



INVERTER

Plug-in option

FR-A7NC E kit

INSTRUCTION MANUAL

CC-Link communication function

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Thank you for choosing this Mitsubishi Inverter plug-in option. This instruction manual gives handling information and precautions for use of this equipment. Incorrect handling might cause an unexpected fault. Before using the equipment, please read this manual carefully to use the equipment to its optimum. Please forward this manual to the end user.

This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect this 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".

WARNING

Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

CAUTION

Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

Note that even the  **CAUTION** level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.

SAFETY INSTRUCTIONS

1. Electric Shock Prevention

WARNING

- While power is on or when the inverter is running, do not open the front cover. You may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals and charging part and get an electric shock.
- If power is off, do not remove the front cover except for wiring or periodic inspection. You may access the charged inverter circuits and get an electric shock.
- Before starting wiring or inspection, check to make sure that the indication of the inverter operation panel is off, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.
- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the plug-in option before wiring. Otherwise, you may get an electric shock or be injured.
- Do not touch the plug-in option 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.

2. Injury Prevention

CAUTION

- Apply only the voltage specified in the instruction manual to each terminal. Otherwise, burst, damage, etc. may occur.
- Ensure that the cables are connected to the correct terminals. Otherwise, burst, damage, etc. may occur.
- Always make sure that polarity is correct to prevent damage, etc. Otherwise, burst, damage may occur.
- While power is on or for some time after power-off, do not touch the inverter as it is hot and you may get burnt.

3. Additional Instructions

Also note the following points to prevent an accidental failure, injury, electric shock, etc.

1) Transportation and mounting

CAUTION

- 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.
- Check that the mounting orientation is correct.
- Prevent other conductive bodies such as screws and metal fragments or other flammable substance such as oil from entering the inverter.

2) Trial run

CAUTION

- Before starting operation, confirm and adjust the parameters. A failure to do so may cause some machines to make unexpected motions.

3) Usage

WARNING

- 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 inverter.

CAUTION

- When parameter clear or all parameter clear is performed, reset the required parameters before starting operations. Each parameter returns to the initial value.
- For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

4) Maintenance, inspection and parts replacement

CAUTION

- Do not test the equipment with a megger (measure insulation resistance).

5) Disposal

CAUTION

- Treat as industrial waste.

6) General instruction

All illustrations given in this manual may have been drawn with covers or safety guards removed to provide in-depth description. Before starting operation of the product, always return the covers and guards into original positions as specified and operate the equipment in accordance with the manual.

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1 PRE-OPERATION INSTRUCTIONS



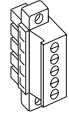
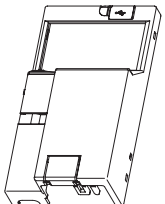
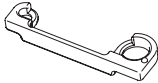
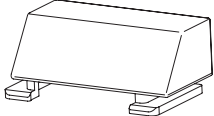
1.1 Unpacking and Product Confirmation

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 dedicated for the E700 series.

1.1.1 Packing confirmation

Check the enclosed items.

<p>Plug-in option 1</p> 	<p>Mounting screw (M3 × 6mm) 2 (Refer to page 9)</p> 	<p>Terminal block 1 (Refer to page 17)</p> 
<p>Front cover for plug-in option 1</p> 	<p>Option protective cover * 1 (Refer to page 10)</p> 	<p>Option small cover (Not used) 1</p> 

* Used with the FR-E720-3.7K (FR-E720-175) or less and FR-E740-7.5K (FR-E740-170) or less.

CAUTION

In place of the inverter front cover, install a provided front cover for plug-in option.

1.2 Parts

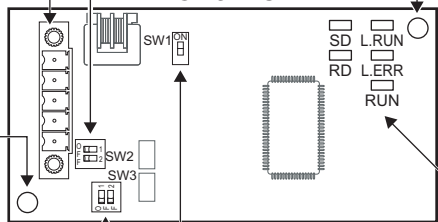
Connector for communication
Mount the accessory terminal block to connect to the network.
(Refer to page 17.)

Mounting hole

Terminating resistor selection switch

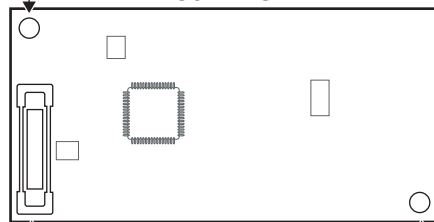
Select the resistor value of the terminating resistor. *(Refer to page 13.)*

Front view



Mounting hole

Rear view



Mounting hole

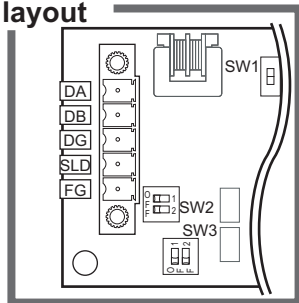
Switch for manufacturer setting

Do not change from initially-set status (1, 2:OFF).
(both SW1 and SW3 are off)

Connector

Connect to the inverter option connector.

Terminal layout



Operation status indication LED

Lit/flicker of the LED indicate operation status. *(Refer to page 3.)*

● Operation status indication LED

LED	Description
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	<ul style="list-style-type: none"> • Lit when a communication error occurs in the own station and flickers when settings of switch, etc. are changed while power is on. • Flickers when the <i>Pr. 542</i> or <i>Pr. 543</i> setting is changed. Turn the power on again or turn the RES signal on. (<i>Refer to page 37, 38.</i>)
RUN	Lit during normal operation (5V is supplied in the board) (Lit even in the noncommunication status.) Flickers when the master station is CC-Link Ver.1 and the FR-A7NC is CC-Link Ver.2 compatible. (<i>Refer to page 5.</i>)
SD	Turns off when no data is transmitted.
RD	Lit when receive data is carrier detected.

REMARKS

- 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 (CC-Link)*. (*Refer to page 38.*)

1.3 Inverter Option Specifications

Type	Inverter plug-in option type terminal block connectable
Power supply	5VDC supplied from the inverter
Number of units connected	42 units max. (Refer to <i>page 43</i> for the number of stations occupied), May be used with other equipment.
Cable size	0.75 to 2mm ²
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 20cm (7.87 inch) 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

- 1) All modules that comprise a CC-Link system should be compatible with CC-Link Ver. 1.10.
- 2) All data link cables should be CC-Link Ver. 1.10 compatible, CC-Link dedicated cables.
(CC-Link Ver. 1.10 compatible cables have a  logo or Ver. 1.10 indication.)

CAUTION

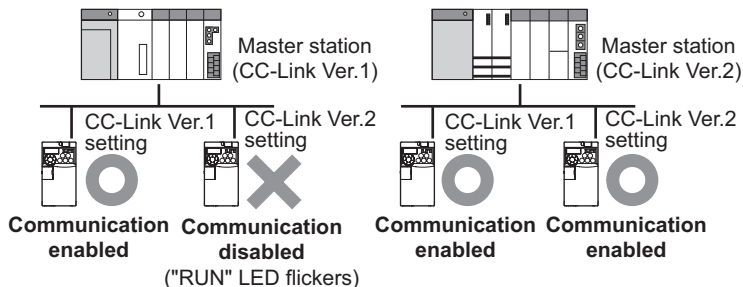
In a system that uses the CC-Link Ver. 1.00 and Ver. 1.10 modules and cables together, the maximum overall cable length and inter-station cable length are as specified for CC-Link Ver. 1.00.

1.4.2 CC-Link Ver. 2

The FR-A7NC is compatible with CC-Link Ver.2.

When using the CC-Link Ver.2 setting with the FR-A7NC, the master station needs to be compatible with the CC-Link Ver.2.

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





2 INSTALLATION

2.1 Pre-Installation Instructions

Make sure that the input power of the inverter is 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.
-  For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

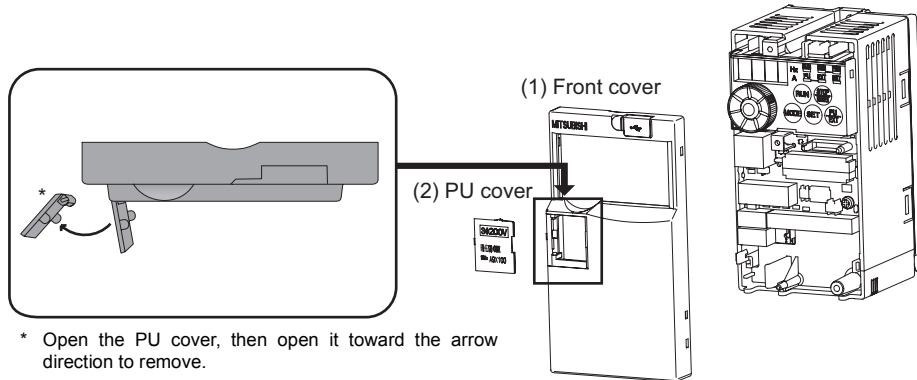
2.2 Installation Procedure

The FR-E700 series has one connection connector for the plug-in option.

CAUTION

- Always perform wiring to the main circuit terminals and control circuit terminals before installing the option. Wiring cannot be performed after installing the option.
- When the inverter can not recognize that the option unit is mounted due to improper installation, etc., "E. /" (option alarm) is displayed.
- Take care not to drop a mounting screw during mounting and removal.
- Pull out the option straight to remove. Otherwise, the connector may be damaged.

- For FR-E720-3.7K (FR-E720-175) or less and FR-E740-7.5K (FR-E740-170) or less
- (1) Remove the front cover from the inverter. (For removing the front cover, refer to the FR-E700 instruction manual.)
 - (2) Remove the PU cover from the front cover. Open the PU cover with a driver, etc. and remove it in the direction of arrow as shown below.

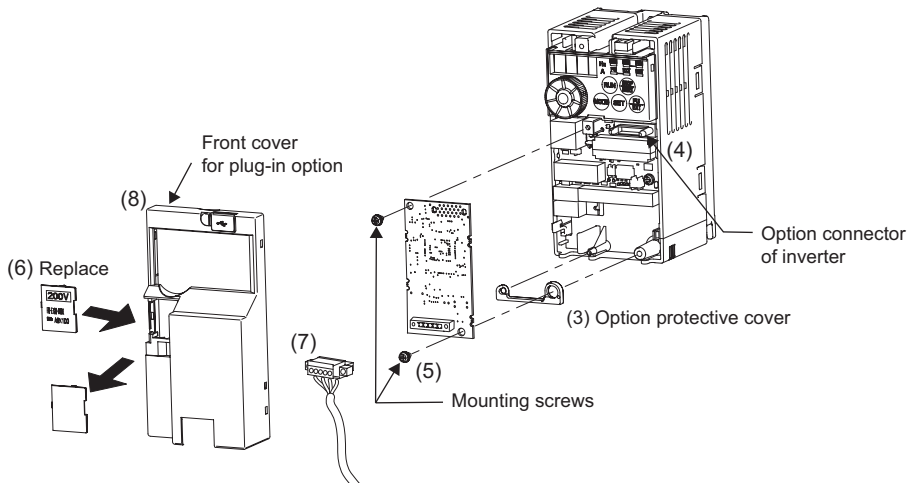


REMARKS

- Because the voltage class, model name and serial (only voltage class is labeled for FR-E740-5.5K (FR-E740-120) or more) are stated on the PU cover, replace a PU cover of a plug-in option front cover with the removed PU cover from the inverter.

7 INSTALLATION

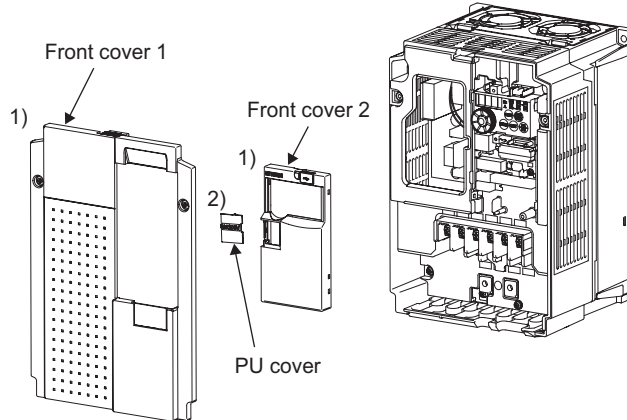
- (3) Install the option protective cover.
- (4) Securely fit the connector of the plug-in option to the inverter connector along the guides.
- (5) Securely fix the both top and bottom of the plug-in option to the inverter with the accessory mounting screws. (tightening torque $0.45\text{N}\cdot\text{m}$ to $0.55\text{N}\cdot\text{m}$) If the screw holes do not line-up, the connector may not have been plugged snugly. Check for loose plugging.
- (6) Remove the PU cover provided on the front cover for plug-in option and install the other PU cover, which was removed in (2).
- (7) Mount the already wired terminal block to the plug-in option. (Refer to *the chapter 3* for wiring.)
- (8) Install the front cover for plug-in option to the inverter.



REMARKS

- When the option protective cover is not installed, the protective structure (JEM1030) changes to open type (IP00).

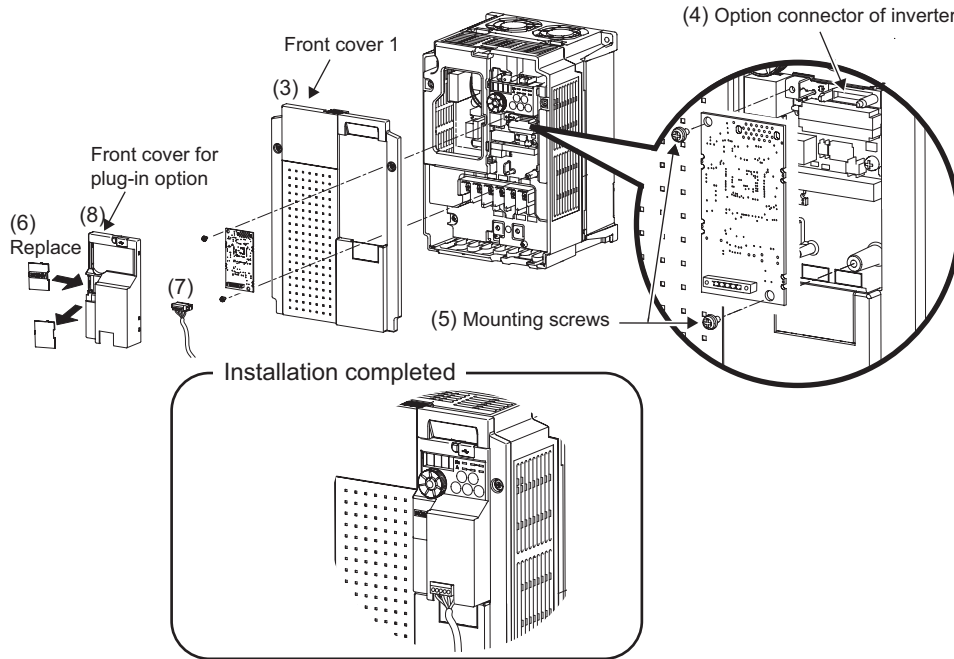
- For FR-E720-5.5K (FR-E720-240) or more and FR-E740-11K (FR-E740-230) or more
- (1) Remove the front cover 1 and 2 from the inverter. (For removing the front cover, refer to the FR-E700 instruction manual.)
 - (2) Remove the PU cover from the front cover 2. For removing the PU cover, refer to *page 7*.



REMARKS

- Because the voltage is stated on the PU cover, replace a PU cover of a plug-in option front cover with the removed PU cover from the inverter.

- (3) Install the front cover 1 to the inverter.
- (4) Securely fit the connector of the plug-in option to the inverter connector along the guides.
- (5) Securely fix the both top and bottom of the plug-in option to the inverter with the accessory mounting screws. (tightening torque 0.45N•m to 0.55N•m) If the screw holes do not line-up, the connector may not have been plugged snugly. Check for loose plugging.
- (6) Remove the PU cover provided on the front cover for plug-in option and install the other PU cover, which was removed in (2).
- (7) Mount the already wired terminal block to the plug-in option. (Refer to *the chapter 3* for wiring.)
- (8) Install the front cover for plug-in option to the inverter.



2

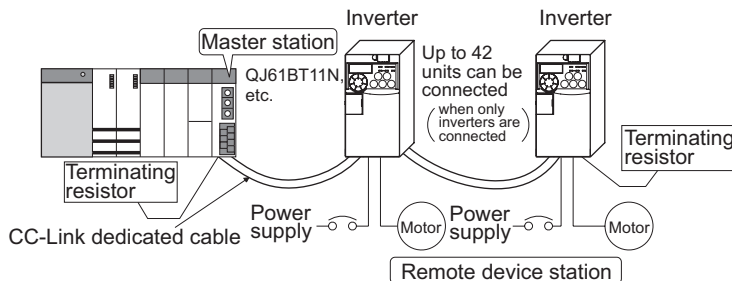
3 WIRING

3.1 System Configuration Example

- (1) Programmable controller side
Load the "QJ61BT11N", "QJ61BT11", "AJ61QBT11", "A1SJ61QBT11", "AJ61BT11" or "A1SJ61BT11" "Control & Communication 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 option (FR-A7NC) on the inverter.
- (3) Connect the programmable controller CC-Link unit master station and the terminal block supplied with the FR-A7NC with the CC-Link dedicated cable. After connecting the terminal block to the FR-A7NC, fit the front cover.

Manual of the CC-Link master station

- QJ61BT11N type
CC-Link System Master/Local Module
User's Manual ...SH-080394E
- QJ61BT11 type
CC-Link System Master/Local Module
User's Manual ...SH-080016
- AJ61QBT11/A1SJ61QBT11 type Control &
Communication Link System Master/Local Module
User's Manual ...IB-66722
- AJ61BT11/A1SJ61BT11 type Control &
Communication Link System Master/Local Module
User's Manual ...IB-66721



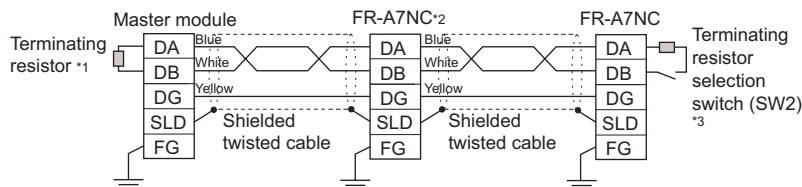
REMARKS

- When the CPU has automatic refresh function (example: QnA series CPU)
Through communication with the corresponding devices using sequence ladder logic, data is automatically transferred to the refresh buffer of the master station at the execution of the END instruction to perform communication with the remote devices.
- When the CPU does not have automatic refresh function (example: AnA series CPU)
Data is transferred to the refresh buffer of the master station directly by sequence ladder logic to perform communication with the remote devices.

3.2 Connection of Several Inverters

Factory Automation can be applied to several inverters which share a link system as CC-Link remote device stations and are controlled and monitored by programmable controller user programs. For the shield cable of the CC-Link dedicated cable, connect it to "SLD" of each unit and always earth (ground) it via "FG".

Terminals SLD and FG are connected inside the unit.



- *1 Use the terminating resistors supplied with the programmable controller.
- *2 For the unit in the middle, set 1 and 2 of SW2 to OFF (without terminating resistor).
- *3 Perform setting of the terminating resistor selection switch (SW2).

(Refer to page 2 for the position of the switch.)

When connecting a terminating resistor separately, do not use a built-in terminating resistor. (SW2 1-OFF, 2-OFF)

	1	2	Description
	OFF	OFF	Without terminating resistor
	ON	OFF	Do not use.
	OFF	ON	130Ω
	ON	ON	110Ω

130Ω is a resistance value for the CC-Link Ver. 1.00 dedicated high performance cable.

REMARKS

When performing online exchange

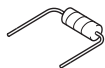
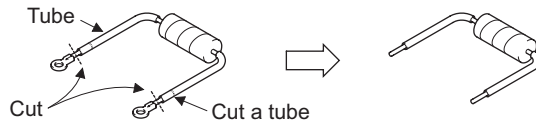
The built-in terminating resistor can not be exchanged online since the terminating resistor is on the FR-A7NC board and disconnected when the terminal block is removed from the FR-A7NC connector for communication. When changing the FR-A7NC online, connect a terminating resistor supplied with a programmable controller master module to the FR-A7NC after modifying it and do not use the internal terminating resistor (SW2 1-OFF, 2-OFF).

● Connection with the terminating resistor

Connect the terminating resistor between terminals DA-DB of the FR-A7NC at the end.

Modify the terminating resistors supplied with the programmable controller to use.

When a resistor is not supplied with the master unit, use a resistor with 110Ω 1/2W available on the market.



- (1) Maximum number of units connected to one master station (CC-Link Ver.1.10)
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:

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

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 ≤ 64

B: Number of remote device stations ≤ 42

C: Number of local, standby master and intelligent device stations ≤ 26

- (2) 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 ≤ 64

B: Number of remote device stations ≤ 42

C: Number of local and intelligent device stations ≤ 26

3.3 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.

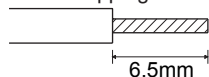
- Website of the CC-Link Partner Association <http://www.cc-link.org/>

3.4 Wiring

- (1) Strip off the sheath of the CC-Link dedicated cable and wind wires to use. If the length of the sheath peeled is too long, a short circuit may occur among neighboring wires. If the length is too short, wires might come off.

Use recommended cables. (Refer to page 16.) Recommended tightening torque : 0.22N·m to 0.25N·m

Cable stripping size



Wire the stripped cable after twisting it to prevent it from becoming loose. (Do not solder it.)
Use a bar type terminal as required.

Recommended bar terminal

For wiring of the CC-link communication signal, two CC-Link dedicated cables need to be twisted to wire to one terminal block.

It is recommended to use the following bar terminal and tool.

Recommended products (as of September, 2006):

Phoenix Contact Co.,Ltd.

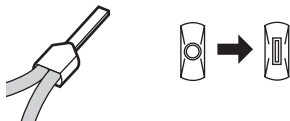
-Bar terminal model: AI-TWIN2 × 0,5-8WH

-Bar terminal crimping tool: CRIMPFOX UD6,
 ZA3



Note the crimping method.

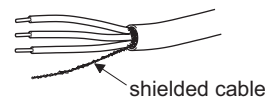
Hold the long side in a longitudinal direction and insert it into the terminal block.



Connection of the shielded cable of the CC-Link dedicated cable

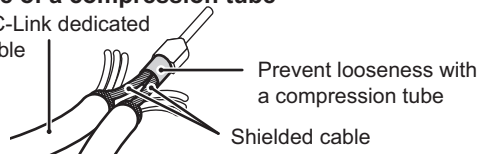
Twist the shielded cable and wire to the terminal SLD.

Use a compression tube and junction terminal block.

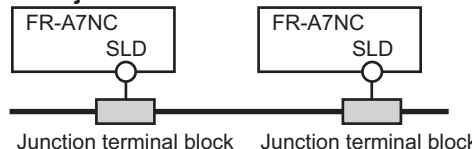


Use of a compression tube

CC-Link dedicated cable



Use of a junction terminal block



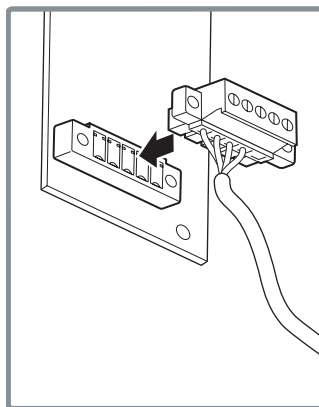
- (2) Loosen the terminal screw and insert the cable into the terminal.

Screw Size	Tightening Torque	Cable Size	Screwdriver
M2	0.22N·m to 0.25N·m	0.3mm ² to 0.75mm ²	Small ⊖ flat-blade screwdriver (Tip thickness: 0.4mm /tip width: 2.5mm)

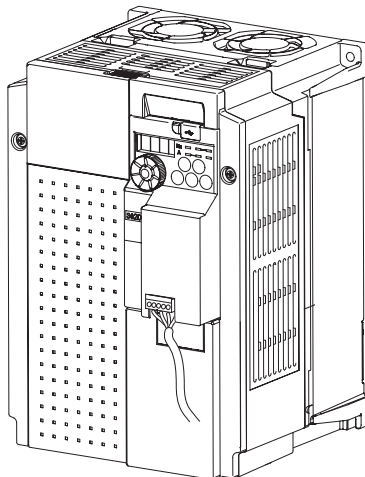
CAUTION

Undertightening can cause cable disconnection or malfunction. Overtightening can cause a short circuit or malfunction due to damage to the screw or unit.

- (3) Connect the terminal block to the connector for communication of the communication option.



- (4) For wiring of FR-E720-5.5K (FR-E720-240) or more and FR-E740-11K (FR-E740-230) or more, pass a cable on the inverter front cover as shown below. If a CC-Link cable is passed through inside the inverter front cover, the bending radius of the cable becomes small, stressing the cable.

**REMARKS**

- If the terminal block of the FR-A7NC is removed, built-in terminating resistor can not be used. (Refer to page 13.)

⚠ CAUTION

- ⚠ **When wiring, take care not to subject the cable to stress.**
- ⚠ **After wiring, wire offcuts must not be left in the inverter. They may cause a fault, failure or malfunction.**

4 INVERTER SETTING

4.1 Parameter List

The following parameters are used for the plug-in option (FR-A7NC).
Set the values according to need.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value	Refer to Page
79	Operation mode selection	0 to 4, 6, 7	1	0	22
313 *1	DO0 output selection	0, 1, 3, 4, 7, 8, 11 to 16, 20, 25, 26, 46, 47, 64, 90, 91, 93, 95, 96, 98, 99, 100, 101, 103, 104, 107, 108, 111 to 116, 120, 125, 126, 146, 147, 164, 190, 191, 193, 195, 196, 198, 199, 9999	1	9999	54
314 *1	DO1 output selection				
315 *1	DO2 output selection				
338	Communication operation command source	0, 1	1	0	25
339	Communication speed command source	0, 1, 2	1	0	25
340	Communication startup mode selection	0, 1, 10	1	0	22
342	Communication EEPROM write selection	0, 1	1	0	29
349 *1	Communication reset selection	0, 1	1	0	35
500 *1	Communication error recognition waiting time	0 to 999.8s	0.1s	0	30
501 *1	Communication error occurrence count display	0	1	0	31
502 *2	Communication error time stop mode selection	0 to 3	1	0	32
541 *1	Frequency command sign selection (CC-Link)	0, 1	1	0	39
542 *1, *2, *3	Communication station number (CC-Link)	1 to 64	1	1	37
543 *1, *2, *3	Baud rate selection (CC-Link)	0 to 4	1	0	38
544 *1, *2	CC-Link extended setting	0, 1, 12, 14, 18	1	0	43
550 *2	NET mode control source selection	0, 2, 9999	1	9999	25

*1 Parameters which can be displayed when the plug-in option (FR-A7NC) is mounted.

*2 The setting is reflected after inverter reset or at the next power-on.

*3 "L.ERR" of the LED flickers if the setting is changed. If the inverter is reset, the setting is reflected and LED turns off.

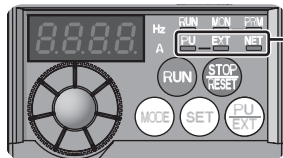
4.2 Operation Mode Setting

The inverter mounted with a communication option has three operation modes.

- (1) PU operation [PU]..... Controls the inverter from the key of the operation panel on the inverter or parameter unit (FR-PU07/FR-PA07).
- (2) External operation [EXT] ... Controls the inverter by switching on/off external signals connected to the control circuit terminals of the inverter.
(The inverter is factory-set to this mode.)
- (3) Network operation [NET] ... Controls the inverter with instructions from the network via the communication option.
(The operation signal and running frequency can be entered from the control circuit terminals depending on the *Pr. 338 Communication operation command source* and *Pr. 339 Communication speed command source* setting.
Refer to page 26.)

4.2.1 Operation mode indication

Operation panel



Operation mode indication
(The inverter operates according to the LED lit mode.)
PU: PU operation mode
EXT: External operation mode
NET: Network operation mode

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

(1) Operation mode switching conditions

Before switching the operation mode, check that:

- 1) The inverter is at a stop;
- 2) Both the STF and STR signals are off; and
- 3) The *Pr. 79 Operation mode selection* setting is correct.

(Set using the operation panel of the inverter or parameter unit (FR-PU07/FR-PA07).)

Refer to *the inverter manual* for details of *Pr. 79*.

(2) 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* to select the network operation mode.

After started in network operation mode, parameter write from the network is enabled. (Refer to *page 78* for a program example for parameter write.)

REMARKS

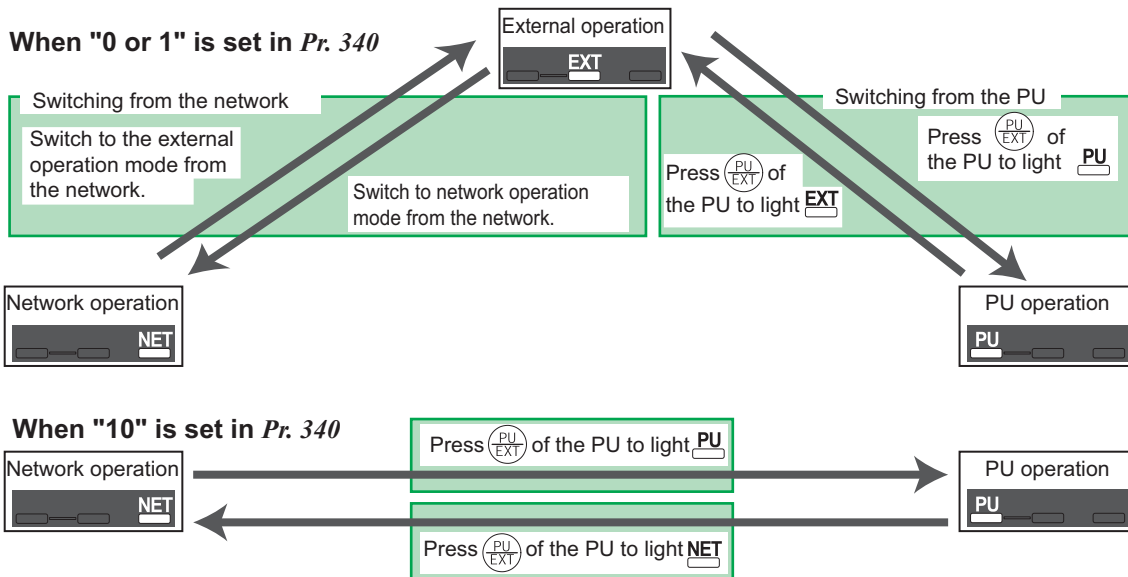
- Change of the *Pr. 340* setting is made valid when powering on or resetting the inverter.
- *Pr. 340* can be changed with the operation panel independently of the operation mode.

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
	1	PU operation mode	PU operation mode fixed
	2	External operation mode	Switching between the external and Net operation mode is enabled 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.
	7	X12 (MRS) signal ON external operation mode X12 (MRS) signal OFF ... external operation mode	Switching among the external, PU, and NET operation mode is enabled *1 External operation mode fixed (Forcibly switched to external operation mode.)
1	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	
10	0	NET operation mode	Switching between the PU and NET operation mode is enabled *2
	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 *2
	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 Operation mode can be changed between the PU operation mode and network operation mode with of the operation panel and X65 signal.

(3) Operation mode switching method



For the switching method from the external terminal, refer to *the inverter manual*.
Refer to *page 63* for a switching method from the network.

CAUTION

- When starting the inverter in network operation mode at powering on or an inverter reset, set a value other than 0 in Pr. 340. (Refer to page 22)
- When setting a value other than 0 in Pr. 340, make sure that the initial settings of the inverter are correct.

4.3 Operation and Speed Command Source (Pr. 338, Pr. 339, Pr. 550)

(1) Select control source for the network operation mode (Pr. 550)

A control location for the network operation mode can be selected from either the RS-485 communication with the PU connector or communication option.

When using a communication option, set "0 or 9999 (initial value)" in Pr. 550.

Parameter Number	Name	Initial Value	Setting Range	Description
550	NET mode operation command source selection	9999	0	Selects the communication option as NET operation mode command source.
			2	Selects the PU connector as the NET operation mode command source.
			9999	Automatic communication option recognition Normally, PU connector is the command source. When a communication option is mounted, the communication option is the command source.

Refer to the inverter manual for details.

(2) Selection of control source for the network operation mode (Pr. 338, Pr. 339)

- As control sources, there are the operation command source that controls the signals related to the inverter start command and function selection and the speed command source that controls the signals related to frequency setting.
- In network operation mode, the commands from the external terminals and communication (PU connector or communication option) are as listed below.

Operation Location Selection		Pr. 338 Communication operation command source		0: NET			1: External			Remarks	
		Pr. 339 Communication speed command source		0: NET	1: External	2: External	0: NET	1: External	2: External		
Fixed function (terminal-equivalent function)	Running frequency from communication		NET	—	NET	NET	—	NET			
	Terminal 2		—	External	—	—	External	—			
	Terminal 4		—	External		—	External				
Selective function	Pr. 178 to Pr. 184 setting	0	RL	Low speed operation command/remote setting clear/stop-on contact selection 0	NET	External		NET	External	Pr. 59 = "0" (multi-speed) Pr. 59 = "1, 2" (remote) Pr. 270 = "1" (stop-on-contact)	
		1	RM	Middle speed operation command/remote setting function	NET	External		NET	External		
		2	RH	High speed operation command/remote setting function	NET	External		NET	External		
		3	RT	Second function selection/stop-on contact selection 1	NET		External			Pr. 270 = "1" (stop-on-contact)	
		4	AU	Current input selection	—	Combined		—	Combined		
		5	JOG	Jog operation selection	—		External				

Operation Location Selection		Pr. 338 Communication operation command source		0: NET			1: External			Remarks		
		Pr. 339 Communication speed command source		0: NET	1: External	2: External	0: NET	1: External	2: External			
Selective function	Pr. 178 to Pr. 184 setting	7	OH	External thermal relay input		External						
		8	REX	Fifteen speed selection		NET	External		NET	External		Pr. 59 = "0" (multi-speed)
		10	X10	Inverter operation enable signal		External						
		12	X12	PU operation external interlock		External						
		14	X14	PID control valid terminal		NET	External		NET	External		
		15	BRI	Brake opening completion signal		NET			External			
		16	X16	PU-external operation switchover		External						
		18	X18	V/F switching		NET			External			
		24	MRS	Output stop		Combined			External			Pr. 79 ≠ "7"
				PU operation interlock		External					Pr. 79 = "7" When the X12 signal is not assigned	
25	STOP	Start self-holding selection		—			External					
60	STF	Forward rotation command		NET			External					

7 INVERTER SETTING

Operation Location Selection		Pr. 338 Communication operation command source		0: NET			1: External			Remarks
		Pr. 339 Communication speed command source		0: NET	1: External	2: External	0: NET	1: External	2: External	
Selective function Pr. 178 to Pr. 184 setting	61	STR	Reverse rotation command	NET			External			
	62	RES	Reset				External			
	65	X65	PU/NET operation switchover				External			
	66	X66	NET-external operation switching				External			
	67	X67	Command source switchover				External			

[Explanation of table]

External : Command is valid only from control terminal.

NET : Command only from communication is valid

Combined : Command from both control terminal and communication is valid.

— : Command from either of control terminal and communication is invalid.

REMARKS

- The command source of communication is as set in Pr. 550 and Pr. 551.
- The Pr. 338 and Pr. 339 settings can be changed while the inverter is running when Pr. 77 = "2". Note that the setting change is reflected after the inverter has stopped. Until the inverter has stopped, communication operation command source and communication speed command source before the setting change are valid.

4.3.1 Communication EEPROM write selection (Pr. 342)

When parameter write is performed from the communication option, write to RAM is enabled. Set when frequent parameter changes are necessary.

Parameter Number	Name	Initial Value	Setting Range	Description
342	Communication EEPROM write selection	0	0	Parameter values written by communication are written to the EEPROM and RAM.
			1	Parameter values written by communication are written to the RAM.

- When changing the parameter values frequently, set "1" in *Pr. 342* to write them to the RAM. Performing frequent parameter write with "0 (initial value)" (EEPROM write) set will shorten the life of the EEPROM.

REMARKS

- When "1" (write to RAM only) is set in *Pr. 342*, powering off the inverter will erase the changed parameter values. Therefore, the parameter values available when power is switched on again are the values stored in EEPROM previously.

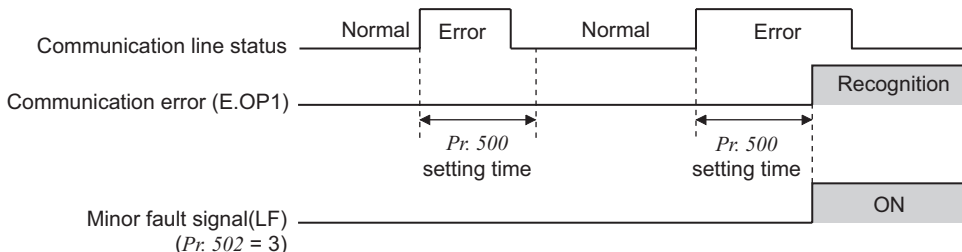
4.4 Operation at Communication Error Occurrence

4.4.1 Operation selection at communication error occurrence (Pr. 500 to Pr. 502)

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

- (1) **The set time from when a communication line error occurrence until communication error output**
 You can set the waiting time from when a communication line error occurs until it is recognized as a communication error.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
500	Communication error execution waiting time	0 to 999.8s	0.1s	0



If the communication line error still persists after the time set in *Pr. 500* has elapsed, it is recognized as a communication error.

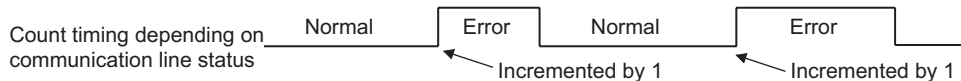
When the error is restored to normal communication within the set time, it is not regarded as a communication error and operation continues.

(2) Display and erasure of communication error occurrence count

The cumulative number of communication error occurrences can be indicated.

Write "0" to erase this cumulative count.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
501	Communication error occurrence count display	0	1	0



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

CAUTION

- The communication error count occurrence is stored into RAM temporarily. Since this data is stored in EEPROM at one-hour intervals, performing power-on reset or inverter may cause the *Pr. 501* data to be the value stored in EEPROM the last time depending on the reset timing.

(3) Inverter operation selection at communication error occurrence

You can select the inverter operation if a communication line error or an error of the option unit itself occurs.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
502	Stop mode selection at communication error	0, 1, 2, 3	1	0

About setting

● Operation at error occurrence

Alarm Definition	Pr. 502 Setting	Operation	Indication	Alarm Output
Communication line	0	Continued *	Normal indication *	Not provided *
	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

* When the error returns to normal communication within the time set in Pr. 500, it is not regarded as a communication line error (E.OP1).

● Operation at error recognition after elapse of Pr. 500 time

Alarm Definition	Pr. 502 Setting	Operation	Indication	Alarm 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	Continued	Normal indication	
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

● **Operation at error removal**

Alarm Definition	Pr. 502 Setting	Operation	Indication	Alarm Output
Communication line	0	Kept stopped	E.OP1 kept lit	Kept provided
	1			
	2	Restart	Normal indication	Not provided
	3	Continued		
Communication option itself	0, 3	Kept stopped	E. 1 kept lit	Kept provided
	1, 2			

CAUTION

- A communication line error [E.OP1 (alarm data: HA1)] is an error that occurs on the communication line, and an error of the communication option unit itself [E. 1 (alarm data: HF1)] is a communication circuit error in the option.
- The alarm output indicates alarm output signal (ALM signal) or alarm bit output.
- When the setting was made to provide an alarm output, the error definition is stored into the alarm history. (The error definition is written to the alarm history when an alarm output is provided.)
When no alarm output is provided, the error definition overwrites the alarm indication of the alarm history temporarily, but is not stored.
After the error is removed, the alarm indication is reset and returns to the ordinary monitor, and the alarm history returns to the preceding alarm indication.
- 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.)

4.4.2 Alarm and measures

(1) The inverter operates as follows at alarm occurrences.

Alarm 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 *	Continued	Continued
	Data communication		Stop	Stop	Stop
Communication option	Communication option connection error	Inverter operation	Inverter trip *	Inverter trip *	Inverter trip *
		Data communication	Continued	Continued	Continued
	Error of communication option itself	Inverter operation	Inverter trip *	Continued	Continued
		Data communication	Stop	Stop	Stop

* Depends on the Pr. 502 setting.

(2) Measures at alarm occurrences

Alarm Indication	Alarm Definition	Measures
E.OP1	Communication line error	Check the LED status of the option unit and remove the cause of the alarm. (Refer to <i>page 85</i> for LED indication status) Inspect the master.
E.1	Option alarm	Check the connection between the inverter and option unit for poor contact, etc. and remove the cause of the error.

When alarms other than the above are displayed, refer to the inverter manual and remove the cause of the alarm.

4.5 Inverter Reset

(Refer to *page 82* for an inverter reset program example.)

(1) 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 (<i>Refer to page 65</i>) *1		Allowed	Disallowed	Disallowed
	Error reset (RY1A) at inverter fault (<i>Refer to page 53</i>) *2	<i>Pr.349 = 0</i>	Allowed	Allowed	Allowed
		<i>Pr.349 = 1</i>		Disallowed	Disallowed
Turn on the inverter terminal RES (RES signal)			Enabled	Enabled	Enabled
Switch off inverter power			Enabled	Enabled	Enabled
Reset from the PU/operation panel	Inverter reset		Enabled	Enabled	Enabled
	Reset at inverter fault		Enabled	Enabled	Enabled

*1 Inverter reset can be made any time.

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

CAUTION

- 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 network operation mode. (*Refer to page 22.*)
- Communication continues during inverter reset. (The inverter can not be controlled for about 1s after release of a reset command .)

(2) Error reset operation selection at inverter fault

When used with the communication option, an error reset command* from network can be made invalid in the external operation mode or PU operation mode.

Parameter Number	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

* RY1A (Refer to page 53)

4.6 CC-Link Function Setting

4.6.1 Station number setting (Pr. 542)

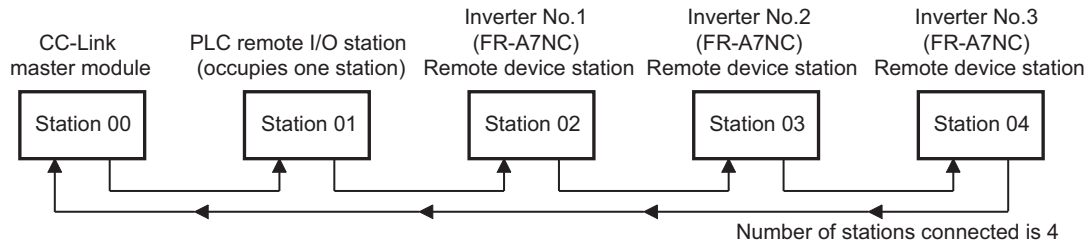
Use Pr. 542 Communication station number (CC-Link) to set inverter station number specification. Set this parameter within the range of 1 to 64.

Parameter Number	Name	Initial Value	Setting Range
542	Communication station number (CC-Link)	1	1 to 64

CAUTION

- Note that the same station numbers can not be used more than once. (Doing so disables proper communication.)

Connection example



REMARKS

- Set the station number sequentially in order of connection. (Do not create a dead station as station 1, station 2, and station 4.) Station numbers may be specified independently of the connection sequence. (Connection sequence is not necessarily in order like station 1, station 3, station 4, and station 2.)
- One inverter occupies one station. (One remote device station)
- "L.ERR" of the 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 LED turns off.

4.6.2 Baud rate setting (Pr. 543)

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

Parameter Number	Name	Initial Value	Setting Range	Transmission Speed
543	Baud rate selection (CC-Link)	0	0	156kbps
			1	625kbps
			2	2.5Mbps
			3	5Mbps
			4	10Mbps

REMARKS

- "L.ERR" of the 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 LED turns off.

4.6.3 Frequency command with sign

By frequency command with sign, start command (forward rotation/reverse rotation) can be inverted to operate. Make selection of sign for the frequency command from RWw1.

Parameter Numbers	Name	Initial Value	Setting Range
541	Frequency command sign selection (CC-Link)	0	0, 1

Pr.541 Setting	Sign	Setting Range	Actual Frequency Command
0	Not used	0 to 40000	0 to 400.00Hz
1	With	-32768 to 32767 (two's complement)	-327.68 to 327.67Hz

Relationship between the start command and sign

Start Command	Sign of the Frequency Command	Actual Run Command
Forward rotation	+	Forward rotation
	-	Reverse rotation
Reverse rotation	+	Reverse rotation
	-	Forward rotation

REMARKS

When Pr.541 = 1(with sign)

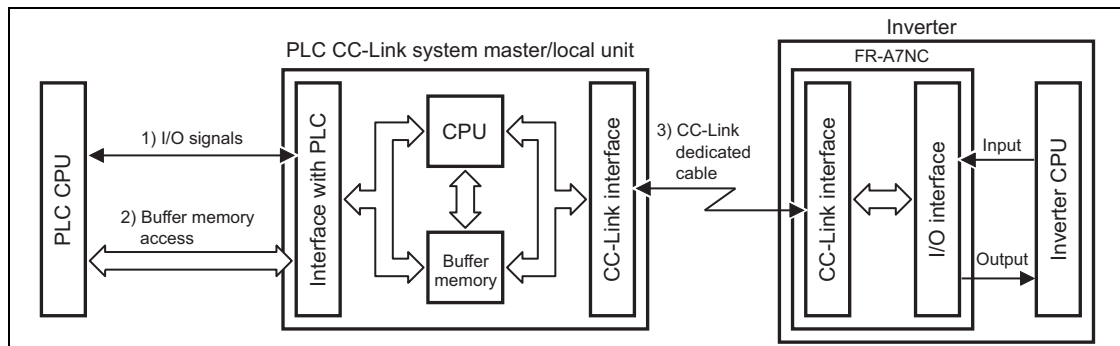
- When EEPROM write is specified with the RYE, write mode error (error code H01) will occur.
- When concurrent execution of both RYD and RYE is enabled (when a value other than 0 is set in Pr.544) and both RYD and RYE are turned on, RYD has precedence.
- When power is turned on (inverter reset), the initial setting status of the sign bit is "positive" and the set frequency is "0Hz". (EEPROM value is not reflected.)
 Note that the operation mode when power is turned on (inverter reset) is PU or external combined operation (Pr.79 = 1, 3), the set frequency is EEPROM value.
- When set frequency is written with the instruction code of HED and HEE, the sign of the frequency command is not changed.

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 1.1ms to 141ms (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 52* for details of the signal.
- 2) Allows input data to be read, output data to be written, and a CC-Link faulty station to be read, etc. Buffer memory is accessed by the FROM and TO instructions in the sequence program. (The FROM/TO instruction is not needed when the automatic refresh function is used.) For full information on the buffer memory, refer to the CC-Link system master/local unit manual.
- 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.	54
Output frequency monitor	The output frequency can be monitored.	60, 63
Output current monitor	The output current can be monitored.	63
Output voltage monitor	The output voltage can be monitored.	63
Special monitor	The monitor data selected can be checked.	63
Alarm definition	Alarm definitions can be checked.	61, 64
Data at alarm occurrence	The inverter status at alarm occurrence can be checked.	61
Operation mode	The current operation mode can be checked.	63
Parameter read	Parameter settings can be read.	65
Read of set frequency	The current set frequency can be read.	64

REMARKS

- Refer to the inverter manual 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.	52
Reverse rotation command	Give the reverse rotation command.	52
Input terminal function command	Execute functions assigned to the inverter input terminals.	52
Inverter output stop command	Stop the inverter output.	52
Error reset	Reset the inverter only when an inverter alarm occurs.	53
Frequency setting	Set the frequency.	57, 64
Monitor command	Specify the description monitored.	57, 63
Operation mode specification	Set the operation mode.	63
Alarm definition clear	Erase past eight alarms.	65
All parameter clear	Return the parameter descriptions to the initial value.	65
Inverter reset	Reset the inverter.	65
Parameter write	Write parameter settings.	65
PID control	PID set point, PID measured value and PID deviation can be input from the network.	59

REMARKS

- Refer to the inverter manual for functions controllable from the network in each operation mode.

6 I/O SIGNAL LIST

6.1 CC-Link Extended Setting (Pr. 544)

Remote register function can be extended.

Parameter Number	Name	Initial Value	Setting Range	CC-Link Ver.	Description	Refer to page
544	CC-Link extended setting	0	0	1	Occupies one station (FR-E500 series compatible) *1	44
			1		Occupies one station	47
			12 *2	2	Occupies one station double	48
			14 *2		Occupies one station quadruple	49
			18 *2		Occupies one station octuple	50

- *1 The program used for conventional series inverter (FR-E500 series) can be used.
When RYD, RYE, and RYF turn on simultaneously, only one of them is executed.
The upper 8 bits of RWw2 are not link parameter expansion 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.)

REMARKS

- 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-E500 series compatible) is occupied (Pr. 544 = 0)

(1) Remote I/O (32 points)

Device No	Signal	Refer to Page
RYn0	Forward rotation command	52
RYn1	Reverse rotation command	52
RYn2	High-speed operation command (terminal RH function) *1	52
RYn3	Middle-speed operation command (terminal RM function) *1	52
RYn4	Low-speed operation command (terminal RL function) *1	52
RYn5	Not used	—
RYn6	Second function selection (RT signal) *2	52
RYn7	Terminal 4 input selection (AU signal) *2	52
RYn8	Not used	—
RYn9	Output stop (terminal MRS function) *1	52
RYnA	Not used	—
RYnB	Reset (terminal RES function) *1	52
RYnC	Monitor command	53
RYnD	Frequency setting command (RAM)	53
RYnE	Frequency setting command (RAM, EEPROM)	53
RYnF	Instruction code execution request	53

Device No	Signal	Refer to Page
RXn0	Forward running	54
RXn1	Reverse running	54
RXn2	Running (terminal RUN function) *3	54
RXn3	Up to frequency (SU signal)	54
RXn4	Overload alarm (OL signal)	54
RXn5	Not used	—
RXn6	Frequency detection (terminal FU function) *3	54
RXn7	Error (terminal ABC function) *3	54
RXn8	Not used	—
RXn9	Pr. 313 assignment function (DO0) *4	54
RXnA	Pr. 314 assignment function (DO1) *4	54
RXnB	Pr. 315 assignment function (DO2) *4	54
RXnC	Monitoring	54
RXnD	Frequency setting completion (RAM)	55
RXnE	Frequency setting completion (RAM, EEPROM)	55
RXnF	Instruction code execution completion	55

Device No	Signal	Refer to Page	Device No	Signal	Refer to Page
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	53	RX(n+1)A	Error status flag	55
RY(n+1)B to RY(n+1)F	Reserved	—	RX(n+1)B	Remote station ready	55
			RX(n+1)C to RX(n+1)F	Reserved	—

("n" indicates a value determined according to the station number setting.)

- *1 Signal names are initial values. Using *Pr. 180* to *Pr. 184*, you can change input signal functions. Signals of the RYn0 and RYn1 can not be changed. Even when changed using *Pr. 178* and *Pr. 179*, the settings are invalid.
Refer to the inverter manual for details of *Pr. 178* to *Pr. 184*.
- *2 Signals of the RY6 and RY7 can not be changed.
- *3 Signal names are initial values. Using *Pr. 190* to *Pr. 192*, you can change output signal functions. Refer to page 56 for signals which can be assigned.
- *4 Output signal can be assigned using *Pr. 313* to *Pr. 315*. Refer to page 56 for signals which can be assigned.

(2) Remote resister

Address	Description		Refer to Page	Address	Description	Refer to Page
	Upper 8 Bits	Lower 8 Bits				
RWwn	Monitor code 2	Monitor code 1	57	RWrn	First monitor value	60
RWwn+1	Set frequency (0.01Hz increments) *2		57	RWrn+1	Second monitor value	60
RWwn+2	H00 (arbitrary) *1	Instruction code	58	RWrn+2	Reply code	60
RWwn+3	Write data		58	RWrn+3	Read data	60


("n" indicates a value determined according to the station number setting.)

*1 The above 8 bit is always H00 even if a value other than H00 is set.

*2 When *Pr: 37* is not equal to "0", this will be speed display (1 increments).

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

(1) Remote I/O (32 points)

Same as when Pr. 544 = "0" ( Refer to page 44)

(2) Remote register


Address	Description		Refer to Page	Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits			Upper 8 Bits	Lower 8 Bits	
RWwn	Monitor code 2	Monitor code 1	57	RWrn	First monitor value		60
RWwn+1	Set frequency (0.01Hz increments) *1		57	RWrn+1	Second monitor value		60
RWwn+2	Link parameter expansion setting	Instruction code	58	RWrn+2	Reply code 2	Reply code 1	60
RWwn+3	Write data		58	RWrn+3	Read data		60

("n" indicates a value determined according to the station number setting.)

*1 When Pr. 37 is not equal to "0", this will be machine speed display (1 increments).

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

(1) Remote I/O (32 points)

Same as when Pr. 544 = "0" ( Refer to page 44)


(2) Remote register

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn	Monitor code 2	Monitor code 1	57
RWwn+1	Set frequency (0.01Hz increments) *1		57
RWwn+2	Link parameter expansion setting	Instruction code	58
RWwn+3	Write data		58
RWwn+4	Monitor code 3		58
RWwn+5	Monitor code 4		58
RWwn+6	Monitor code 5		58
RWwn+7	Monitor code 6		58

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn	First monitor value		60
RWrn+1	Second monitor value		60
RWrn+2	Reply code 2	Reply code 1	60
RWrn+3	Read data		60
RWrn+4	Third monitor value		61
RWrn+5	Fourth monitor value		61
RWrn+6	Fifth monitor value		61
RWrn+7	Sixth monitor value		61

("n" indicates a value determined according to the station number setting.)

*1 When Pr. 37 is not equal to "0", this will be machine speed display (1 increments).

6.2.4 I/O signal when CC-Link Ver.2 quadruple setting is selected (Pr. 544 = "14")**(1) Remote I/O (32 points)**Same as when Pr. 544 = "0" ( Refer to page 44)**(2) Remote resistor**

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn	Monitor code 2	Monitor code 1	57
RWwn+1	Set frequency (0.01Hz increments)*2		57
RWwn+2	Link parameter expansion setting	Instruction code	58
RWwn+3	Write data		58
RWwn+4	Monitor code 3		58
RWwn+5	Monitor code 4		58
RWwn+6	Monitor code 5		58
RWwn+7	Monitor code 6		58
RWwn+8	Alarm definition No.	H00	58
RWwn+9	PID set point (0.01% increments) *1		59
RWwn+A	PID measured value (0.01% increments) *1		59
RWwn+B	PID deviation (0.01% increments) *1		59
RWwn+C	H00 (Free)		—
RWwn+D			
RWwn+E			
RWwn+F			

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn	First monitor value		60
RWrn+1	Second monitor value		60
RWrn+2	Reply code 2	Reply code 1	60
RWrn+3	Read data		60
RWrn+4	Third monitor value		61
RWrn+5	Fourth monitor value		61
RWrn+6	Fifth monitor value		61
RWrn+7	Sixth monitor value		61
RWrn+8	Alarm definition No.	Alarm definition data	61
RWrn+9	Alarm definition (output frequency)		61
RWrn+A	Alarm definition (output current)		61
RWrn+B	Alarm definition (output voltage)		61
RWrn+C	Alarm definition (energization time)		61
RWrn+D	H00 (Free)		—
RWrn+E			
RWrn+F			


("n" indicates a value determined according to the station number setting.)

*1 When Pr. 128 = "50, 51, 60, 61", they are valid.

*2 When Pr. 37 is not equal to "0", this will be machine speed display (1 increments).

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

(1) Remote I/O (32 points)

Same as when Pr. 544 = "0" ( Refer to page 44)

(2) Remote register

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn	Monitor code 2	Monitor code 1	57
RWwn+1	Set frequency (0.01Hz increments) *1		57
RWwn+2	Link parameter expansion setting	Instruction code	58
RWwn+3	Write data		58
RWwn+4	Monitor code 3		58
RWwn+5	Monitor code 4		58
RWwn+6	Monitor code 5		58
RWwn+7	Monitor code 6		58
RWwn+8	Alarm definition No.	H00	58
RWwn+9	PID set point (0.01% increments) *1		59
RWwn+A	PID measured value (0.01% increments) *1		59
RWwn+B	PID deviation (0.01% increments) *1		59
RWwn+C	H00 (Free)		—
RWwn+D			
RWwn+E			
RWwn+F			

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn	First monitor value		60
RWrn+1	Second monitor value		60
RWrn+2	Reply code 2	Reply code 1	60
RWrn+3	Read data		60
RWrn+4	Third monitor value		61
RWrn+5	Fourth monitor value		61
RWrn+6	Fifth monitor value		61
RWrn+7	Sixth monitor value		61
RWrn+8	Alarm definition No.	Alarm definition data	61
RWrn+9	Alarm definition (output frequency)		61
RWrn+A	Alarm definition (output current)		61
RWrn+B	Alarm definition (output voltage)		61
RWrn+C	Alarm definition (energization time)		61
RWrn+D	H00 (Free)		—
RWrn+E			
RWrn+F			

*1 When Pr. 128 = "50, 51, 60, 61", they are valid.

*2 When Pr. 37 is not equal to "0", this will be machine speed display (1 increments).

Address	Description		Refer to Page	Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits			Upper 8 Bits	Lower 8 Bits	
RWwn+10	Link parameter expansion setting	Instruction code	59	RWrn+10	Reply code		61
RWwn+11	Write data		59	RWrn+11	Read data		61
RWwn+12	Link parameter expansion setting	Instruction code	59	RWrn+12	Reply code		61
RWwn+13	Write data		59	RWrn+13	Read data		61
RWwn+14	Link parameter expansion setting	Instruction code	59	RWrn+14	Reply code		61
RWwn+15	Write data		59	RWrn+15	Read data		61
RWwn+16	Link parameter expansion setting	Instruction code	59	RWrn+16	Reply code		61
RWwn+17	Write data		59	RWrn+17	Read data		61
RWwn+18	Link parameter expansion setting	Instruction code	59	RWrn+18	Reply code		61
RWwn+19	Write data		59	RWrn+19	Read data		61
RWwn+1A	H00 (Free)		—	RWrn+1A	H00 (Free)		—
RWwn+1B							
RWwn+1C							
RWwn+1D							
RWwn+1E							
RWwn+1F							

("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 unit 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 unit to inverter (FR-A7NC))

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

Device No.	Signal	Description	
RY0	Forward rotation command *2	OFF : Stop command ON : Forward rotation start	A starting command is input to the inverter when the signal turns on.
RY1	Reverse rotation command *2	OFF : Stop command ON : Reverse rotation start	A stop command is given when both signals turn on simultaneously.
RY2	High-speed operation command (terminal RH function) *1	Functions assigned to terminals RH, RM and RL are activated.	
RY3	Middle-speed operation command (terminal RM function) *1		
RY4	Low-speed operation command (terminal RL function) *1		
RY6	Second function selection (RT signal) *3	ON: Second function is selected	
RY7	Terminal 4 input selection (AU signal) *3	ON: Terminal 4 input is the main speed setting	
RY9	Output stop (terminal MRS function)*1	Functions assigned to terminal MRS is activated.	
RYB	Reset (terminal RES function) *1	Functions assigned to terminal RES is activated.	

*1 Signal names are initial values. Using *Pr. 180* to *Pr. 184*, you can change input signal functions. Note that some of signals do not accept a command from the network according to the *Pr. 338* and *Pr. 339* settings. For example, reset (terminal RES function) of RYB can not be controlled by the network. (Refer to page 25.)
Refer to *the inverter manual* for details of *Pr. 180* to *Pr.184*.

*2 Signals of the RY0 and RY1 can not be changed. Even when changed using *Pr. 178* and *Pr. 179* the settings are invalid.
Refer to *the inverter manual* for details of *Pr. 178* and *Pr.179*.

*3 Signals of the RY6 and RY7 can not be changed.

Device No.	Signal	Description
RYC	Monitor command	When the monitor command (RYC) is switched on, the monitor value is set to remote resistor RWr0, 1, 4 to 7 and monitoring (RXC) switches on. While the monitor command (RYC) is on, the monitor value is always updated.
RYD *5	Frequency setting command (RAM)	When the frequency setting command (RYD) is switched on, the set frequency (RWw1) is written to RAM of the inverter. *4 On completion of write, frequency setting completion (RXD) switches on.
RYE *5	Frequency setting command (RAM, EEPROM)	When the frequency setting command (RYE) is switched on, the set frequency (RWw1) is written to RAM and EEPROM of the inverter. On completion of write, frequency setting completion (RXE) switches on. To change the running speed consecutively, always write data to the inverter RAM.
RYF *5	Instruction code execution request	When the instruction code execution request (RYF) is switched on, processing corresponding to the instruction code set to RWw2, 10, 12, 14, 16 and 18 is executed. The instruction code execution completion (RXF) is switched on after completion of execution of instruction code. 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	If the error reset request flag (RY1A) is switched on only when an inverter fault occurs, the inverter is reset and the error status flag (RX1A) switches off. *6

*4 While the frequency setting command (RYD) is on, the set frequency (RWw1) value is always returned.

*5 When Pr. 544 = "0", only one of these is executed if these commands are switched on simultaneously.

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

7.1.2 Input signals (inverter (FR-A7NC) to master unit)

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

Device No.	Signal	Description
RX0	Forward running	OFF : Other than forward running (during stop or reverse rotation) ON : Forward running
RX1	Reverse running	OFF : Other than reverse running (during stop or forward rotation) ON : Reverse running
RX2	Running (terminal RUN function) *1	Functions assigned to terminals RUN are activated. Refer to <i>page 56</i> for signals which can be assigned.
RX3	Up to frequency (SU signal) *2	ON: Output frequency has reached the set frequency
RX4	Overload alarm (OL signal) *2	ON: Overload alarm occurrence
RX6	Frequency detection (terminal FU function) *1	Functions assigned to terminals FU and ABC activate. Refer to <i>page 56</i> for signals which can be assigned.
RX7	Alarm (terminal ABC function) *1	
RX9	— (DO0 function) *3	Functions assigned to <i>Pr. 313</i> to <i>Pr. 315</i> are activated. Refer to <i>page 56</i> for signals which can be assigned.
RXA	— (DO1 function) *3	
RXB	— (DO2 function) *3	
RXC	Monitoring	When the monitor command (RYC) is switched on, the monitor value is set to RWr0,1,4 to 7 and monitoring (RXC) switches on. Switched off when the monitor command (RYC) is switched off.

*1 Signal names are initial values. Using *Pr. 190* to *Pr. 192*, you can change output signal functions.
Refer to *the inverter manual* for details of *Pr. 190* to *Pr.192*.

*2 Signals of the RX3 and RX4 can not be changed.

*3 Signals are not assigned in the initial setting.
Refer to *Pr. 190* to *Pr. 192* of *the inverter manual* for details of signals.

Device No.	Signal	Description
RXD	Frequency setting completion (RAM)	Switched on when the set frequency is written to the inverter RAM by the frequency setting command (RYD) switching on. Frequency setting completion (RXD) is switched off when the frequency setting command (RYD) is switched off.
RXE	Frequency setting completion (RAM, EEPROM)	Switched on when the set frequency is written to the inverter RAM and EEPROM by the frequency setting command (RYE) switching on. Frequency setting completion (RXE) is switched off when the frequency setting command (RYE) is switched off.
RXF	Instruction code execution completion	Switched on on completion of the processing corresponding to the instruction code (RWw2,10,12,14,16,18) which is executed when the instruction code execution request (RYF) switches on. Switched off when the instruction code execution completion (RXF) is switched off.
RX1A	Error status flag	Switched on when an inverter error occurs (protective function is activated).
RX1B	Remote station ready	Switched on when the inverter goes into the ready status on completion of initial setting after power-on or hardware reset. (Used as an interlock for read/write from/to the master unit.) Switched off when an inverter error occurs (protective function is activated).

<Output Signal List>

The following signals can be assigned to RX2, RX6 and RX7 and RX9 to RXB using *Pr.190 to Pr.192* and *Pr.313 to Pr.315* respectively.

For details of signal definitions, refer to *Pr. 190 to Pr. 192 Output terminal function selection of the inverter manual*.

Setting		Signal Name	Function
Positive Logic	Negative Logic		
0	100	RUN	Inverter running
1	101	SU	Up to frequency
3	103	OL	Overload alarm
4	104	FU	Output frequency detection
7	107	RBP	Regenerative brake pre-alarm
8	108	THP	Electronic thermal O/L relay function pre-alarm
11	111	RY	Inverter operation ready
12	112	Y12	Output current detection
13	113	Y13	Zero current detection
14	114	FDN	PID lower limit
15	115	FUP	PID upper limit
16	116	RL	PID forward/reverse rotation output
20	120	BOF	Brake opening request

Setting		Signal Name	Function
Positive Logic	Negative Logic		
25	125	FAN	Fan fault output
26	126	FIN	Heatsink overheat pre-alarm
46	146	Y46	During deceleration at occurrence of power failure
47	147	PID	During PID control activated
64	164	Y64	During retry
90	190	Y90	Life alarm
91	191	Y91	Fault output 3 (power-off signal)
93	193	Y93	Current average value monitor signal
95	195	Y95	Maintenance timer signal
96	196	REM	Remote output
98	198	LF	Alarm output
99	199	ALM	Fault output
9999		—	No function

REMARKS

- When an option error (E. I) occurs, all outputs are tuned off.

7.2 Details of Remote Resister

7.2.1 Remote resister (master unit to inverter (FR-A7NC))

●Remote resister definition

Device No.	Signal	Description
RWw0	Monitor code1/ Monitor code2	Set the monitor code to be referenced (<i>Refer to page 68</i>). By switching on the RYC signal after setting, the specified monitored data is set to RWr0/RWr1.
RWw1	Set frequency *1, *2	<ul style="list-style-type: none"> · Specify the set frequency. At this time, whether it is written to RAM or EEPROM is differentiated by the RYD and RYE signals. After setting the frequency to this resister, switch on RYD or RYE to write the frequency. On completion of frequency write, RXD or RXE switches on in response to the input command. · The setting range is 0 to 400.00Hz (0.01Hz increments). Write "40000" when setting 400.00Hz.

*1 When Pr. 37 is not equal to "0", this will be machine speed display (1 increments).

*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: -327.68Hz to 327.67Hz (-327.68 to 327.67) 0.01Hz increments.
For details refer to page 39.

7 DETAILS OF INPUT AND OUTPUT SIGNALS




Device No.	Signal	Description
RWw2	Link parameter expansion setting/ Instruction code	Set the instruction code for execution of operation mode rewrite, Pr. read/write, error reference, error clear, etc. (Refer to page 63) The corresponding instruction is executed by switching on RYF after completion of register setting. RXF switches on on completion of instruction execution. When a value other than "0" is set in Pr. 544 CC-Link expansion setting, upper eight bits are link parameter expansion setting. Example) When reading Pr. 300, instruction code is 0300H.
RWw3	Write data	Set the data specified by the RWw2 instruction code. (When required) Switch RYF on after setting the RWw2 and this register. Set zero when the write code is not required.
RWw4	Monitor code 3	Set the monitor code to be monitored. By switching on the RYC signal after setting, the specified monitored data is stored to RWr□. (□ indicates a register number. (RWr4 to 7))
RWw5	Monitor code 4	
RWw6	Monitor code 5	
RWw7	Monitor code 6	
RWw8	Alarm definition No.	


Device No.	Signal	Description	
RWw9	PID set point *3	Set the PID set point Setting range : "0 to 100.00%"	<ul style="list-style-type: none"> · Input a value 100 times greater than the value to be set For example, input "10000" when setting 100.00%. · Refer to <i>the inverter manual</i> for details of PID control.
RWwA	PID measured value *3	Set the PID measured value Setting range : "0 to 100.00%"	
RWwB	PID deviation *3	Set the PID deviation. Setting range : "-100.00% to 100.00%"	
RWw10, RWw12, RWw14, RWw16, RWw18	Link parameter expansion setting/ Instruction code	Set the instruction code (<i>refer to page 63</i>) for execution of operation mode rewrite, Pr. read/write, error reference, error clear, etc. The corresponding instruction is executed in order of RWw2, 10, 12, 14, 16, 18 by switching on RYF after completion of register setting, then, RXF switches on on completion of instruction execution of RWw18. Set HFFFF to disable an instruction by RWw10 to 18. (RWw2 is always executed.) The first 8bits is link parameter expansion setting. Example) When reading <i>Pr. 300</i> , instruction code is H0300.	
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. After setting this register corresponding to the instruction code of RWw10, 12, 14, 16, and 18, switch on RYF. Set zero when the write code is not required.	

*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 inverter manual* for details of *Pr.128*.

7.2.2 Remote resistor (inverter (FR-A7NC) to master unit)

(1) Remote resistor definition

Device No.	Signal	Description
RWr0	First monitor value	When RYC is on, the monitor value specified to the lower 8 bits of the monitor code (RWw0) is set. When Pr. 37 Speed display $\neq 0$ and output frequency or set frequency monitor is set for monitor code (RWw0), machine speed setting (1 unit) is monitored.
RWr1	Second monitor value (Output frequency)	When "0" is set to the upper 8 bits of the monitor code (RWw0), the current output frequency is always set. When other than "0" is set to the upper 8 bits of the monitor code (RWw0) and RYC is on, the monitor value specified to the upper 8 bits of the monitor code (RWw0) is set. When Pr. 37 Speed display $\neq 0$ and output frequency or set frequency monitor is set for monitor code (RWw0), machine speed setting (1 unit) is monitored.
RWr2	Reply code (when Pr. 544 = 0)	Turning on either RYD or RYE set the reply code corresponds to the frequency setting command. Turning on RYF set the reply code corresponds to the instruction code of RWw2. The value "0" is set for a normal reply and other than "0" is set for data fault, mode error, etc. (reply code  refer to page 62)
	Reply code 1 (when Pr. 544 $\neq 0$)	Lower 8bits of RWr2 Turning on either RYD or RYE set the reply code corresponds to the frequency setting command. (reply code 1  refer to page 62)
	Reply code 2 (when Pr. 544 $\neq 0$)	Upper 8bits of RWr2 Turning on RYF set the reply code corresponds to the instruction code of RWw2. (reply code 2  refer to page 62)
RWr3	Read data	For a normal reply, the reply data to the instruction specified by the instruction code is set.

Device No.	Signal	Description
RWr4	Third monitor value	When RYC is on, the monitor value specified to the monitor code (RWw□) is stored. (□ indicates a register number (RWw4 to 7)) When <i>Pr. 37 Speed display</i> ≠ 0 and output frequency or set frequency monitor is set for monitor code (RWw0), machine speed setting (1 unit) is monitored.
RWr5	Fourth monitor value	
RWr6	Fifth monitor value	
RWr7	Sixth monitor value	
RWr8	Alarm definition (alarm data)	The alarm data of alarm definition No. specified by RWw8 is stored in the lower 8bits. Alarm definition No. specified is echo backed to the upper 8bits.
RWr9	Alarm definition (output frequency)	Output frequency of the alarm definition No. specified in RWw8 is stored.
RWrA	Alarm definition (output current)	Output current of the alarm definition No. specified in RWw8 is stored.
RWrB	Alarm definition (output voltage)	Output voltage of the alarm definition No. specified in RWw8 is stored.
RWrC	Alarm definition (energization time)	Energization time of the alarm definition No. specified in RWw8 is stored.
RWr10 to RWr19	Reply code	Turning on RYF stores the reply code corresponds to the instruction code of RWw10, 12, 14, 16, and 18. The value "0" is set for a normal reply and other than "0" is set for data fault, mode error, etc. <i>(reply code  refer to page 62)</i>
	Read data	For a normal reply, the reply data to the instruction specified by the instruction code is set.

(2) 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)	<ul style="list-style-type: none"> Reply code to Rwr2 when Pr. 544 = "0" Reply code to RWwr10, 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	H00	Normal	No error (normal completion of instruction code execution)	Reply code to RWwr2 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 setting range error	Frequency 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.	

7.2.3 Instruction codes

(1) Instruction code definition

Set the instruction code using a remote resistor (RWw) (Refer to page 57.)

The definition read by the instruction code is stored in the remote resistor (RWR). (Refer to page 60.)

Item		Read/ Write	Code Number	Description
Operation mode		Read	H007B	H0000: Network operation H0001: External operation H0002: PU operation
		Write	H00FB	H0000: Network operation H0001: External operation H0002: PU operation (Pr. 79 = "6")
Monitor	Output frequency *1	Read	H006F	H0000 to HFFFF: Running frequency 0.01Hz increments Machine speed 1 increments (When Pr. 37 ≠ "0")
	Output current	Read	H0070	H0000 to HFFFF: Output current (hexadecimal) Increments 0.01A
	Output voltage	Read	H0071	H0000 to HFFFF: Output voltage (hexadecimal) Increments 0.1V
	Special monitor	Read	H0072	H0000 to HFFFF: Check the data of the monitor selected by the instruction code H00F3.
	Special monitor selection No.	Read Write	H0073 H00F3 *2	H01 to H36: Monitor selection data Refer to monitor code. (Refer to page 68.)

*1 When "100" is set in Pr. 52 DU/PU main display data selection, frequency setting is monitored during a stop and output frequency is monitored during running.

*2 Write data is hexadecimal and only lower two digits are valid. (Upper 2 digits are ignored.)

7 DETAILS OF INPUT AND OUTPUT SIGNALS

Item		Read/ Write	Code Number	Description							
Monitor	Alarm definition	Read	H0074 to H0077	H0000 to HFFFF: Last two alarm definitions							
				H74	<table border="1"> <tr> <td style="text-align: center;">b15</td> <td style="text-align: center;">b8 b7</td> <td style="text-align: center;">b0</td> </tr> <tr> <td>Second alarm in past</td> <td>Latest alarm</td> <td></td> </tr> </table>	b15	b8 b7	b0	Second alarm in past	Latest alarm	
				b15	b8 b7	b0					
				Second alarm in past	Latest alarm						
				H75	<table border="1"> <tr> <td>Fourth alarm in past</td> <td>Third alarm in past</td> </tr> </table>	Fourth alarm in past	Third alarm in past				
Fourth alarm in past	Third alarm in past										
H76	<table border="1"> <tr> <td>Sixth alarm in past</td> <td>Fifth alarm in past</td> </tr> </table>	Sixth alarm in past	Fifth alarm in past								
Sixth alarm in past	Fifth alarm in past										
H77	<table border="1"> <tr> <td>Eighth alarm in past</td> <td>Seventh alarm in past</td> </tr> </table>	Eighth alarm in past	Seventh alarm in past								
Eighth alarm in past	Seventh alarm in past										
				Refer to the alarm data table (<i>page 67</i>)							
Set frequency (RAM)		Read	H006D	Read set frequency/speed from RAM or EEPROM. · H0000 to HFFFF: Set frequency...0.01Hz increments Machine speed .. 1 increments (When <i>Pr. 37</i> ≠ "0")							
Set frequency (EEPROM)			H006E								
Set frequency (RAM) *3		Write	H00ED	Write set frequency/speed to RAM or EEPROM. · H0000 to H9C40 (0 to 400.00Hz) : Frequency.....0.01Hz increments · H0000 to H270E (0 to 9998) : " Machine speed .. 1 increments (When <i>Pr. 37</i> ≠ "0") · To change the set frequency consecutively, write data to the inverter RAM. (Instruction code: HED)							
Set frequency (RAM and EEPROM) *3		Write	H00EE								

*3 Setting from remote resistors can be made.

Item	Read/ Write	Code Number	Description																									
Parameter	Read	H0000 to H0063	· Refer to the instruction code in the parameter list in the inverter manual to read and write as required. Write to Pr. 77 and Pr. 79 is disabled. When setting Pr.100 and later, set link parameter expansion setting. · Set 65520 (HFFF0) as a parameter value "8888" and 65535 (HFFFF) as "9999". · When changing the parameter values frequently, set "1" in Pr. 342 to write them to the RAM. (Refer to page 29.)																									
	Write	H0080 to H00E3																										
Batch alarm definition clear	Write	H00F4	H9696: Batch-clears the alarm history.																									
All parameter clear	Write	H00FC	Four types of clears are available with H9696, H9966, H5A5A, and H55AA. All clear types (O...clear, x...not clear)																									
			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Data</th> <th style="text-align: center;">Communication parameters</th> <th style="text-align: center;">Calibration parameter</th> <th style="text-align: center;">Other parameters</th> <th style="text-align: center;">HEC, HF3, HFF</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">H9696</td> <td style="text-align: center;">○ *4</td> <td style="text-align: center;">×</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> <tr> <td style="text-align: center;">H9966</td> <td style="text-align: center;">○ *4</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> <tr> <td style="text-align: center;">H5A5A</td> <td style="text-align: center;">×</td> <td style="text-align: center;">×</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> <tr> <td style="text-align: center;">H55AA</td> <td style="text-align: center;">×</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> </tbody> </table>	Data	Communication parameters	Calibration parameter	Other parameters	HEC, HF3, HFF	H9696	○ *4	×	○	○	H9966	○ *4	○	○	○	H5A5A	×	×	○	○	H55AA	×	○	○	○
			Data	Communication parameters	Calibration parameter	Other parameters	HEC, HF3, HFF																					
			H9696	○ *4	×	○	○																					
			H9966	○ *4	○	○	○																					
H5A5A	×	×	○	○																								
H55AA	×	○	○	○																								
H9696	○ *4	×	○	○																								
H9966	○ *4	○	○	○																								
H5A5A	×	×	○	○																								
H55AA	×	○	○	○																								
Inverter reset	Write	H00FD	H9696: Resets the inverter.																									
Link parameter expansion setting *5	Read	H007F	H0000 to H0009: Parameter description is changed according to the instruction code (extended) setting. Refer to <i>the inverter manual</i> for instruction code (extended) settings.																									
	Write	H00FF																										

*4 Communication parameters (Pr. 117 to Pr. 124, Pr. 338 to Pr.341, Pr.343, Pr.349, Pr.542 to Pr.544 Pr.549 to Pr.551) are also cleared.

*5 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 58)

7 DETAILS OF INPUT AND OUTPUT SIGNALS

Item	Read/ Write	Code Number	Description
Second parameter changing *6	Read	H006C	When setting the bias/gain (instruction codes H5E to H61, HDE to HE1) parameters H00: Frequency *7 H01: Analog value set in parameters H02: Analog value input from the terminal
	Write	H00EC	

*6 Setting can be made when the link parameter expansion setting = "1, 9".

*7 Gain frequencies can be written using *Pr. 125* (instruction code H99) and *Pr. 126* (instruction code H9A) also.

(2) Alarm data

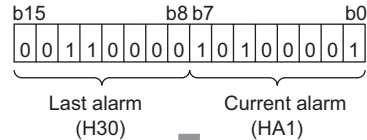
Refer to the inverter manual for details of alarm definitions.

Data	Definition
H00	No alarm
H10	OC1
H11	OC2
H12	OC3
H20	OV1
H21	OV2
H22	OV3
H30	THT
H31	THM
H40	FIN
H52	ILF
H60	OLT
H70	BE
H80	GF
H81	LF
H90	OHT
HA1	OP1
HB0	PE

Data	Definition
HB1	PUE
HB2	RET
HB3	PE2
HC0	CPU
HC5	IOH
HC7	AIE
HC8	USB
HD8	MB4
HD9	MB5
HDA	MB6
HDB	MB7
HF1	E.1
HF6	E.6
HF7	E.7
HFD	E.13

Alarm definition display example
(instruction code H74)

For read data H30A1



Last alarm THT
Current alarm OP1

7.2.4 Monitor codes

Monitor items selected with RWw0, RWw4 to 7 are explained below.

Devide the monitor code (RWw0) into half to select the first monitor description (RWr0) from the lower 8 bits and the second monitor description (RWr1) from the upper 8 bits.

REMARKS

- When Pr. 544 = "12, 14, 18" descriptions of monitor code 3 (RWw4) to 6 (RWw7) can be selected.

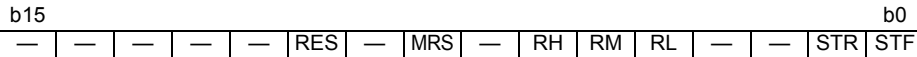
(Example) When output current is selected for the first monitor and output voltage is selected for the second monitor → monitor code is H0302

Code Number	Second Monitor Description (the first 8 bits)	First, Third to Sixth Monitor Description (the last 8 bits)	Increments
H00	Output frequency/speed *1	No monitoring (monitor value is 0)	0.01Hz/1
H01	Output frequency/speed *1		0.01Hz/1
H02	Output current		0.01A
H03	Output voltage		0.1V
H05	Frequency setting/speed setting *1		0.01Hz/1
H07	Motor torque		0.1%
H08	Converter output voltage		0.1V
H09	Regenerative brake duty		0.1%
H0A	Electronic thermal relay function load factor		0.1%
H0B	Output current peak		0.01A
H0C	Converter output voltage peak		0.1V
H0E	Output power		0.01kW
H0F	Input terminal status *2		—
H10	Output terminal status *3		—

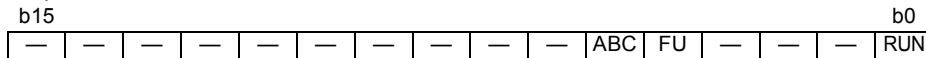
Code Number	Second Monitor Description (the first 8 bits)	First, Third to Sixth Monitor Description (the last 8 bits)	Increments
H14	Cumulative energization time		1h
H17	Actual operation time		1h
H18	Motor load factor		0.1%
H19	Cumulative power		1kWh
H34	PID set point		0.1%
H35	PID measured value		0.1%
H36	PID deviation		0.1%
H3D	Motor thermal load factor		0.1%
H3E	Inverter thermal load factor		0.1%

*1 When Pr. 37 is not equal to "0", this will be machine speed display (1 increments).

*2 Input terminal monitor details



*3 Output terminal monitor details



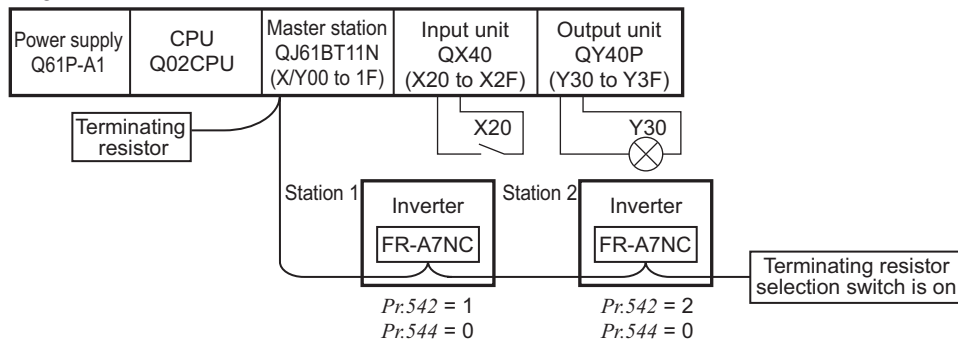
8 PROGRAMMING EXAMPLES

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	73
Setting the operation mode	Selecting the network operation mode	74
Setting the operation commands	Commanding the forward rotation and middle speed signals	75
Setting the monitoring function	Monitoring the output frequency	76
Reading a parameter value	Reading the value of <i>Pr. 7 Acceleration time</i>	77
Writing a parameter value	Setting "3.0 s" in <i>Pr. 7 Acceleration time</i>	78
Setting the running frequency (running speed)	Setting to 50.00Hz	79
Reading the alarm definitions	Reading the inverter alarms	81
Inverter reset	Perform inverter reset at an inverter alarm occurrence.	82

(1) System configuration for programming example

Programmable controller

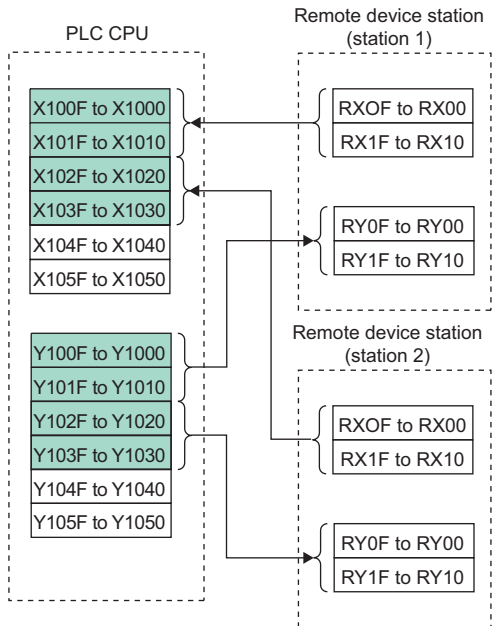


- (2) Network parameter setting of the master station
 Network parameters are set as below.

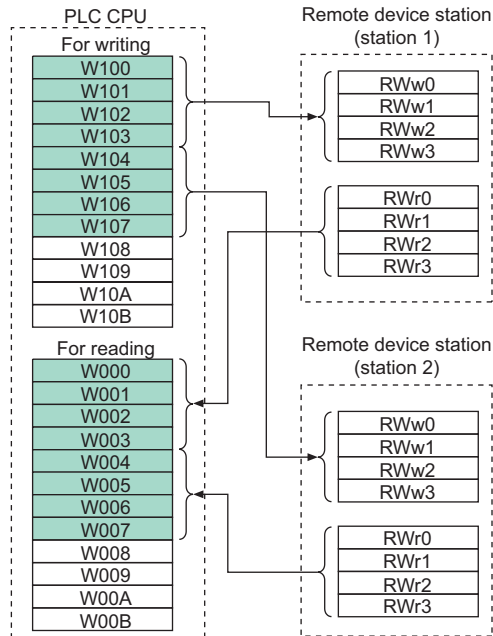
Item		Setting Conditions
Start I/O No.		0000
Operation settings	Data link alarm station setting	Input clear
	Setting at CPU stop	Refresh
Type		Master
Mode		Remote net Ver.1 mode
All connect count		2
Remote input (RX)		X1000
Remote output (RY)		Y1000

Item	Setting Conditions
Remote resister (RW _r)	W0
Remote resister (RW _w)	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

- (3) 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.

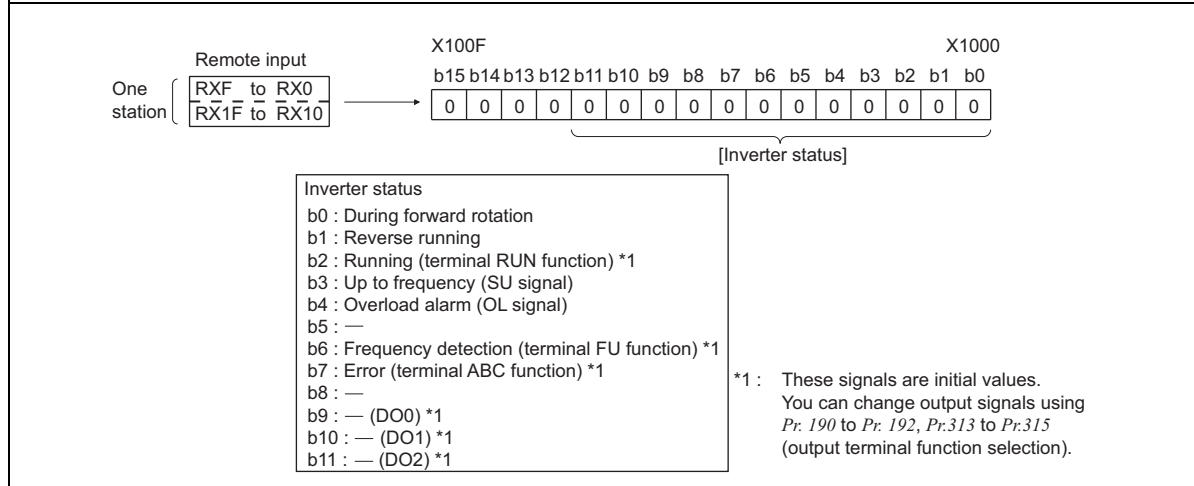
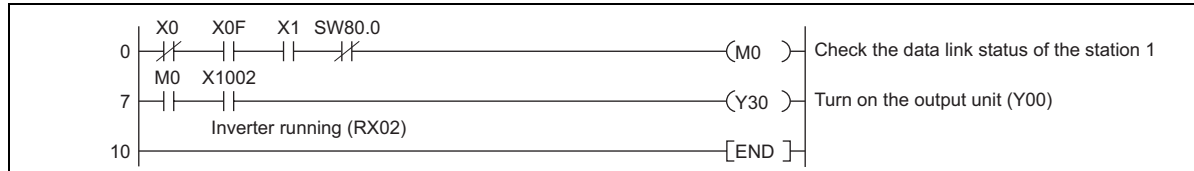


- (4) The relation between the device of the programmable controller CPU and remote register (RWw, RWr) of the remote device station is as follows:
The devices used actually are indicated in shaded regions.



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

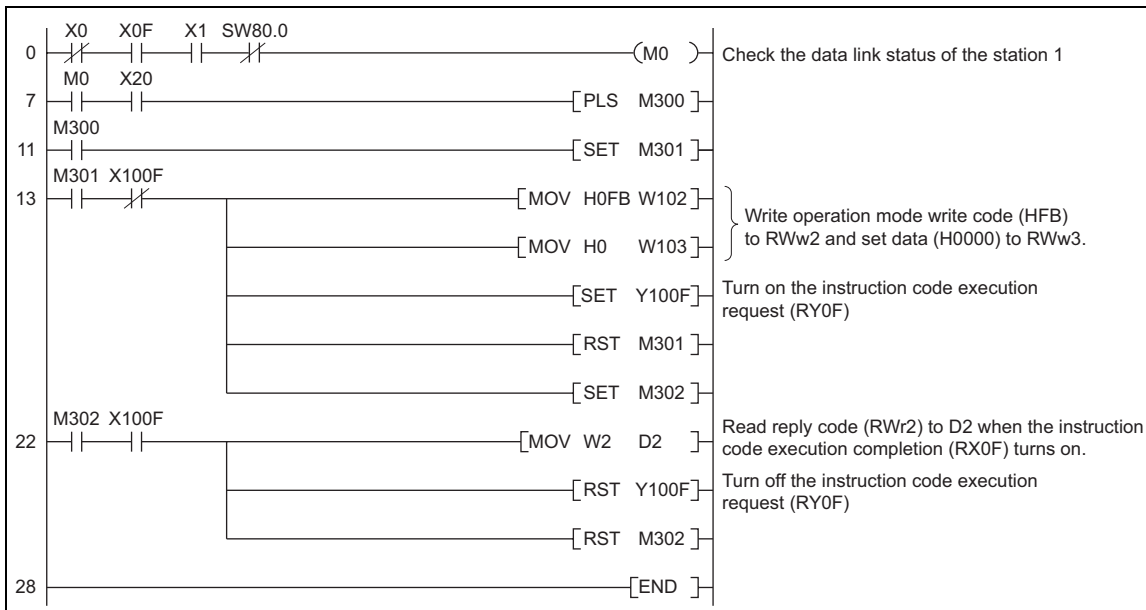


8.2 Program Example for Setting the Operation Mode

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

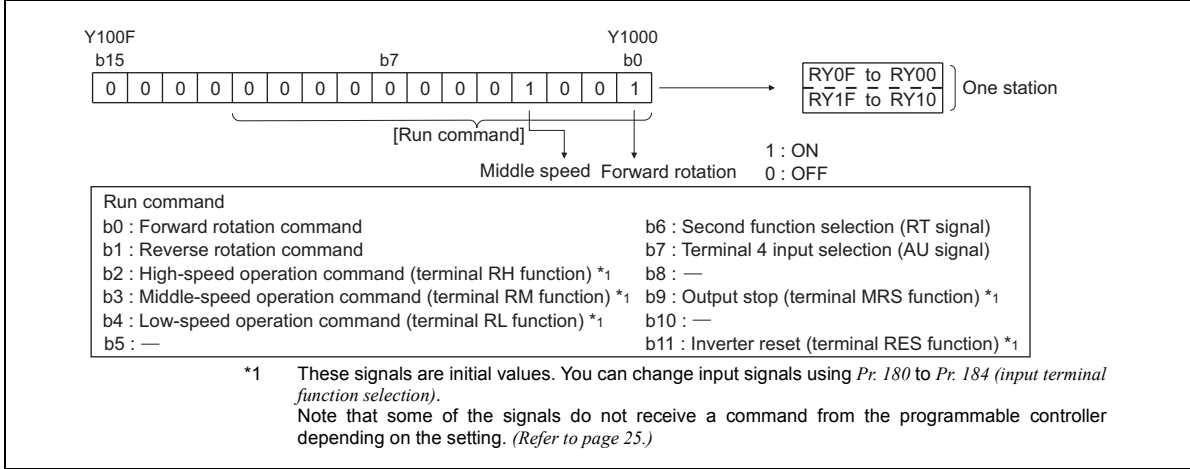
The following explains a program to change the operation mode of station 1 inverter to network operation.

- Operation mode writing code number: HFB (hexadecimal)
- Network operation set data: H0000 (hexadecimal) (*Refer to page 63*)
- The reply code at the time of instruction code execution is set to D2. (*Refer to page 62*)



8.3 Program Example for Setting the Operation Commands

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



8.4 Program Example for Monitoring the Output Frequency

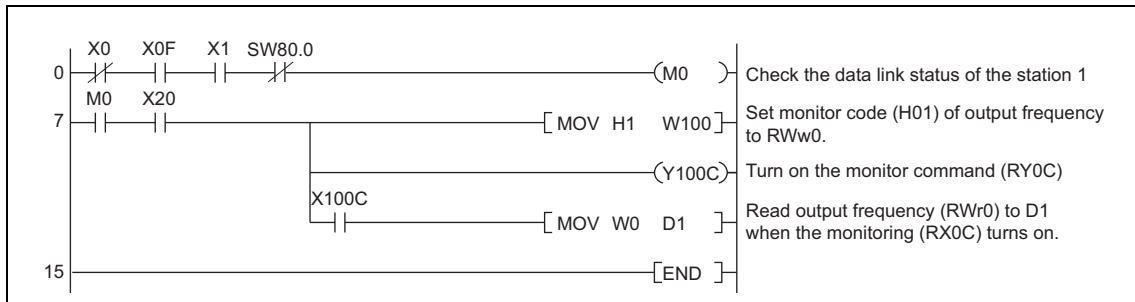
The following explains a program to read monitor functions of the inverter.

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

Output frequency reading code number: H0001 (hexadecimal)

Refer to *page 68* for the monitor code numbers.

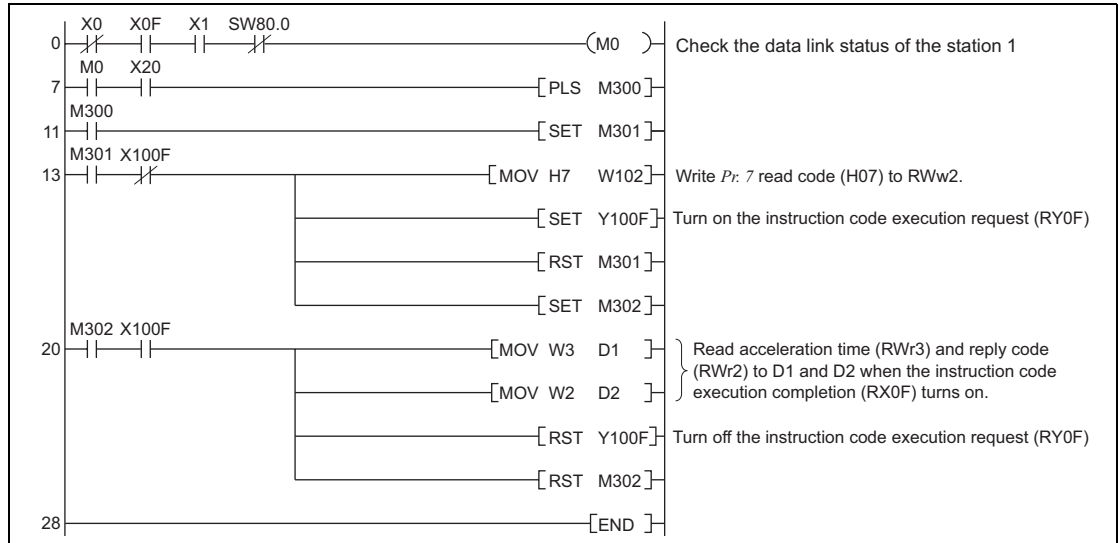
(Example) The output frequency of 60Hz is indicated as H1770 (6000).



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 code number: H07 (hexadecimal)
- Refer to the inverter manual for details of the parameter codes .
- The reply code at the time of instruction code execution is set to D2. (*Refer to page 62*)



REMARKS

- For parameters having numbers 100 and later, change their link parameter expansion settings (set them to other than H0000). Refer to *the inverter manual* for details.

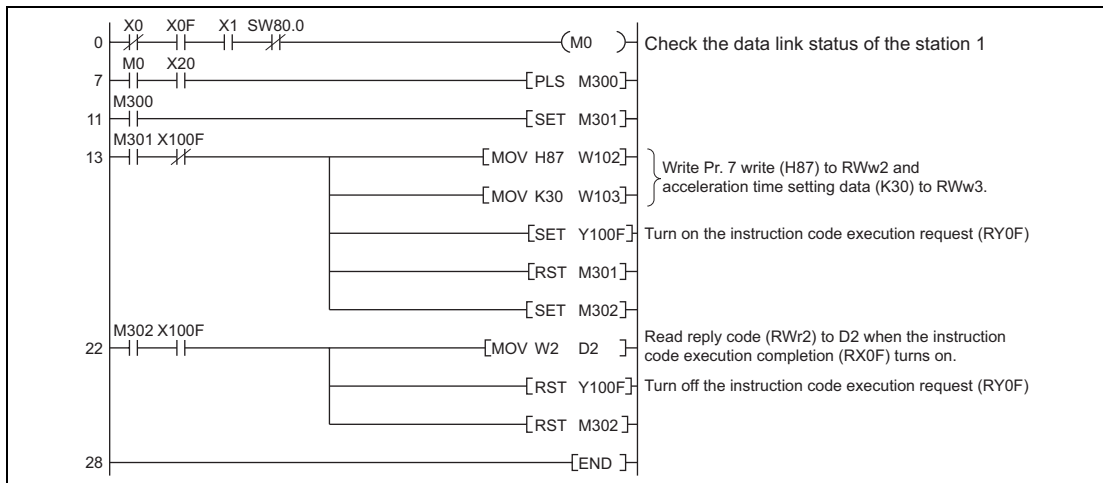
8.6 Program Example for Parameter Writing

The following program changes the setting of *Pr.7 Acceleration time* of station 1 inverter to 3.0s.

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

For the parameter code numbers, refer to the inverter manual.

The reply code at the time of instruction code execution is set to D2. (*Refer to page 62*)

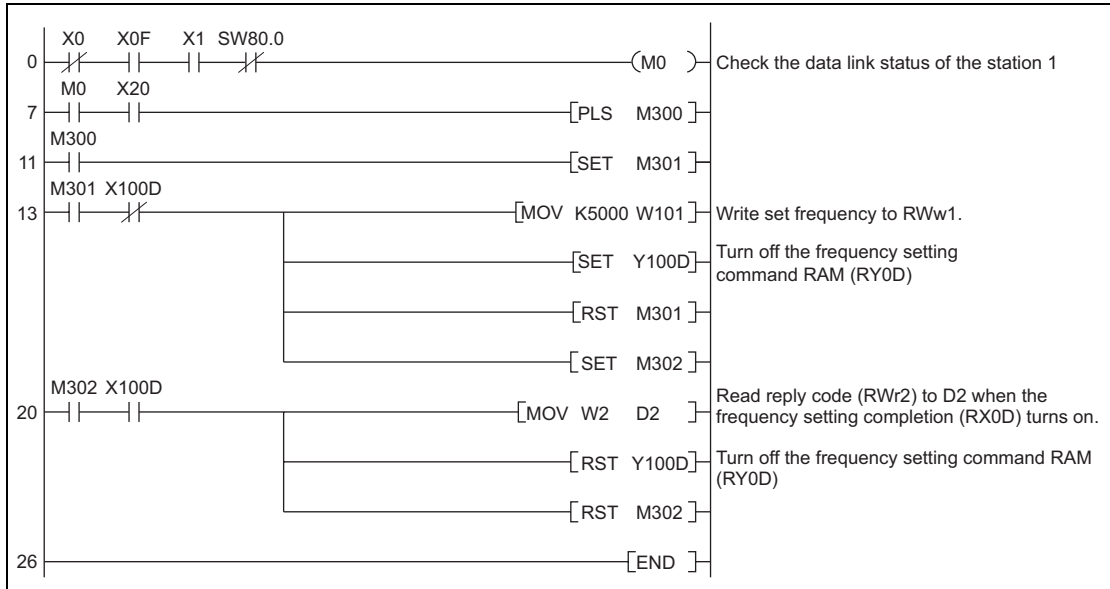


REMARKS

- For parameters having numbers 100 and later, change their link parameter expansion settings (set them to other than H0000). Refer to the parameter list of *the inverter manual* for settings.
- For other functions, refer to the instruction codes (*page 63*).

8.7 Program Example for Setting the Running Frequency

- 1) The following program example changes the running frequency of station 1 inverter to 50.00Hz
 Set frequency: K5000 decimal
 The reply code at the time of instruction code execution is set to D2. (Refer to page 62)



2) 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.

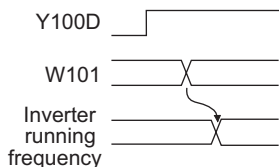
3) Program example for writing data to EEPROM

Modify the program on *page 79* as follows:

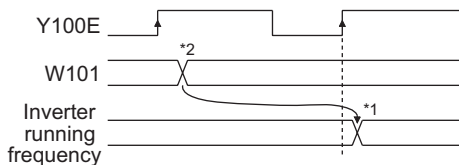
Frequency setting command Y100D → Y100E

Frequency setting completion X100D → X100E

<Timing chart when writing to RAM>



<Timing chart when writing to EEPROM>



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.

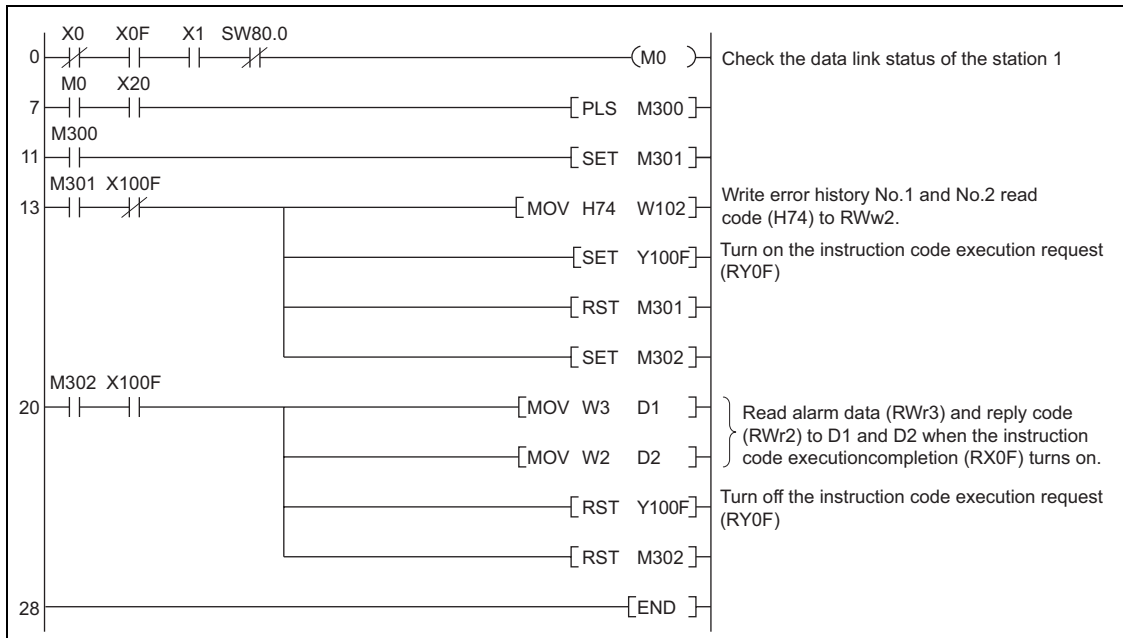
8.8 Program Example for Alarm Definition Reading

The following program reads alarm definitions of station 1 inverter to D1.

· Alarm (error) history No. 1, No. 2 reading code number: H74 (hexadecimal)

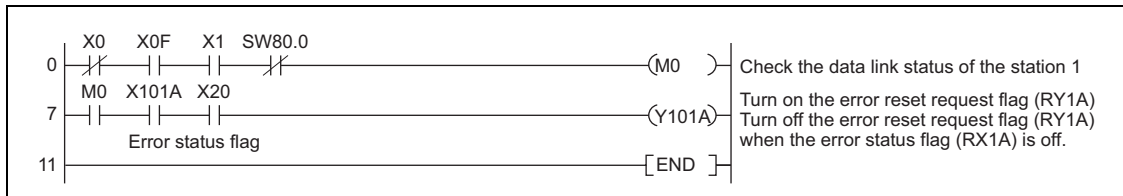
For the error code numbers, refer to *page 67*.

The reply code at the time of instruction code execution is set to D2. (*Refer to page 62*)



8.9 Program Example for Resetting the Inverter at Inverter Error

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



REMARKS

- The above inverter reset using RY1A may be made only when an inverter error occurs.
When *Pr. 349 Communication reset selection* = "0", inverter reset can be made 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 22) or change the operation mode to the network operation mode. (For the program example, refer to page 74)
- Refer to *page 35* for operation conditions of inverter reset.

8.10 Instructions

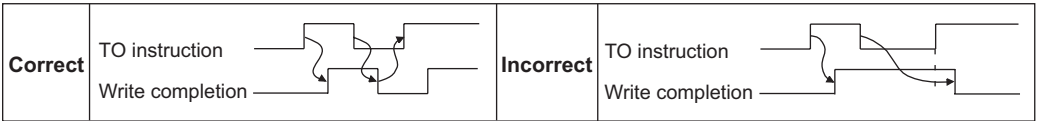
(1) Programming instructions

1) 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.

2) 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.



(2) Operating and handling instructions

1) 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.

2) If the station number set to different inverters is not the same, wrong data will be transferred and normal communication cannot be made.

3) The inverter is brought to an alarm stop "E.OP1" if data communication stops for more than the time set in *Pr. 500 Communication error recognition waiting time* due to a programmable controller fault, an open CC-Link dedicated cable etc. during CC-Link operation.

4) 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 is brought to an alarm stop "E.OP1".

To reset the programmable controller (master station), switch the operation mode to the external operation once, then reset the programmable controller.

5) 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 22*)

(3) Troubleshooting

1) Operation mode does not switch to the network operation mode

- Check that the option unit (FR-A7AC) and CC-Link dedicated cables are fitted properly. (Check for contact fault, break in the cable, etc.)
- Check that *Pr. 542 CC-Link station number* 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.

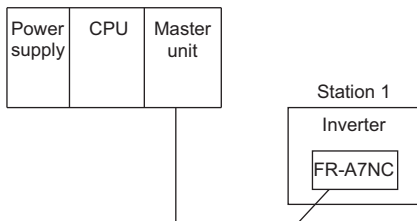
2) Inverter does not start in the network operation mode

- Check that the inverter starting program has been written correctly.
- Check that the inverter starting program is running.
- Check that *Pr.338 Communication operation command source* is not set to external. (*Refer to page 25*)

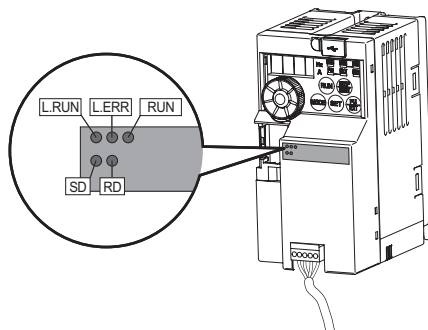
9 HOW TO CHECK FOR ERROR USING THE LEDS

9.1 When One Inverter Is Connected

The following example indicates the causes of faults which may be judged from the LED status of the communication option (FR-A7NC) of the inverter under the condition that the SW, M/S and PRM LEDs of the master unit are off (the master unit setting is correct) in the system configuration where one inverter is connected:



Operation status indication LED

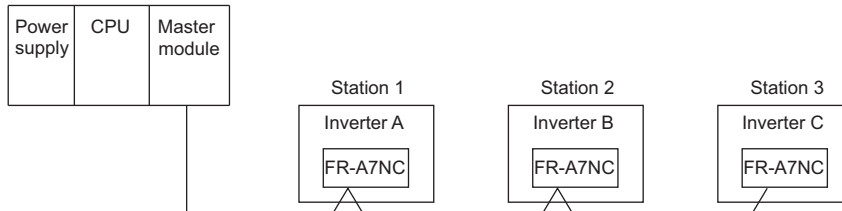


LED Status					Cause
RUN	L.RUN	SD	RD	L.ERR	
●	●	◎	◎	◎	Normal communication is made but CRC error has occurred due to noise.
●	●	◎	◎	○	Normal communication
●	●	◎	○	◎	Hardware fault
●	●	◎	○	○	Hardware fault
●	●	○	◎	◎	Cannot answer due to CRC error of receive data.
●	●	○	◎	○	Data sent to the host station 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-A7NC is connected to CC-Link ver. 2.

●: On, ○: Off, ◎: Flicker

9.2 When Two or More Inverters Are Connected

The following example indicates the causes and corrective actions for faults which may be judged from the LED status of the communication option (FR-A7NC) of the inverter under the condition that the SW, M/S and PRM LEDs of the master unit are off (the master unit setting is correct) in the system configuration shown below:



LED Status				Cause	Corrective Action
Master Unit	Inverters (FR-A7NC)				
	Station 1	Station 2	Station 3		
TIME LINE or TIME LINE	RUN ●	RUN ●	RUN ●	Normal	—
	L.RUN ●	L.RUN ●	L.RUN ●		
	SD ●	SD ●	SD ●		
	RD ●	RD ●	RD ●		
	L.ERR ○	L.ERR ○	L.ERR ○		
	L.ERR ○	L.ERR ○	L.ERR ○		
TIME LINE	RUN ○	RUN ●	RUN ●	Poor contact of the FR-A7NC with the inverter	Plug the FR-A7NC securely. Check the connector.
	L.RUN ○	L.RUN ●	L.RUN ●		
	SD ○	SD ●	SD ●		
	RD ○	RD ●	RD ●		
	L.ERR ○	L.ERR ○	L.ERR ○		
	L.ERR ○	L.ERR ○	L.ERR ○		

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

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Master Unit		LED Status			Cause	Corrective Action
		Inverters (FR-A7NC)				
		Station 1	Station 2	Station 3		
		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-A7NC on station 2 and later are off, the transmission cable between the remote I/O units A and B is open or disconnected from the terminal block.	Referring to the LED "on" condition, search for an open point and repair.
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 ○	The transmission cable is shorted.	Among the three wires of the transmission cable, search for the shorted wire and repair.
		RUN ● L.RUN ○ SD * RD * L.ERR *	RUN ● L.RUN ○ SD * RD * L.ERR *	RUN ● L.RUN ○ SD * RD * L.ERR *	The transmission cable is wired improperly.	Check the wiring on the inverter terminal block and correct the improper wiring point.

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

9.3 Communication Stops During Operation

- Check that the option unit (FR-A7AC) 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 States			Cause	Corrective Action	
Master Unit	Inverters (FR-A7NC)						
	Station 1	Station 2	Station 3				
TIME LINE or TIME LINE	○	RUN ●	RUN ●	RUN ●	Since the L.RUN LEDs of the FR-A7NC on station 1 and the FR-A7NC 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 <i>Pr. 542 CC-Link station number</i> , switch power on again.	
		L.RUN ○	L.RUN ●	L.RUN ○			
		SD *	SD ●	SD *			
		RD ●	RD ●	RD ●			
	●	L.ERR ○	L.ERR ○	L.ERR ○			
		○	RUN ●	RUN ●	RUN ●	Since the L.RUN and SD LEDs of the FR-A7NC on station 2 are off, the transmission speed setting of the FR-A7NC on station 2 is wrong within the setting range (0 to 4).	After correcting the transmission speed setting using <i>Pr. 543 CC-Link baud rate</i> , switch power on again.
			L.RUN ●	L.RUN ○	L.RUN ●		
			SD ●	SD ○	SD ●		
	RD ●		RD ●	RD ●			
	○	L.ERR ○	L.ERR ○	L.ERR ○			
		●	RUN ●	RUN ●	RUN ●	Since the L.ERR LED of the FR-A7NC on station 3 flickers, the setting switch of the FR-A7NC on station 3 was moved during normal operation.	After returning the setting switch of the FR-A7NC to the original position using <i>Pr. 542 CC-Link station number</i> or <i>Pr. 543 CC-Link baud rate</i> power on the inverter again.
			L.RUN ●	L.RUN ●	L.RUN ●		
SD ●			SD ●	SD ●			
RD ●	RD ●		RD ●				
○	L.ERR ○	L.ERR ○	L.ERR ◎				

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

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LED States				Cause	Corrective Action
Master Unit	Inverters (FR-A7NC)				
	Station 1	Station 2	Station 3		
	RUN ● L.RUN ● SD ● RD ● L.ERR ○	RUN ● L.RUN ● SD ● RD ● L.ERR ●	RUN ● L.RUN ● SD ● RD ● L.ERR ○	Since the L.ERR LED of the FR-A7NC on station 2 is on, the FR-A7NC itself on station 2 is affected by noise. (L.RUN may go off.)	Securely connect FG of each inverter and master unit to ground.
TIME LINE or TIME LINE	● ● ○ ●	RUN ● L.RUN ● SD ● RD ● L.ERR ○	RUN ● L.RUN ● SD ● RD ● L.ERR ●	Since the L.ERR LEDs of the FR-A7NC 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 that the transmission cable is connected to SLD. Also run it as far away as possible from the power lines. (100mm or more)
	RUN ● L.RUN ● SD ● RD ● L.ERR ○	RUN ● L.RUN ● SD ● RD ● L.ERR ○	RUN ● L.RUN ● SD ● RD ● L.ERR ●	Terminating resistor is not selected. (L.RUN may go off.)	Check that the setting of the terminating resistor selection switch is correct. (refer to page 13)

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

MEMO

REVISIONS

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

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