



INVERTER

Plug-in option

FR-A7NC

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 inverter power indicator lamp 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

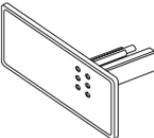
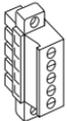
1.1 Unpacking and Product Confirmation

Take the plug-in option out of the package, check the unit name, and confirm that the product is as you ordered and intact.

This product is a plug-in option dedicated for the FR-F700 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 6.)</p> 	<p>Hex-head screw for option mounting (5.5mm) 1 (Refer to page 6.)</p> 
<p>Communication option LED display cover 1 (Refer to page 5.)</p> 	<p>Terminal block 1</p> 	

1.1.2 Parts

Connector for communication

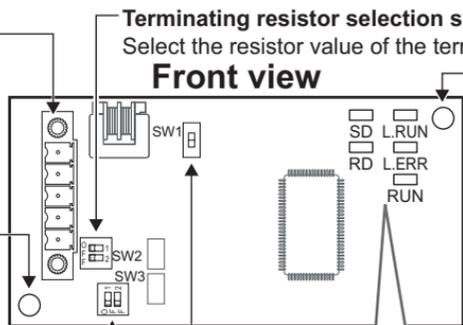
Mount the accessory terminal block to connect to the network.
(Refer to page 12.)

Mounting hole

Terminating resistor selection switch

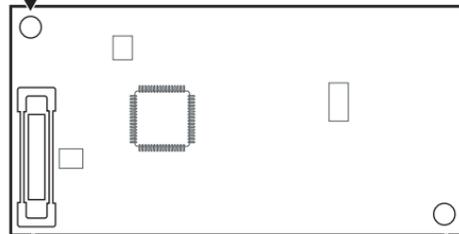
Select the resistor value of the terminating resistor. (Refer to page 8.)

Front view



Mounting hole

Rear view



Switch for maker

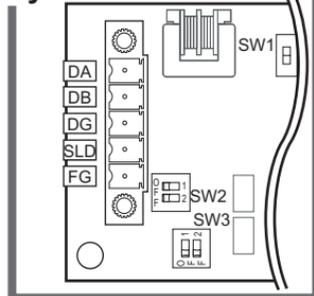
Do not change.

Connector

Connect to the inverter option connector.

Mounting hole

Terminal layout



Operation status indication LED.....Lit/flicker of the LED indicate operation status.

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 Pr. 542 or Pr. 543 setting is changed. Turn the power on again or turn the RES signal on. (Refer to page 31, 32.)
RUN	Lit during normal operation (5V is supplied in the board) (Lit even in the noncommunication status.) Flickers when the master station is Ver.1 and the FR-A7NC is Ver.2 compatible. (Refer to page 4.)
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 31.)
- Set transmission baud rate using Pr.543 Baud rate selection. (Refer to page 32.)

1.2 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 37</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	Ver.1: occupies one station, 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

1.3 CC-Link Version

1.3.1 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  or Ver. 1.10 indication.)

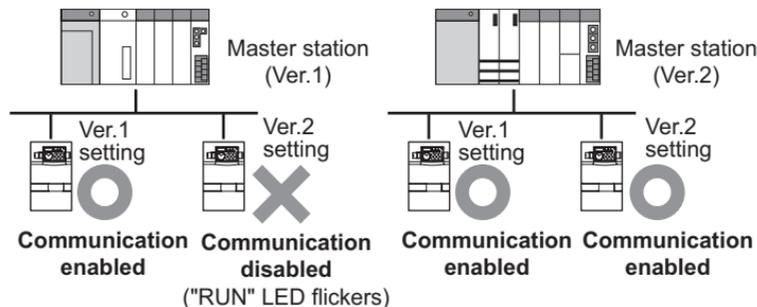
CAUTION

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.

1.3.2 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.



2 INSTALLATION

2.1 Pre-Installation Instructions

Make sure that the input power of the inverter is off.

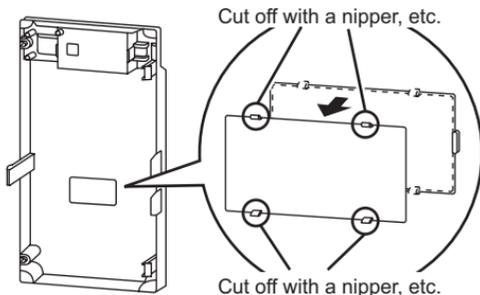
⚠ CAUTION

⚠ **With input power on, do not install or remove the plug-in option. Otherwise, the inverter and plug-in option may be damaged.**

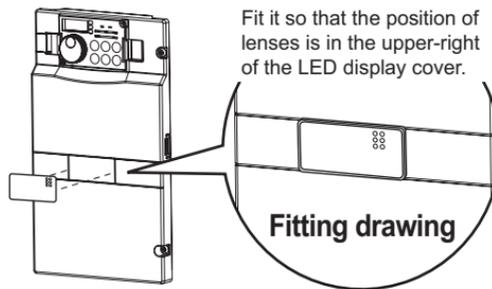
2.2 Installation of the communication option LED display cover

Mount the cover for displaying the operation status indication LED for the communication option on the inverter front cover.

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



- 2) Fit the communication option LED display cover to the front of the inverter front cover and push it into until fixed with hooks.

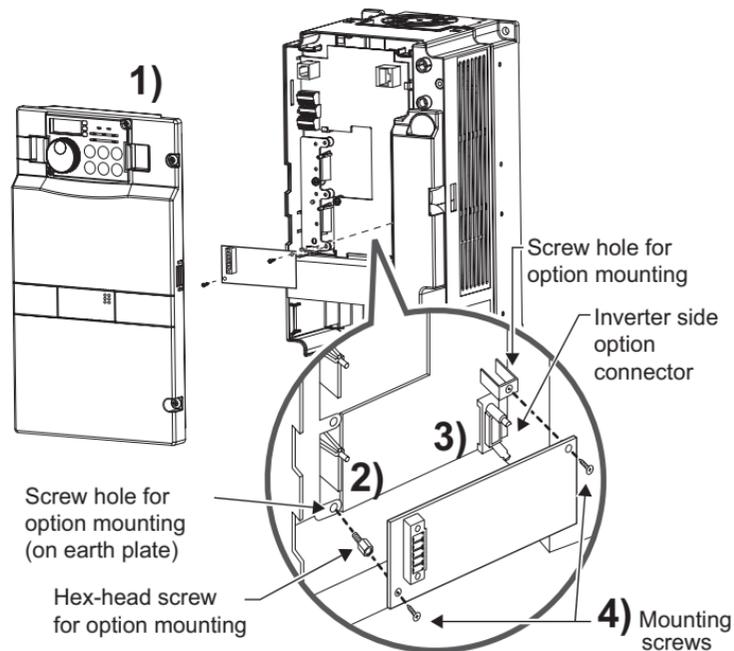


⚠ CAUTION

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



2.3 Installation Procedure



- 1) Remove the inverter front cover.
- 2) Mount the hex-head screw for option mounting into the inverter screw hole (on earth plate). (size 5.5mm, tightening torque 0.56N·m to 0.75N·m)
- 3) Securely fit the connector of the plug-in option to the inverter connector along the guides.
- 4) Securely fix the both right and left sides of the plug-in option to the inverter with the accessory mounting screws. If the screw holes do not line-up, the connector may not have been plugged snugly. Check for loose plugging.

REMARKS

After removing two screws on the right and left places, remove the plug-in option.
(The plug-in option is easily removed if the control circuit terminal block is removed before.)

CAUTION

1. When the inverter can not recognize that the option unit is mounted due to improper installation, etc., "E. 1" (option alarm) is displayed.
2. Note that a hex-head screw for option mounting or mounting screw may drop during mounting and removal.

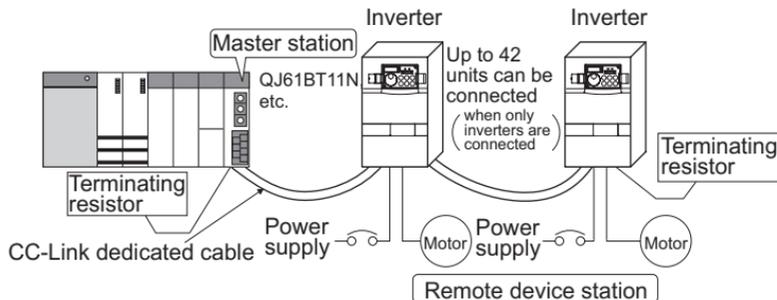
3 WIRING

3.1 System Configuration Example

- (1) PLC 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 PLC CPU used as the master station.
- (2) Inverter side
Mount the option (FR-A7NC) on the inverter.
- (3) Connect the PLC 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



3

REMARKS

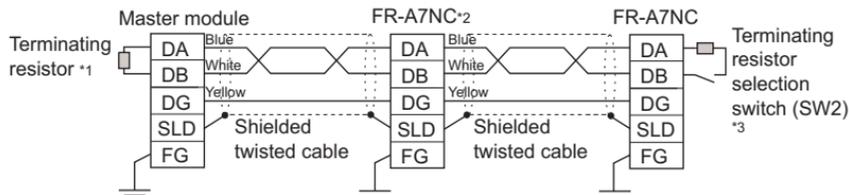
- When the CPU has automatic refresh function (example: QnA series CPU)
Through communication with the corresponding devices using sequence ladder logic, data is automatically transferred to the refresh buffer of the master station at the execution of the END instruction to perform communication with 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 PLC user programs.

- *3 Perform setting of the terminating resistor selection switch (SW1). (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 Use the terminating resistors supplied with the PLC.
 *2 For the unit in the middle, set 1 and 2 of SW2 to OFF (without terminating resistor).

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	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

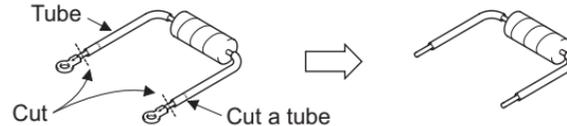
The built-in terminating resistor can not be exchanged online since the terminating resistor is on the FR-A7NC board and disconnected when the terminal block is removed from the FR-A7NC connector for communication. When changing the FR-A7NC online, connect a terminating resistor supplied with a PLC master 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 PLC 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/>

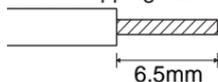


3.4 Wiring

- (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 11.) 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. In addition, 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 October, 2003):

Phoenix Contact Co.,Ltd.

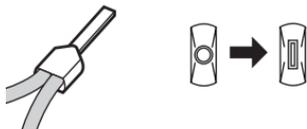
·Bar terminal model: AI-TWIN2 × 0.5-8WH

·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

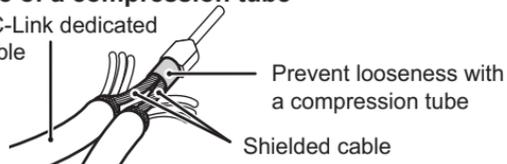
Twist the shielded cable and wire to the terminal SLD.

Use a compression tube and junction terminal block.

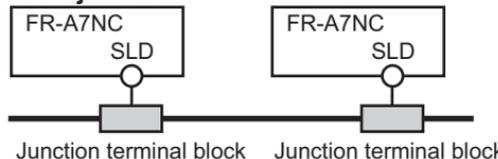


Use of a compression tube

CC-Link dedicated cable



Use of a junction terminal block



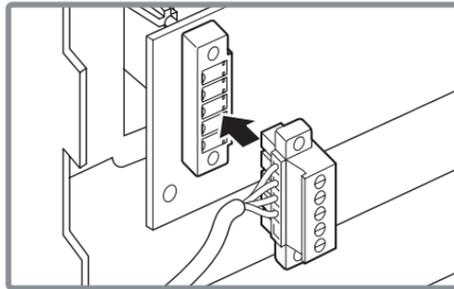
- (2) Loosen the terminal screw and insert the cable into the terminal.

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.

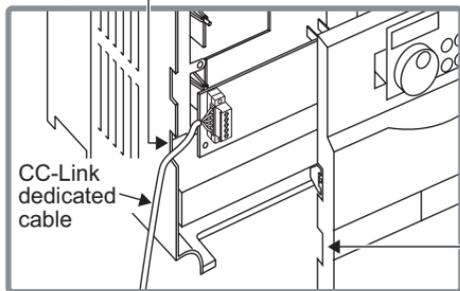
- (3) Connect the terminal block to the connector for communication of the communication option.



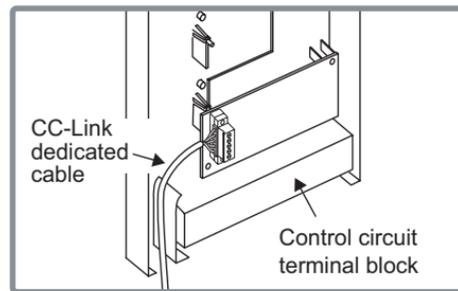
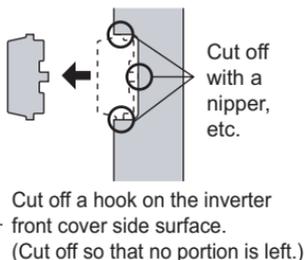


- (4) For wiring of the **30K(00620 (EC Version)) or less**, route wires between the control circuit terminal block and front cover. If cables can not be routed between the control circuit terminal block and front cover (5.5K or less, 37K or more...7.76mm, 7.5K to 30K...7.26mm), remove a hook of the front cover and use a space become available.
 For wiring of the **37K(00770 (EC Version)) or more**, use the space on the left side of the control circuit terminal block.

Wiring can be also performed using a cable groove in the inverter side surface



30K or less



37K or more

REMARKS

- When the hook of the inverter front cover is cut off for wiring, the protective structure (JEM1030) changes to open type (IP10).
- If the terminal block of the FR-A7NC is removed, built-in terminating resistor can not be used. (Refer to page 8.)

CAUTION

- ⚠ When installing the inverter front cover, the cables to the inverter's control circuit terminals and option terminals should be routed properly in the wiring space to prevent them from being caught between the inverter and its cover.
- ⚠ After wiring, wire offcuts must not be left in the inverter. They may cause an error, 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	17
313 *1	DO0 output selection	0 to 5, 7, 8, 10 to 19, 25, 26, 45 to 47, 64, 70 to 78, 86 to 96, 98, 99, 100 to 105, 107, 108, 110 to 116, 125, 126, 145 to 147, 164, 170, 186 to 196, 198, 199, 9999 *4	1	9999	47
314 *1	DO1 output selection				
315 *1	DO2 output selection				
338	Communication operation command source	0, 1	1	0	21
339	Communication speed command source	0, 1, 2	1	0	21
340	Communication startup mode selection	0, 1, 2, 10, 12	1	0	17
342	Communication EEPROM write selection	0, 1	1	0	23
349 *1	Communication reset selection	0, 1	1	0	30
500 *1	Communication error recognition waiting time	0 to 999.8s	0.1s	0	24
501 *1	Communication error occurrence count display	0	1	0	25
502 *1	Communication error time stop mode selection	0 to 3	1	0	26
542 *1, 2, 3	Communication station number (CC-Link)	1 to 64	1	1	31
543 *1, 2, 3	Baud rate selection (CC-Link)	0 to 4	1	0	32
544 *1, 2	CC-Link extended setting	0, 1, 12, 14, 18	1	0	37
550 *2	NET mode control source selection	0, 1, 9999	1	9999	20

*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 The setting values "7, 107" can be set only for the 75K(01800-EC, S75K-CH) or more.
The setting value of "70 to 78" can be set only for EC and CH versions.



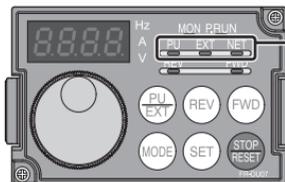
4.2 Operation Mode Setting

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 (FR-DU07) mounted on the inverter.
- (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 21.)

4.2.1 Operation mode indication

FR-DU07



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 with the operation panel of the inverter.)

Refer to *the inverter manual (applied)* 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 69* for a program example for parameter write.)

REMARKS

1. Change of the *Pr. 340* setting is made valid when powering on or resetting the inverter.
2. *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, 2 *2	0	NET operation mode	Same as when Pr. 340 = "0"
	1	PU operation mode	
	2	NET operation mode	
	3, 4	External/PU combined operation mode	
	6	NET operation mode	
	7	X12 (MRS) signal ON NET operation mode X12 (MRS) signal OFF ... external operation mode	
10, 12 *2	0	NET operation mode	Switching between the PU and NET operation mode is enabled *3
	1	PU operation mode	Same as when Pr. 340 = "0"
	2	NET operation mode	NET operation mode fixed
	3, 4	External/PU combined operation mode	Same as when Pr. 340 = "0"
	6	NET operation mode	Switching between the PU and NET operation mode is enabled while running *3
	7	External operation mode	Same as when Pr. 340 = "0"

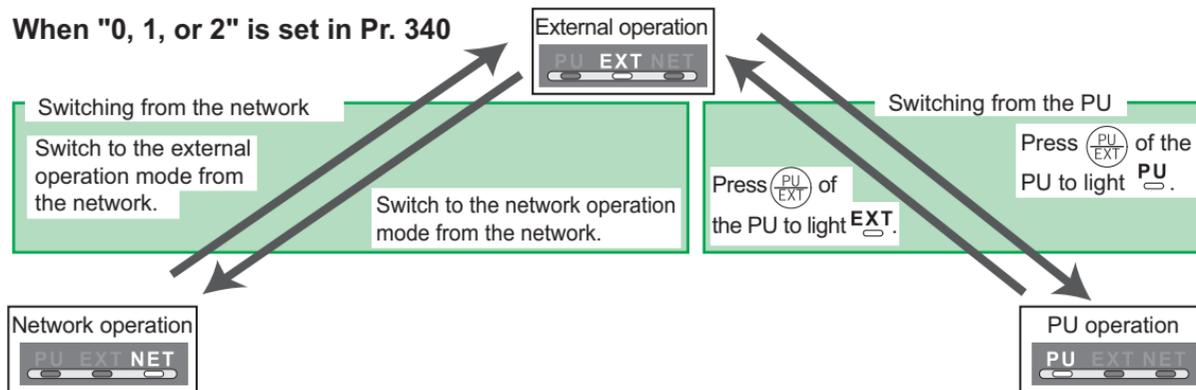
*1 Operation mode can not be directly changed between the PU operation mode and network operation mode.

*2 The Pr. 340 settings "2, 12" are mainly used for communication operation using the inverter RS-485 terminal. When a value other than "9999" (Selection of automatic restart after instantaneous power failure) is set in Pr. 57 Restart coasting time, the inverter will resume the same operation state which was in before after power has been restored from an instantaneous power failure.

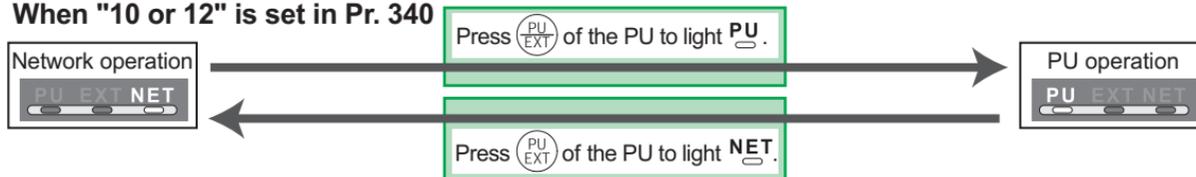
*3 Operation mode can be changed between the PU operation mode and network operation mode with  of the operation panel (FR-DU07) and X65 signal.

(3) Operation mode switching method

When "0, 1, or 2" is set in Pr. 340



When "10 or 12" is set in Pr. 340



For the switching method from the external terminal, refer to *the inverter manual (applied)*.
Refer to *page 55* 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 17)
- 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 inverter RS-485 terminal 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	Control source for the communication option is valid (control source of the inverter RS-485 terminal is invalid)
			1	Control source of the inverter RS-485 terminal is valid (control source for the communication option is invalid)
			9999	Automatic recognition of the communication option Normally, control source of the RS-485 terminal is valid. When a communication option is mounted, the control source of the communication option is valid.

Refer to the inverter manual (applied) for details.

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

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

Control 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 functions (Functions equivalent to terminals)	Running frequency from communication		NET	—	NET	NET	—	NET			
	Terminal 2		—	External	—	—	External	—			
	Terminal 4		—	External		—	External				
	Terminal 1		Compensation								
Selective functions Pr. 178 to Pr. 189 settings	0	RL	Low-speed operation command/remote setting clear		NET	External		NET	External		Pr. 59 = "0" (multi-speed) Pr. 59 = "1, 2" (remote)
	1	RM	Middle-speed operation command/remote setting deceleration		NET	External		NET	External		
	2	RH	High-speed operation command/remote setting acceleration		NET	External		NET	External		
	3	RT	Second function selection		NET			External			
	4	AU	Terminal 4 input selection		—	Combined		—	Combined		
	5	JOG	Jog operation selection		—			External			
	6	CS	Automatic restart after instantaneous power failure selection		External						
	7	OH	External thermal relay input		External						
	8	REX	15-speed selection		NET	External		NET	External		Pr. 59 = "0" (multi-speed)
	10	X10	Inverter operation enable signal		External						



Control 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 functions Pr. 178 to Pr. 189 settings	11	X11	FR-HC connection, instantaneous power failure detection			External				
	12	X12	PU operation external interlock			External				
	13	X13	External DC injection brake operation is started *1			NET		External		
	14	X14	PID control valid terminal		NET	External		NET	External	
	16	X16	PU operation-external operation switching			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		
	37	X37	Traverse function selection *2			NET		External		
	60	STF	Forward rotation command			NET		External		
	61	STR	Reverse rotation command			NET		External		
	62	RES	Reset			External				
	63	PTC	PTC thermistor selection			External				
	64	X64	PID forward rotation action switchover		NET	External		NET	External	
65	X65	PU/NET operation switchover			External					
66	X66	NET/external operation switchover			External					
67	X67	Command source switchover			External					

*1 Setting can be made only for the EC version.

*2 Setting can be made only for the EC and CH versions.

[Explanation of table]

External :Control by signal from external terminal is only valid.

NET :Control from network is only valid

Combined :Operation from either external terminal or communication is valid.

— :Operation from either external terminal or computer is invalid.

Compensation :Control by signal from external terminal is only valid if Pr. 28 Multi-speed input compensation setting is "1".

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 in will shorten the life of the EEPROM.

REMARKS

When "1" is set in *Pr. 342* (write to RAM only), 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

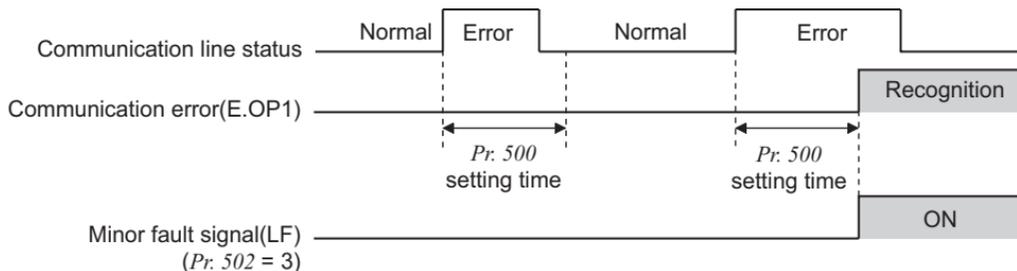
4.4.1 Operation selection at communication error occurrence (Pr. 500 to Pr. 502)

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 recognition 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.

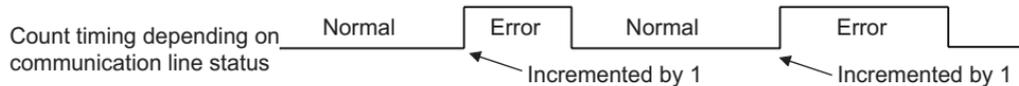
When the error is restored to normal communication within the set time, it is not regarded as a communication error and operation continues.

(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

Error	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

Error	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			
	3	Continued	Normal indication	Not provided
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

Error	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

1. 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.
2. The alarm output indicates alarm output signal (terminal ABC1) or alarm bit output.
3. 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.
4. 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).
5. The acceleration time at a restart is the ordinary acceleration time setting (e.g. Pr. 7, Pr. 44).
6. When the Pr. 502 setting is "2", the operation/speed command at a restart is the one given before the error occurrence.
7. 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.

Error Location	Status		Operation Mode		
			PU Operation	External Operation	Network Operation
Inverter	Inverter operation		Inverter trip	Inverter trip	Inverter trip
	Data communication		Continued	Continued	Continued
Communication line	Inverter operation		Continued	Continued	Inverter trip (depends on the Pr. 502 setting)
	Data communication		Stop	Stop	Stop
Communication option	Communication option connection error	Inverter operation	Inverter trip (depends on the Pr. 502 setting)	Inverter trip (depends on the Pr. 502 setting)	Inverter trip (depends on the Pr. 502 setting)
		Data communication	Continued	Continued	Continued
	Error of communication option itself	Inverter operation	Continued	Continued	Inverter trip (depends on the Pr. 502 setting)
		Data communication	Stop	Stop	Stop

(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 77</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 73* 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 57</i>) *1	Allowed	Disallowed	Disallowed	
	Error reset (RY1A) at inverter fault (<i>Refer to page 46</i>) *2	<i>Pr.349 = 0</i>	Allowed	Allowed	Allowed
		<i>Pr.349 = 1</i>		Disallowed	Disallowed
Connect terminals RES-SD		Allowed	Allowed	Allowed	
Switch off inverter power		Allowed	Allowed	Allowed	
Reset from the PU/DU	Inverter reset	Allowed	Allowed	Allowed	
	Reset at inverter fault	Allowed	Allowed	Allowed	

*1 Inverter reset can be made any time.

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



CAUTION

1. When a communication line error has occurred, reset cannot be made from the network.
2. The inverter is set to the external operation mode if it has been reset in network operation mode. 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 17.)
3. 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 (FR-A7NC), an error reset command (RY1A) 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 (RY1A) is enabled independently of operation mode
			1	Error reset (RY1A) is enabled only in the network operation mode

4.6 CC-Link function setting

4.6.1 Station number setting (Pr. 542)

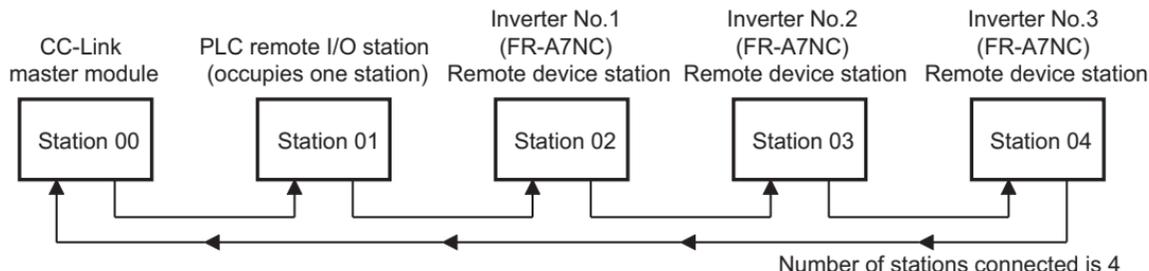
Use *Pr. 542 Communication station number* to set inverter station number specification. Set this parameter within the range of 1 to 64.

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. (Station numbers may be specified independently of the connection sequence.)
- 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	0	0	156kbps
			1	625kbps
			2	2.5Mbps
			3	5Mbps
			4	10Mbps

REMARKS

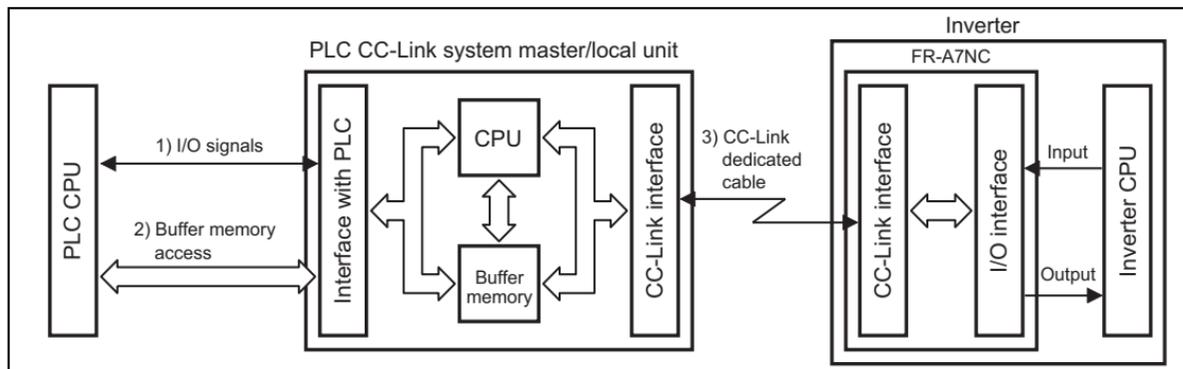
"L.ERR" of the LED flickers if the setting is changed. When power is switched on again or the RES signal is turned on, the setting value is reflected and LED turns off.

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 PLC CPU and CC-Link system master/local unit. Refer to *page 45* 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.	47
Output frequency monitor	The output frequency can be monitored.	52, 55
Output current monitor	The output current can be monitored.	55
Output voltage monitor	The output voltage can be monitored.	55
Special monitor	The monitor data selected can be checked.	55
Alarm definition	Alarm definitions can be checked.	53, 56
Data at alarm occurrence	The inverter status at alarm occurrence can be checked.	53
Operation Mode	The current operation mode can be checked.	55
Parameter read	Parameter settings can be read.	57
Read of set frequency	The current set frequency can be read.	56

REMARKS

Refer to the inverter manual (applied) 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.	45
Reverse rotation command	Give the reverse rotation command.	45
Input terminal function command	Execute functions assigned to the inverter input terminals.	45
Inverter output stop command	Stop the inverter output.	45
Error reset	Reset the inverter only when an inverter alarm occurs.	46
Frequency setting	Set the frequency.	49, 56
Monitor command	Specify the description monitored.	49, 55
Operation mode specification	Set the operation mode.	55
Alarm definition clear	Erase past eight alarms.	57
All parameter clear	Return the parameter descriptions to the initial value.	57
Inverter reset	Reset the inverter.	57
Parameter Write	Write parameter settings.	57
PID control	PID set point, PID measured value and PID deviation can be input from the network.	50

REMARKS

Refer to the inverter manual (applied) for functions controllable from the network in each operation mode.

MEMO

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-A5NC compatible) *1	38
			1		Occupies one station	40
			12 *2	2	Occupies one station double	41
			14 *2		Occupies one station quadruple	42
			18 *2		Occupies one station octuple	43

*1 The program used for conventional series inverter (FR-A5NC) can be used.

*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 29* for inverter reset.)



6.2 I/O Signal List

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

(1) Remote I/O (32 points)

Device No	Signal	Refer to Page
RYn0	Forward rotation command	45
RYn1	Reverse rotation command	45
RYn2	High-speed operation command (terminal RH function) *1	45
RYn3	Middle-speed operation command (terminal RM function) *1	45
RYn4	Low-speed operation command (terminal RL function) *1	45
RYn5	Jog operation command (terminal Jog function) *1	45
RYn6	Second function selection (terminal RT function) *1	45
RYn7	Current input selection (terminal AU function) *1	45
RYn8	Selection of automatic restart after instantaneous power failure (terminal CS function) *1	45
RYn9	Output stop	45
RYnA	Start self-holding selection (terminal STOP function) *1	45
RYnB	Reset (terminal RES function) *1	45
RYnC	Monitor command	46
RYnD	Frequency setting command (RAM)	46
RYnE	Frequency setting command (RAM, EEPROM)	46
RYnF	Instruction code execution request	46

Device No	Signal	Refer to Page
RXn0	Forward running	47
RXn1	Reverse running	47
RXn2	Running (terminal RUN function) *2	47
RXn3	Up to frequency (terminal SU function) *2	47
RXn4	Overload alarm (terminal OL function) *2	47
RXn5	Instantaneous power failure (terminal IPF function) *2	47
RXn6	Frequency detection (terminal FU function) *2	47
RXn7	Error (terminal ABC1 function) *2	47
RXn8	— (terminal ABC2 function) *2	47
RXn9	Pr. 313 assignment function (DO0)	47
RXnA	Pr. 314 assignment function (DO1)	47
RXnB	Pr. 315 assignment function (DO2)	47
RXnC	Monitoring	47
RXnD	Frequency setting completion (RAM)	48
RXnE	Frequency setting completion (RAM, EEPROM)	48
RXnF	Instruction code execution completion	48

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	46	RX(n+1)A	Error status flag	48
RY(n+1)B to RY(n+1)F	Reserved	—	RX(n+1)B	Remote station Ready	48
			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. 186*, *Pr. 188*, and *Pr. 189*, you can change input signal functions. Signals of the RYn0, RYn1, and RYn9 can not be changed. Even when changed using *Pr. 178*, *Pr. 179*, and *Pr. 187*, the settings are invalid.
Refer to the inverter manual (applied) for details of *Pr. 178* to *Pr. 189*.
- *2 Signal names are initial values. Using *Pr. 190* to *Pr. 196*, you can change output signal functions.
Refer to the inverter manual (applied) for details of *Pr. 190* to *Pr. 196*.

(2) Remote register

Address	Description		Refer to Page	Address	Description	Refer to Page
	Upper 8 Bits	Lower 8 Bits				
RWwn	Monitor code 2	Monitor code 1	49	RWrn	First monitor value	52
RWwn+1	Set frequency (0.01Hz increments)		49	RWrn+1	Second monitor value	52
RWwn+2	H00	Instruction code	49	RWrn+2	Reply code	52
RWwn+3	Write data		49	RWrn+3	Read data	52

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



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 38)

(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	49	RWrn	First monitor value		52
RWwn+1	Set frequency (0.01Hz increments)		49	RWrn+1	Second monitor value		52
RWwn+2	Link parameter expansion setting	Instruction code	49	RWrn+2	Reply code 2	Reply code 1	52
RWwn+3	Write data		49	RWrn+3	Read data		52

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

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

(1) Remote I/O (32 points)

Same as when Pr. 544 = 0 (Refer to page 38)

(2) Remote resister

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	49	RWrn	First monitor value		52
RWwn+1	Set frequency (0.01Hz increments)		49	RWrn+1	Second monitor value		52
RWwn+2	Link parameter expansion setting	Instruction code	49	RWrn+2	Reply code 2	Reply code 1	52
RWwn+3	Write data		49	RWrn+3	Read data		52
RWwn+4	Monitor code 3		50	RWrn+4	Third monitor value		53
RWwn+5	Monitor code 4		50	RWrn+5	Fourth monitor value		53
RWwn+6	Monitor code 5		50	RWrn+6	Fifth monitor value		53
RWwn+7	Monitor code 6		50	RWrn+7	Sixth monitor value		53

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



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 38)

(2) Remote resistor

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	49	RWrn	First monitor value		52
RWwn+1	Set frequency (0.01Hz increments)		49	RWrn+1	Second monitor value		52
RWwn+2	Link parameter expansion setting	Instruction code	49	RWrn+2	Reply code 2	Reply code 1	52
RWwn+3	Write data		49	RWrn+3	Read data		52
RWwn+4	Monitor code 3		50	RWrn+4	Third monitor value		53
RWwn+5	Monitor code 4		50	RWrn+5	Fourth monitor value		53
RWwn+6	Monitor code 5		50	RWrn+6	Fifth monitor value		53
RWwn+7	Monitor code 6		50	RWrn+7	Sixth monitor value		53
RWwn+8	Alarm definition No.	H00	50	RWrn+8	Alarm definition No.	Alarm definition data	53
RWwn+9	PID set point (0.01% increments) *1		50	RWrn+9	Alarm definition (output frequency)		53
RWwn+A	PID measured value (0.01% increments) *1		50	RWrn+A	Alarm definition (output current)		53
RWwn+B	PID deviation (0.01% increments) *1		50	RWrn+B	Alarm definition (output voltage)		53
RWwn+C	H00 (Free)		—	RWrn+C	Alarm definition (energization time)		53
RWwn+D				H00 (Free)		—	
RWwn+E							
RWwn+F							
RWwn+F							

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

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

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 38)

(2) Remote resistor

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn	Monitor code 2	Monitor code 1	49
RWwn+1	Set frequency (0.01Hz increments)		49
RWwn+2	Link parameter expansion setting	Instruction code	49
RWwn+3	Write data		49
RWwn+4	Monitor code 3		50
RWwn+5	Monitor code 4		50
RWwn+6	Monitor code 5		50
RWwn+7	Monitor code 6		50
RWwn+8	Alarm definition No.	H00	50
RWwn+9	PID set point (0.01% increments) *1		50
RWwn+A	PID measured value (0.01% increments) *1		50
RWwn+B	PID deviation (0.01% increments) *1		50
RWwn+C	H00 (Free)		—
RWwn+D			
RWwn+E			
RWwn+F			

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

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn	First monitor value		52
RWrn+1	Second monitor value		52
RWrn+2	Reply code 2	Reply code 1	52
RWrn+3	Read data		52
RWrn+4	Third monitor value		53
RWrn+5	Fourth monitor value		53
RWrn+6	Fifth monitor value		53
RWrn+7	Sixth monitor value		53
RWrn+8	Alarm definition No.	Alarm definition data	53
RWrn+9	Alarm definition (output frequency)		53
RWrn+A	Alarm definition (output current)		53
RWrn+B	Alarm definition (output voltage)		53
RWrn+C	Alarm definition (energization time)		53
RWrn+D	H00 (Free)		—
RWrn+E			
RWrn+F			



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	51	RWrn+10	Reply code		53
RWwn+11	Write data		51	RWrn+11	Read data		53
RWwn+12	Link parameter expansion setting	Instruction code	51	RWrn+12	Reply code		53
RWwn+13	Write data		51	RWrn+13	Read data		53
RWwn+14	Link parameter expansion setting	Instruction code	51	RWrn+14	Reply code		53
RWwn+15	Write data		51	RWrn+15	Read data		53
RWwn+16	Link parameter expansion setting	Instruction code	51	RWrn+16	Reply code		53
RWwn+17	Write data		51	RWrn+17	Read data		53
RWwn+18	Link parameter expansion setting	Instruction code	51	RWrn+18	Reply code		53
RWwn+19	Write data		51	RWrn+19	Read data		53
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	OFF : Stop command ON : Forward rotation start	A starting command is input to the inverter when the signal turns on.
RY1	Reverse rotation command	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, RL, JOG, RT, AU, and CS are activated.	
RY3	Middle-speed operation command (terminal RM function) *1		
RY4	Low-speed operation command (terminal RL function) *1		
RY5	Jog operation command (terminal Jog function) *1		
RY6	Second function selection (terminal RT function) *1		
RY7	Current input selection (terminal AU function) *1		
RY8	Selection of automatic restart after instantaneous power failure (terminal CS function) *1		
RY9	Output stop		
RYA	Start self-holding selection (terminal STOP function) *1	Functions assigned to terminal STOP and RES are activated.	
RYB	Reset (RES terminal function) *1		

*1 Signal names are initial values. Using Pr. 180 to Pr. 186, Pr. 188, and Pr. 189, you can change input signal functions. Note that some of signals do not accept a command from the network according to the Pr. 338 and Pr. 339 settings. (Refer to page 21.)

Signals of the RY0, RY1, and RY9 can not be changed. Even when changed using Pr. 178, Pr. 179, and Pr. 187, the settings are invalid.

Refer to the inverter manual (applied) for details of Pr. 178 to Pr.189.



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 *3	Frequency setting command (RAM)	When the frequency setting command (RYD) is switched on, the set frequency (RWw1) is written to RAM of the inverter. *2 On completion of write, frequency setting completion (RXD) switches on.
RYE *3	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 *3	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.

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

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

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 RM function) *1	Functions assigned to terminals RUN, SU, OL, IPF, FU, ABC1 and ABC2 activate.
RX3	Up to frequency (terminal SU function) *1	
RX4	Overload alarm (terminal OL function) *1	
RX5	Instantaneous power failure (terminal IPF function) *1	
RX6	Frequency detection (terminal FU function) *1	
RX7	Alarm (terminal ABC1 function) *1	
RX8	— (terminal ABC2 function) *1	
RX9	— (DO0 function) *2	
RXA	— (DO1 function) *2	
RXB	— (DO2 function) *2	
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. 196, you can change output signal functions.

Refer to the *inverter manual (applied)* for details of Pr. 190 to Pr. 196.

*2 Signals are not assigned in the initial setting.

Refer to Pr. 190 to Pr. 196 of the *inverter manual (applied)* 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).

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 59</i>) By switching on the RYC signal after setting, the specified monitored data is set to RWr0/RWr1.
RWw1	Set frequency *1	<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.
RWw2	Link parameter expansion setting/ Instruction code	<p>Set the instruction code for execution of operation mode rewrite, Pr. read/write, error reference, error clear, etc. (<i>Refer to page 55</i>) The corresponding instruction is executed by switching on RYF after completion of register setting. RXF switches on on completion of instruction execution.</p> <p>When a value other than "0" is set in <i>Pr. 544 CC-Link expansion setting</i>, upper eight bits are link parameter expansion setting.</p> <p>Example) When reading <i>Pr. 300</i>, instruction code is 0300H.</p>
RWw3	Write data	<p>Set the data specified by the RWw2 instruction code. (When required)</p> <p>Switch RYF on after setting the RWw2 and this register.</p> <p>Set zero when the write code is not required.</p>

*1 When speed display is set using *Pr. 37* and *Pr. 144*, the monitor is 1r/min increments.



Device No.	Signal	Description	
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.	Set how many alarm definitions in past to be read. Back to eight alarm definitions in past can be read. (lower 8bits is H00) Upper: H00 (latest alarm) to H07 (eight alarms in past)/lower: H00	
RWw9	PID set point *2	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 (applied)</i> for details of PID control.
RWwA	PID measured value *2	Set the PID measured value Setting range : "0 to 100.00%"	
RWwB	PID deviation *2	Set the PID deviation. Setting range : "-100.00% to 100.00%"	

*2 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 (applied)* for details of Pr.128.

Device No.	Signal	Description
RWw10, RWw12, RWw14, RWw16, RWw18	Link parameter expansion setting/ Instruction code	Set the instruction code (<i>refer to page 55</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. Set HFFFF to disable an instruction by RWw10 to 19. (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.



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.
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.
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 54)
	Reply code 1 (when Pr. 544 ≠ 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 54)
	Reply code 2 (when Pr. 544 ≠ 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 54)
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))
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.
RWr10to 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 54)</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.

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 49.)

The definition read by the instruction code is stored in the remote resistor (RWr). (Refer to page 52.)

Item		Code Number	Description	
Operation mode read		H007B	H0000: Network operation H0001: External operation H0002: PU operation	
Operation mode write		H00FB	H0000: Network operation H0001: External operation H0002: PU operation (Pr. 79 = "6")	
Monitor	Output frequency *1, *2	H006F	H0000 to HFFFF: Running frequency (hexadecimal) Increments 0.01Hz	
	Output current	H0070	H0000 to HFFFF: Output current (hexadecimal) Increments 0.01A(55K(01160-EC, 55K-CH) or less)/0.1A(75K(01800-EC, S75K-CH) or more)	
	Output voltage	H0071	H0000 to HFFFF: Output voltage (hexadecimal) Increments 0.1V	
	Special monitor	H0072	H0000 to HFFFF: Check the data of the monitor selected by the instruction code H00F3.	
	Special monitor selection No. (read)	H0073	Check the monitor code set in the special monitor.	Monitor code (Refer to page 59.)
	Special monitor selection No. (write)	H00F3	Check the monitor code to be set in the special monitor.	

*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 When speed display is set using Pr. 37 and Pr. 144, the monitor is 1r/min increments.



Item		Code Number	Description																									
Monitor	Alarm definition	H0074 to H0077	H0000 to HFFFF: Last two alarm definitions																									
			<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; padding-right: 10px;">b15</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">b8 b7</td> <td style="text-align: center;">_____</td> <td style="text-align: right; padding-right: 10px;">b0</td> </tr> <tr> <td style="padding-right: 5px;">H74</td> <td style="border: 1px solid black; padding: 2px;">Second alarm in past</td> <td style="padding: 2px;"></td> <td style="border: 1px solid black; padding: 2px;">Latest alarm</td> <td></td> </tr> <tr> <td style="padding-right: 5px;">H75</td> <td style="border: 1px solid black; padding: 2px;">Fourth alarm in past</td> <td style="padding: 2px;"></td> <td style="border: 1px solid black; padding: 2px;">Third alarm in past</td> <td></td> </tr> <tr> <td style="padding-right: 5px;">H76</td> <td style="border: 1px solid black; padding: 2px;">Sixth alarm in past</td> <td style="padding: 2px;"></td> <td style="border: 1px solid black; padding: 2px;">Fifth alarm in past</td> <td></td> </tr> <tr> <td style="padding-right: 5px;">H77</td> <td style="border: 1px solid black; padding: 2px;">Eighth alarm in past</td> <td style="padding: 2px;"></td> <td style="border: 1px solid black; padding: 2px;">Seventh alarm in past</td> <td></td> </tr> </table>	b15	_____	b8 b7	_____	b0	H74	Second alarm in past		Latest alarm		H75	Fourth alarm in past		Third alarm in past		H76	Sixth alarm in past		Fifth alarm in past		H77	Eighth alarm in past		Seventh alarm in past	
			b15	_____	b8 b7	_____	b0																					
			H74	Second alarm in past		Latest alarm																						
			H75	Fourth alarm in past		Third alarm in past																						
H76	Sixth alarm in past		Fifth alarm in past																									
H77	Eighth alarm in past		Seventh alarm in past																									
Refer to the alarm data table (<i>page 58</i>)																												
Set frequency read (RAM) *2	H006D	Reads the set frequency from the inverter RAM.	<ul style="list-style-type: none"> · H0000 to H9C40: Increments 0.01Hz (0 to 400.00Hz) · To change the running speed consecutively, always write data to the inverter RAM. · Setting from remote resistors can be made. 																									
Set frequency read (RAM and EEPROM) *2	H006E	Reads the set frequency from the inverter EEPROM.																										
Set frequency write (RAM) *2	H00ED	Writes the set frequency to the inverter RAM.																										
Set frequency write (RAM and EEPROM) *2	H00EE	Writes the set frequency to the inverter RAM and EEPROM.																										

*2 When speed display is set using *Pr. 37* and *Pr. 144*, the monitor is 1r/min increments.

Item	Code Number	Description																									
Parameter read	H0000 to H0063	<ul style="list-style-type: none"> Refer to the instruction code in the parameter list in the inverter manual (applied) to read and write as required. Write to <i>Pr. 77</i> and <i>Pr. 79</i> is disabled. 																									
Parameter write	H0080 to H00E3	<ul style="list-style-type: none"> Set 65520 (HFFF0) as a parameter value "8888" and 65535 (HFFFF) as "9999". When changing the parameter values frequently, set "1" in <i>Pr. 342</i> to write them to the RAM. (Refer to page 23.) 																									
Batch alarm definition clear	H00F4	H9696: Batch-clears the alarm history.																									
All parameter clear	H00FC	Four types of clears are available with H9696, H9966, H5A5A, and H55AA. All clear types (O...clear, x...not clear)																									
		<table border="1"> <thead> <tr> <th>Data</th> <th>Communication parameters</th> <th>Calibration parameter</th> <th>Other parameters</th> <th>HEC, HF3, HFF</th> </tr> </thead> <tbody> <tr> <td>H9696</td> <td>○ *3</td> <td>×</td> <td>○</td> <td>○</td> </tr> <tr> <td>H9966</td> <td>○ *3</td> <td>○</td> <td>○</td> <td>○</td> </tr> <tr> <td>H5A5A</td> <td>×</td> <td>×</td> <td>○</td> <td>○</td> </tr> <tr> <td>H55AA</td> <td>×</td> <td>○</td> <td>○</td> <td>○</td> </tr> </tbody> </table>	Data	Communication parameters	Calibration parameter	Other parameters	HEC, HF3, HFF	H9696	○ *3	×	○	○	H9966	○ *3	○	○	○	H5A5A	×	×	○	○	H55AA	×	○	○	○
		Data	Communication parameters	Calibration parameter	Other parameters	HEC, HF3, HFF																					
		H9696	○ *3	×	○	○																					
		H9966	○ *3	○	○	○																					
H5A5A	×	×	○	○																							
H55AA	×	○	○	○																							
Inverter reset	H00FD	H9696: Resets the inverter.																									
Link parameter expansion setting (read) *4	H007F	H0000 to H0009: Parameter description is changed according to the instruction code (extended) setting. Refer to <i>the inverter manual (applied)</i> for instruction code (extended) settings.																									
Link parameter expansion setting (write) *4	H00FF																										

*3 Communication parameters (*Pr. 117* to *Pr. 124*, *Pr. 331* to *Pr.341*, *Pr.343*, *Pr.349*, *Pr.549* to *Pr.551*, *Pr.542* to *Pr.544*) are also cleared.

*4 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 49)



Item	Code Number	Description
Second parameter changing (read) *5	H006C	When setting the bias/gain (instruction codes H5E to H61, HDE to HE1) parameters H00: Frequency *6 H01: Analog value set in parameters H02: Analog value input from the terminal
Second parameter changing (write) *5	H00EC	

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

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

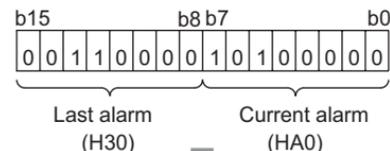
(2) Alarm data

Refer to the inverter manual for details of alarm definitions.

Data	Definition	Data	Definition	Data	Definition
H00	No alarm	H52	ILF	HB3	PE2
H10	OC1	H60	OLT	HC0	CPU
H11	OC2	H70	BE	HC1	CTE
H12	OC3	H80	GF	HC2	P24
H20	OV1	H81	LF	HC4	CDO
H21	OV2	H90	OHT	HC5	IOH
H22	OV3	H91	PTC	HC6	SER
H30	THT	HA0	OPT	HC7	AIE
H31	THM	HA1	OP1	HF1	E.1
H40	FIN	HB0	PE	HF6	E.6
H50	IPF	HB1	PUE	HF7	E.7
H51	UVT	HB2	RET	HFD	E.13

Alarm definition display example
(instruction code H74)

For read data H30A0



Last alarm THT
 Current alarm OPT

7.2.4 Monitor codes

Monitor items selected with RWw0, RWw4 to 7 are explained below.
Divide 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 = 14 or 18, descriptions of monitor code 3 (RWw4) to 6 (RWw7) can be selected.

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

Code Number	Second to Sixth Monitor Description (the first 8 bits)	First Monitor Description (the last 8 bits)	Increments
H00	Output frequency *1	No monitoring (monitor value is 0)	0.01Hz
H01	Output frequency *1	Output frequency *1	0.01Hz
H02	Output current	Output current	0.01A
H03	Output voltage	Output voltage	0.1V
H05	Set frequency *1	Set frequency *1	0.01Hz
H06	Running speed	Running speed	1r/min
H08	Converter output voltage	Converter output voltage	0.1V
H09	Regenerative brake duty *2	Regenerative brake duty *2	0.1%
H0A	Electronic thermal relay function load factor	Electronic thermal relay function load factor	0.1%
H0B	Output current peak	Output current peak	0.01A
H0C	Converter output voltage peak	Converter output voltage peak	0.1V
H0D	Input power	Input power	0.01kW
H0E	Output power	Output power	0.01kW
H0F	Input terminal status *3	Input terminal status *3	—
H10	Output terminal status *3	Output terminal status *3	—
H11	Load meter	Load meter	0.1%

DETAILS OF INPUT AND OUTPUT SIGNALS



Code Number	Second to Sixth Monitor Description (the first 8 bits)	First Monitor Description (the last 8 bits)	Increments
H14	Cumulative energization time	Cumulative energization time	1h
H15	No monitoring (monitor value is 0)	No monitoring (monitor value is 0)	—
H17	Actual operation time	Actual operation time	1h
H18	Motor load factor	Motor load factor	0.1%
H19	Cumulative power	Cumulative power	1kWh
H1A to H31	No monitoring (monitor value is 0)	No monitoring (monitor value is 0)	—
H32	Power saving effect	Power saving effect	Variable according to parameters
H33	Cumulative saving power	Cumulative saving power	Variable according to parameters
H34	PID set point	PID set point	0.1%
H35	PID measured value	PID measured value	0.1%
H36	PID deviation	PID deviation	0.1%
H37 and later	No monitoring (monitor value is 0)	No monitoring (monitor value is 0)	—

*1 Even if speed display setting is made valid using *Pr. 37* and *Pr. 144*, the increments remain as frequency (0.01Hz).

*2 Setting can be made only for the 75K(01800-EC, S75K-CH) or more.

*3 External I/O terminal monitor details

<Input terminal monitor definitions>

b15

b0

blank "0"	CS	RES	STOP	MRS	JOG	RH	RM	RL	RT	AU	STR	STF
-----------	----	-----	------	-----	-----	----	----	----	----	----	-----	-----

<Output terminal monitor definitions>

b15

b0

blank "0"	ABC2	ABC1	FU	OL	IPF	SU	RUN
-----------	------	------	----	----	-----	----	-----

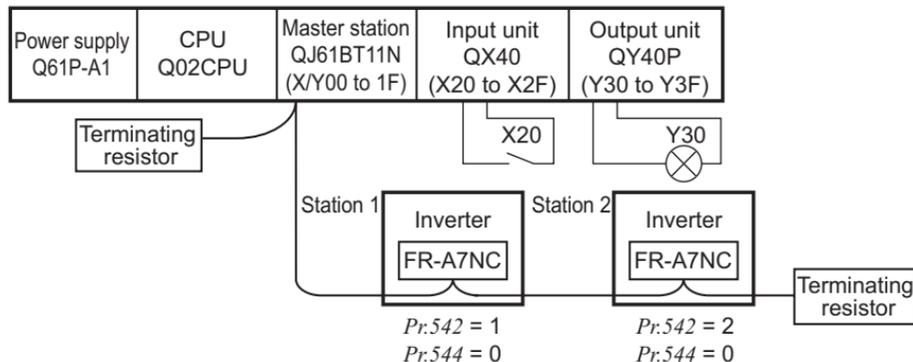
8 PROGRAMMING EXAMPLES

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	64
Setting the operation mode	Selecting the network operation mode	65
Setting the operation commands	Commanding the forward rotation and middle speed signals	66
Setting the monitoring function	Monitoring the output frequency	67
Reading a parameter value	Reading the value of <i>Pr. 7 Acceleration time</i>	68
Writing a parameter value	Setting "3.0 s" in <i>Pr. 7 Acceleration time</i>	69
Setting the running frequency (running speed)	Setting to 50.00Hz	70
Reading the alarm definitions	Reading the inverter alarms	72
Inverter reset	Perform inverter reset at an inverter alarm occurrence.	73

(1) System configuration for programming example

PLC

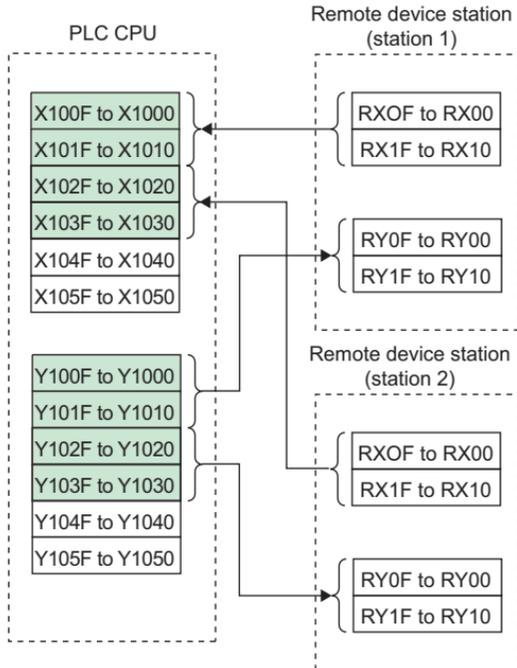


- (2) Network parameter setting of the master station
Network parameters are set as below.

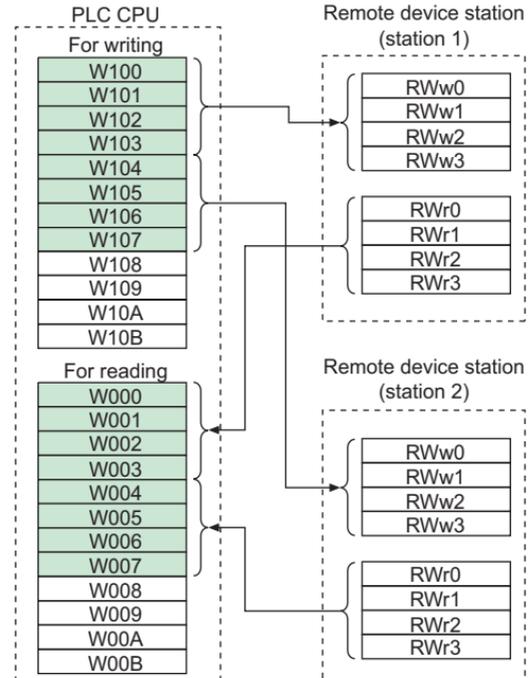
Item		Setting Conditions
Start I/O No.		0000
Operation settings	Data link alarm station setting	Input clear
	Setting at CPU stop	Refresh
Type		Master
Mode		Remote net Ver.1 mode
All connect count		2
Remote input (RX)		X1000
Remote output (RY)		Y1000

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 PLC CPU and remote I/O (RX, RY) of the remote device station is as follows:
The devices used actually are indicated in shaded regions.

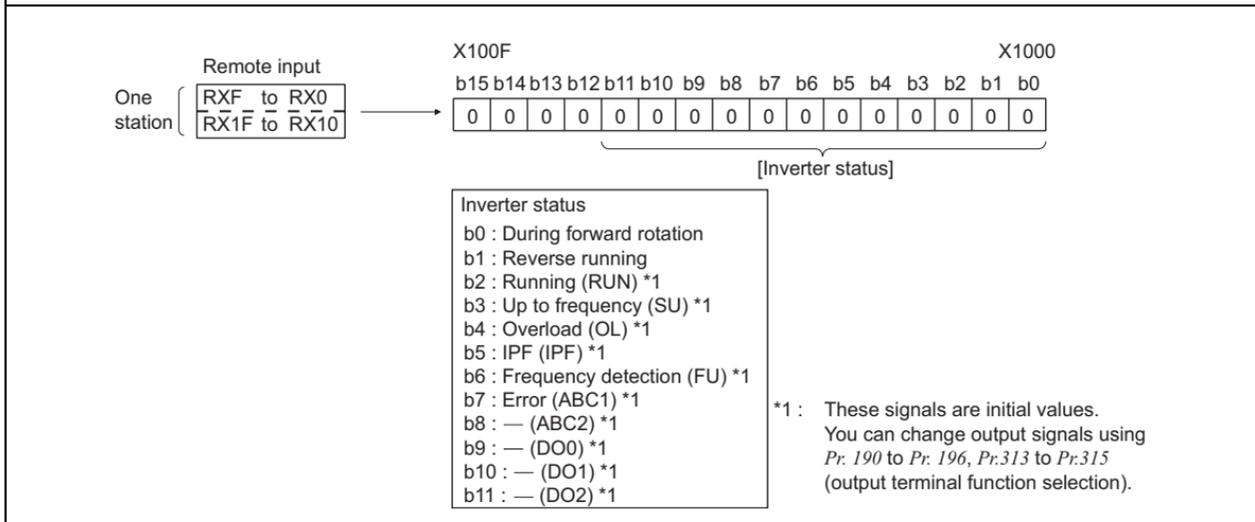
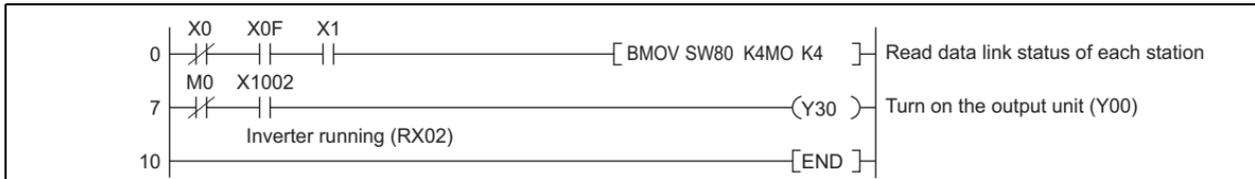


- (4) The relation between the device of the PLC CPU and remote resistor (RWw, RWr) of the remote device station is as follows:
The devices used actually are indicated in shaded regions.



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

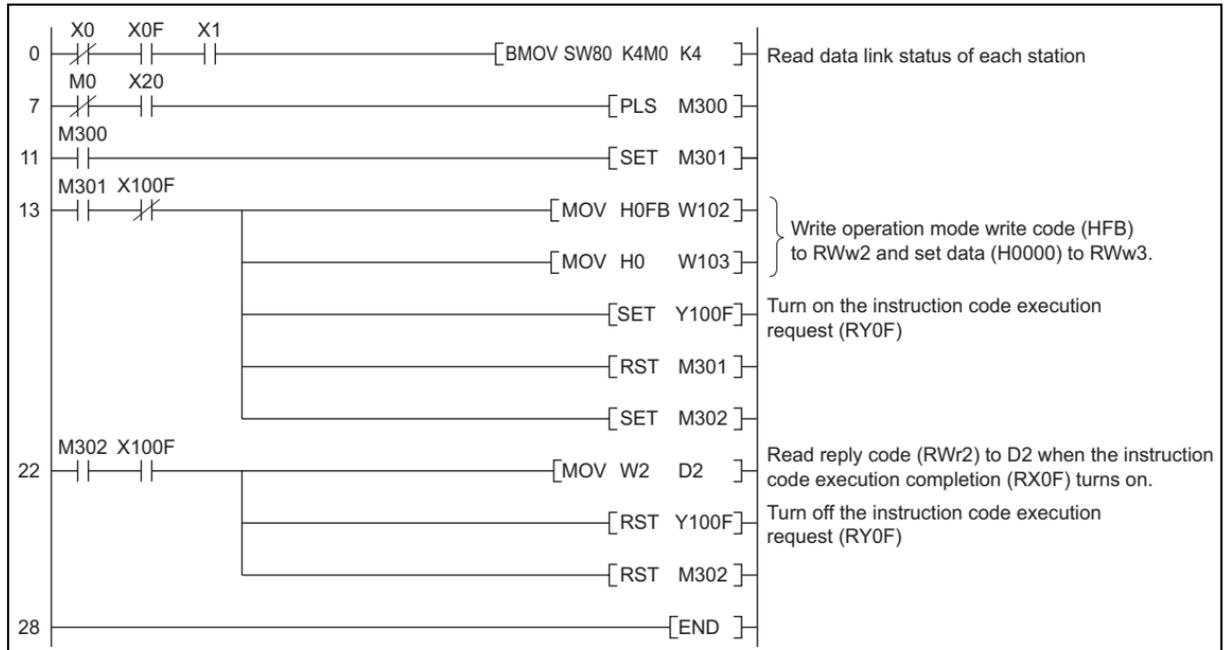


8.2 Program Example for Setting the Operation Mode

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

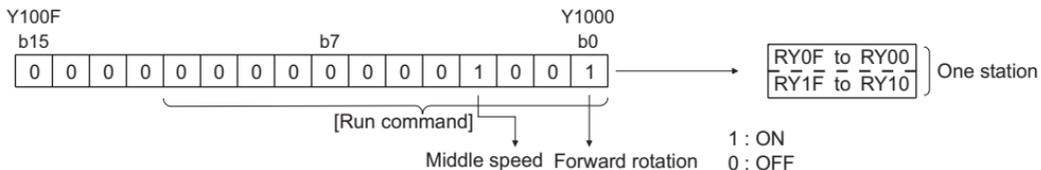
The following explains a program to change the operation mode of Station 1 inverter to network operation.

- Operation mode writing code number: HFB (hexadecimal)
- Network operation set data: H0000 (hexadecimal) (*Refer to page 55*)
- The reply code at the time of instruction code execution is set to D2. (*Refer to page 54*)



8.3 Program Example for Setting the Operation Commands

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



Run command

- | | |
|---|---|
| b0 : Forward rotation command | b6 : Second function selection (RT) *1 |
| b1 : Reverse rotation command | b7 : Terminal 4 input selection (AU) *1 |
| b2 : High-speed operation command (RH) *1 | b8 : Selection of automatic restart after instantaneous power failure (CS) *1 |
| b3 : Middle-speed operation command (RM) *1 | b9 : Output stop |
| b4 : Low-speed operation command (RL) *1 | b10 : Start self-holding selection (STOP) *1 |
| b5 : Jog operation selection (JOG) *1 | b11 : Inverter reset (RES) *1 |

*1 These signals are initial values. You can change input signals using Pr. 180 to Pr. 186, Pr. 188, and Pr. 189 (input terminal function selection).
Note that some of the signals do not receive a command from the PLC depending on the setting. (Refer to page 21.)

8.4 Program Example for Monitoring the Output Frequency

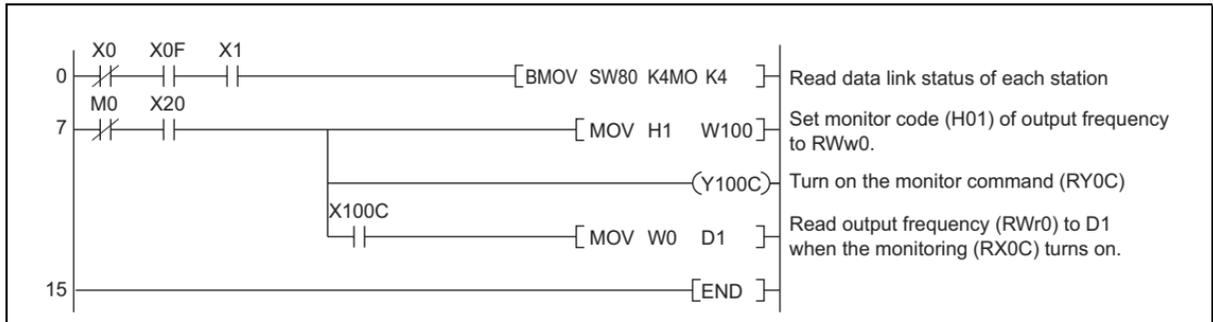
The following explains a program to read monitor functions of the inverter.

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

Output frequency reading code number: H0001 (hexadecimal)

Refer to *page 59* for the monitor code numbers.

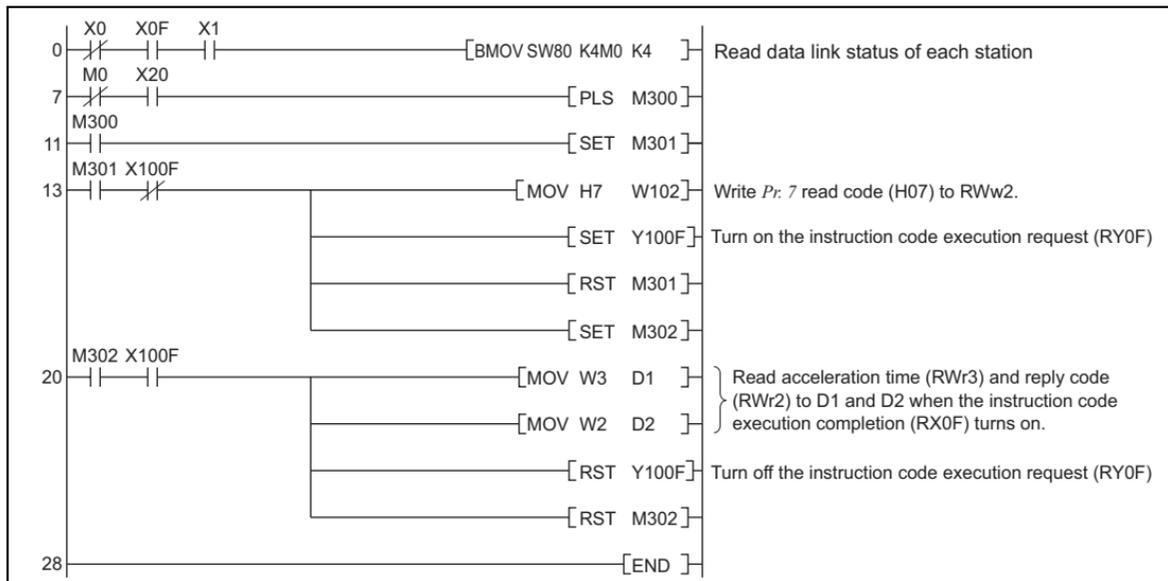
(Example) The output frequency of 60Hz is indicated as H1770 (6000).



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 54*)



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 (applied)* for details.

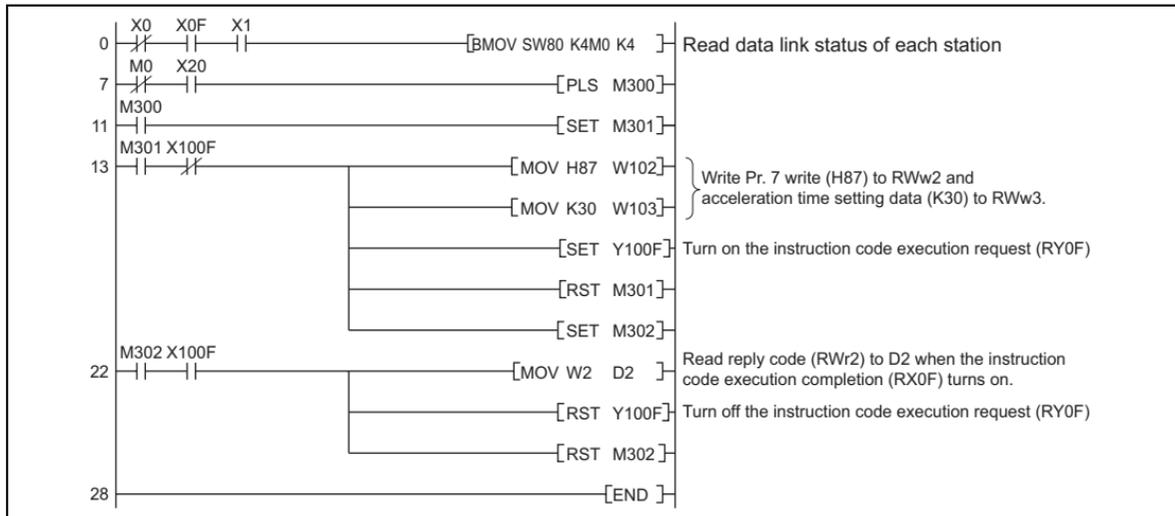
8.6 Program Example for Parameter Writing

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 54*)

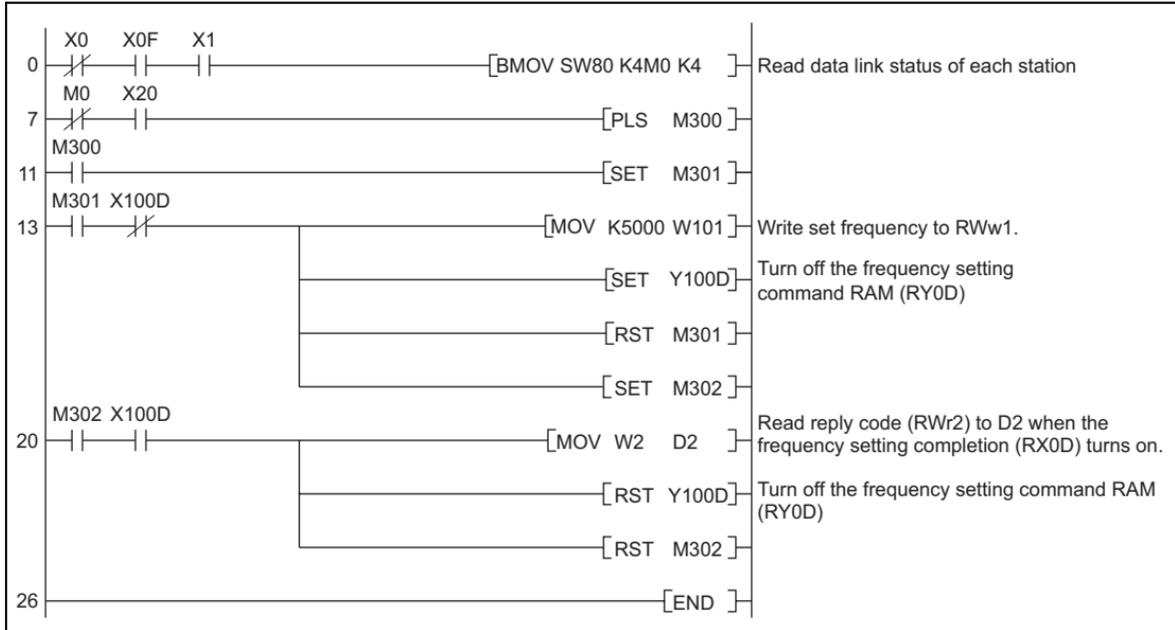


REMARKS

1. 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 (applied)* for settings.
2. For other functions, refer to the instruction codes (*page 55*).

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 54)



2) To continuously change the running frequency from the PLC

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.

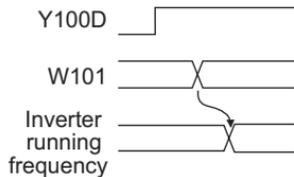
3) Program example for writing data to EEPROM

Modify the above program as follows:

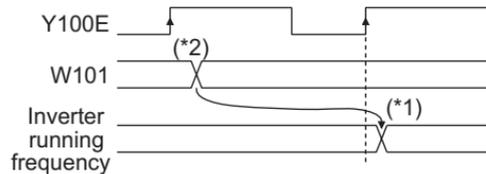
Frequency setting command Y100D → Y100E

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.

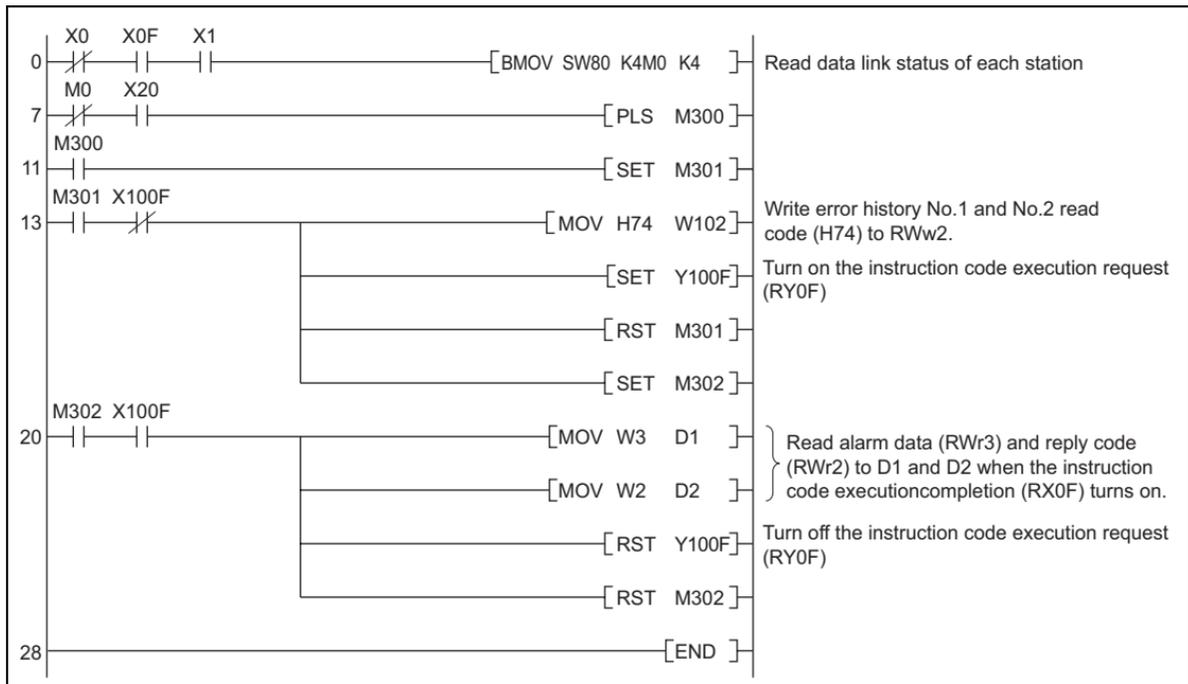
8.8 Program Example for Alarm Definition Reading

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

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

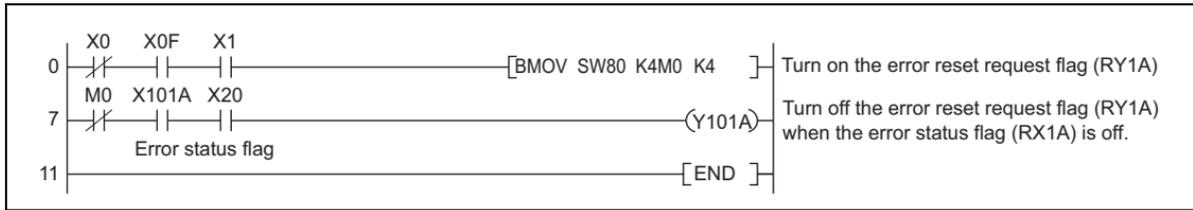
For the error code numbers, refer to *page 58*.

The reply code at the time of instruction code execution is set to D2. (*Refer to page 54*)



8.9 Program Example for Resetting the Inverter at Inverter Error

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



REMARKS

1. The above inverter reset using RY1A may be made only when an inverter error occurs. Also, inverter reset can be made independently of the operation mode.
2. 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 17)* or change the operation mode to the network operation mode. (*For the program example, refer to page 65*)
3. Refer to *page 29* for operation conditions of inverter reset.

8.10 Instructions

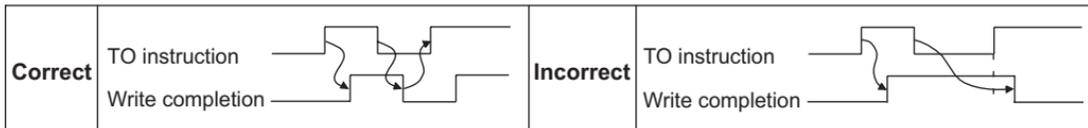
(1) Programming instructions

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) During CC-Link operation, the inverter only accepts commands from the PLC and ignores any external operation command and any operation command from the parameter unit.

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 PLC fault, an open CC-Link dedicated cable etc. during CC-Link operation.

4) If the PLC (master station) is reset during CC-Link operation or if the PLC is powered off, data communication stops and the inverter is brought to an alarm stop "E.OP1".

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

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 PLC program.

Set a value other than "0" in *Pr. 340* to start in the network operation mode after inverter reset. (*Refer to page 17*)

(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

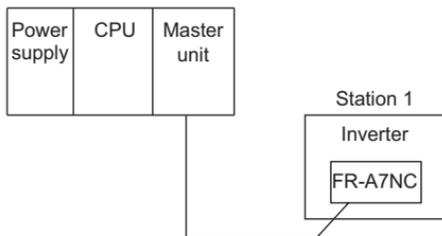
- Check that the inverter starting program has been written correctly.
- Check that the inverter starting program is running.
- Check that the inverter is providing output.

MEMO

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**

SD L.RUN
RD L.ERR
RUN



HOW TO CHECK FOR ERROR USING THE LEDS

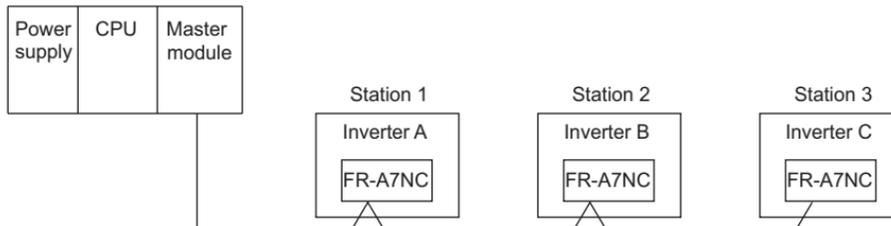


LED Status					Cause
RUN	L.RUN	SD	RD	L.ERR	
●	●	◎	◎	◎	Normal communication is made but CRC error has occurred due to noise.
●	●	◎	◎	○	Normal communication
●	●	◎	○	◎	Hardware fault
●	●	◎	○	○	Hardware fault
●	●	○	◎	◎	Cannot answer due to CRC error of receive data.
●	●	○	◎	○	Data sent to the host station 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 ●	Poor contact of the FR-A7NC with the inverter	Plug the FR-A7NC securely. Check the connector.
	RD ●	RD ●	RD ●		
●	L.ERR ○	L.ERR ○	L.ERR ○		
	RUN ○	RUN ●	RUN ●		
○	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

HOW TO CHECK FOR ERROR USING THE LEDS

LED Status				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.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 PLC program is executed properly.
- Check that data communication has not stopped due to an instantaneous power failure, etc.

Master Unit		LED States			Cause	Corrective Action
		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

HOW TO CHECK FOR ERROR USING THE LEDS

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 8)

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

REVISIONS

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

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