----|------|---------------|---------------|--------------------|
| 543 | Baud rate selection (CC-Link) | 0 | 0 | 156 kbps |
| | | | 1 | 625 kbps |
| | | | 2 | 2.5 Mbps |
| | | | 3 | 5 Mbps |
| | | | 4 | 10 Mbps |

- "L.ERR" LED flickers if the setting is changed. When power is switched on again or the RES signal is turned on, the setting value is reflected and the LED turns off.

## 4.5.3 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 RWw1.

| Pr. | Name | Initial value | Setting range |
|-----|------|---------------|---------------|
| 541 | Frequency command sign selection (CC-Link) | 0 | 0, 1 |

| Speed setting using Pr.37 and Pr.144 | Pr.541 setting | Sign | Setting range | Actual frequency command |
|---|---|---|---|---|
| Not used | 0 | Not used | 0 to 59000 | 0 to 590.00 Hz |
| | 1 | With | -32768 to 32767 (two's complement) | -327.68 to 327.67 Hz |
| With | 0 | Not used | 0 to 65535 | It depends on **Pr.37, Pr.144, Pr.811**. (in 1 or 0.1 increments) |
| | 1 | With | -32768 to 32767 (two's complement) | |

• 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 |

**4**

- When **Pr.541** = 1(with sign)
  - When EEPROM write is specified with the RYE, write mode error (error code H01) will occur.
  - When concurrent execution of both RYD and RYE is enabled (when a value other than 0 is set in **Pr.544**) and both RYD and RYE are turned on, RYD 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 **Pr.811 Set resolution switchover** ="1 or 11" changes the increment from 1 r/min to 0.1 r/min.

# 5 FUNCTION OVERVIEW

## 5.1    Function block diagram

Using function blocks, this section explains I/O data transfer to/from an inverter in CC-Link:
• Link refresh is continuously executed between the master station and inverter in the CC-Link system at intervals of 1.1 ms to 141 ms (per station).
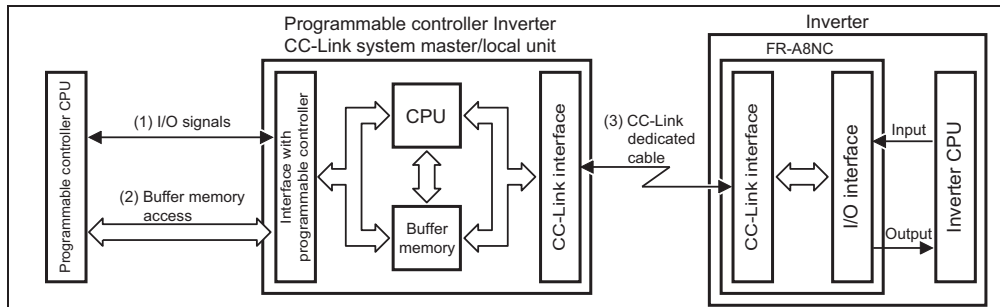


(1) These are I/O signals assigned to the CC-Link system master/local unit. These signals are used for communication between the programmable controller CPU and CC-Link system master/local unit.
Refer to **page 55** for details of the signal.
(2) Regarding the data input to the inverter, writing of inverter output data, and reading of a faulty CC-Link station are available. Automatic refresh function enables reading from/writing to buffer memory. (Use FROM/TO command of the sequence program to synchronize without using the automatic refresh function.) Refer to CC-Link master/local module manual for the buffer memory details.
(3) CC-Link communication start command is given from the sequence program. After the CC-Link communication starts, link refresh is always performed asynchronously (or synchronously) with execution of sequence program.
For details, refer to the CC-Link system master/local unit manual.

## 5.2 Output from the inverter to 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. | **57** |
| Output frequency monitor | The output frequency can be monitored. | **62, 66** |
| Output current monitor | The output current can be monitored. | **66** |
| Output voltage monitor | The output voltage can be monitored. | **66** |
| Special monitor | The monitor data selected can be checked. | **66** |
| Faults history | Fault records can be checked. | **62, 67** |
| Data at alarm occurrence | The inverter status at alarm occurrence can be checked. | **63** |
| Operation Mode | The current operation mode can be checked. | **66** |
| Parameter read | Parameter settings can be read. | **68** |
| Read of set frequency (torque command) | The current set frequency (torque command) can be read. | **67** |

**NOTE**

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

## 5.3 Input to the inverter from the network

Main items which can be commanded 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. | 55 |
| Reverse rotation command | Give the reverse rotation command. | 55 |
| Input terminal function command | Execute functions assigned to the inverter input terminals. | 55 |
| Inverter output stop command | Stop the inverter output. | 56 |
| Error reset | Reset the inverter only when an inverter alarm occurs. | 56 |
| Frequency setting (torque command) | Set the frequency (torque command). | 59, 67 |
| Monitor command | Specify the description monitored. | 59, 66 |
| Operation mode specification | Set the operation mode. | 66 |
| Faults history clear | Erase past eight fault records. | 68 |
| All parameter clear | Return the parameter descriptions to the initial value. | 68 |
| Inverter reset | Reset the inverter. | 68 |
| Parameter write | Write parameter settings. | 68 |
| PID control | PID set point, PID measured value and PID deviation can be input from the network. | 60 |

•···◆ **NOTE** ···•

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

## 6.1 CC-Link extended setting (Pr.544)

Remote register function can be extended.

| Pr. | Name | Initial value | Setting range | Description | | | Refer to page |
|---|---|---|---|---|---|---|---|
| | | | | CC-Link Ver. | | | |
| 544 | CC-Link extended setting | 0 | 0 | 1 | Occupies one station (FR-A5NC compatible)∗1 | | **45** |
| | | | 1 | | Occupies one station | | **48** |
| | | | 12∗2 | 2 | Occupies one station double | | **49** |
| | | | 14∗2 | | Occupies one station quadruple | | **50** |
| | | | 18∗2 | | Occupies one station octuple | | **52** |
| | | | 100 | 1 | Occupies one station | PLC function | — ∗3 |
| | | | 112∗2 | 2 | Occupies one station double | | |
| | | | 114∗2 | | Occupies one station quadruple | | |
| | | | 118∗2 | | Occupies one station octuple | | |

∗1 The program used for conventional series inverter (FR-A5NC) can be used.
   When RYD, RYE, and RYF turn on simultaneously, only one of them is executed.
   The upper 8 bits of RWw2 are link parameter extended setting.
∗2 When using double, quadruple and octuple settings of the CC-Link Ver.2, station data of the master station must be set to double, quadruple and octuple also.
   (If the master station is CC-Link Ver.1 compatible station, the above setting can not be made.)
∗3 Refer to the PLC function programming manual.

**NOTE**

• The setting change is reflected after an inverter reset. (Refer to **page 35** for inverter reset.)

## 6.2 I/O signal list

### 6.2.1 I/O signal when CC-Link Ver.1 one station (FR-A5NC compatible) is occupied (Pr.544 = 0)

◆ Remote I/O (32 points)

| Device no.*5 | Signal | Refer to page | Device no.*5 | Signal | Refer to page |
|---|---|---|---|---|---|
| RYn0 | Forward rotation command *2 | **55** | RXn0 | Forward running | **57** |
| RYn1 | Reverse rotation command *2 | **55** | RXn1 | Reverse running | **57** |
| RYn2 | High-speed operation command (terminal RH function) *1 | **55** | RXn2 | Running (terminal RUN function) *3 | **57** |
| RYn3 | Middle-speed operation command (terminal RM function) *1 | **55** | RXn3 | Up to frequency (terminal SU function) *3 | **57** |
| RYn4 | Low-speed operation command (terminal RL function) *1 | **55** | RXn4 | Overload alarm (terminal OL function) *3 | **57** |
| RYn5 | Jog operation command (terminal Jog function) *1 | **55** | RXn5 | Instantaneous power failure (terminal IPF function) *3 | **57** |
| RYn6 | Second function selection (terminal RT function) *1 | **55** | RXn6 | Frequency detection (terminal FU function) *3 | **57** |
| RYn7 | Current input selection (terminal AU function) *1 | **55** | RXn7 | Error (terminal ABC1 function) *3 | **57** |
| RYn8 | Selection of automatic restart after instantaneous power failure (terminal CS function) *1 | **55** | RXn8 | ─ (terminal ABC2 function) *3 | **57** |
| RYn9 | Output stop *2 | **56** | RXn9 | **Pr.313** assignment function  (DO0) *4 | **57** |
| RYnA | Start self-holding selection (terminal STOP function) *1 | **56** | RXnA | **Pr.314** assignment function  (DO1) *4 | **57** |

**6**

| Device no.[5] | Signal | Refer to page | Device no.[5] | Signal | Refer to page |
|---|---|---|---|---|---|
| RYnB | Reset (terminal RES function) [1] | **56** | RXnB | **Pr.315** assignment function (DO2) [4] | **57** |
| RYnC | Monitor command | **56** | RXnC | Monitoring | **57** |
| RYnD | Frequency setting command (RAM) | **56** | RXnD | Frequency setting completion (RAM) | **58** |
| RYnE | Frequency setting command (RAM, EEPROM) | **56** | RXnE | Frequency setting completion (RAM, EEPROM) | **58** |
| RYnF | Instruction code execution request | **56** | RXnF | Instruction code execution completion | **58** |
| RY(n+1)0 to RY(n+1)7 | Reserved | — | RX(n+1)0 to RX(n+1)7 | Reserved | — |
| RY(n+1)8 | Not used (initial data process completion flag) | — | RX(n+1)8 | Not used (initial data process request flag) | — |
| RY(n+1)9 | Not used (initial data process request flag) | — | RX(n+1)9 | Not used (initial data process completion flag) | — |
| RY(n+1)A | Error reset request flag | **56** | RX(n+1)A | Error status flag | **58** |
| RY(n+1)B to RY(n+1)F | Reserved | — | RX(n+1)B | Remote station ready | **58** |
| | | | RX(n+1)C to RX(n+1)F | Reserved | — |

*1 These signals are set in the initial status. Using **Pr.180 to Pr.186**, **Pr.188,** and **Pr .189**, you can change input signal functions.
Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.180 to Pr.186**, **Pr.188,** and **Pr .189**.

*2 The signals are fixed. They cannot be changed using parameters.

*3 These signals are set in the initial status. 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.**

*4 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.190 to Pr.196.**

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

## ◆ Remote register

| Address[*3] | Description | | Refer to page | Address[*3] | Description | Refer to page |
|---|---|---|---|---|---|---|
| | **Upper 8 bits** | **Lower 8 bits** | | | | |
| RWwn | Monitor code 2 | Monitor code 1 | **59** | RWrn | First monitor value | **62** |
| RWwn+1 | Set frequency (0.01 Hz increments) / torque command[*2] | | **59** | RWrn+1 | Second monitor value | **62** |
| RWwn+2 | H00 (arbitrary)[*1] | Instruction code | **59** | RWrn+2 | Reply code | **62** |
| RWwn+3 | Write data | | **59** | RWrn+3 | Read data | **62** |

*1 The above 8 bit is always H00 even if a value other than H00 is set.
*2 Setting "3" or "5" in **Pr.804** during torque control under Real sensorless vector control or vector control sets torque command in RWwn + 1.
*3 "n" indicates a value determined according to the station number setting.

**6**

## 6.2.2 I/O signal when CC-Link Ver.1 one station is occupied (Pr.544 = 1)

### ◆ Remote I/O (32 points)

Same as when **Pr.544** = 0 (Refer to **page 45**)

### ◆ Remote register

| Address[*2] | Description | | Refer to page | Address[*2] | Description | | Refer to page |
|---|---|---|---|---|---|---|---|
| | **Upper 8 bits** | **Lower 8 bits** | | | **Upper 8 bits** | **Lower 8 bits** | |
| RWwn | Monitor code 2 | Monitor code 1 | **59** | RWrn | First monitor value | | **62** |
| RWwn+1 | Set frequency (0.01 Hz increments) / torque command[*1] | | **59** | RWrn+1 | Second monitor value | | **62** |
| RWwn+2 | Link parameter extended setting | Instruction code | **59** | RWrn+2 | Reply code 2 | Reply code 1 | **62** |
| RWwn+3 | Write data | | **59** | RWrn+3 | Read data | | **62** |

*1   Setting "3" or "5" in **Pr.804** during torque control under Real sensorless vector control or vector control sets torque command in RWwn + 1.

*2   "n" indicates a value determined according to the station number setting.

## 6.2.3 I/O signal when CC-Link Ver.2 double setting is selected (Pr.544 = 12)

◆ **Remote I/O (32 points)**

Same as when **Pr.544** = 0 (Refer to **page 45**)

◆ **Remote register**

| Address*2 | Description | | Refer to page | Address*2 | Description | | Refer to page |
|---|---|---|---|---|---|---|---|
| | **Upper 8 bits** | **Lower 8 bits** | | | **Upper 8 bits** | **Lower 8 bits** | |
| RWwn | Monitor code 2 | Monitor code 1 | **59** | RWrn | First monitor value | | **62** |
| RWwn+1 | Set frequency (0.01 Hz increments) / torque command*1 | | **59** | RWrn+1 | Second monitor value | | **62** |
| RWwn+2 | Link parameter extended setting | Instruction code | **59** | RWrn+2 | Reply code 2 | Reply code 1 | **62** |
| RWwn+3 | Write data | | **59** | RWrn+3 | Read data | | **62** |
| RWwn+4 | Monitor code 3 | | **60** | RWrn+4 | Third monitor value | | **62** |
| RWwn+5 | Monitor code 4 | | **60** | RWrn+5 | Fourth monitor value | | **62** |
| RWwn+6 | Monitor code 5 | | **60** | RWrn+6 | Fifth monitor value | | **62** |
| RWwn+7 | Monitor code 6 | | **60** | RWrn+7 | Sixth monitor value | | **62** |

*1 Setting "3" or "5" in **Pr.804** during torque control under Real sensorless vector control or vector control sets torque command in RWwn + 1.
*2 "n" indicates a value determined according to the station number setting.

**6**

## 6.2.4 I/O signal when CC-Link Ver.2 quadruple setting is selected (Pr.544 = 14)

### ◆ Remote I/O (32 points (64 points occupied))
Same as when **Pr.544** = 0 (Refer to **page 45**)

### ◆ Remote register

| Address[*3] | Description | | Refer to page | Address[*3] | Description | | Refer to page |
|---|---|---|---|---|---|---|---|
| | **Upper 8 bits** | **Lower 8 bits** | | | **Upper 8 bits** | **Lower 8 bits** | |
| RWwn | Monitor code 2 | Monitor code 1 | **59** | RWrn | First monitor value | | **62** |
| RWwn+1 | Set frequency (0.01 Hz increments) | | **59** | RWrn+1 | Second monitor value | | **62** |
| RWwn+2 | Link parameter extended setting | Instruction code | **59** | RWrn+2 | Reply code 2 | Reply code 1 | **62** |
| RWwn+3 | Write data | | **59** | RWrn+3 | Read data | | **62** |
| RWwn+4 | Monitor code 3 | | **60** | RWrn+4 | Third monitor value | | **62** |
| RWwn+5 | Monitor code 4 | | **60** | RWrn+5 | Fourth monitor value | | **62** |
| RWwn+6 | Monitor code 5 | | **60** | RWrn+6 | Fifth monitor value | | **62** |
| RWwn+7 | Monitor code 6 | | **60** | RWrn+7 | Sixth monitor value | | **62** |
| RWwn+8 | Faults history No. | H00 | **60** | RWrn+8 | Faults history No. | Fault data | **62** |
| RWwn+9 | PID set point (0.01% increments) [*1] | | **60** | RWrn+9 | Fault record (output frequency) | | **63** |
| RWwn+A | PID measured value (0.01% increments) [*1] | | **60** | RWrn+A | Fault record (output current) | | **63** |
| RWwn+B | PID deviation (0.01% increments) [*1] | | **60** | RWrn+B | Fault record (output voltage) | | **63** |
| RWwn+C | Torque command [*2] | | **71** | RWrn+C | Fault record (energization time) | | **63** |

| Address[∗3] | Description | | Refer to page | Address[∗3] | Description | | Refer to page |
|---|---|---|---|---|---|---|---|
| | Upper 8 bits | Lower 8 bits | | | Upper 8 bits | Lower 8 bits | |
| RWwn+D | | | | RWrn+D | | | |
| RWwn+E | H00 (Free) | | — | RWrn+E | H00 (Free) | | — |
| RWwn+F | | | | RWrn+F | | | |

∗1  When **Pr.128** = "50, 51, 60, 61", they are valid.
∗2  Setting "3" or "5" in **Pr.804** during torque control under Real sensorless vector control or vector control sets torque command in RWwn + C.
∗3  "n" indicates a value determined according to the station number setting.

**6**

## 6.2.5 I/O signal when CC-Link Ver.2 octuple setting is selected (Pr.544 = 18)

◆ **Remote I/O (32 points (128 points occupied))**
Same as when **Pr.544** = 0 (Refer to **page 45**)

◆ **Remote register**

| Address*3 | Description | | Refer to page | Address*3 | Description | | Refer to page |
|---|---|---|---|---|---|---|---|
| | **Upper 8 bits** | **Lower 8 bits** | | | **Upper 8 bits** | **Lower 8 bits** | |
| RWwn | Monitor code 2 | Monitor code 1 | **59** | RWrn | First monitor value | | **62** |
| RWwn+1 | Set frequency (0.01 Hz increments) | | **59** | RWrn+1 | Second monitor value | | **62** |
| RWwn+2 | Link parameter extended setting | Instruction code | **59** | RWrn+2 | Reply code 2 | Reply code 1 | **62** |
| RWwn+3 | Write data | | **59** | RWrn+3 | Read data | | **62** |
| RWwn+4 | Monitor code 3 | | **60** | RWrn+4 | Third monitor value | | **62** |
| RWwn+5 | Monitor code 4 | | **60** | RWrn+5 | Fourth monitor value | | **62** |
| RWwn+6 | Monitor code 5 | | **60** | RWrn+6 | Fifth monitor value | | **62** |
| RWwn+7 | Monitor code 6 | | **60** | RWrn+7 | Sixth monitor value | | **62** |
| RWwn+8 | Faults history No. | H00 | **60** | RWrn+8 | Faults history No. | Faults history data | **62** |
| RWwn+9 | PID set point (0.01% increments)*1 | | **60** | RWrn+9 | Fault record (output frequency) | | **63** |
| RWwn+A | PID measured value (0.01% increments) *1 | | **60** | RWrn+A | Fault record (output current) | | **63** |
| RWwn+B | PID deviation (0.01% increments) *1 | | **60** | RWrn+B | Fault record (output voltage) | | **63** |
| RWwn+C | Torque command *2 | | **71** | RWrn+C | Fault record (energization time) | | **63** |

| Address[*3] | Description | | Refer to page | Address[*3] | Description | | Refer to page |
|---|---|---|---|---|---|---|---|
| | Upper 8 bits | Lower 8 bits | | | Upper 8 bits | Lower 8 bits | |
| RWwn+D | H00 (Free) | | — | RWrn+D | H00 (Free) | | — |
| RWwn+E | | | | RWrn+E | | | |
| RWwn+F | | | | RWrn+F | | | |
| RWwn+10 | Link parameter extended setting | Instruction code | **60** | RWrn+10 | Reply code | | **63** |
| RWwn+11 | Write data | | **60** | RWrn+11 | Read data | | **63** |
| RWwn+12 | Link parameter extended setting | Instruction code | **60** | RWrn+12 | Reply code | | **63** |
| RWwn+13 | Write data | | **60** | RWrn+13 | Read data | | **63** |
| RWwn+14 | Link parameter extended setting | Instruction code | **60** | RWrn+14 | Reply code | | **63** |
| RWwn+15 | Write data | | **60** | RWrn+15 | Read data | | **63** |
| RWwn+16 | Link parameter extended setting | Instruction code | **60** | RWrn+16 | Reply code | | **63** |
| RWwn+17 | Write data | | **60** | RWrn+17 | Read data | | **63** |
| RWwn+18 | Link parameter extended setting | Instruction code | **60** | RWrn+18 | Reply code | | **63** |
| RWwn+19 | Write data | | **60** | RWrn+19 | Read data | | **63** |

**6**

| Address[*3] | Description | | Refer to page | Address[*3] | Description | | Refer to page |
|---|---|---|---|---|---|---|---|
| | **Upper 8 bits** | **Lower 8 bits** | | | **Upper 8 bits** | **Lower 8 bits** | |
| RWwn+1A | H00 (Free) | | — | RWrn+1A | H00 (Free) | | — |
| RWwn+1B | | | | RWrn+1B | | | |
| RWwn+1C | | | | RWrn+1C | | | |
| RWwn+1D | | | | RWrn+1D | | | |
| RWwn+1E | | | | RWrn+1E | | | |
| RWwn+1F | | | | RWrn+1F | | | |

*1  When **Pr.128** = "50, 51, 60, 61", they are valid.
*2  Setting "3" or "5" in **Pr.804** during torque control under Real sensorless vector control or vector control sets torque command in RWwn + C.
*3  "n" indicates a value determined according to the station number setting.

# **7** DETAILS OF 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)

## 7.1  Details of remote input and output signals

### 7.1.1  Output signals (master module to inverter (FR-A8NC))

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

| Device no. | Signal | Description | |
|---|---|---|---|
| RY0 | Forward rotation command *2 | 0: Stop command<br>1: Forward rotation start | When "1" is set, a start command is input to the inverter.<br>When "1" is set in RY0 and RY1, a stop command is input. |
| RY1 | Reverse rotation command *2 | 0: Stop command<br>1: Reverse rotation start | |
| RY2 | High-speed operation command (terminal RH function) *1 | Functions assigned to terminals RH, RM, RL, JOG, RT, AU, and CS are activated. | |
| RY3 | Middle-speed operation command (terminal RM function) *1 | | |
| RY4 | Low-speed operation command (terminal RL function) *1 | | |
| RY5 | Jog operation command (terminal Jog function) *1 | | |
| RY6 | Second function selection (terminal RT function) *1 | | |
| RY7 | Current input selection (terminal AU function) *1 | | |
| RY8 | Selection of automatic restart after instantaneous power failure (terminal CS function) *1 | | |

**7**

| Device no. | Signal | Description |
|---|---|---|
| RY9 | Output stop *2 | Turn on the MRS signal to stop the inverter output. (The logic can be changed by the **Pr.17** setting.) |
| RYA | Start self-holding selection (terminal STOP function) *1 | Functions assigned to terminal STOP and RES are activated. |
| RYB | Reset (RES terminal function) *1 | |
| RYC | Monitor command | When "1" is set in the monitor command (RYC), the monitored value is set in the remote register RWr0, 1, 4 to 7, and "1" is set in the monitoring (RXC). While "1" is set in the monitor command (RYC), the monitored data is always updated. |
| RYD*4 | Frequency setting command / torque command (RAM) | When "1" is set in the frequency setting command/torque command (RYD), the set frequency/torque command (RWw1) is written to RAM of the inverter.*3 After the writing completes, "1" is set in the frequency setting (torque command) completion (RXD). Torque command is written to the inverter RAM at the same time during torque control under Real sensorless vector control or vector control. |
| RYE*4 | Frequency setting command / torque command (RAM, EEPROM) | When "1" is set in the frequency setting command/torque command (RYE), the set frequency/torque command (RWw1) is written to RAM and EEPROM of the inverter. After the writing completes, "1" is set in the frequency setting (torque command) completion (RXE). Torque command is written to RAM and EEPROM of the inverter at the same time during torque control under Real sensorless vector control or vector control. To change the frequency consecutively, be sure to write data to the inverter RAM. |
| RYF*4 | Instruction code execution request | When "1" is set in the instruction code execution request (RYF), processes corresponding to the instruction codes set to RWw2, 10, 12, 14, 16 and18 are executed. "1" is set in the instruction code execution request (RXF) after completion of instruction codes. When an instruction code execution error occurs, a value other than "0" is set in the reply code (RWr2, 10, 12, 14, 16, 18). |
| RY1A | Error reset request flag | When "1" is set in the error reset request flag (RY1A) at an inverter fault, the inverter is reset, then "0" is set in the error status flag (RX1A). *5 |

*1 Signal names are initial values. Using **Pr.180 to Pr.186**, **Pr.188**, and **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.
　Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.180 to Pr.186**, **Pr.188**, **Pr.189**, **Pr.338**, and **Pr.339**.

*2 The signals are fixed. They cannot be changed using parameters.

*3 While "1" is set in the frequency setting command (RYD), the set frequency (RWw1) is always applied.

*4 If "1" is set in these registers at the same time while **Pr.544** = "0," only one of these is executed.

*5 Refer to **page 35** for operation conditions of inverter reset.

## 7.1.2 Input signals (inverter (FR-A8NC) 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)<br>1: Forward running |
| RX1 | Reverse running | 0: Other than reverse running (during stop or forward rotation)<br>1: Reverse running |
| RX2 | Running (terminal RUN function)*1 | Functions assigned to terminals RUN, SU, OL, IPF, FU, ABC1 and ABC2 activate. |
| RX3 | Up to frequency (terminal SU function)*1 | |
| RX4 | Overload alarm (terminal OL function)*1 | |
| RX5 | Instantaneous power failure (terminal IPF function)*1 | |
| RX6 | Frequency detection (terminal FU function)*1 | |
| RX7 | Fault (terminal ABC1 function)*1 | |
| RX8 | — (terminal ABC2 function)*1 | |
| RX9 | — (DO0 function)*2 | Functions assigned to **Pr.313 to Pr.315** are activated. |
| RXA | — (DO1 function)*2 | |
| RXB | — (DO2 function)*2 | |
| RXC | Monitoring | After "1" is set in the monitor command (RYC), and the monitored value is set in the remote register Rwr0, 1, 4 to 7, "1" is set in this signal. When "0" is set in the monitor command (RYC), "0" is set in this signal. |

| Device no. | Signal | Description |
|---|---|---|
| RXD | Frequency setting completion/torque command setting completion (RAM) | After "1" is set in the frequency setting command/torque command (RYD) and the frequency setting command/torque command is written to the inverter RAM, "1" is set in this signal.<br>When "0" is set in the frequency setting command/torque command (RYD), "0" is set in this signal. |
| RXE | Frequency setting completion/torque command setting completion (RAM, EEPROM) | After "1" is set in the frequency setting command/torque command (RYE) and the frequency setting command/torque command is written to the inverter RAM and EEPROM, "1" is set in this signal.<br>When "0" is set in the frequency setting command/torque command (RYE), "0" is set in this signal. |
| RXF | Instruction code execution completion | After "1" is set in the instruction code execution request (RYF) and the processes corresponding to the instruction codes (RWw2, 10, 12, 14, 16 and 18) are executed, "1" is set in this signal.<br>When "0" is set in the instruction code execution request (RYF), "0" is set in this signal. |
| RX1A | Error status flag | When an inverter error occurs (protective function is activated), "1" is set in this signal. |
| RX1B | Remote station ready | When the inverter goes into the ready status upon completion of initial setting after power-on or hardware reset, "1" is set in this signal. When an inverter error occurs (protective function is activated), "0" is set in this signal.<br>The signal is used as an interlock signal during the write to/read from the master module. |

∗1 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**.
∗2 Signals are not assigned in the initial setting. Use **Pr.313 to Pr.315** to assign signals to the devices RX9 to RXB.
   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.190 to Pr.196**.

## 7.2 Details of remote register

### 7.2.1 Remote register (master module to inverter (FR-A8NC))

◆ **Remote register definition**

| Device no. | Signal | Description |
|---|---|---|
| RWw0 | Monitor code1, 2 | Set the monitor code to be referenced (Refer to **page 70**). When "1" is set in RYC, data of specified monitored items will be stored in RWr0, RWr1. |
| RWw1 | Set frequency∗1, ∗2 | Specify the set frequency or speed (machine speed). At this time, whether to write to RAM or EEPROM is decided with the RYD and RYE settings. After setting the set frequency in this register, set "1" in RYD or RYE to write the frequency. After writing of frequency is completed, "1" is set in RXD or RXE in response to the input command.<br>The setting range is 0 to 590.00 Hz (0.01 Hz increments). Write "59000" when setting 590.00 Hz. |
| | Torque command value | When performing torque control under Real sensorless vector control or vector control with **Pr.544 CC-Link extended setting** = 0, 1, 12, and **Pr.804 Torque command source selection** = 3, 5, specify torque command value. The value is written to the inverter either by RYD or RYE. **Pr.805 Torque command value (RAM)** and **Pr.806 Torque command value (RAM,EEPROM)** are also updated at the same time. The setting range and setting increments depend on the **Pr.804** setting. (Refer to **page 71**.) |
| RWw2 | Link parameter extended setting/ Instruction code | Set the instruction code for execution of operation mode rewrite, Pr.read/write, error reference, error clear, etc. (Refer to **page 66**) Set "1" in RYF to execute the corresponding instruction after completing the register setting. "1" is set in RXF after completing the execution of the instruction. When a value other than "0 (100)" is set in **Pr.544 CC-Link extended setting**, upper eight bits are link parameter extended setting.<br>Example) When reading **Pr.160**, instruction code is H0200. |
| RWw3 | Write data | Set the data specified by the RWw2 instruction code. (When required)<br>Set "1" in RYF after setting RWw2 and this register.<br>Set "0" when the write code is not required. |

**7**

| Device no. | Signal | Description | |
|---|---|---|---|
| RWw4 | Monitor code 3 | Set the monitor code to be monitored. By setting "1" in RYC after setting, the specified monitored data is stored in RWr4 to 7. | |
| RWw5 | Monitor code 4 | | |
| RWw6 | Monitor code 5 | | |
| RWw7 | Monitor code 6 | | |
| RWw8 | Faults history No. | Set how many fault records in past to be read. Back to eight fault records in past can be read. (lower 8 bits is H00)<br>Upper 8 bits: H00 (latest fault) to H07 (eight faults in past)<br>When H08 to HFF is set to the lower 8 bits, the fault record becomes an undetermined value. | |
| RWw9 | PID set point∗3 | Set the PID set point<br>Setting range : "0 to 100.00%" | • Input a value 100 times greater than the value to be set<br> For example, input "10000" when setting 100.00%.<br>• Refer to the Instruction Manual (Detailed) of the inverter for details of PID control. |
| RWwA | PID measured value∗3 | Set the PID measured value<br>Setting range : "0 to 100.00%" | |
| RWwB | PID deviation∗3 | Set the PID deviation.<br>Setting range : "-100.00% to 100.00%" | |
| RWwC | Torque command value | When performing torque control under Real sensorless vector control or vector control with **Pr.544 CC-Link extended setting** = "14, 18" and **Pr.804 Torque command source selection** = "3, 5", specify a torque command value. The value is written to the inverter either by RYD or RYE. **Pr.805 Torque command value (RAM)** and **Pr.806 Torque command value (RAM,EEPROM)** are also updated at the same time. The setting range and setting increments depend on the **Pr.804** setting. | |
| RWw10,<br>RWw12,<br>RWw14,<br>RWw16,<br>RWw18 | Link parameter extended setting/ Instruction code | Set the instruction code (Refer to **page 66**.) for execution of operation mode rewrite, Pr.read/write, error reference, error clear, etc. The instructions are executed in the following order by setting "1" in RYF after completing the register setting: RWw2, 10, 12, 14, 16, then 18. After completing the execution up to RWw18, "1" is set in RXF. Set HFFFF to disable an instruction by RWw10 to 18. (RWw2 is always executed.)<br>The first 8bits are link parameter extended setting.<br>Example) When reading **Pr.160**, instruction code is H0200. | |

| Device no. | Signal | Description |
|---|---|---|
| RWw11, RWw13, RWw15, RWw17, RWw19 | Write data | Set the data specified by the instruction code of RWw10, 12, 14, 16, and 18. (when required) RWw10 and 11, 12 and 13, 14 and 15, 16 and 17, and 18 and 19 correspond each other. Set "1" in RYF after setting the instruction codes (RWw10, 12, 14, 16, and 18) and the corresponding register. Set "0" when the write code is not required. |

∗1 The display by rotations per minute can be enabled with **Pr.37**, **Pr.144**, and **Pr.811**. For details, refer to the Instruction Manual (Detailed) of the inverter.

∗2 When **Pr.541 Frequency command sign selection (CC-Link)** = 1, the setting value has either + or -. When the setting value is negative, the command is inversed from starting command.
Setting range: -327.68 Hz to 327.67 Hz (-327.68 to 327.67) 0.01 Hz increments
For details refer to **page 39**.

∗3 When **Pr.128** = "50, 51, 60, 61", they are valid. If the data outside the range is set, the previous setting is retained.
Refer to the Instruction Manual (Detailed) of the inverter for details of **Pr.128**.

## 7.2.2 Remote register (inverter (FR-A8NC) to master module)

◆ Remote register definition

| Device no. | Signal | Description |
|---|---|---|
| RWr0 | First monitor value | When "1" is set in RYC, the specified monitored data is set to the lower 8 bits of the monitor code (RWw0). |
| RWr1 | Second monitor value (Output frequency ∗1) | When "0" is set to the upper 8 bits of the monitor code (RWw0), the current output frequency is always set. When a value other than "0" is set to the upper 8 bits of the monitor code (RWw0) while "1" is set in RYC, the monitor data specified by the upper 8 bits of the monitor code (RWw0) is set. |
| RWr2 | Reply code (when **Pr.544** = 0) | When "1" is set in RYD or RYE, the reply code for the frequency setting command is set. When "1" is set in RYF, the reply code corresponding to the instruction code RWw2 is set. The value "0" is set for a normal reply and any digit other than "0" is set for data fault, mode error, etc. (Refer to **page 64**.) |
| | Reply code 1 (when **Pr.544** ≠ 0) | Lower 8 bits of RWr2 <br> When "1" is set in RYD or RYE, the reply code for the frequency setting command (torque command) is set. (Refer to **page 64**.) |
| | Reply code 2 (when **Pr.544** ≠ 0) | Upper 8 bits of RWr2 <br> When "1" is set in RYF, the reply code corresponding to the instruction code RWw2 is set. (Refer to **page 64**.) |
| RWr3 | Read data | For a normal reply, the reply data to the instruction specified by the instruction code is set. |
| RWr4 | Third monitor value | When "1" is set in RYC, the monitored data specified by the monitor code (RWw4 to 7) is saved. |
| RWr5 | Fourth monitor value | |
| RWr6 | Fifth monitor value | |
| RWr7 | Sixth monitor value | |
| RWr8 | Fault record (fault data) | The fault data of faults history No. specified by RWw8 is stored in the lower 8bits. Faults history No. specified is echo backed to the upper 8bits. |

| Device no. | Signal | Description |
|---|---|---|
| RWr9 | Fault record (output frequency) | Output frequency of the faults history No. specified in RWw8 is stored. |
| RWrA | Fault record (output current) | Output current of the faults history No. specified in RWw8 is stored. |
| RWrB | Fault record (output voltage) | Output voltage of the faults history No. specified in RWw8 is stored. |
| RWrC | Fault record (energization time) | Energization time of the faults history No. specified in RWw8 is stored. |
| RWr10 to RWr19 | Reply code | When "1" is set in RYF, the reply codes corresponding to the instruction code RWw10, 12, 14, 16, and 18 are set. The value "0" is set for a normal reply and other than "0" is set for data fault, mode error, etc. (Refer to **page 64**.) |
| | Read data | For a normal reply, the reply data to the instruction specified by the instruction code is set. |

∗1    When a value other than 9999 is set in **Pr.430** under position control (**Pr.800** = 3), pulse monitor is selected.

**7**

#### ◆ Reply code definition

The reply to the instruction execution is set to RWr2, 10, 12, 14, 16, 18.

When executing the frequency setting (RYD, RYE) or instruction code execution (RYF), check the reply code (RWr2) in the remote register after execution.

| | Data | Item | Alarm definition | Remarks |
|---|---|---|---|---|
| Reply code | H0000 | Normal | No error (normal completion of instruction code execution) | • Reply code to RWr2 when **Pr.544** = 0<br>• Reply code to RWw10, 12, 14, 16, and 18 when **Pr.544** = 18 |
| | H0001 | Write mode error | Parameter write was attempted during operation other than a stop in the network operation mode. | |
| | H0002 | Parameter selection error | Unregistered code number was set. | |
| | H0003 | Setting range error | Set data is outside the permissible data range. | |
| Reply code 1[*1] | H00 | Normal | No error (normal completion of instruction code execution) | Reply code to RWr2 when **Pr.544** ≠ 0, |
| | H01 | Write mode error | Parameter write was attempted during operation other than a stop in the network operation mode. | |
| | H03 | Frequency command (torque command) setting range error | Frequency (torque command) outside the range is set | |
| Reply code 2 | H00 | Normal | No error (normal completion of instruction code execution) | |
| | H01 | Write mode error | Parameter write was attempted during operation other than a stop in the network operation mode. | |
| | H02 | Parameter selection error | Unregistered code number was set. | |
| | H03 | Setting range error | Set data is outside the permissible data range. | |

∗1 When torque command is given, values of reply code 1 below are changed. (when values other than 14, 18 are set in **Pr.544**)

The above 4 bit of the reply code 1 is reply code to the torque command and the lower 4 bit is to the frequency command.

| Bit15 | | | | | | | | | | | | | | | Bit0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |

Reply code2      Reply code corresponds to the torque command      Reply code corresponds to the frequency command

Reply code1
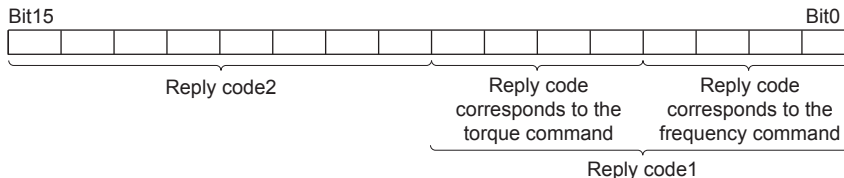
Example) The error code is H0030 when the torque command value is outside the setting range.

| Bit15 | | | | | | | | | | | | | | | Bit0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |

Reply code corresponds to the torque command
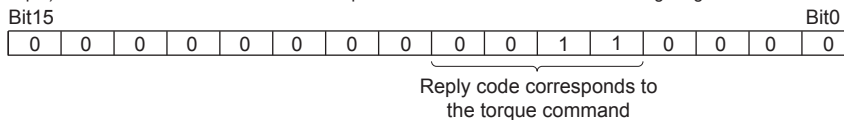
## 7.2.3 Instruction codes

### ◆ Instruction code definition

Set the instruction code using a remote register (RWw) (Refer to **page 59**.)

The definition read by the instruction code is stored in the remote register (RWr). (Refer to **page 62**.)

| Item | | Read/write | Instruction code | Description |
|---|---|---|---|---|
| Operation mode | | Read | H7B | H0000: Network operation mode<br>H0001: External operation mode, External JOG operation mode<br>H0002: PU operation mode, External/PU combined operation mode 1 and 2, PUJOG operation mode |
| | | Write | HFB | H0000: Network operation mode<br>H0001: External operation mode<br>H0002: PU operation mode (**Pr.79** = "6") |
| Monitor | Output frequency/speed∗1, ∗2 | Read | H6F | H0000 to HFFFF<br>Output frequency: Increments 0.01 Hz<br>(The display can be changed to the rotations per minute using **Pr.37**, **Pr.144** and **Pr.811**. (Refer to the Instruction Manual (Detailed) of the inverter.)) |
| | Output current | Read | H70 | H0000 to HFFFF<br>Output current (hexadecimal): Increments 0.01 A / 0.1 A ∗4 |
| | Output voltage | Read | H71 | H0000 to HFFFF<br>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: Monitor selection data<br>Refer to monitor code. (Refer to **page 70**.) |
| | | Write | HF3∗3 | |

| Item | | Read/write | Instruction code | Description |
|---|---|---|---|---|
| Monitor | Faults history | Read | H74 to H77 | H0000 to HFFFF: Last two fault records<br><br>**For instruction code H74, read data H30A0**<br><br>H74 `b15` Second fault in past `b8` `b7` Latest fault `b0`<br>H75 Fourth fault in past \| Third fault in past<br>H76 Sixth fault in past \| Fifth fault in past<br>H77 Eighth fault in past \| Seventh fault in past<br><br>`b15` 0 0 1 1 0 0 0 0 `b8` `b7` 1 0 1 0 0 0 0 0 `b0`<br>Last fault (H30) \|\_\_\| Current fault (HA0)<br>⬇<br>Last fault ...... THT<br>Current fault ...... OPT<br><br>For the data codes or details of fault records, refer to the Instruction Manual (Detailed) of the inverter. |
| Set frequency (RAM) | | Read | H6D | Read the set frequency/speed from the RAM or EEPROM.<br>H0000 to HFFFF: Set frequency in 0.01 Hz increments<br>(The display can be changed to the rotations per minute using **Pr.37**, **Pr.144** and **Pr.811**. (Refer to the Instruction Manual (Detailed) of the inverter.))<br>• When performing torque control under Real sensorless vector control or vector control with **Pr.544** = "0, 1, 12" and **Pr.804** = "3 or 5", read torque command value. The setting range depends on **Pr.804**. |
| Set frequency (EEPROM) | | | H6E | |
| Set frequency (RAM)∗5 | | Write | HED | Write the set frequency/speed into the RAM or EEPROM.<br>H0000 to HE678 (0 to 590.00 Hz): frequency in 0.01 Hz increments<br>(The display can be changed to the rotations per minute using **Pr.37**, **Pr.144** and **Pr.811**. (Refer to the Instruction Manual (Detailed) of the inverter.))<br>• To change the set frequency consecutively, write data to the inverter RAM. (Instruction code: HED)<br>• When performing torque control under Real sensorless vector control or vector control (torque control) with **Pr.544** = "0, 1, 12" and **Pr.804** = "3 or 5", torque command is set. The setting range depends on **Pr.804**. |
| Set frequency (RAM and EEPROM)∗5 | | Write | HEE | |

**7**

| Item | Read/write | Instruction code | Description |
|---|---|---|---|
| Parameter | Read | H00 to H63 | • Refer to the instruction code in the Instruction Manual (Detailed) of the inverter to read and write as required.<br>Write to **Pr.77** and **Pr.79** is disabled.<br>When setting **Pr.100** and later, set link parameter extended setting.<br>• Set 65520 (HFFF0) as a parameter value "8888" and 65535 (HFFFF) as "9999".<br>• 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 details.) |
| | Write | H80 to HE3 | |
| Faults history batch clear | Write | HF4 | H9696: Clears the faults history as a batch. |
| All parameter clear | Write | HFC | All parameters return to the initial values.<br>Whether to clear communication parameters or not can be selected according to data.<br>(○: Clear, ×: Not clear)<br>Refer to the Instruction Manual (Detailed) of the inverter for parameter clear, all clear, and communication parameters.<br><br>|Clear type|Data|Communication Pr.|<br>|---|---|---|<br>|Parameter clear|H9696|○|<br>| |H5A5A|×*6|<br>|All parameter clear|H9966|○|<br>| |H55AA|×*6|<br><br>When clear is executed for H9696 or H9966, communication-related parameter settings also return to the initial values. When resuming operation, set the parameters again.<br>Executing clear will clear the instruction code HEC, HF3, and HFF settings. |
| Inverter reset | Write | HFD | H9696: Resets the inverter. |
| Link parameter extended setting*7 | Read | H7F | H00 to H0D: Parameter description is changed according to the instruction code (extended) setting. Refer to the Instruction Manual (Detailed) of the inverter for instruction code (extended) settings. |
| | Write | HFF | |

| Item | Read/write | Instruction code | 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"). |
| | Write | HEC | H00: Frequency*9<br>H01: Analog value set in parameters<br>H02: Analog value input from the terminal |

- ∗1 When "100" is set in **Pr.52 Operation panel main monitor selection**, frequency setting is monitored during a stop and output frequency is monitored during running.
- ∗2 When a value other than 9999 is set in **Pr.430** under position control (**Pr.800** = 3), pulse monitor is selected.
- ∗3 Write data is in hexadecimal, and only last two digits are valid. (The upper two digits are ignored.)
- ∗4 Differs according to capacities. (FR-A820-03160(55K) or lower, FR-A840-01800(55K) or lower /FR-A820-03800(75K) or higher, FR-A840-02160(75K) or higher)
- ∗5 Setting from the remote register (RWw1) is also available.
- ∗6 Turning OFF the power supply while clearing parameters with H5A5A or H55AA sets back the communication parameter settings to the initial settings.
- ∗7 Setting is valid only when **Pr.544** = "0". When **Pr.544** ≠ "0", set using RWw2 or RWw10, 12, 14, 16, or 18. (Refer to **page 59**)
- ∗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**

### 7.2.4 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, RWw0 and RWw4 to 7.

• For the monitor code (RWw0), select the first monitor description (RWr0) from the lower 8 bits and the second monitor description (RWr1) from the upper 8 bits.

   (Example)   When output current is selected for the first monitor (RWr0) and running speed is selected for the second monitor (RWr1) → monitor code (RWw0) is H0602

• When **Pr.544** = "12, 14, or 18", descriptions of monitor codes 3 (RWw4) to 6 (RWw7) can be selected.

| Monitor code | Second monitor description (the first 8 bits) | First, third to sixth monitor description (the last 8 bits) | Increments |
|---|---|---|---|
| H00 | Output frequency | No monitoring (monitor value is 0) | 0.01 Hz |
| H01 | Output frequency | | 0.01 Hz |
| H02 | Output current | | 0.01 A/0.1 A |
| H03 | Output voltage | | 0.1 V |
| . . . | . . . | | . . . |

**NOTE**

• The monitor codes (monitored items) after H01 are the same as those of the RS-485 communication dedicated monitor. 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 RWw0 and RWw4 to 7 are used for monitoring, H00 (output frequency), H01 (output frequency), and H05 (set frequency) always indicate the frequency regardless of the settings of **Pr.37**, **Pr.144**, and **Pr.811**.

## 7.3 Torque command by CC-Link communication

Digital torque command can be given during torque control under Real sensorless vector control and vector control using the FR-A8NC. The torque command setting method can be selected using **Pr.804 Torque command source selection**.

| Pr. | Name | Initial value | Setting range | Torque command | Parameter for speed limit |
|---|---|---|---|---|---|
| 804 | Torque command source selection | 0 | 0 | Torque command by terminal1 analog input | Pr.807 |
| | | | 1 | Torque command by CC-Link communication (FR-A8NC)<br>• Torque command by parameter setting<br>  Setting value of **Pr.805** or **Pr.806** (-400% to 400%) ∗1 | Pr.807 |
| | | | 3 | Torque command by CC-Link communication (FR-A8NC)<br>• Torque command by parameter setting<br>  Setting value of **Pr.805** or **Pr.806** (-400% to 400%) ∗1<br>• Setting is available using the remote register RWw1 or RWwC.<br>  (-400% to 400%) | Pr.808, Pr.809 |
| | | | 4 | 16 bit digital input (FR-A8AX) | Pr.807 |
| | | | 5 | Torque command by CC-Link communication (FR-A8NC)<br>• Torque command by parameter setting<br>  Setting value of **Pr.805** or **Pr.806** (-327.68% to 327.67%) ∗1<br>• Setting is available using the remote register RWw1 or RWwC.<br>  (-327.68% to 327.67%) | Pr.808, Pr.809 |
| | | | 6 | Torque command by CC-Link communication (FR-A8NC)<br>• Torque command by parameter setting<br>  Setting value of **Pr.805** or **Pr.806** (-327.68% to 327.67%) ∗1 | Pr.807 |

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

**7**

#### ◆ List of I/O devices whose function is changed when the torque command is given

| I/O device | Controls other than torque control | Torque control | |
|---|---|---|---|
| RYD | Frequency setting command (RAM) | Torque setting command (RAM) | |
| RYE | Frequency setting command (EEPROM) | Torque setting command (EEPROM) | |
| RXD | Frequency setting completion (RAM) | Torque setting completion (RAM) | |
| RXE | Frequency setting completion (EEPROM) | Torque setting completion (EEPROM) | |
| RWw1 | Set frequency | **Pr.544 setting** | |
| | | 0, 1, 12 | Torque command |
| | | 14, 18 | Set frequency |
| RWwC | — | 0, 1, 12 | — |
| | | 14, 18 | Torque command |

#### ◆ Torque command setting method

| Pr.804 setting | Pr.544 setting | Torque command setting method (Any method below can be chosen) |
|---|---|---|
| 3, 5 | 0, 1, 12 | • Set the torque command value in RWwn+1, and "1" in RYD or RYE.<br>• Set the instruction code HED or HEE in RWwn+2, the torque command value in RWwn+3, and "1" in RYF. (Torque command value can be read by the instruction code H6D and H6E.)<br>• Set H08 in the link parameter extended setting (HFF), the instruction code H85 or H86 in RWwn+2, the torque command value in RWwn+3, and "1" in RYF. (write to **Pr.805 and Pr.806**) |
| | 14, 18 | • Set the torque command value in RWwn+C, and "1" in RYD or RYE.<br>• Set H08 in the link parameter extended setting (HFF), the instruction code H85 or H86 in RWwn+2, the torque command value in RWwn+3, and "1" in RYF. (write to **Pr.805 and Pr.806**) |
| 1, 6 | 0, 1, 12, 14, 18 | Set H08 in the link parameter extended setting (HFF), the instruction code H85 or H86 in RWwn+2, the torque command value in RWwn+3, and "1" in RYF. (write to **Pr.805 and Pr.806**) |
| 0, 4 | — | Torque command from CC-Link communication is disabled. |

#### ◆ Relationship between Pr.804 and the setting range and actual torque command (when setting is made from CC-Link communication)

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

# **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 | **77** |
| Setting the operation mode | Selecting the network operation mode | **78** |
| Setting the operation commands | Commanding the forward rotation and middle speed signals | **79** |
| Setting the monitoring function | Monitoring the output frequency | **80** |
| Reading a parameter value | Reading the value of **Pr.7 Acceleration time** | **81** |
| Writing a parameter value | Setting "3.0 s" in **Pr.7 Acceleration time** | **82** |
| Setting the running frequency (running speed) | Setting to 50.00 Hz | **83** |
| Reading the fault records | Reading the inverter faults | **85** |
| Inverter reset | Perform inverter reset at an inverter alarm occurrence. | **86** |

◆ System configuration for programming example
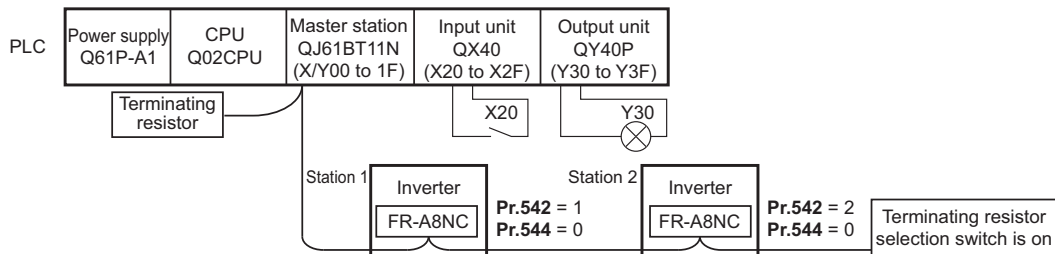
#### ◆ Network parameter setting of the master station

Network parameters are set as below.

| Item | | Setting conditions |
|---|---|---|
| Start I/O No. | | 0000 |
| Operation settings | Data link alarm station setting | Input clear |
| | Setting at CPU stop | Refresh |
| Type | | Master |
| Mode | | Remote net Ver.1 mode |
| All connect count | | 2 |
| Remote input (RX) | | X1000 |
| Remote output (RY) | | Y1000 |
| Remote register (RWr) | | W0 |

| Item | | Setting conditions |
|---|---|---|
| Remote register (RWw) | | W100 |
| Special relay (SB) | | SB0 |
| Special resister (SW) | | SW0 |
| Retry count | | 3 |
| Automatic reconnection station count | | 1 |
| CPU down select | | Stop |
| Scan mode settings | | Asynchronous |
| Station information | Station type | Remote device station |

- The relation between the device of the programmable controller CPU and remote I/O (RX, RY) of the remote device station is as follows:
  The devices used actually are indicated in shaded regions.
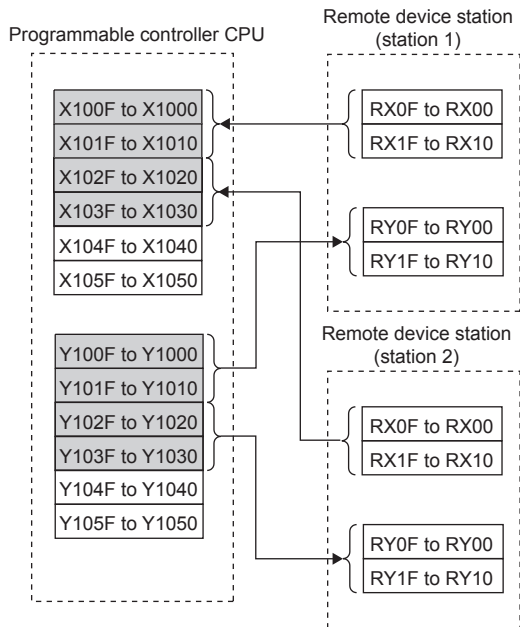
- The relation between the device of the programmable controller CPU and remote register (RWw, RWr) of the remote device station is as follows:
  The devices used actually are indicated in shaded regions.
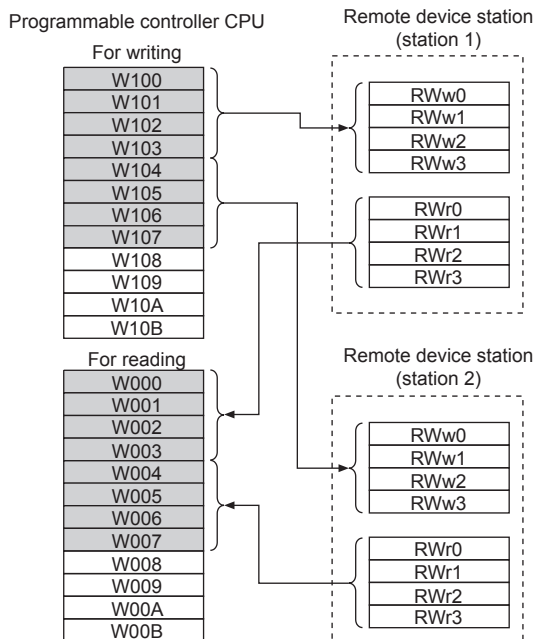
## 8.1    Program example for reading the inverter status

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



```
    X0   X0F  X1  SW80.0
0  ─┤↑├──┤├──┤├───┤↑├──────────────────────────(M0  )─   Check the data link status of the station 1
    M0   X1002
7  ─┤├───┤├──────────────────────────────────(Y30 )─   Turn on the output unit (Y00)
         Inverter running (RX02)
10 ─────────────────────────────────────────[END ]─
```

Remote input
| RXF  to RX0  |
| R̄X̄1̄F̄ to R̄X̄1̄0̄ |

One station

X100F                                                                    X1000
b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

[Inverter status]

Inverter status
b0: During forward rotation
b1: Reverse running
b2: Running (RUN)∗1
b3: Up to frequency (SU)∗1
b4: Overload alarm (OL)∗1
b5: Instantaneous power failure (IPF)∗1
b6: Frequency detection (FU)∗1
b7: Fault (ABC1)∗1
b8: — (ABC2)∗1
b9: — (DO0)∗1
b10: — (DO1)∗1
b11: — (DO2)∗1

∗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**

## 8.2 Program 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 66**)
• The reply code at the time of instruction code execution is set to D2. (Refer to **page 64**)
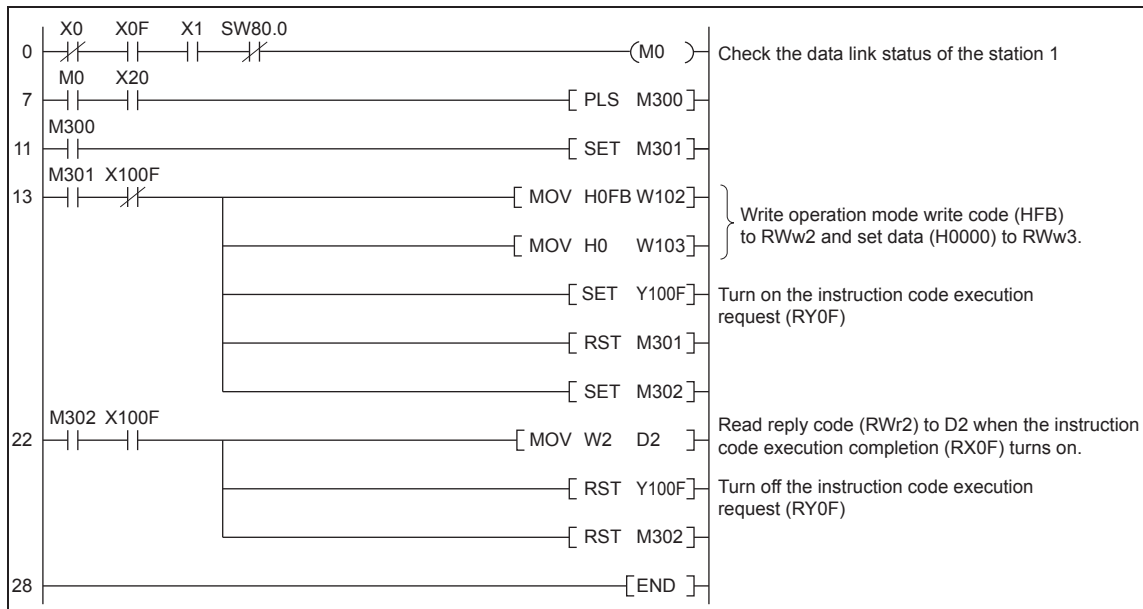
## 8.3    Program example for setting the operation commands

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

```
        X0    X0F   X1   SW80.0
    0  ─┤/├──┤├──┤├──┤/├─────────────────────────( M0  )─  Check the data link status of the station 1
        M0    X20
    7  ─┤├──┤├──────────────────────────────────( Y1000 )─  Forward rotation command (RY00)

                                                 ( Y1003 )─  Middle speed operation command (RY03)

   11  ─────────────────────────────────────────[ END ]
```

```
    Y100F                                           Y1000
    b15                        b7                    b0
   ┌──┬──┬──┬──┬──┬──┬──┬──┬──┬──┬──┬──┬──┬──┬──┬──┐        ┌──────────────┐
   │ 0│ 0│ 0│ 0│ 0│ 0│ 0│ 0│ 0│ 0│ 0│ 0│ 1│ 0│ 0│ 1│ ────→ │ RY0F  to  RY00│ ┐
   └──┴──┴──┴──┴──┴──┴──┴──┴──┴──┴──┴──┴──┴──┴──┴──┘        │ RY1F  to  RY10│ │ One station
                              └──────────┬────────┘        └──────────────┘ ┘
                              [Run command]    ↓      ↓
                                   Middle speed  Forward rotation    1: ON
                                                                     0: OFF
```
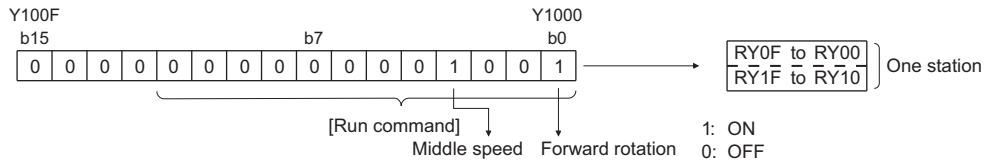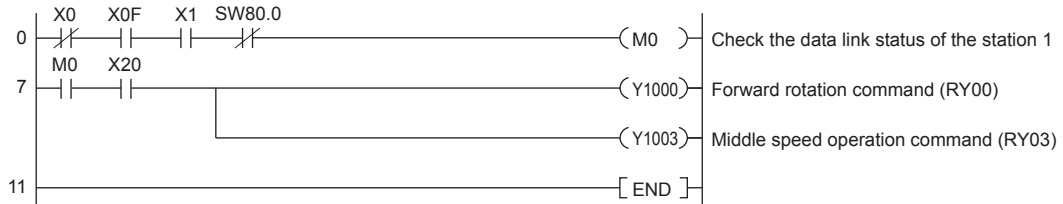
Run command
b0 : Forward rotation command                b6 : Second function selection (RT)∗1
b1 : Reverse rotation command                b7 : Terminal 4 input selection (AU)∗1
b2 : High-speed operation command (RH)∗1     b8 : Selection of automatic restart after instantaneous power failure (CS)∗1
b3 : Middle-speed operation command (RM)∗1   b9 : Output stop
b4 : Low-speed operation command (RL)∗1      b10 : Start self-holding selection (STOP)∗1
b5 : Jog operation selection (JOG)∗1         b11 : Inverter reset (RES)∗1

∗1    These signals are initial values. You can change input signals using **Pr.180 to Pr.186, Pr.188, and 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 details.)

**8**

## 8.4    Program 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)
Refer to **page 70** for the monitor codes.
(Example) The output frequency of 60Hz is indicated as H1770 (6000).
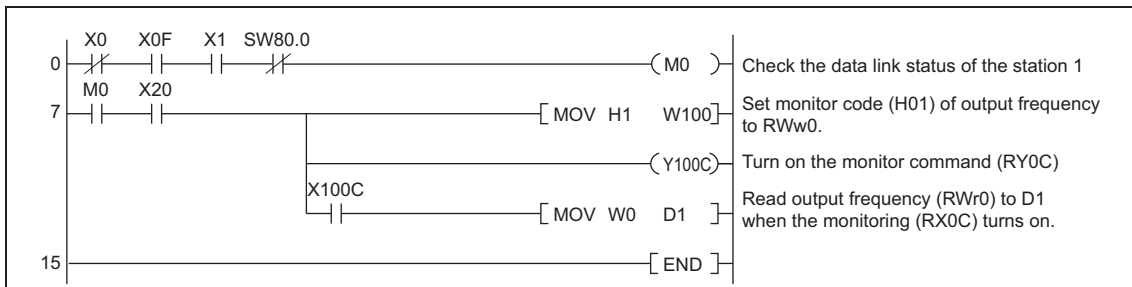
## 8.5 Program example for parameter reading

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 codes.
- The reply code at the time of instruction code execution is set to D2. (Refer to **page 64**)
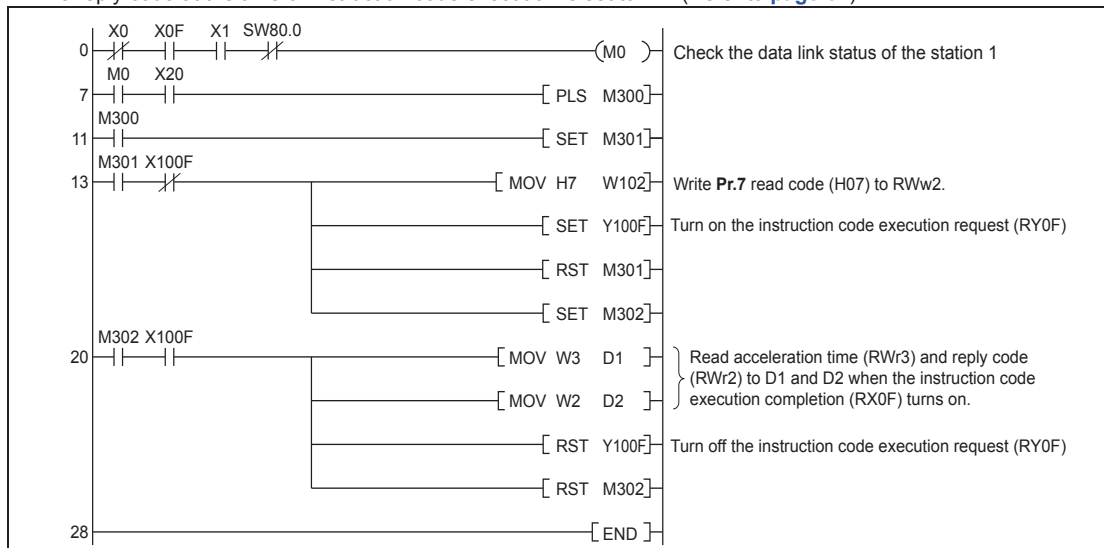


```
      X0   X0F   X1  SW80.0
0    ─┤↑├──┤├───┤├───┤/├──────────────────────────( M0 )─   Check the data link status of the station 1
      M0   X20
7    ─┤├───┤├────────────────────────────[ PLS  M300 ]
      M300
11   ─┤├──────────────────────────────────[ SET  M301 ]
      M301 X100F
13   ─┤├──┤/├────────────────────[ MOV  H7   W102 ]─   Write Pr.7 read code (H07) to RWw2.
                                  ─[ SET  Y100F ]─   Turn on the instruction code execution request (RY0F)
                                  ─[ RST  M301 ]
                                  ─[ SET  M302 ]
      M302 X100F
20   ─┤├──┤├─────────────────────[ MOV  W3   D1  ]─┐  Read acceleration time (RWr3) and reply code
                                  ─[ MOV  W2   D2  ]─┘  (RWr2) to D1 and D2 when the instruction code
                                                        execution completion (RX0F) turns on.
                                  ─[ RST  Y100F ]─   Turn off the instruction code execution request (RY0F)
                                  ─[ RST  M302 ]
28   ───────────────────────────────────────[ END ]
```

> **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 for details.

## 8.6    Program example for parameter writing

The following program changes the setting of **Pr.7 Acceleration time** of station 1 inverter to 3.0 s.
• Acceleration time writing instruction code: H87 (hexadecimal)
• Acceleration time set data: K30 (decimal)
For the parameter instruction codes, refer to the Instruction Manual (Detailed) of the inverter.
The reply code at the time of instruction code execution is set to D2. (Refer to **page 64**)



Ladder program:

```
        X0   X0F  X1  SW80.0
0      ─┤├──┤├──┤├──┤/├────────────────────────────( M0 )──   Check the data link status of the station 1
        M0   X20
7      ─┤├──┤├──────────────────────────────────[ PLS  M300 ]
        M300
11     ─┤├───────────────────────────────────────[ SET  M301 ]
        M301 X100F
13     ─┤├──┤/├────────────────────[ MOV  H87   W102 ]─┐  Write Pr.7 write (H87) to RWw2 and
                                   ─[ MOV  K30   W103 ]─┘  acceleration time setting data (K30) to RWw3.
                                   ─[ SET  Y100F ]          Turn on the instruction code execution request (RY0F)
                                   ─[ RST  M301 ]
                                   ─[ SET  M302 ]
        M302 X100F
22     ─┤├──┤├───────────────────[ MOV  W2    D2 ]       Read reply code (RWr2) to D2 when the instruction
                                                          code execution completion (RX0F) turns on.
                                   ─[ RST  Y100F ]          Turn off the instruction code execution request (RY0F)
                                   ─[ RST  M302 ]
28     ────────────────────────────────────────────[ END ]
```
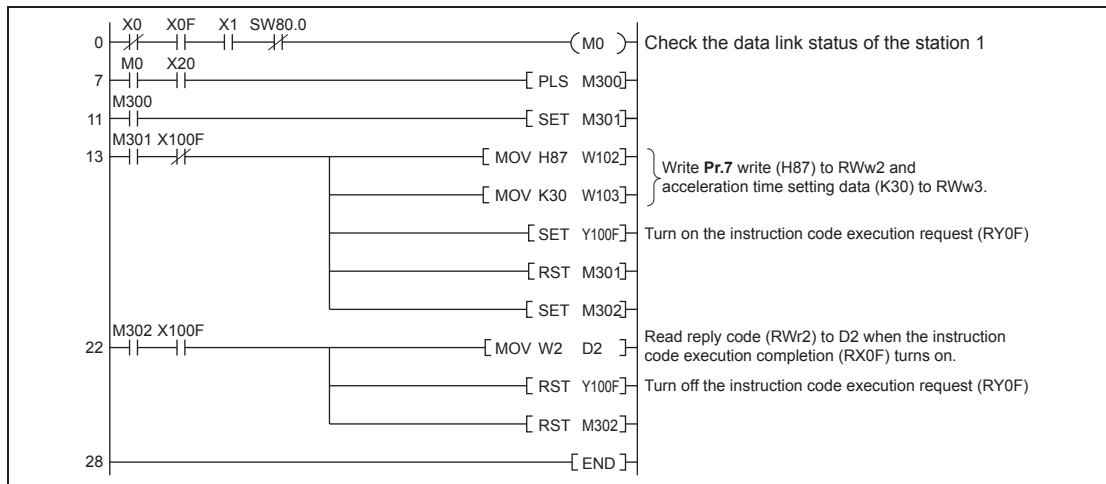
> **NOTE**
> • For parameters having numbers 100 and later, change their link parameter extended settings (set them to other than H00). Refer to the parameter list of the Instruction Manual (Detailed) of the inverter for settings.
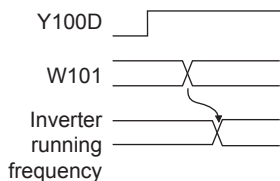> • For other functions, refer to the instruction codes (Refer to **page 66**).

## 8.7 Program 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. (Refer to **page 64**)
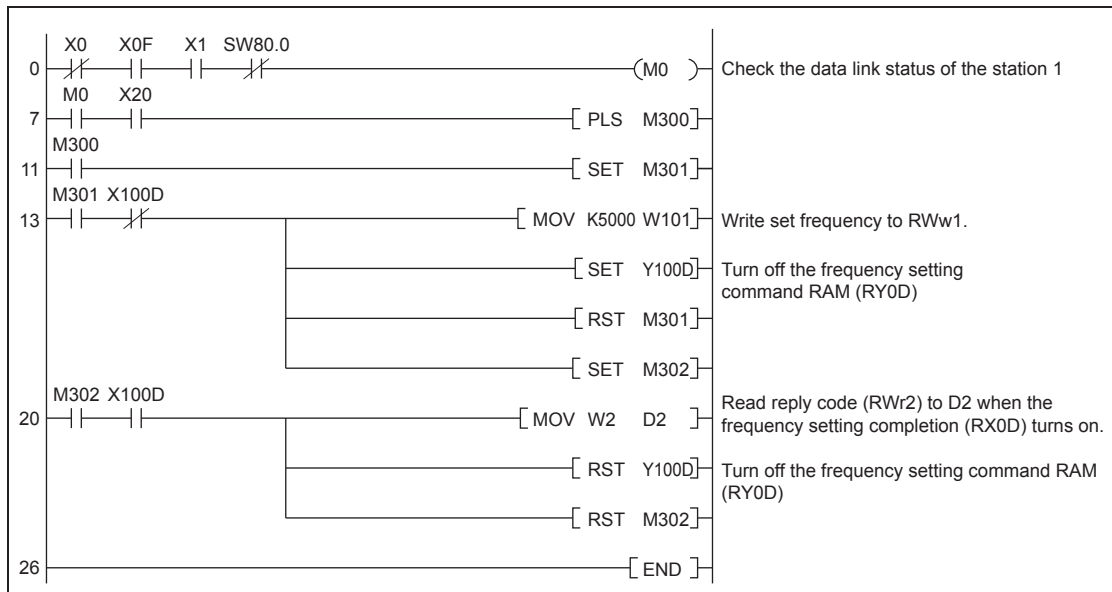
- To continuously change the running frequency from the programmable controller
  When the frequency (speed) setting completion (example: X100D) switches on, make sure that the reply code in the remote register is 0000H and change the set data (example: W101) continuously.
- Program example for writing data to EEPROM
  Modify the program on **page 83** as follows:
  Frequency setting command Y100D → Y100E
  Frequency setting completion X100D → X100E



&lt;Timing chart when writing to RAM&gt;

&lt;Timing chart when writing to EEPROM&gt;

Reflect to the inverter when Y100E turns on
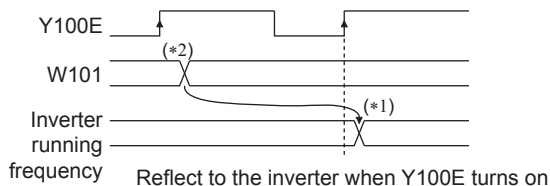
*1   For EEPROM, write is made only once when Y100E is switched on.
*2   If the set data is changed with Y100E on, it is not reflected on the inverter.

## 8.8 Program example for fault record reading

The following program reads fault records of station 1 inverter to D1.
• Faults history No. 1, No. 2 reading instruction code: H74 (hexadecimal)
For the error codes, refer to the Instruction Manual (Detailed) of the inverter.
The reply code at the time of instruction code execution is set to D2. (Refer to **page 64**)



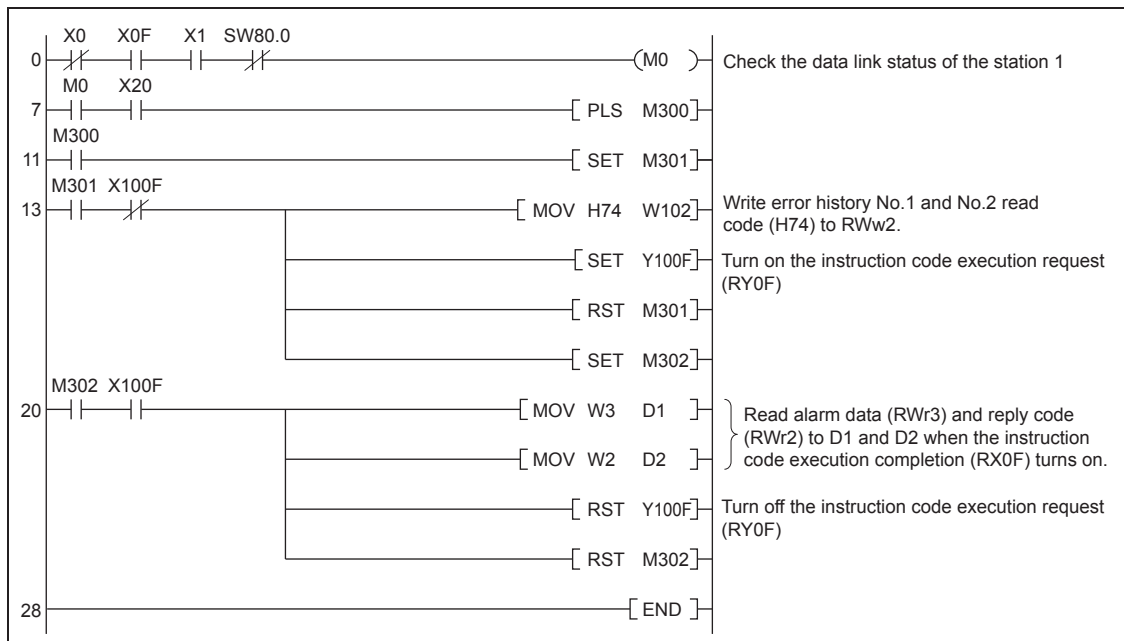| Rung | Ladder | Comment |
|---|---|---|
| 0 | X0 /⊦ X0F ⊦⊦ X1 ⊦⊦ SW80.0 /⊦ ——(M0) | Check the data link status of the station 1 |
| 7 | M0 ⊦⊦ X20 ⊦⊦ —[ PLS M300 ] | |
| 11 | M300 ⊦⊦ —[ SET M301 ] | |
| 13 | M301 ⊦⊦ X100F /⊦ —[ MOV H74 W102 ] | Write error history No.1 and No.2 read code (H74) to RWw2. |
| | —[ SET Y100F ] | Turn on the instruction code execution request (RY0F) |
| | —[ RST M301 ] | |
| | —[ SET M302 ] | |
| 20 | M302 ⊦⊦ X100F ⊦⊦ —[ MOV W3 D1 ] | Read alarm data (RWr3) and reply code (RWr2) to D1 and D2 when the instruction code execution completion (RX0F) turns on. |
| | —[ MOV W2 D2 ] | |
| | —[ RST Y100F ] | Turn off the instruction code execution request (RY0F) |
| | —[ RST M302 ] | |
| 28 | —[ END ] | |

**8**

## 8.9 Program example for resetting the inverter at inverter error

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

```
       X0   X0F   X1   SW80.0
   0 ──┤/├──┤ ├──┤ ├──┤/├──────────────────────( M0  )─  Check the data link status of the station 1
       M0   X101A  X20
   7 ──┤ ├──┤ ├──┤ ├──────────────────────────(Y101A)─  Turn on the error reset request flag (RY1A)
            Error status flag                              Turn off the error reset request flag (RY1A)
  11 ──────────────────────────────────────────[ END ]─  when the error status flag (RX1A) is off.
```
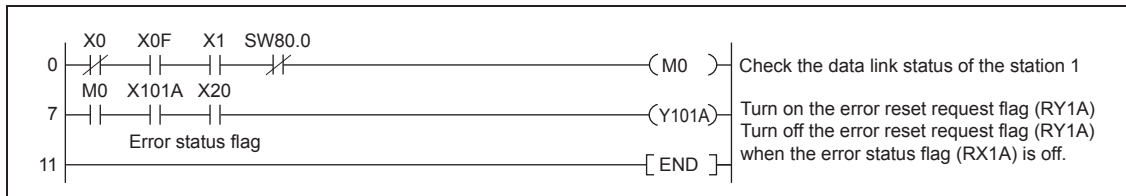
### NOTE

- The above inverter reset using RY1A may be made only when an inverter error occurs. When **Pr.349 Communication reset selection** = "0", inverter reset is available independently of the operation mode.
- When using the instruction code execution request (RYF) 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** (refer to **page 27**) or change the operation mode to the network operation mode. (For the program example, refer to **page 78**)
- Refer to **page 35** 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.

| Correct | TO instruction<br>Write completion | Incorrect | TO instruction<br>Write completion |
|---|---|---|---|
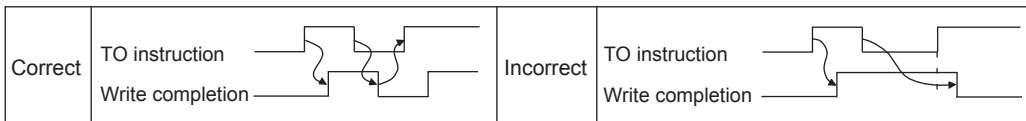
#### ◆ Operating and handling instructions
- Command only from the programmable controller can be accepted during operation from CC-Link communication. The run command from external and parameter unit is ignored.
- If multiple inverters have the same station number, the communication cannot be performed 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, a CC-Link dedicated cable disconnection etc. during CC-Link operation.
- If the programmable controller (master station) is reset during CC-Link 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. (Refer to **page 27**)

**8**

#### ◆ Troubleshooting

| Description | Check point |
|---|---|
| Operation mode does not switch to the network operation mode | Check that the option unit (FR-A8NC) and CC-Link dedicated cables are fitted properly. (Check for contact fault, break in the cable, etc.) |
| | Check that **Pr.542 Communication station number (CC-Link)** setting switches are set to the correct positions. (Check that the station number matches the program, the station numbers are not repeated, and the station number is not outside 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 HOW TO CHECK FOR ERROR USING THE LEDS

## 9.1 When one inverter is connected

The following diagram shows the system configuration with one inverter. The diagram indicates how the cause of the fault can be checked with the LED status of the inverter communication option (FR-A8NC).
(In this example, assume SW, M/S, and PRM LEDs of the master module are OFF (master module is in normal operation).)
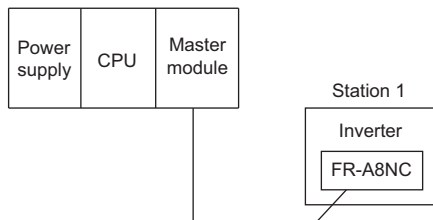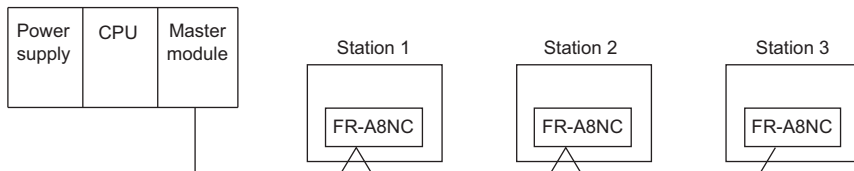


**Operation status indication LED**
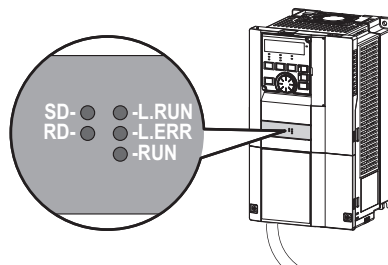
| LED status | | | | | Cause |
|---|---|---|---|---|---|
| RUN | L.RUN | SD | RD | L.ERR | |
| ● | ● | ◎ | ◎ | ◎ | Normal communication is made but CRC error has occurred due to noise. |
| ● | ● | ◎ | ◎ | ○ | Normal communication |
| ● | ● | ◎ | ○ | ◎ | Hardware fault |
| ● | ● | ◎ | ○ | ○ | Hardware fault |
| ● | ● | ○ | ◎ | ◎ | Cannot answer due to CRC error of receive data. |
| ● | ● | ○ | ◎ | ○ | Data sent to the host station does not reach destination. |
| ● | ● | ○ | ○ | ◎ | Hardware fault |
| ● | ● | ○ | ○ | ○ | Hardware fault |
| ● | ○ | ◎ | ◎ | ◎ | Polling response is made but refresh receive is in CRC error. |
| ● | ○ | ◎ | ◎ | ○ | Hardware fault |
| ● | ○ | ◎ | ○ | ◎ | Hardware fault |
| ● | ○ | ◎ | ○ | ○ | Hardware fault |
| ● | ○ | ○ | ◎ | ◎ | Data sent to the host station is in CRC error. |
| ● | ○ | ○ | ◎ | ○ | There is no data sent to the host station, or data sent to the host station cannot be received due to noise. |
| ● | ○ | ○ | ○ | ◎ | Hardware fault |
| ● | ○ | ○ | ○ | ○ | Cannot receive data due to break in the cable, etc. |
| ● | ○ | ○ | ◎○ | ● | Invalid baud rate or station number setting |
| ● | ● | ◎ | ◎ | ◎ | Baud rate or station number changed during operation. |
| ○ | ○ | ○ | ○ | ○ | Baud rate or station number changed during operation. |
| ◎ | — | — | — | — | Master station is connected to CC-Link ver. 1 and FR-A8NC is connected to CC-Link ver. 2. |

●: ON, ○: OFF, ◎: Flicker

## 9.2    When two or more inverters are connected

The following system configuration shows how the cause of a fault can be checked with the LED status of the inverter communication option (FR-A8NC) and countermeasures for the fault.
(In this example, assume SW, M/S, and PRM LEDs of the master module are OFF (master module is in normal operation).)



| LED status | | | | Cause | Corrective action |
|---|---|---|---|---|---|
| **Master unit** | **Inverters (FR-A8NC)** | | | | |
| | **Station 1** | **Station 2** | **Station 3** | | |
| TIME ○<br>LINE ○<br>or<br>TIME ●<br>LINE ○ | RUN      ●<br>L.RUN ●<br>SD        ●<br>RD        ●<br>L.ERR ○ | RUN      ●<br>L.RUN ●<br>SD        ●<br>RD        ●<br>L.ERR ○ | RUN      ●<br>L.RUN ●<br>SD        ●<br>RD        ●<br>L.ERR ○ | Normal | ─── |
| | RUN      ○<br>L.RUN ○<br>SD        ○<br>RD        ○<br>L.ERR ○ | RUN      ●<br>L.RUN ●<br>SD        ●<br>RD        ●<br>L.ERR ○ | RUN      ●<br>L.RUN ●<br>SD        ●<br>RD        ●<br>L.ERR ○ | Contact faults of the FR-A8NC with the station 1 inverter | Plug the FR-A8NC securely.<br>Check the connector. |

●: On, ○: Off, ◎: Flicker, *: Any of on, flicker or off

| LED status | | | | Cause | Corrective action |
|---|---|---|---|---|---|
| **Master unit** | **Inverters (FR-A8NC)** | | | | |
| | **Station 1** | **Station 2** | **Station 3** | | |
| TIME ○ LINE ○ or TIME ● LINE ○ | RUN ● L.RUN ● SD ∗ RD ● L.ERR ○ | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ○ | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ○ | Since the L.RUN LEDs of the FR-A8NC on station 2 and later are off, the CC-Link dedicated cable between the remote I/O units A and B is open or disconnected from the CC-Link communication connector. | Referring to the LED "on" condition, search for an open point and repair. |
| | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ○ | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ○ | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ○ | The CC-Link dedicated cable is shorted. | Identify the shorted wire out of the three wires (blue, white, yellow) of the CC-Link dedicated cable, and repair the wire. |
| | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ∗ | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ∗ | RUN ● L.RUN ○ SD ∗ RD ∗ L.ERR ∗ | The CC-Link dedicated cable is wired improperly. | Check if the three wires (blue, white, yellow) of the CC-Link dedicated cable are correctly inserted to the one-touch communication connector plug. If any improper connection is found, correct the connection. |

●: On, ○: Off, ◉: Flicker, ∗: Any of on, flicker or off

## 9.3 Communication stops during operation

- Check that the option unit (FR-A8NC) and CC-Link dedicated cables are fitted properly.
  (Check for contact fault, break in the cable, etc.)
- Check that the programmable controller program is executed properly.
- Check that data communication has not stopped due to an instantaneous power failure, etc.

| LED status | | | | Cause | Corrective action |
|---|---|---|---|---|---|
| Master unit | Inverters (FR-A8NC) | | | | |
| | Station 1 | Station 2 | Station 3 | | |
| TIME ○<br>LINE ○<br>or<br>TIME ●<br>LINE ○ | RUN ●<br>L.RUN ○<br>SD ∗<br>RD ●<br>L.ERR ○ | RUN ●<br>L.RUN ○<br>SD ●<br>RD ●<br>L.ERR ○ | RUN ●<br>L.RUN ○<br>SD ∗<br>RD ●<br>L.ERR ○ | Since the L.RUN LEDs of the FR-A8NC on station 1 and the FR-A8NC on station 3 are off, the station numbers of the inverters set as stations 1 and 3 are the same. | After correcting the repeated station numbers of the inverters using **Pr.542 Communication station number (CC-Link)**, switch power on again. |
| | RUN ●<br>L.RUN ●<br>SD ●<br>RD ●<br>L.ERR ○ | RUN ●<br>L.RUN ○<br>SD ○<br>RD ●<br>L.ERR ○ | RUN ●<br>L.RUN ●<br>SD ●<br>RD ●<br>L.ERR ○ | Since the L.RUN and SD LEDs of the FR-A8NC on station 2 are off, the transmission speed setting of the FR-A8NC on station 2 is wrong within the setting range (0 to 4). | After correcting the transmission speed setting using **Pr.543 Baud rate selection (CC-Link)**, switch power on again. |
| | RUN ●<br>L.RUN ●<br>SD ●<br>RD ●<br>L.ERR ○ | RUN ●<br>L.RUN ●<br>SD ●<br>RD ●<br>L.ERR ○ | RUN ●<br>L.RUN ●<br>SD ●<br>RD ●<br>L.ERR ◎ | Since the L.ERR LED of the FR-A8NC on station 3 flickers, the setting switch of the FR-A8NC on station 3 was moved during normal operation. | After returning the setting switch of the FR-A8NC to the original position using **Pr.542 Communication station number (CC-Link)** or **Pr.543 Baud rate selection (CC-Link)** power on the inverter again. |

●: On, ○: Off, ◎: Flicker, ∗: Any of on, flicker or off

| LED status | | | | Cause | Corrective action |
|---|---|---|---|---|---|
| **Master unit** | **Inverters (FR-A8NC)** | | | | |
| | **Station 1** | **Station 2** | **Station 3** | | |
| TIME ● <br> LINE ● <br> or <br> TIME ○ <br> LINE ● | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ○ | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ● | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ○ | Since the L.ERR LED of the FR-A8NC on station 2 is on, the FR-A8NC itself on station 2 is affected by noise. (L.RUN may go off.) | Securely earth (ground) each inverter and the master module. |
| | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ○ | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ○ | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ● | Since the L.ERR LEDs of the FR-A8NC on station 2 and later are on, the transmission cable between the inverters of stations 2 and 3 is affected by noise. (L.RUN may go off.) | Check if shielding (drain) wires of the CC-Link dedicated cable are properly inserted to the one-touch communication connector plug. (Refer to **page 16**) Also run it as far away as possible from the power lines. (100 mm or more) |
| | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ○ | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ○ | RUN ● <br> L.RUN ● <br> SD ● <br> RD ● <br> L.ERR ● | The terminating resistor has been left unfitted, or the one-touch connector plug with terminating resistor has been left unfitted. (L.RUN may go off.) | • Check that the setting of the terminating resistor selection switch is correct. (Refer to **page 23**) <br> • Use the one-touch connector plug with terminating resistor. (Refer to **page 20**) |

●: On, ○: Off, ◎: Flicker, *: Any of on, flicker or off

# MEMO

REVISIONS

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

| Print Date | *Manual Number | Revision |
|------------|----------------|----------|
| Sep. 2013 | IB(NA)-0600501ENG-A | First edition |
| | | |

INVERTER

**MITSUBISHI ELECTRIC CORPORATION**

Specifications subject to change without notice.