MITSUBISHI ELECTRIC

TRANSISTORIZED INVERTER

-INSTRUCTION MANUAL-

CC-Link COMMUNICATION OPTION

FR-A5NC

Thank you for choosing the Mitsubishi transistorized inverter option unit.
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 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 removed. Otherwise, you may access the exposed high-voltage terminals and charging part and get an electric shock.**
- **Even 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..**

⚠ WARNING

- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the option unit before wiring. Otherwise, you may get an electric shock or be injured.
- Handle this option unit with dry hands to prevent an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise, you may get an electric shock.
- While power is on, do not move the station number and baud rate setting switches. Doing so can cause an electric shock.

2. Injury Prevention

⚠ CAUTION

- Apply only the voltage specified in the instruction manual to each terminal to prevent burst, damage, etc.
- 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 burst, damage, etc.
- 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 option unit 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 screws, metal fragments or other conductive bodies or oil or other flammable substance from entering the inverter.

(2) Test operation and adjustment

⚠ 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.

⚠ CAUTION
● When parameter clear or all parameter clear is performed, each parameter returns to the factory setting. Reset the required parameters before starting operation. ● 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 indepth 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.

CONTENTS

1.PRE-OPERATION INSTRUCTIONS

1.1 Unpacking and Product Confirmation

Take the option unit out of the package, check the unit name, and confirm that the product is as you ordered and intact.
Note that the FR-A500(L)/F500(L) series inverter and FR-V500 series inverter have different functions when the option is fitted.
Please check the SERIAL number of the inverter.

● SERIAL number check

- This product may be used with the FR-A500 series manufactured in and after November 1997. Any of the models may be used with this unit if its SERIAL number indicated on the rating plate and package has "R7Y○○○○○○" or later version.
- This product may be used with the FR-V500 series manufactured in and after March 2002. Any of the models may be used with this unit if its SERIAL number indicated on the rating plate and package has "○23○○○○○○" or later version. For details of the SERIAL number, please contact your sales representative.
  SERIAL is made up of 1 version symbol, 1 alphabet letter or numeric character indicating month, and 7 numeric characters indicating the year and control number as shown below. (Only the first three digits of the control number are printed on the package.)

○	2	3	○○○○○○
Symbol	Year	Month	Control number
SERIAL number			

1.2 Packing Confirmation

Make sure that the package includes the following

- Instruction manual 1
- Mounting screws M3 × 6 2

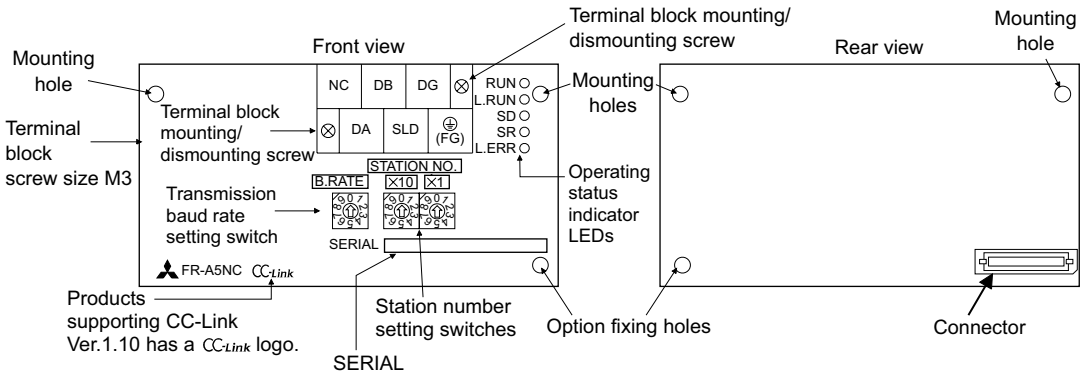
1.3 Instruction Manual Note

(1) Refer to the following manuals for full information on the CC-Link master station:

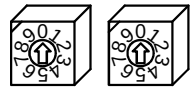
- AJ61BT11/A1SJ61BT11 Control & Communication Link system master/local module user's manual.....IB-66721
- AJ61QBT11/A1SJ61QBT11 Control & Communication Link system master/local module user's manual.....IB-66722
- QJ61BT11 Control & Communication Link system master/local module user's manual.....SH-080016

(2) In this manual, Control & Communication Link is abbreviated to CC-Link.

1.4 Structure



(1) Names and functions

Name	Function
Station number setting switches	 ×10 ×1 Used to set the inverter station number between 1 and 64. For details, refer to page 6.
Transmission baud rate setting switch	Used to set the transmission speed. For details, refer to page 8.
Operating status indicator LEDs	RUN ..... Lit during normal operation (when internal 5V is normal). (Also lit when communication is not yet started.) L.RUN ..... Lit to indicate that refresh data is received properly. Extinguished to indicate a break in data for a given period of time. SD ..... Extinguished to indicate that send data is "0". RD ..... Lit to indicate that the carrier of receive data is detected. L.ERR ..... Lit to indicate the communication error of the station itself. Flickers to indicate that the switch or other setting was changed while power is on.

1.5 Inverter Option (FR-A5NC) Specifications

Type	Inverter inboard option fitted to the terminal block(can be mounted/dismounted to/from the inverter front face)
Power supply	5VDC supplied from the inverter
Number of units connected	42 units max. (1 station occupied by 1 unit). May be used with other equipment.
Terminal block	8-pin terminal block (M3 × 6 screws)
Cable size	0.75mm^2 to 2mm^2
Station type	Remote device station
Number of stations occupied	One inverter occupies one station.
Communication cable	CC-Link dedicated cable, CC-Link Version 1.10 compatible CC-Link dedicated cable

REMARKS

When the CC-Link unit (FR-A5NC) is plugged in, the protective structure (JEM1030) is open type (IP00).

1.6 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.

(1) 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 CC-Link logo or Ver. 1.10 indication.)

CAUTION

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

(2) How to confirm the CC-Link Ver. 1.10 compatible products
Only the FR-A5NC units manufactured in and after September 2001 are CC-Link Ver. 1.10 compatible.

1) Product having SERIAL number of "F19○○○○○○ " or later version on its board and package
(Only the first three digits of the control number are printed on the package.)

F	1	9	○○○○○○
Symbol	Year	Month	Control number

SERIAL number

2) Product having a CC-Link logo on its board
Refer to page 2 for the SERIAL and logo positions on the board.

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 option unit. Otherwise, the inverter and option unit may be damaged.

2.2 Station Number and Transmission Baud Rate Setting

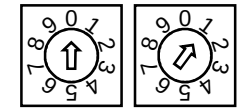
2.2.1 Station number setting

Set the inverter station number before switching on the inverter and do not change the setting while power is on.
The station number may be set between 1 and 64.

CAUTION

1. **The station number changed while powering on the inverter is not made valid. The station number setting is made valid either after power is reapplied or when the RES signal turns on.**
2. **Note that the same station number cannot be reqeated. (If the same station number is repeated, proper communication cannot be made.)**

tation number setting switches



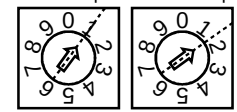
●Set the arrow (⇧) of the corresponding switch to the required numeral.
Example:

- For station number 1: Set (⇧) of × 10 to "0" and (⇧) of × 1 to "1".
- For station number 26: Set the (⇧) × 10 to "2" and the (⇧) × 1 to "6".

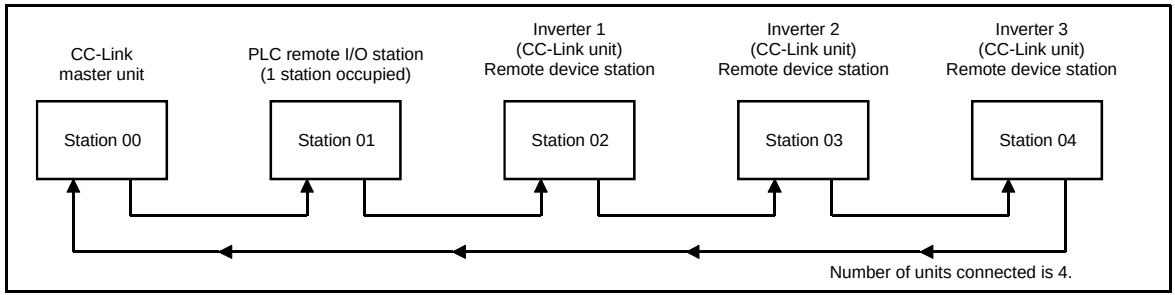
REMARKS

- Set station numbers consecutively in a connection sequence.
  (The station numbers may also be set independently of the connection sequence.)
- Set each station number switch to the position of its numeral without error. If it is set to any position between numerals, normal data communication cannot be made.

Good example Bad example



3) Connection example



REMARKS

One inverter occupies one station (one remote device station)

2.2.2 Setting of the transmission baud rate setting switch

Set the transmission speed. (For details, refer to the CC-Link master unit manual.)

Setting Switch	Transmission Speed
0	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps

Setting Switch	Transmission Speed
4	10Mbps
5 or later should not be used. (If the switch is set to position 5 or later, the "L.ERR" LED is lit and a communication error occurs.)	

2.3 Installation Procedure

(1) Mount the option unit to slot 3.
Remove the DATA PORT from the front cover and mount the front cover. (To remove the DATA PORT cover, push it from the back of the front cover.) (If it is fitted in slot 1 or 2, E.OP1 (E.OP2) is displayed and the inverter will not function.)

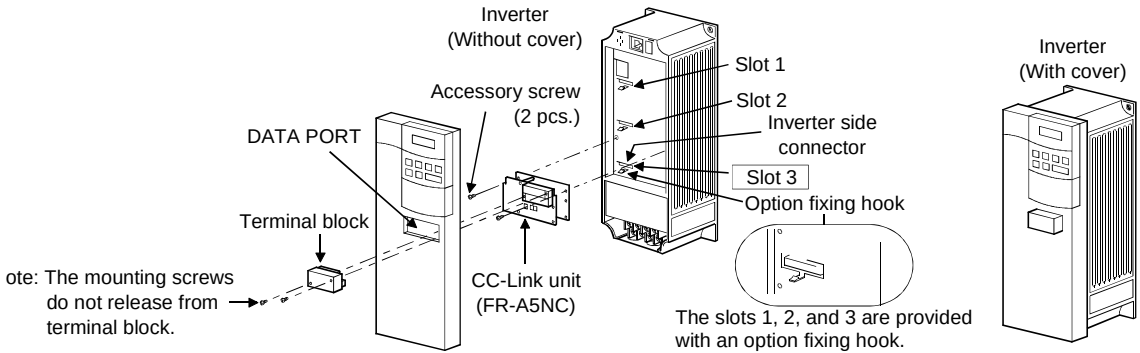
(2) Securely insert the connector of the option unit far into the connector of slot 3 in the inverter. At this time, fit the option fixing holes snugly. For the position of slot 3, refer to the next page. Also be sure to fit the unit into the option fixing hook (For the FR-A500(L)/ FR-F500(L) series, it is available in Aug., 2000).

(3) Securely fix the two right and left places of the option unit 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 looseness.

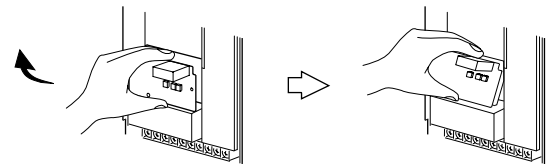
(4) Remove the terminal block mounting/dismounting screws to dismount the terminal block.

(5) Reinstall the front cover of the inverter. (Refer to the inverter manual.)

(6) Reinstall the terminal block securely.



(7) To remove the option unit, remove the two left and right screws, and then hold the option unit and pull its bottom toward you as shown in the figure. (The option unit is fixed by the hook of the inverter.)



REMARKS

1. Before wiring, mount the option unit (FR-A5NC) and fit the inverter front cover.
2. After wiring, wire offcuts must not be left in the inverter. They may cause a fault, failure or malfunction.
3. The option unit (FR-A5NC) can be used only when mounted in the slot 3.
4. When two or more communication options are mounted, "E.OPT" error is displayed. Note that the error will not be displayed and relay output and FR-A5NC will activate when used with the relay output/computer link unit (FR-A5NC).
5. When installing the inverter front cover with the terminal block attached, the front cover may not be fitted properly.

⚠ 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.**

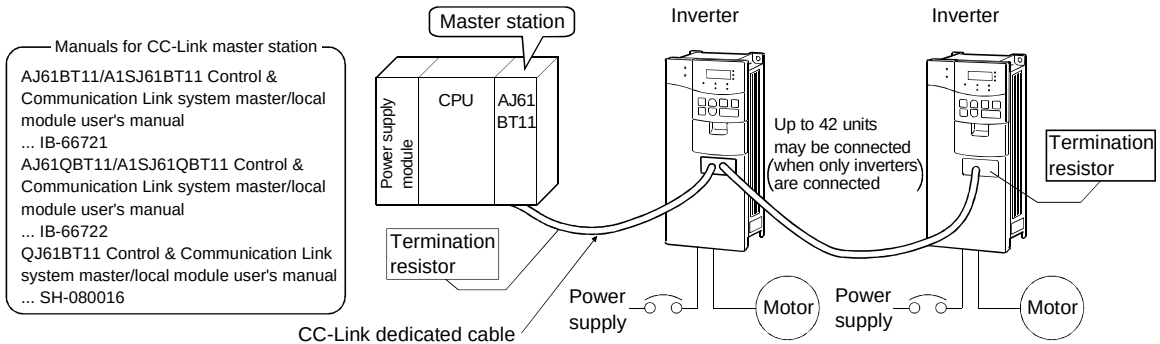
3.Wiring

3.1 System Configuration Example

(1) PLC side
Load the "AJ61BT11", "A1SJ61BT11", "AJ61QBT11", "A1SJ61QBT11" or "QJ61BT11" "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 "CC-Link unit (FR-A5NC)" on the inverter. Before wiring, mount the CC-Link unit (FR-A5NC) and fit the inverter front cover.

(3) Connect the PLC CC-Link unit master station and the FR-A5NC with the CC-Link dedicated cable.



(4) 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.

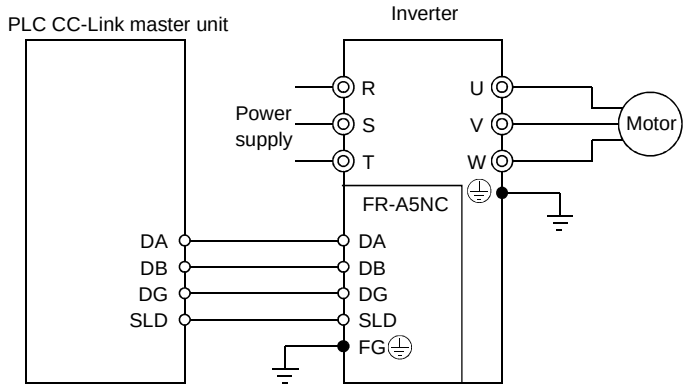
(5) When the CPU does not have automatic refresh function (example: AnA series CPU)
Data is transferred to the refresh buffer of the master station directly by sequence ladder logic to perform communication with the remote devices.

3.2 Connection Cable

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 and availability of the CC-Link dedicated cable, refer to the CC-Link catalog.

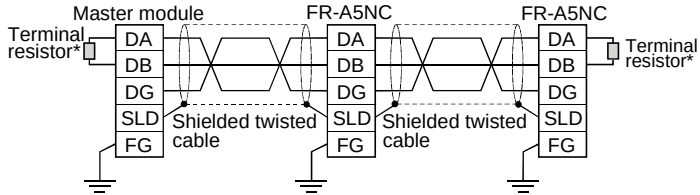
3.3 Connection Diagram

The following diagram shows how to wire the inverter and PLC CC-Link master unit:



3.4 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.



*Use the termination resistors supplied with the PLC.

1) Maximum number of units connected to one master station
   42 units (when only inverters are connected)

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
b: Number of units occupying 2 stations
c: Number of units occupying 3 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 stations ≤ 64
B: Number of remote device stations ≤ 42
C: Number of local, standby master and intelligent device stations ≤ 26

4. INVERTER SETTING

4.1 Parameter List

When the FR-A5NC is mounted on the inverter, parameters below can be set.

FR-A500(L)/F500(L) series parameter

Parameter Number	Name	Setting Range	Minimum Setting Increments	Factory Setting	Refer to
338	Operation command source	0, 1	1	0	26
339	Speed command source	0, 1	1	0	26
340*1	Link startup mode selection	0 to 2, 10, 12, 20, 22*1	1	0	19
349	Error reset selection during CC-Link communication	0, 1	1	0	38
500*2	Communication error recognition waiting time	0 to 999.8s	0.1s	0	33
501*2	Communication error occurrence count display	0	1	0	34
502*2	Communication error time stop mode selection	0 to 2	1	0	35

*1 The Pr.340 setting of "10, 12, 20, 22" and Pr.349 can be set for the FR-A500 series only.
*2 Refer to the inverter manual for availability of Pr. 500 to Pr. 502.

FR-V500 series parameter

Parameter Number	Name	Setting Range	Minimum Setting Increments	Factory Setting	Refer to
338	Operation command source	0, 1	1	0	30
339	Speed command source	0, 1	1	0	30
340	Link startup mode selection	0 to 2	1	0	19
400	DI11 terminal function selection	0 to 3, 5, 8 to 12,14 to 16, 20, 22 to 27, 42 to 44, 9999	1	9999	—
401	DI12 terminal function selection				
402	DI13 terminal function selection				
410	DO11 terminal function selection	0 to 8, 10 to 16, 20, 25 to 27, 30 to 37, 40 to 44, 96 to 99, 100 to 108, 110 to 116, 120, 125 to 127, 130 to 137, 140 to 144, 196 to 199, 9999	1	9999	—
411	DO12 terminal function selection				
412	DO13 terminal function selection				
500	Communication error recognition waiting time	0 to 999.8s	0.1s	0	33
501	Communication error occurrence count display	0	1	0	34
502	Communication error time stop mode selection	0 to 2	1	0	35

4.2 Operation Mode

The inverter mounted with the option unit (FR-A5NC) has the following operation modes:

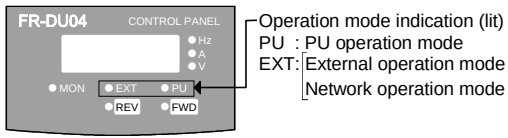
(1) PU operation [PU]..... Controls the inverter from the keyboard of the operation panel (FR-DU04(-1)) or parameter unit (FR-PU04(V)) (referred to as the "PU") installed to the inverter.

(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.)

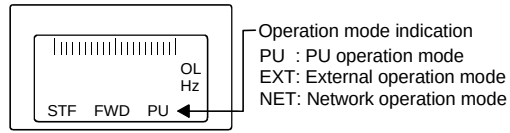
(3) Network operation [NET] ..... Controls the inverter in accordance with the PLC program via the option unit (FR-A5NC). (The operation signal and running frequency can be entered from the control circuit terminals depending on the Pr. 338 "operation command source" and Pr. 339 "speed command source" setting.)

4.2.1 Operation mode indication

FR-DU04(-1)



FR-PU04(V)



4.2.2 Operation mode switching

(1) Operation mode switching conditions

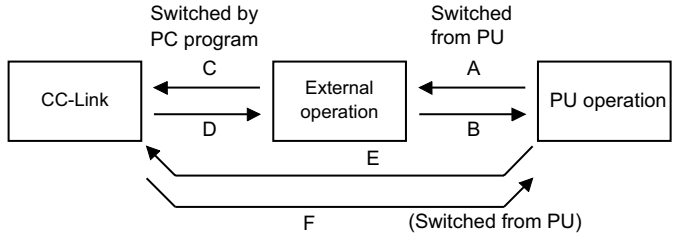
Before switching the operation mode, check that:

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.
   (For setting, use the inverter's operation panel or optional parameter unit.)

Pr. 79 Setting	Operation Mode Selection	Switching to Network Operation Mode
0	PU or external operation	Disabled when the PU mode is selected. Allowed when the external mode is selected.
1	PU operation	Disabled
2	External operation	Enabled
3, 4	External/PU combined operation	Disabled
5*	Programmed operation	Disabled
6	Switch-over	Enabled
7	External operation (PU operation interlock)	Enabled only in the external operation mode when the PU interlock signal (X12) is on.
8	PU or external (signal switching)	Enabled only in the external operation mode (X16 on).

* Programmed operation is available only with the FR-A500(L) series.

(2) Operation mode switching method



Symbol	Switching Type	Switching Method
A	PU operation → External operation	Operate the external operation key on the PU.
B	External operation → PU operation	Operate the PU operation key on the PU.
C	External operation → Network operation	By the user program of the PLC.
D	Network operation → External operation	By the user program of the PLC.
E	PU operation → Network operation	Setting Pr.79 and Pr.340 allows switching from the PU. (Refer to page 22) *1
F	Network operation → PU operation	Setting Pr.79 and Pr.340 allows switching from the PU. (Refer to page 22) *1

*1 In the switch-over mode (Pr. 79 = 6) or when Pr. 340 = "10 or 12", switching in E and F is enabled.

CAUTION

1. **When "1", "2","10", "12", "20" or "22" is set in Pr. 340 "link startup mode selection", the operation mode is network operation at power on or inverter reset.**
2. **When setting any of "1", "2","10" , "12" , "20" or "22"in Pr. 340, the initial settings (station number setting, etc.) of the inverter must be made without fail.**

(3) Link startup mode

The operation mode at power on and at restoration from instantaneous power failure can be selected. To choose the network operation mode, set "1", "2","10*1", "12*1","20*1","22*1" in Pr. 340. Pr.340 "link startup mode selection" can be switched from the PU in any operation mode. After the link has started, parameter write is enabled with a program. (Refer to page 83 for a parameter write program example.)

*1 The Pr. 340 setting of "10, 12, 20, 22" can be set for the A500 series only. Refer to the inverter manual for the availability of this function.

REMARKS

For Pr. 79 "operation mode selection", different inverters have different functions. For details, refer to the inverter manual.

Pr. 340 Setting	Pr. 79	Operation Mode	Mode at Power On or at Restoration from Instantaneous Power Failure
0 (Factory Setting)	0	PU or external operation	Inverter operates in the external operation mode.
	1	PU operation	Inverter operates in the PU operation mode.
	2	External operation	Inverter operates in the external operation mode.
	3	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency/running speed from the PU and the start signal from outside.
	4	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency/running speed from outside and the start signal from the PU.
	5*1	Programmed operation	Inverter operates in the programmed operation mode.
	6	Switch-over	Inverter operates in the external operation mode. Operation mode is switched while running.
	7	PU operation interlock	X12 signal ON..... Inverter operates in the external operation mode. (Operation mode can be switched to the PU operation mode from the parameter unit.) X12 signal OFF..... Inverter operates in the external operation mode.
	8	Operation mode switchover by the external signal	X16 signal ON..... Inverter operates in the external operation mode. X16 signal OFF..... Inverter operates in the PU operation mode.

*1 Programmed operation is available only with the FR-A500(L) series.

Pr. 340 Setting	Pr. 79	Operation Mode	Mode at Power On or at Restoration from Instantaneous Power Failure
1(2*2)	0	PU or network operation	Inverter operates in the network operation mode. (Program need not be used for switching)
	1	PU operation	Inverter operates in the PU operation mode.
	2	Network operation	Inverter operates in the network operation mode. (Program need not be used for switching)
	3	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency/running speed from the PU and the start signal from outside.
	4	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency/running speed from outside and the start signal from the PU.
	5*1	Programmed operation	Inverter operates in the programmed operation mode.
	6	Switch-over	Inverter operates in the network operation mode. Operation mode is switched while running. Refer to the inverter manual for details.
	7	PU operation interlock	X12 signal ON..... Inverter operates in the network operation mode. (Operation mode can be switched to the external operation mode by the program.) X12 signal OFF..... Inverter operates in the external operation mode.
	8	Operation mode switchover by the external signal	X16 signal ON..... Inverter operates in the network operation mode. (Operation mode can be switched to the external operation mode by the program.) X16 signal OFF..... Inverter operates in the PU operation mode.

*1 Programmed operation is available only with the FR-A500(L) series.
*2 The setting of "2" chooses the network operation mode, which is mainly used for computer link operation (when the FR-A5NR is connected).

Pr. 340 Setting	Pr. 79	Operation Mode	Mode at Power On or at Restoration from Instantaneous Power Failure
10, 12*1, *2	0	PU or network operation	Inverter operates in the network operation mode. Operation mode can be switched between the PU operation and the network operation. (Refer to page 25)
	1	PU operation	Inverter operates in the PU operation mode.
	2	Network operation	Inverter operates in the network operation mode.
	3	External/PU combined operation	The running frequency is set in the PU operation mode and the start signal in the external operation mode.
	4	External/PU combined operation	The running frequency is set in the external operation mode and the start signal in the PU operation mode.
	5	Programmed operation	Inverter operates in the programmed operation mode.
	6	Switch-over	Inverter operates in the network operation mode. Operation mode can be switched between the PU operation and the network operation. (Refer to page 25)
	7*3	PU operation interlock	X12 signal ON..... Inverter operates in the external operation mode. (Operation mode can be switched to the PU operation mode by the parameter unit.) X12 signal OFF..... Inverter operates in the external operation mode.
	8*3	Operation mode switch-over by the external signal	X16 signal ON..... Inverter operates in the external operation mode. X16 signal OFF..... Inverter operates in the PU operation mode.

*1 The setting of "12" chooses the network operation mode, which is mainly used for computer link operation (when the FR-A5NR is connected).

*2 Refer to the FR-A500 series inverter manual for the availability of the Pr.340 setting values of "10 and 12".

*3 The values "10, 12" set in Pr.340 are valid only when Pr.79 is "0, 2, 6". (When Pr.79="7, 8", the inverter operates in the same manner as when Pr.340="0". Therefore, the inverter will not operate in the network operation mode at powering on.)

Pr. 340 Setting	Pr. 79	Operation Mode	Mode at Power On or at Restoration from Instantaneous Power Failure
20, 22*1, *2	0	External or network operation	X66 signal OFF.....Inverter operates in the external operation mode. The operation mode can be switched to the PU operation mode from the parameter unit. X66 signal ON .....Inverter operates in the Network operation mode. Without X66 signal assignment*4 ..Pr.340="20" :Inverter operates in the external operation mode. Pr.340="22": Inverter operates in the network operation mode. (Refer to page 25 for the X66 signal.)
	1	PU operation	Inverter operates in the PU operation mode.
	2	External or network operation	X66 signal OFF .....Inverter operates in the external operation mode. X66 signal ON .....Inverter operates in the Network operation mode. Without X66 signal assignment*4 ..Pr.340="20" :Inverter operates in the external operation mode. Pr.340="22": Inverter operates in the network operation mode. (Refer to page 25 for the X66 signal.)
	3	External/PU combined operation	The running frequency is set in the PU operation mode and the start signal in the external operation mode.
	4	External/PU combined operation	The running frequency is set in the external operation mode and the start signal in the PU operation mode.
	5	Programmed operation	Inverter operates in the programmed operation mode.
	6*3	Switch-over	Inverter operates in the external operation mode. Operation mode can be changed without changing the operating status.
	7*3	PU operation interlock	X12 signal ON .....Inverter operates in the external operation mode. (Operation mode can be switched to the PU operation mode by the parameter unit.) X12 signal OFF .....Inverter operates in the external operation mode.

Pr. 340 Setting	Pr. 79	Operation Mode	Mode at Power On or at Restoration from Instantaneous Power Failure
20, 22*1, *2	8	Operation mode switch-over by the external signal	X66 signal OFF ..... X16 signal OFF.... Inverter operates in the PU operation mode. X16 signal ON ..... Inverter operates in the external operation mode. X66 signal ON ..... Inverter operates in the network operation mode independently of the X16 signal. Without X66 signal assignment*4 ..... X16 signal OFF..... Inverter operates in the PU operation mode. X16 signal ON ..... Pr.340="20" :Inverter operates in the external operation mode. Pr.340="22": Inverter operates in the network operation mode. (Refer to page 25 for the X66 signal.)

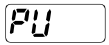
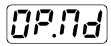
*1 The setting of "22" chooses the network operation mode, which is mainly used for computer link operation (when the FR-A5NR is connected).
*2 Refer to the FR-A500 series inverter manual for the availability of the Pr.340 setting values of "20 and 22".
*3 The values "20, 22" set in Pr.340 are valid only when Pr.79 is "0, 2, 8". (When Pr.79="6, 7", the inverter operates in the same manner as when Pr.340="0". Therefore, the inverter will not operate in the network operation mode at powering on.)
*4 When the X66 signal is not assigned to the input terminal, the inverter starts up in the same manner as when Pr.340 is"0" for when Pr.340 is"20" and Pr.340 is"2" for when Pr.340 is "22".

REMARKS

1. Change of the Pr.340 setting is made valid when powering on or resetting the inverter.
2. When Pr.340="0, 1, 10, 20", computer programming, which has stopped due to an instantaneous power failure or the like during network operation, remains stopped even if power is recovered. When a start command is given from the network with restart enabled (Pr.57≠"9999") when Pr.340="2, 12, 22", a start command during power off (including instantaneous power failure and power failure) is stored. Therefore, the inverter resumes operation in the state before powering off at powering on (power restoration) again.
3. When "10, 12, 20, 22" are copied to the inverter which is not available with "10, 12, 20, 22" for Pr.340, the inverter operates in the same manner as when Pr.340="0".
4. The Pr. 340 value may be changed in any operation mode.

●When "0" or "6" is set in Pr. 79 when Pr. 340 = "10 or 12", the operation can be switched between the PU operation and the network operation from the FR-DU04 or the parameter unit (FR-PU04).

• For the FR-DU04

Use  display on the operation mode switching menu to change the operation mode to the PU operation mode and  display to the network operation mode.

• For the FR-PU04

Use PU to change the operation mode to the PU operation and EXT to the network operation.

●When Pr.340 is "20, 22" and "66" is set in any of Pr.180 to Pr.186 (input terminal function selection), switching between external operation and network operation can be performed by the external terminal.

Setting	Signal	Function
66	X66	External operation, network operation switchover signal X66-OFF : External operation mode X66-ON : Network operation mode

CAUTION

1. **You can set "66" even when values other than "20, 22" are set in Pr.340 or a communication option is not connected. However, operation mode can not be switched with the X66 signal.**
2. **For the X66 signal, operation only from the external terminal is valid independently of the setting of Pr.338 "operation command source", Pr.339 "speed command source". (can not be operated from the network)**

4.3 Operation and Speed Command Source

In the network operation mode, commands from the external terminals and sequence program are as listed below.
(For Pr. 180 to (input terminal function selection), assigned signals differ depend on inverters. For details, refer to the inverter manual.)

4.3.1 FR-A500(L)/F500(L) series

Control location selection	Pr. 338 "operation command source"	0: NET	0: NET	1: External	1: External	Remarks
	Pr. 339 "speed command source"	**0: NET**	**1: External**	**0: NET**	**1: External**	
Fixed functions (Functions equivalent to terminals)	Forward rotation command (STF)	NET	NET	External	External	
	Reverse rotation command (STR)	NET	NET	External	External	
	Start self-holding selection (STOP)	—	—	External	External	
	Output stop (MRS)	Combined	Combined	External	External	*1
	Reset (RES)	Combined	Combined	Combined	Combined	
	Network operation frequency	NET	—	NET	—	
	2	—	External	—	External	
	4	—	External	—	External	
	1	Compensation	External	Compensation	External	

Control location selection			Pr. 338 "operation command source"	0: NET	0: NET	1: External	1: External	Remarks
			Pr. 339 "speed command source"	0: NET	1: External	0: NET	1: External	
Selective functions	Pr. 180 to Pr. 183, Pr. 186 settings	0	Low-speed operation command / Remote setting (setting clear) (RL)	NET	External	NET	External	Pr. 59 = 0:Multi-speed setting Pr. 59 =1,2: Remote setting
		1	Middle-speed operation command / Remote setting (deceleration) (RM)	NET	External	NET	External	
		2	High-speed operation command/ Remote setting (acceleration) (RH)	NET	External	NET	External	
		3	Second function selection (RT)	NET	NET	External	External	
		4	Current input selection (AU)	—	Combined	—	Combined	
		5	Jog operation selection (JOG)	—	—	External	External	
		6	Automatic restart after instantaneous power failure selection (CS)	External	External	External	External	
		7	External thermal relay input (OH)	External	External	External	External	
		8	15-speed selection (REX)	NET	External	NET	External	Pr. 59 = 0
		9	Third function (X9)	NET	NET	External	External	
		10	FR-HC connection, FR-CV connection (inverter operation enable) (X10)	External	External	External	External	
		11	FR-HC connection, instantaneous power failure detection (X11)	External	External	External	External	
		12	PU operation external interlock (X12)	External	External	External	External	
		13	External DC injection braking start (X13)	NET	NET	External	External	
		14	PID control valid terminal (X14)	NET	External	NET	External	
		15	Brake opening completion signal (BRI)	NET	NET	External	External	

Control location selection			Pr. 338 "operation command source"	0: NET	0: NET	1: External	1: External	Remarks
			Pr. 339 "speed command source"	0: NET	1: External	0: NET	1: External	
Selective functions	Pr. 180 to Pr. 183, Pr. 186 settings	16	PU operation-external operation switching (X16)	External	External	External	External	
		17	Load pattern selection-forward/reverse rotation boost switching (X17)	NET	NET	External	External	
		18	Magnetic flux-V/F switching (X18)	NET	NET	External	External	
		19	Load torque high-speed frequency (X19)	NET	NET	External	External	
		20	S-pattern acceleration/deceleration C selection terminal (X20)*2	NET	NET	External	External	
		22	Orientation command (X22)*2	NET	NET	External	External	
		23	Pre-excitation (LX)*2	NET	NET	External	External	
		66	External operation-NET operation switching (X66)	External	External	External	External	
RH, RM, RL, RT selection functions			Programmed operation group selection (RH, RM, RL)	—	—	—	—	Pr. 79 = 5 Network operation disabled
			Stop-on-contact selection 0 (RL)	NET	External	NET	External	Pr. 270 = 1, 3
			Stop-on-contact selection 1 (RT)	NET	NET	External	External	

External : Control by signal from external terminal is only valid.
NET : Control from network is only valid.
Combined : Control from both external terminal and network is valid.
— : Control from both external terminal and network is invalid.
Compensation : Control by signal from external terminal is only valid if Pr. 28 "multi-speed input compensation" setting is "1".

*1 When the MRS signal is assigned to both Network and External control, the output stop command is as listed below:

Network	External	Output Stop Command	
		Pr. 17 = 0	Pr. 17 = 2
ON	ON	Output stopped	Output not stopped
ON	OFF	Output stopped	Output stopped
OFF	ON	Output stopped	Output stopped
OFF	OFF	Output not stopped	Output stopped

*2 This setting is valid only when the FR-A5AP option is mounted. (The FR-A5AP cannot be used with the FR-F500(L) series.)

CAUTION

If the inverter operation enable signal (X10) is not assigned when the FR-HC or the FR-CV is used (Pr.30 regenerative function selection = 2) or if the PU operation external interlock signal (X12) is not assigned when the PU operation external interlock function is set (Pr.79 =7), this function is also used by the MRS terminal and therefore operation is only valid for the external terminal, independently of Pr.338 and Pr.339 settings.

4.3.2 FR-V500 series

Control location selection			Pr. 338 "operation command source"		0: NET	0: NET	1: External	1: External	Remarks
			Pr. 339 "speed command source"		0: NET	1: External	0: NET	1: External	
Fixed functions (Functions equivalent to terminals)			Forward rotation command (STF)		NET	NET	External	External	
			Reverse rotation command (STR)		NET	NET	External	External	
			Reset (RES)		Combined	Combined	Combined	Combined	
			External thermal relay (OH)		External	External	External	External	
			Network operation speed		NET	—	NET	—	
			2		—	External	—	External	
			1	Speed setting auxiliary	Compensation	External	Compensation	External	
				Magnetic flux command/ regeneration torque restriction	External	External	External	External	
			3		—	External	—	External	
Selective functions	Pr. 180 to Pr. 183, Pr. 187 settings *1	0	Low-speed operation command, Remote setting (setting clear) (RL)		NET	External	NET	External	Pr. 59≠"0": Remote setting
		1	Middle-speed operation command, Remote setting (deceleration) (RM)		NET	External	NET	External	
		2	High-speed operation command, Remote setting (acceleration) (RH)		NET	External	NET	External	
		3	Second function selection (RT)		NET	NET	External	External	
		5	Jog operation selection (JOG)		—	—	External	External	
		8	15-speed selection (REX)		NET	External	NET	External	
		9	Third function (X9)		NET	NET	External	External	
		10	FR-HC connection, FR-CV connection (inverter operation enable) (X10)		External	External	External	External	

Control location selection			Pr. 338 "operation command source" / Pr. 339 "speed command source"	0: NET / 0: NET	0: NET / 1: External	1: External / 0: NET	1: External / 1: External	Remarks
Selective functions	Pr. 180 to Pr. 183, Pr. 187 settings *1	11	FR-HC connection (instantaneous power failure detection) (X11)	External	External	External	External	
		12	PU operation external interlock (X12)	External	External	External	External	
		14	PID control enable terminal (X14)	NET	External	NET	External	
		15	Brake sequence opening completion signal (BRI)	NET	NET	External	External	
		16	PU-external operation switchover (X16)	External	External	External	External	
		20	S-pattern acceleration/deceleration C switchover (X20)	NET	NET	External	External	
		22	Orientation command(X22)	NET	NET	External	External	
		23	Pre-excitation/servo ON (LX)	NET	NET	External	External	
		24	Output stop (MRS)	Combined	Combined	External	External	*2
		25	Start self-holding selection (STOP)	—	—	External	External	
		26	Control mode changing (MC)	NET	NET	External	External	
		27	Torque restriction selection (TL)	NET	NET	External	External	
		42	Torque bias selection 1 (X42)	NET	NET	External	External	
		43	Torque bias selection 2 (X43)	NET	NET	External	External	
		44	P control selection (P/PI control switchover) (X44)	NET	NET	External	External	

External : Control by signal from external terminal is only valid.
NET : Control from network is only valid.
Combined : Control from both external terminal and network is valid.
— : Control from both external terminal and network is invalid.
Compensation : Control by signal from external terminal is only valid if Pr. 28 "multi-speed input compensation" setting is 1.

*1 For details of Pr. 180 to Pr. 183, Pr. 187 (input terminal function selection), refer to the inverter manual.
*2 When the MRS signal is assigned for both network and external, the output stop command is as indicated in the following table.

Network	External	Output Stop Command	
		Pr.17="0"	Pr.17="2"
ON	ON	Output stopped	Output not stopped
ON	OFF	Output stopped	Output stopped
OFF	ON	Output stopped	Output stopped
OFF	OFF	Output not stopped	Output stopped

4.4 Operation at Communication Error Occurrence

4.4.1 Operation selection at communication error occurrence

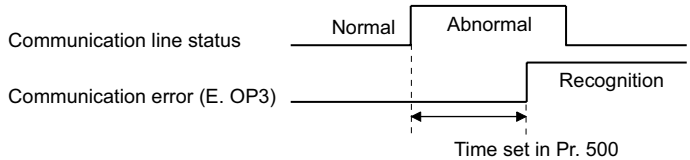
You can select operations at communication error occurrences by setting Pr. 500 to Pr. 502 under network operation.
For the A500 and F500 series, refer to the inverter manual for availability of Pr. 500 to Pr. 502.

(1) Parameter setting

1) Pr. 500 "communication error recognition waiting time"

You can set the waiting time from when a communication line fault occurs until it is recognized as a communication error.

Parameter Number	Setting Range	Minimum Setting Increments	Factory Setting
500	0 to 999.8s	0.1s	0

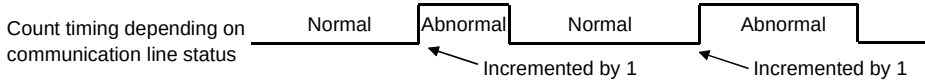


If the communication line fault still persists after the time set in Pr. 500 has elapsed, it is recognized as a communication error.
When the fault is restored to normal communication within the set time, it is not regarded as a communication error and operation continues.

2) Pr. 501 "communication error occurrence count display"

The cumulative number of communication error occurrences can be indicated. Write 0 to erase this cumulative count.

Parameter Number	Setting Range	Minimum Setting Increments	Factory Setting
501	0	1	0



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

CAUTION

The communication error occurrence count is stored into RAM temporarily. Since this data is stored in E^2PROM at one-hour intervals, performing power-on reset or inverter reset may cause the Pr. 501 data to be the value stored in E^2PROM the last time depending on the reset timing.

3) Pr. 502 "communication error-time stop mode selection"

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

Parameter Number	Setting Range	Minimum Setting Increments	Factory Setting
502	0, 1, 2	1	0

(About setting)

Fault	Pr. 502 Setting	At Fault Occurrence			At Error Recognition after Elapse of Pr. 500 Time			At Fault Removal		
		Operation	Indication	Alarm output	Operation	Indication	Alarm output	Operation	Indication	Alarm output
Communication line	0	Continued *	None *	Not provided *	Coast to stop	E.OP3 lit	Provided	Kept stopped	E.OP3 kept lit	Kept provided
	1				Decelerated to stop	E.OP3 lit after stop	Provided after stop			
	2						Not provided	Restart	Normal indication	Not provided
Option itself	0	Coast to stop	E. 3 lit	Provided	Coast to stop	E. 3 lit	Provided	Kept stopped	E. 3 kept lit	Kept provided
	1, 2	Decelerated to stop	E. 3 lit after stop	Provided after stop	Decelerated to stop	E. 3 lit after stop	Provided after stop			

* When the fault returns to normal communication within the time set in Pr.500, it is not regarded as a communication line error (E.OP3).

CAUTION

1. **A communication line fault [E.OP3 (alarm data: HA3)] is a fault that occurs on the communication line, and a fault of the option unit itself [E. 3 (alarm data: HF3)] is a communication circuit fault in the option.**
2. **The alarm output is the ABC contact output or alarm bit output.**
3. **When the setting was made to provide an alarm output, the fault definition is stored into the alarm history.**
   (The fault definition is written to the alarm history when an alarm output is provided.)
   When no alarm output is provided, the fault definition overwrites the alarm indication of the alarm history temporarily, but is not stored.
   After the fault 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 fault occurrence.**
7. **When a communication line fault occurs at the Pr. 502 setting of "2", removing the fault during deceleration causes acceleration to restart at that point.**
   (Acceleration is not restarted if the fault is that of the option unit itself.)

4.4.2 Alarm and measures

(1) The inverter operates as follows at alarm occurrences

Fault Location	Status		Operation Mode		
			PU operation	External operation	Network operation
Inverter alarm	Inverter operation		Inverter trip	Inverter trip	Inverter trip
	Data communication		Continued	Continued	Continued
Communication line alarm	Inverter operation		Continued	Continued	Inverter trip (Depends on the Pr. 502 setting)
	Data communication		Stop	Stop	Stop
Option itself	Communication option connection fault	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
	FR-A5NC alarm	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. OP3	Communication line alarm	Check the LED states of the option unit (FR-A5NC) and remove the cause of the alarm. (Refer to page 90) Check the CC-Link master station.
E. 3	Option alarm	Check the connection between the inverter and option unit (FR-A5NC) for poor contact, etc. and remove the cause of the alarm.

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 87 for an inverter reset program example.)

Addition of Pr.349 "error reset selection during CC-Link communication"

When used with the CC-Link communication option (FR-A5NC), an error reset command (RY1A) from network can be made invalid in the external operation mode or PU operation mode. Refer to the FR-A500 series inverter manual for the availability of this function.

Parameter	Name	Setting Range	Setting Increments	Factory Setting	Function
349	Error reset selection during CC-Link communication	0,1	1	0	0: Error reset (RY1A) is enabled independently of operation mode 1: Error reset (RY1A) is enabled only in the network operation mode

Which resetting method is allowed or disallowed in each operation mode is described below.

Resetting Method			Operation Mode		
			Network operation	External operation	PU operation
Reset from CC-Link communication (PLC program)	Inverter reset		Enabled	Disabled	Disabled
	Error reset (RY1A) at inverter fault	Pr.349=0	Enabled	Enabled	Enabled
		Pr.349=1		Disabled	Disabled
Connect terminals RES-SD			Enabled	Enabled	Enabled
Switch off inverter power			Enabled	Enabled	Enabled
Reset from PU/DU	Inverter reset		Enabled	Enabled	Enabled
	Error reset at inverter fault		Enabled	Enabled	Enabled

CAUTION

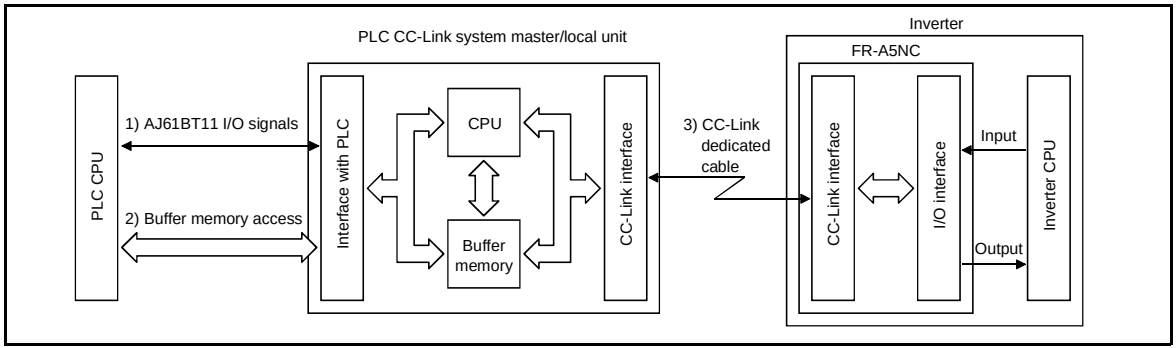
1. **When parameters are copied from the inverter without the above function, the Pr.349 setting becomes "0" (error reset enabled).**
2. **When a communication line fault has occurred, reset cannot be made from the PLC.**
3. **The inverter is set to the external operation mode if it has been reset in the network operation mode. Therefore, to resume the network operation, the inverter must be switched to the network operation mode again. (When any of "1, 2, 10, 12, 20, 22" is set in Pr.340 "link startup mode selection", switching is not necessary.)**
4. **Communication stops for about 1s during inverter reset.**

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.
   For further details of the signals, refer to page 46, 59.
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 start is dictated by the sequence program. After CC-Link is initiated, I/O refresh is continually executed independently of (or in synchronization with) the sequence program execution.
   For details, refer to the CC-Link system master/local unit manual.

5.2 Function Overview

The following table lists the functions which can be executed from the PLC in the CC-Link system:

Control Location	Item	Operation Mode		
		PU operation	External operation	Network operation
User program	Operation command	Disabled	Disabled	Enabled (*4)
	Running frequency setting	Disabled	Disabled	Enabled (*4)
	Monitoring	Enabled	Enabled	Enabled
	Parameter write	Disabled (*3)	Disabled (*3)	Enabled (*3)
	Parameter read	Enabled	Enabled	Enabled
	Inverter reset	Disabled	Disabled	Enabled (*1)
	Error reset at inverter fault (RY1A)	Enabled (*1)	Enabled (*1)	Enabled (*1)
	Stop command (*2)	Disabled	Disabled	Enabled
Control circuit terminal	Inverter reset terminal	Enabled	Enabled	Enabled
	Operation command	Disabled	Enabled	Enabled (*4)
	Frequency setting	Disabled	Enabled	Enabled (*4)

(*1) At occurrence of a communication line fault, the inverter cannot be reset from the PLC. (For inverter reset, refer to the inverter manual.)
(*2) As set in Pr. 75 "PU stop selection".
(*3) As set in Pr. 77 "Parameter write disable selection".
For parameters write-enabled during operation, refer to the inverter manual.
(*4) As set in Pr. 338 and Pr. 339 (Refer to page 26.)

REMARKS

1. The inverter operates in the external operation mode if it is reset from the PLC in the network operation mode. Setting any of "1, 2, 10, 12", 20", 22" in Pr. 340 (link startup mode) selects network operation mode. (Referto page 19)
2. In the programmed operation mode, parameters write-enabled in the external operation mode are write-enabled in the network operation mode.

5.2.1 Output from the inverter to the PLC

●Monitoring function

The following items can be monitored by the PLC (Refer to page 81):

1)Output frequency ..... Binary in 0.01Hz increments (FR-A500(L)/F500(L) series)
Running Speed ..... Binary in 1r/min (FR-V500 series)
2)Output current..... Binary in 0.01A increments (0.1A increments for the FR-A500L and FR-F500L series)
3)Output voltage ..... Binary in 0.1V increments
4)Alarm definition
5)Special monitoring ..... Monitored data selected by instruction code F3H
6)Inverter status

FR-A500(L)/F500(L) series		FR-V500 series			
Terminal	**Output Definition (Signal)**	**Terminal**	**Output Definition (Signal)**	**Terminal**	**Output Definition (Signal)**
RUN	Inverter running (RUN) *1	—	Inverter running (RUN)	DO11	— *2
—	Forward running	—	Forward running	DO12	— *2
—	Reverse running	—	Reverse running	DO13	— *2
SU	Up to frequency *1	DO1	Inverter running (RUN) *1		
OL	Overload alarm (OL) *1	DO2	Up to speed (SU) *1		
IPF	Instantaneous power failure or under voltage (IPF) *1	DO3	Instantaneous power failure or under voltage (IPF) *1		
FU	Output speed detection (FU)*1	—	Speed detection (FB)		
ABC	Alarm output (ABC) *	ABC	Alarm output (ABC) *1		

*1 These are factory-set signals. Output signals can be changed by output terminal function selection (Pr. 190 and higher). Signals to be assigned to output terminal function selection (Pr. 190 and higher) differ according to the inverters. For details, refer to the instruction manual of the inverter.

*2 Signals can be assigned using output terminal function selection (Pr. 410 to Pr. 412).

REMARKS

Items 1) to 4) are read from the buffer memory by setting the corresponding code numbers when needed.
Item 6) can be read from the buffer memory any time.

●Parameter read

Functions can be read to the PLC. (Refer to page 81.)

For the parameter data code list, refer to the inverter manual.

5.2.2 Input to the inverter from the PLC.

●operation command (Refer to page 79.)

Any of the following commands can be output from the PLC to the inverter as an operation command any time:

FR-A500(L)/F500(L) series		FR-V500 series	
Terminal	**Operation Command (Signal)**	**Terminal**	**Operation Command (Signal)**
STF	Forward rotation command (STF)	STF	Forward rotation command (STF)
STR	Reverse rotation command (STR)	STR	Reverse rotation command (STR)
RH	High speed operation command (RH) *1	DI1	Low speed operation command (RL) *1
RM	Middle speed operation command (RM) *1	DI2	Middle speed operation command (RM) *1
RL	Low speed operation command (RL) *1	DI3	High speed operation command (RH) *1
JOG	Jog operation selection (JOG) *1	DI4	Second function selection (RT) *1
RT	Second function selection (RT) *1	DI11	— *2
AU	Current input selection (AU) *1	DI12	— *2
CS	Instantaneous power failure restart selection (CS) *1	DI13	— *2
MRS	Output stop (MRS)	MRS	Output stop (MRS)

*1 These are factory-set signals. Input signals can be changed by input terminal function selection (Pr. 180 and higher). Note that some signals do not accept a command from the PLC according to the settings. Refer to page 26 for details. Signals to be assigned to input terminal function selection (Pr. 180 and higher) differ according to the inverters. For details, refer to the inverter manual.

*2 Signals can be assigned using input terminal function selection (Pr. 400 to Pr. 402).

CAUTION

The order of the RH, RM, and RL signals assigned to the bit is different between the FR-A500(L)/F500(L) series and FR-V500 series.

●Running frequency/running speed

The running frequency/running speed is written from the PLC to the inverter when it is changed. (Refer to page 84.)

Running frequency (FR-A500(L)/F500(L) series).....Binary in 0.01Hz increments

Running speed (FR-V500 series).....Binary in 1r/min increments

The running frequency/running speed may either be written to E^2PROM or to RAM. When changing the frequency/speed continuously, always write the data to the inverter RAM.

●Parameter write

Parameters can be written to the inverter from the PLC. Note that write during inverter operation will result in a write error. (Refer to page 83.)

For the parameter data code list, refer to the inverter manual.

REMARKS

Set 65520 (HFFF0) as a parameter value "8888" and 65535 (HFFFF) as "9999".

●Inverter reset

The inverter and the inverter alarm can be reset. (Refer to page 38, 87.)

5.3 Device No.

The correspondence between the device No. and stations are indicated below.
Refer to the master unit manual for details.

Output Signal (master unit to FR-A5NC)

Address	Remote outputs (RY)
For station 1	160_H RY F to RY 0
	161_H RY 1F to RY 10
For station 2	162_H RY 2F to RY 20
	163_H RY 3F to RY 30
For station 3	164_H RY 4F to RY 40
	165_H RY 5F to RY 50
For station 4	166_H RY 6F to RY 60
	167_H RY 7F to RY 70
For station 5	168_H RY 8F to RY 80
	169_H RY 9F to RY 90
For station 6	$16A_H$ RY AF to RY A0
	$16B_H$ RY BF to RY B0
For station 7	$16C_H$ RY CF to RY C0
	$16D_H$ RY DF to RY D0
For station 8	$16E_H$ RY EF to RY E0
	$16F_H$ RY FF to RY F0
For station 9	170_H RY10F to RY100
	171_H RY11F to RY110
	172_H to $1DB_H$ to
For station 63	$1DC_H$ RY7CF to RY7C0
	$1DD_H$ RY7DF to RY7D0
For station 64	$1DE_H$ RY7EF to RY7E0
	$1DF_H$ RY7FF to RY7F0

Input Signal (FR-A5NC to master unit)

Address	Remote inputs (RX)
For station 1	$E0_H$ RX F to RX 0
	$E1_H$ RX 1F to RX 10
For station 2	$E2_H$ RX 2F to RX 20
	$E3_H$ RX 3F to RX 30
For station 3	$E4_H$ RX 4F to RX 40
	$E5_H$ RX 5F to RX 50
For station 4	$E6_H$ RX 6F to RX 60
	$E7_H$ RX 7F to RX 70
For station 5	$E8_H$ RX 8F to RX 80
	$E9_H$ RX 9F to RX 90
For station 6	EA_H RX AF to RX A0
	EB_H RX BF to RX B0
For station 7	EC_H RX CF to RX C0
	ED_H RX DF to RX D0
For station 8	EE_H RX EF to RX E0
	EF_H RX FF to RX F0
For station 9	$F0_H$ RX10F to RX100
	$F1_H$ RX11F to RX110
	$F2_H$ to $15B_H$ to
For station 63	$15C_H$ RX7CF to RX7C0
	$15D_H$ RX7DF to RX7D0
For station 64	$15E_H$ RX7EF to RX7E0
	$15F_H$ RX7FF to RX7F0

Remote Register (master unit to FR-A5NC)

Address	Remote registers (RW_W)
For station 1	$1E0_H$ RW_W 0
	$1E1_H$ RW_W 1
	$1E2_H$ RW_W 2
	$1E3_H$ RW_W 3
For station 2	$1E4_H$ RW_W 4
	$1E5_H$ RW_W 5
	$1E6_H$ RW_W 6
	$1E7_H$ RW_W 7
For station 3	$1E8_H$ RW_W 8
	$1E9_H$ RW_W 9
	$1EA_H$ RW_W A
	$1EB_H$ RW_W B
For station 4	$1EC_H$ RW_W C
	$1ED_H$ RW_W D
	$1EE_H$ RW_W E
	$1EF_H$ RW_W F
	$1F0_H$ to $2DB_H$ to
For station 64	$2DC_H$ RW_W FC
	$2DD_H$ RW_W FD
	$2DE_H$ RW_W FE
	$2DF_H$ RW_W FF

Remote Register (FR-A5NC to master unit)

Address	Remote registers (RW_R)
For station 1	$2E0_H$ RW_R 0
	$2E1_H$ RW_R 1
	$2E2_H$ RW_R 2
	$2E3_H$ RW_R 3
For station 2	$2E4_H$ RW_R 4
	$2E5_H$ RW_R 5
	$2E6_H$ RW_R 6
	$2E7_H$ RW_R 7
For station 3	$2E8_H$ RW_R 8
	$2E9_H$ RW_R 9
	$2EA_H$ RW_R A
	$2EB_H$ RW_R B
For station 4	$2EC_H$ RW_R C
	$2ED_H$ RW_R D
	$2EE_H$ RW_R E
	$2EF_H$ RW_R F
	$2F0_H$ to $3DB_H$ to
or tation 64	$3DC_H$ RW_R FC
	$3DD_H$ RW_R FD
	$3DE_H$ RW_R FE
	$3DF_H$ RW_R FF

6.1 I/O Signal List

The following device No. are those for station 1.
For stations 2 and later, the device No. are different. (For the device No. correspondence list, refer to the master unit manual.)

6.1.1 Output signals (master unit to inverter (FR-A5NC))

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

Device No.	Signal/Factory-set function	Description
RY0	Forward rotation command	OFF : Stop command ON : Forward rotation start *1
RY1	Reserve rotation command	OFF : Stop command ON : Reserve rotation start *1
RY2	RH terminal function/ high speed operation command	Functions assigned to RH/RM/RL are selected. In the factory setting, multi-speed selection can be made by the combination of RH, RM and RL. *2
RY3	RM terminal function/ middle speed operation command	
RY4	RL terminal function/ low speed operation command	
RY5	JOG terminal function/ JOG operation selection	Function assigned to the JOG terminal is selected. *2
RY6	RT terminal function/ second function selection	Function assigned to the RT terminal is selected. *2

*1 Switching on RY0 and RY1 at the same time gives a stop command.
*2 With Pr. 180 to Pr. 186 (input terminal function selection), you can set the input signals of device No. RY2 to RY8. For full information, refer to the inverter manual.

Device No.	Signal/Factory-set function	Description
RY7	AU terminal function/ current input selection	Function assigned to the AU terminal is selected. *2
RY8	CS terminal function/ restart after instantaneous power failure selection	Function assigned to the CS terminal is selected. *2
RY9	Output stop (MRS)	When the MRS signal switches on, the inverter output stops.
RYA	Reserved *5	Reserved for the system.
RYB		
RYC	Monitor command	When the monitor command (RYC) is switched on, the monitored value is set to remote register RWr_0 and monitoring (RXC) switches on. While the monitor command (RYC) is on, the monitored value is always updated.
RYD *4	Frequency setting command (RAM)	When the frequency setting command (RYD) is switched on, the set frequency (RWw_1) is written to the inverter. *3 On completion of write, frequency setting completion (RXD) switches on.
RYE *4	Frequency setting command (E^2PROM)	When the frequency setting command (RYE) is switched on, the set frequency (RWw_1) is written to the inverter. On completion of write, frequency setting completion (RXE) switches on.

*2 With Pr. 180 to Pr. 186 (input terminal function selection), you can set the input signals of device No. RY2 to RY8. For full information, refer to the inverter manual.
*3 While the frequency setting command (RYD) is on, the set frequency (RWw_1) value is always returned.
*4 If these commands are switched on simultaneously, only one of these is executed.
*5 The reserved input signal should be off. (Enter 0)

Device No.	Signal	Description
RYF *4	Instruction code execution request	When the instruction code execution request (RYF) is switched on, processing corresponding to the instruction code set to RWw2 is executed. After completion of instruction code execution, instruction code execution completion (RXF) switches on. When an instruction code execution error occurs, a value other than 0 is set to the reply code (RWr2).
RY10	Reserved *5	Reserved for the system.
RY11		
RY12		
RY13		
RY14		
RY15		
RY16		
RY17		
RY18		
RY19		
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. For the FR-A500 series, reset can be enabled only in the network operation mode when Pr.349="1". (Refer to page 38 for details.)

*4 If these commands are switched on simultaneously, only one of these is executed.
*5 The reserved input signal should be off. (Enter 0)

6.1.2 Input signals (inverter (FR-A5NC) to master unit)

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

Device No.	Signal/Factory-set function	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	RUN terminal function/ running	Function assigned to the RUN terminal is selected. *1
RX3	SU terminal function/ up to frequency	Function assigned to the SU terminal is selected. *1
RX4	OL terminal function/ overload	Function assigned to the OL terminal is selected. *1
RX5	IPF terminal function/ instantaneous power failure	Function assigned to the IPF terminal is selected. *1
RX6	FU terminal function/ frequency detection	Function assigned to the FU terminal is selected. *1
RX7	ABC terminal function/ alarm	Function assigned to the ABC terminal is selected. *1
RX8	Reserved	Reserved for the system.
RX9		
RXA		
RXB		

*1 With Pr. 190 to Pr. 195 (output terminal function selection), you can set the output signals of device No. RX2 to RX7. For full information, refer to the inverter manual.

Device No.	Signal	Description
RXC	Monitoring	Switched on when the monitored value is set to RW_{r0} by the monitor command (RYC) switching on. Switched off when the monitor command (RYC) is switched off.
RXD	Frequency setting completion (RAM)	Switched on when the set frequency is written to the inverter by the frequency setting command (RYD) switching on. Switched off when the frequency setting command (RYD) is switched off.
RXE	Frequency setting completion (E^2PROM)	Switched on when the set frequency is written to the inverter by the frequency setting command (RYE) switching on. 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 (RW_{w2}) which is executed when the instruction code execution request (RYF) switches on. Switched off when the instruction code execution completion (RXF) is switched off.
RX10	Reserved	Reserved for the system.
RX11		
RX12		
RX13		
RX14		
RX15		
RX16		
RX17		
RX18		
RX19		
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).

6.2 Remote Register Assignment

6.2.1 Remote registers (master unit to inverter (FR-A5NC))

Device No.	Signal	Description
RWw0	Monitor code	Set the monitor code to be referenced. (Refer to page 56) By switching on the RYC signal after setting, the specified monitored data is set to RWr0.
RWw1	Set frequency	Specify the set frequency. At this time, whether it is written to RAM or E^2PROM is differentiated by the RYD and RYE signals. After setting the frequency to this register, switch on the above RYD or RYE to write the frequency. On completion of frequency write, RXD or RXE switches on in response to the input command.
RWw2	Instruction code	Set the instruction code for execution of operation mode rewrite, Pr. read/write, error reference, error clear, etc. (refer to page 53). The corresponding instruction is executed by switching on RYF after completion of register setting. RXF switches on on completion of instruction execution.
RWw3	Write data	Set the data specified by the above instruction code. (When required) Switch RYF on after setting the above instruction code and this register. Set zero when the write code is not required.

6.2.2 Remote registers (inverter (FR-A5NC) to master unit)

Device No.	Signal	Description
RWr0	First monitor	When RYC is on, the monitored value specified to the last 8 bits of the monitor code (RWw0) is set. (Refer to page 56 for the monitor code numbers.)
RWr1	Second monitor (output frequency)	When "0" is set to the first 8 bits of the monitor code (RWw0), the current output frequency is always set. When other than "0" is set to the first 8 bits of the monitor code (RWw0) and RYC is on, the monitored value specified to the first 8 bits of the monitor code (RWw0) is set. (Refer to page 56 for the monitor code numbers.)
RWr2	Reply code	Turning on RYF set the reply code corresponds to the instruction code of RWw2. Turning on either RYD or RYE set the reply code corresponds to the frequency setting command. The value "0" is set for a normal reply and other than "0" is set for data fault, mode error, etc. (Refer to page 55 for the reply code numbers.)
RWr3	Read data	For a normal reply, the reply data to the instruction specified by the instruction code is set.

6.3 Instruction Codes

Item	Code Number	Description	
Operation mode read	007BH	0000H: Network operation 0001H: External operation 0002H: PU operation	
Operation mode write	00FBH	0000H: Network operation 0001H: External operation 0002H: PU operation (Pr. 79 = "6")	
Alarm history No. 1, No. 2 read	0074H	Reads the most recent No. 1 and 2 alarms.	Refer to page 58 for error codes.
Alarm history No. 3, No. 4 read	0075H	Reads the most recent No. 3 and 4 alarms.	
Alarm history No. 5, No. 6 read	0076H	Reads the most recent No. 5 and 6 alarms.	
Alarm history No. 7, No. 8 read	0077H	Reads the most recent No. 7 and 8 alarms.	
Set frequency (RAM) read	006DH	Reads the set frequency (RAM).	Setting from remote registers can be made.
Set frequency (E^2PROM) read	006EH	Reads the set frequency (E^2PROM).	
Set frequency (RAM) write	00EDH	Writes the set frequency to RAM.	
Set frequency (E^2PROM) write	00EEH	Writes the set frequency to E^2PROM.	
Parameter read	0000H to 006CH	Refer to the data code list in the inverter manual, and perform read/write as required. It should be noted that some parameters cannot be accessed.	
Parameter write	0080H to 00ECH		
Batch alarm definition clear	00F4H	9696H: Batch-clears the alarm history.	
Parameter clear	00FCH	9696H: Parameter clear (parameters values other than calibrated values are reset to factory settings.) 9966H: All clear 9669H: User clear	
Inverter reset	00FDH	9696H: Resets the inverter.	

Item		Code Number	Description
Link parameter extention setting	Read	007FH	Changes parameter values by setting 0000H to 0009H. For details of the setting values, refer to the inverter manual.
	Write	00FFH	
Second parameter changing	Read	006CH	Pr. 201 to Pr. 230 0000H: Running frequency 0001H: Time 0002H: Rotation direction Pr. 902 to Pr. 905 0000H: Offset/gain 0001H: Analog 0002H: Analog value of terminal
	Write	00ECH	

6.4 Code Definitions

6.4.1 Reply Code

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

Date	Item	Alarm Definition
0000H	Normal	Normal completion of instruction code execution
0001H	Write error	Parameter write was attempted during operation other than a stop in the network operation mode.
0002H	Parameter selection error	Unregistered code number was set.
0003H	Setting range error	Set data is outside the permissible data range.

6.4.2 Monitor codes

Devide the monitor code (RWw_0) into half to select the first monitor description (RWr_0) from the last 8 bits and the second monitor description (RWr_1) from the first 8 bits.

(Example) When output current is selected for the first monitor and running speed is selected for the second monitor → monitor code is 0602_H

Code Number	Second Monitor Description (the first 8 bits)	First Monitor Description (the last 8 bits)	Increments	
00_H	Output frequency	No monitoring (monitored value is 0)	0.01Hz	
01_H	Output frequency	Output frequency	0.01Hz	
02_H	Output current	Output current	0.01A	
03_H	Output voltage	Output voltage	0.1V	
04_H	No monitoring (monitored value fixed to 0)	No monitoring (monitored value is 0)	——	
05_H	Frequency setting	Frequency setting	0.01Hz	
06_H	Running speed	Running speed	1r/min	
07_H	Motor torque	Motor torque	0.1%	
08_H	Converter output voltage	Converter output voltage	0.1V	
09_H	Regenerative brake duty factor	Regenerative brake duty factor	0.1%	
$0A_H$	Electronic thermal relay function load factor	Electronic thermal relay function load factor	0.1%	
$0B_H$	Output current peak	Output current peak	0.01A	
$0C_H$	Converter output voltage peak	Converter output voltage peak	0.1V	
$0D_H$	Input power	Input power	0.01kW	
$0E_H$	Output power	Output power	0.01kW	
$0F_H$	Input terminal status	Input terminal status	——	*1
10_H	Output terminal status	Output terminal status	——	*1
11_H	Load meter	Load meter	0.1%	
12_H	Motor excitation current	Motor excitation current	0.01A	
13_H	Position pulse	Position pulse	——	*2

Code Number	Second Monitor Description (the first 8 bits)	First Monitor Description (the last 8 bits)	Increments	
14H	Cumulative energization time	Cumulative energization time	1hr	
15H	No monitoring (monitored value is 0)	No monitoring (monitored value is 0)	——	
16H	Orientation status	Orientation status	——	*2
17H	Actual operation time	Actual operation time	1hr	
18H	Motor load factor	Motor load factor	0.1%	
19H	Cumulative power	Cumulative power	1kWh	

*1 External I/O terminal monitor

<Input terminal monitor definitions>

b15															b0
				CS	RES	STOP	MRS	JOG	RH	RM	RL	RT	AU	STR	STF

blank "0"

<Output terminal monitor definitions>

b15															b0
										ABC	FU	OL	IPF	SU	RUN

blank "0"

*2 Only valid when FR-A5AP option is mounted and orientation control is selected.

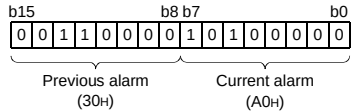
6.4.3 Error code

Alarm definition display

The last two alarm definitions are displayed.

Example

Example: Read data is 30A0H — Previous alarm ..... THT
Current alarm ..... OPT



Alarm data

For full information on alarm definition, refer to the inverter manual.
Different inverters have different alarm definitions.

Data	Definition
00H	No alarm
10H	E. OC1
11H	E. OC2
12H	E. OC3
20H	E. OV1
21H	E. OV2
22H	E. OV3
30H	E. THT
31H	E. THM
40H	E. FIN
50H	E. IPF
51H	E. UVT
60H	E. OLT

Data	Definition
70H	E. BE
80H	E. GF
81H	E. LF
90H	E. OHT
A0H	E. OPT
A1H	E. OP1
A2H	E. OP2
A3H	E. OP3
B0H	E. PE
B1H	E. PUE
B2H	E. RET
C1H	E. CTE
C2H	E. P24

Data	Definition
D5H	E. MB1
D6H	E. MB2
D7H	E. MB3
D8H	E. MB4
D9H	E. MB5
DAH	E. MB6
DBH	E. MB7
F1H	E. 1
F2H	E. 2
F3H	E. 3
F6H	E. 6
F7H	E. 7

7.1 I/O Signal List

The following device No. are those for station 1.
For stations 2 and later, the device No. are different. (For the device No. correspondence list, refer to the master unit manual.)

7.1.1 Output signals (master unit to inverter (FR-A5NC))

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

Device No.	Signal/Factory-set function	Description
RY0	Forward rotation command	OFF : Stop command ON : Forward rotation start *1
RY1	STR terminal function/reverse rotation command	Functions assigned to STR terminal are selected. With Pr. 187 (input terminal function seledction), you can set the input signal. Refer to the inverter manual for details. (factory setting) OFF : Stop command ON: Reverse rotation start *1
RY2	DI1 terminal function/low speed operation command	Functions assigned to DI1 to DI4 are selected. With Pr. 180 to Pr. 183 (input terminal function selection), you can set the input signal. Refer to the inverter manual for details.
RY3	DI2 terminal function/middle speed operation command	
RY4	DI3 terminal function/high speed operation command	
RY5	DI4 terminal function/second function selection	

*1 Switching on RY0 and RY1 at the same time gives a stop command.

Device No.	Signal	Description
RY6	DI11 terminal function	Functions assigned to DI11 to DI12 are selected. With Pr. 400 to Pr. 402 (input terminal function selection), you can set the input signal.
RY7	DI12 terminal function	
RY8	DI13 terminal function	
RY9	Output stop (MRS)	When the MRS signal switches on, the inverter output stops.
RYA	Reserved *4	Reserved for the system.
RYB		
RYC	Monitor command	When the monitor command (RYC) is switched on, the monitored value is set to remote register RWr_0 and monitoring (RXC) switches on. While the monitor command (RYC) is on, the monitored value is always updated.
RYD *3	Speed setting command (RAM)	When the speed setting command (RYD) is switched on, the set speed (RWw_1) is written to the inverter. *2 On completion of write, speed setting completion (RXD) switches on.
	Torque setting command (RAM)	Refer to page 73.
RYE *3	Speed setting command (E^2PROM)	When the speed setting command (RYE) is switched on, the set speed (RWw_1) is written to the inverter. On completion of write, speed setting completion (RXE) switches on.
	Torque setting command (E^2PROM)	Refer to page 73.
RYF *3	Instruction code execution request	When the instruction code execution request (RYF) is switched on, processing corresponding to the instruction code set to RWw_2 is executed. After completion of instruction code execution, instruction code execution completion (RXF) switches on. When an instruction code execution error occurs, a value other than 0 is set to the reply code (RWr_2).

*2 While the speed setting command (RYD) is on, the set speed (RWw_1) value is always returned.
*3 If these commands are switched on simultaneously, only one of these is executed.
*4 The reserved input signal should be off. (Enter 0)

Device No.	Signal/Factory-set function	Description
RY10	Reserved *4	Reserved for the system.
RY11		
RY12		
RY13		
RY14		
RY15		
RY16		
RY17		
RY18		
RY19		
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.

*4 The reserved input signal should be off. (Enter 0)

7.1.2 Input signals (inverter (FR-A5NC) to master unit)

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

Device No.	Signal/Factory Set Function	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 (RUN)	Switched on during inverter running.
RX3	DO1 terminal function/running	Functions assigned to DO1 to DO3 are selected. *1
RX4	DO2 terminal function/up to speed	
RX5	DO3 terminal function/ instantaneous power failure	
RX6	Speed detection (FB)	Switched on when the output speed reaches the speed set in Pr. 42.
RX7	ABC terminal function/ alarm	Functions assigned to ABC terminals are selected. *1
RX8	DO11 terminal function	Functions assigned to DO11 to DO13 are selected. *2
RX9	DO12 terminal function	
RXA	DO13 terminal function	
RXB	Reserved	Reserved for the system.
RXC	Monitoring	Switched on when the monitored value is set to RWr0 by the monitor command (RYC) switching on. Switched off when the monitor command (RYC) is switched off.

*1 With Pr. 190 to Pr. 192, Pr. 195 (output terminal function selection), you can set the output signal. Refer to the inverter manual for details.

*2 With Pr. 410 to Pr. 412 (output terminal function selection), you can set the output signal.

Device No.	Signal/Factory Set Function	Description
RXD	Speed setting completion (RAM)	Switched on when the set speed is written to the inverter by the speed setting command (RYD) switching on. Switched off when the speed setting command (RYD) is switched off.
	Torque setting completion (RAM)	Refer to page 73.
RXE	Speed setting completion (E^2PROM)	Switched on when the set speed is written to the inverter by the speed setting command (RYE) switching on. Switched off when the speed setting command (RYE) is switched off.
	Torque setting completion (E^2PROM)	Refer to page 73.
RXF	Instruction code execution completion	Switched on on completion of the processing corresponding to the instruction code (RWw2) which is executed when the instruction code execution request (RYF) switches on. Switched off when the instruction code execution completion (RXF) is switched off.
RX10	Reserved	Reserved for the system.
RX11		
RX12		
RX13		
RX14		
RX15		
RX16		
RX17		
RX18		
RX19		
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 Remote Register Assignment

7.2.1 Remote registers (master unit to inverter (FR-A5NC))

Device No.	Signal	Description
RWw0	Monitor code	Set the monitor code to be referenced. (Refer to page 70) By switching on the RYC signal after setting, the specified monitored data is set to RWr0.
RWw1	Set speed	Specify the set speed. At this time, whether it is written to RAM or E^2PROM is differentiated by the RYD and RYE signals. After setting the speed to this register, switch on the above RYD or RYE to write the speed. On completion of speed write, RXD or RXE switches on in response to the input command.
	Set torque	Refer to page 73.
RWw2	Instruction code	Set the instruction code for execution of operation mode rewrite, Pr. read/write, error reference, error clear, etc. (refer to page 66). The corresponding instruction is executed by switching on RYF after completion of register setting. RXF switches on on completion of instruction execution.
RWw3	Write data	Set the data specified by the above instruction code. (When required) Switch RYF on after setting the above instruction code and this register. Set zero when the write code is not required.

7.2.2 Remote registers (inverter (FR-A5NC) to master unit)

Device No.	Signal	Description
RWr0	First monitor	When RYC is on, the monitored value specified to the last 8 bits of the monitor code (RWw0) is set. (Refer to page 70 for the monitor code numbers.)
RWr1	Second monitor (output frequency)	When "0" is set to the first 8 bits of the monitor code (RWw0), the current output frequency is always set. When other than "0" is set to the first 8 bits of the monitor code (RWw0) and RYC is on, the monitored value specified to the first 8 bits of the monitor code (RWw0) is set. (Refer to page 70 for the monitor code numbers.)
RWr2	Reply code	Turning on RYF set the reply code corresponds to the instruction code of RWw2. Turning on either RYD or RYE set the reply code corresponds to the speed setting command. The value "0" is set for a normal reply and other than "0" is set for data fault, mode error, etc. (Refer to page 69 for the reply code numbers.)
RWr3	Read data	For a normal reply, the reply data to the instruction specified by the instruction code is set.

7.3 Instruction Codes

Item		Code Number	Description	
Operation mode	read	007BH	0000H: Network operation 0001H: External operation 0002H: PU operation	
Operation mode	write	00FBH	0000H: Network operation 0001H: External operation 0002H: PU operation (Pr. 79 = "6")	
Running speed monitor		006FH	0000H to FFFFH: Running speed binary code in 1r/min increments	
Output current monitor		0070H	0000H to FFFFH: Output current binary code in 0.01A increments	
Output voltage monitor		0071H	0000H to FFFFH: Output voltage binary code in 0.1V increments	
Special monitor		0072H	0000H to FFFFH: Monitored data selected in instruction code F3H	
Special monitor selection	read	0073H	Refer to page 70 for monitor definition and monitor code.	
	write	00F3H		
Alarm history No. 1, No. 2 read		0074H	Reads the most recent No. 1 and 2 alarms.	Refer to page 72 for error codes.
Alarm history No. 3, No. 4 read		0075H	Reads the most recent No. 3 and 4 alarms.	
Alarm history No. 5, No. 6 read		0076H	Reads the most recent No. 5 and 6 alarms.	
Alarm history No. 7, No. 8 read		0077H	Reads the most recent No. 7 and 8 alarms.	

Item		Code Number	Description	
Running speed/torque setting* (RAM) read		006DH	Reads the Operation speed/torque setting* (RAM).	Setting from remote registers can be made. 0000H DE10H: Binary code in 1r/min increments
Running speed/torque setting* (E^2PROM) read		006EH	Reads the Operation speed/torque setting* (E^2PROM).	
Running speed/torque setting* (RAM) write		00EDH	Writes the Operation speed/torque setting* to RAM.	
Running speed/torque setting* (E^2PROM) write		00EEH	Writes the Operation speed/torque setting* to E^2PROM.	
Parameter	read	0000H to 007BH	Refer to the data code list in the inverter manual, and perform read/write as required. It should be noted that some parameters cannot be accessed.	
	write	0080H to 00FDH		
Batch alarm definition clear		00F4H	9696H: Batch-clears the alarm history.	
Parameter clear		00FCH	9696H: Parameter clear (parameters values other than calibrated values are reset to factory settings.) 9966H: All clear	
Inverter reset		00FDH	9696H: Resets the inverter.	

* For torque setting, set "3" in Pr.804 "torque command source selection". (For torque setting, refer to page 73.) Refer to the FR-V500 series inverter manual for the availability of torque setting by the instruction code.

Item		Code Number	Description
Link parameter extension setting	read	007FH	Changes parameter values by setting H00 to H09. For details of the setting values, refer to the inverter manual.
	write	00FFH	
Second parameter changing	read	006CH	When reading/setting the bias/gain (data code 005EH to 0061H, 00DEH to 00E1H) parameters H00: Speed/torque H01: Analog H02: Analog value of terminal (The data value at writing is an arbitrary 4-digit value.)
	write	00ECH	

7.4 Code Definitions

7.4.1 Reply Code

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

Data	Item	Alarm Definition
0000H	Normal	Normal completion of instruction code execution
0001H	Write mode error	Parameter write was attempted during operation other than a stop in the network operation mode.
0002H	Parameter selection error	Unregistered code number was set.
0003H	Setting range error	Set data is outside the permissible data range.

7.4.2 Monitor codes

Devide the monitor code (RWw0) into half to select the first monitor description (RWr0) from the last 8 bits and the second monitor description (RWr1) from the first 8 bits.
Monitor description of special monitor is the same as the first monitor.

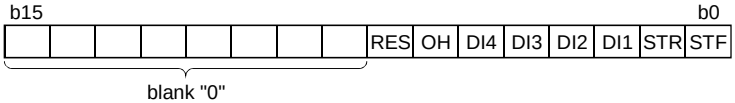
(Example) When output current is selected for the first monitor and running speed is selected for the second monitor → monitor code is 0602H

Code Number	Second Monitor Description (the first 8 bits)	First Monitor Description (the last 8 bits)	Increments	
00H	Output frequency	No monitoring (monitored value is 0)	0.01Hz/-	
01H	Output frequency	Output frequency	0.01Hz	
02H	Output current	Output current	0.01A	
03H	Output voltage	Output voltage	0.1V	
05H	Set speed	Set speed	1r/min	
06H	Running speed	Running speed	1r/min	
07H	Motor torque	Motor torque	0.1%	
08H	Converter output voltage	Converter output voltage	0.1V	
09H	Regenerative brake duty factor	Regenerative brake duty factor	0.1%	
0AH	Electronic thermal relay function load factor	Electronic thermal relay function load factor	0.1%	
0BH	Output current peak	Output current peak	0.01A	
0CH	Converter output voltage peak	Converter output voltage peak	0.1V	
0DH	No monitoring (monitored value is 0)	No monitoring (monitored value is 0)	——	
0EH	No monitoring (monitored value is 0)	No monitoring (monitored value is 0)	——	
0FH	Input terminal status	Input terminal status	——	*
10H	Output terminal status	Output terminal status	——	*
11H	Load meter	Load meter	0.1%	
12H	Motor excitation current	Motor excitation current	0.01A	
13H	Position pulse	Position pulse	——	

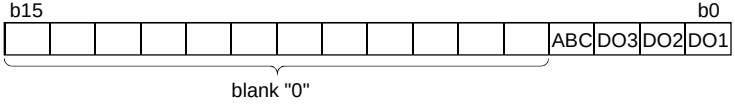
Code Number	Second Monitor Description (the first 8 bits)	First Monitor Description (the last 8 bits)	Increments
14H	Cumulative energization time	Cumulative operation time	1hr
15H	No monitoring (monitored value is 0)	No monitoring (monitored value is 0)	——
17H	Actual operation time	Actual operation time	1hr
18H	Motor load factor	Motor load factor	0.1%
19H to 1FH	No monitoring (monitored value is 0)	No monitoring (monitored value is 0)	——
20H	Torque command	Torque command	0.1%
21H	Torque current command	Torque current command	0.1%
22H	Motor output	Motor output	0.01kW
23H	Feedback pulse	Feedback pulse	——

*External I/O terminal monitor

<Input terminal monitor definitions>



<Output terminal monitor definitions>



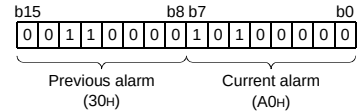
7.4.3 Error code

Alarm definition display

The last two alarm definitions are displayed.

Example

Example: Read data is 30A0H — Previous alarm ..... THT
Current alarm ..... OPT



Alarm data

For full information on alarm definition, refer to the inverter manual.

Data	Definition	Data	Definition	Data	Definition	Data	Definition
00H	No alarm	60H	E.OLT	C0H	E.CPU	D8H	E.MB4
10H	E.OC1	70H	E.BE	C1H	E.CTE	D9H	E.MB5
11H	E.OC2	80H	E.GF	C2H	E.P24	DAH	E.MB6
12H	E.OC3	81H	E.LF	C3H	E.P12	DBH	E.MB7
20H	E.OV1	90H	E.OHT	D0H	E.OS	DCH	E.EP
21H	E.OV2	A0H	E.OPT	D1H	E.OSD	F1H	E.1
22H	E.OV3	A1H	E.OP1	D2H	E.ECT	F2H	E.2
30H	E.THT	A2H	E.OP2	D3H	E.OD	F3H	E.3
31H	E.THM	A3H	E.OP3	D4H	E.ECA	F6H	E.6
40H	E.FIN	B0H	E.PE	D5H	E.MB1	F7H	E.7
50H	E.IPF	B1H	E.PUE	D6H	E.MB2		
51H	E.UVT	B2H	E.RET	D7H	E.MB3		

7.5 Torque command from communication (Torque control)

Set "3" in Pr. 804 "torque command source selection" to give the torque command from the FR-A5NC. Functions of the I/O device below are changed.

I/O Device	When other than "3" is set in Pr. 804	When "3" is set in Pr. 804 *
RYD	Speed setting command RAM	Torque setting command RAM
RYE	Speed setting command E^2PROM	Torque setting command E^2PROM
RXD	Speed seting completion RAM	Torque seting completion RAM
RXE	Speed seting completion E^2PROM	Torque seting completion E^2PROM
RWw_1	Set speed	Set torque

* The speed setting command is given under speed/position control even when Pr. 804 = "3".

(1) The set torque (RWw_1) description is reflected on the torque command value of the inverter by turning on the torque set command E^2PROM (RYE).

(2) The set torque (RWw_1) description is reflected on the inverter while the torque setting command RAM (RYD) is on.

(3) The speed restriction value when Pr. 804 = "3" is equal to the value when "1" is set in Pr. 807 "speed restriction selection" even when "0" is set.

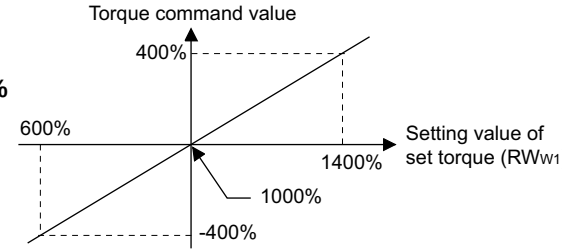
(4) When the torque setting value is reset via CC-Link, the RAM value of Pr. 805 is reset when using the torque setting command RAM (RYD) and the RAM/E^2PROM values of Pr. 806 are reset when using the torque setting command E^2PROM (RYE).

(5) If an operation mode error or outside of range error occurs when the torque setting command is executed, an error code is set in the reply code (RWr_2). If no error occurs, "0" is set.

CAUTION

The value set as set torque (RWw1) should be the desired torque value plus 1000.

Torque command value = Set torque (RWw1) - 1000%



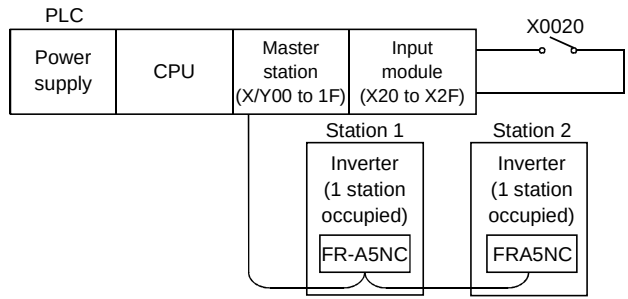
• Refer to the inverter manual for details of Pr. 804 to Pr. 806, Pr. 808 and Pr. 809

8. PROGRAMMING EXAMPLES

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

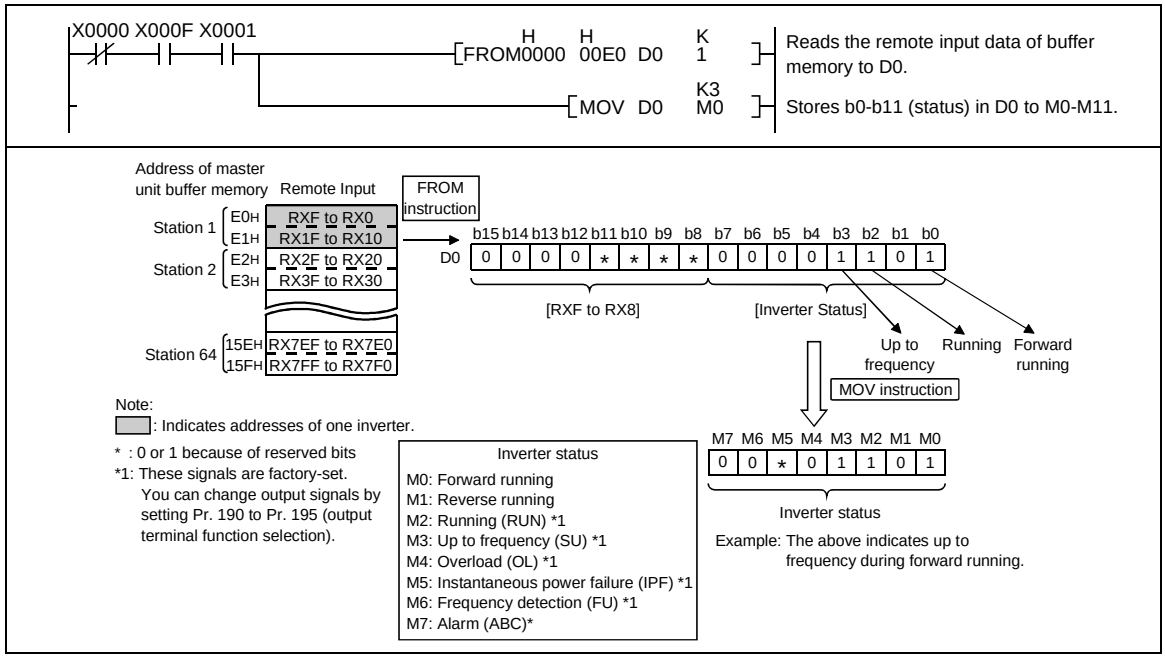
	Item	Program Example	Refer to Page
8.1	Reading the inverter status	Reading the inverter status from the buffer memory of the master station	76
8.2	Setting the operation mode	Selecting the network operation mode	78
8.3	Setting the operation commands	Commanding the forward rotation and middle speed signals	79
8.4	Setting the monitoring function	Monitoring the output frequency	81
8.5	Reading a parameter value	Reading the value of Pr. 7 "acceleration time"	82
8.6	Writing a parameter value	Setting "3.0 s" in Pr. 7 "acceleration time"	83
8.7	Setting the running frequency (running speed)	Setting to 50.00Hz	84
8.8	Reading the alarm definitions	Reading the inverter alarms	86
8.9	Inverter reset	Resetting the inverter	87

System configuration for programming example

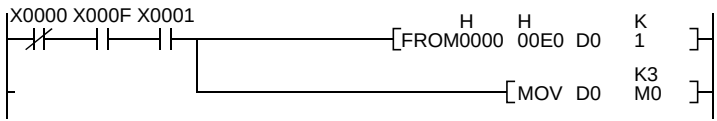


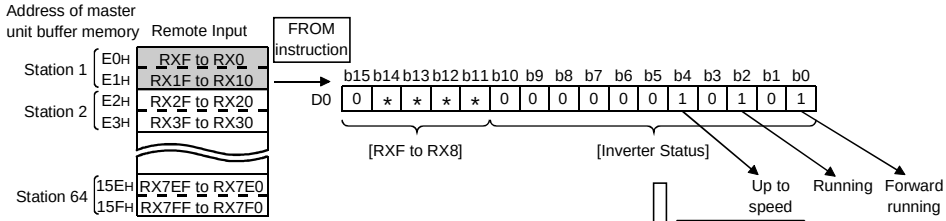
8.1 Program Example for Reading the Inverter Status

Write a program as explained below to read the inverter status from the master unit buffer memory:
The inverter status is always stored in remote inputs RX (addresses E0H to 15FH).
The following program reads the inverter status of station 1 to M0-M7 (FR-A500(L)/F500(L) series):



The following program reads the inverter status of station 1 to M0-M7 (FR-V500 series):





Example: The above indicates up to speed during forward running.

Note:

: Indicates addresses of one inverter.

* : 0 or 1 because of reserved bits

*1: These signals are factory-set. You can change output signals by setting Pr. 190 to Pr. 192, Pr. 195 (output terminal function selection).

*2: You can assign output signals by setting Pr. 410 to Pr. 412 (output terminal function selection).

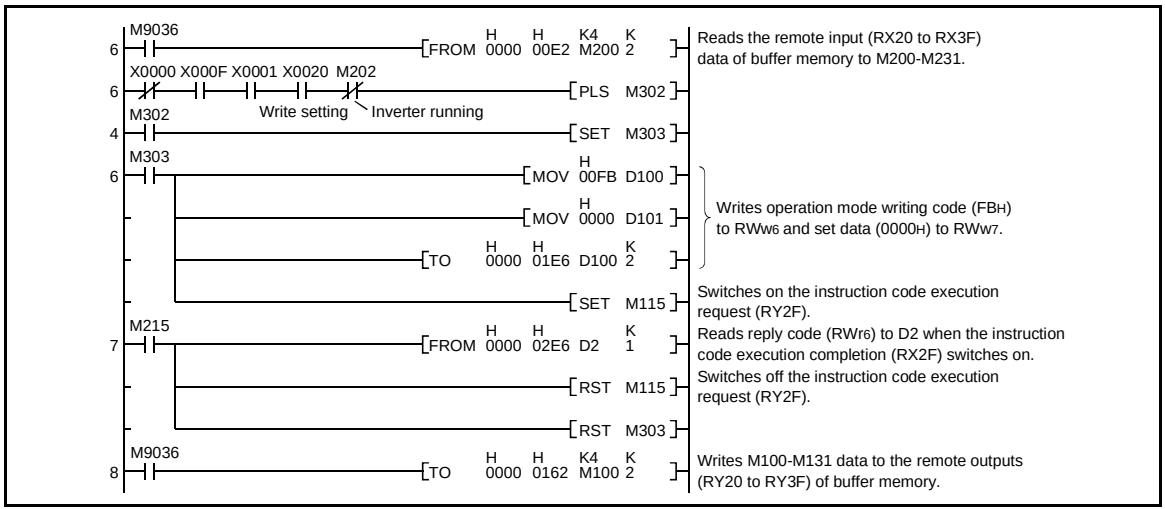
Inverter status

M0: Forward running
M1: Reverse running
M2: Running (RUN) *1
M3: Running (RUN/DO1) *1
M4: Up to speed (SU/DO2) *1
M5: Instantaneous power failure (IPF/DO3) *1
M6: Speed detection (FB)
M7: Alarm (ABC)
M8: DO11 *2
M9: DO12 *2
M10: DO13 *2

8.2 Program Example for Setting the Operation Mode

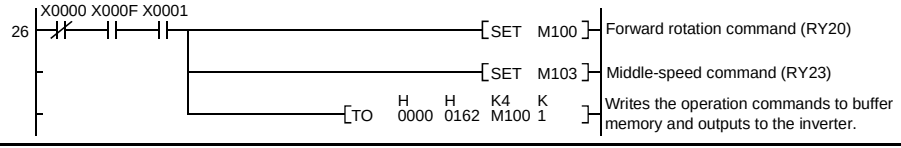
The following explains a program to write various data to the inverter.

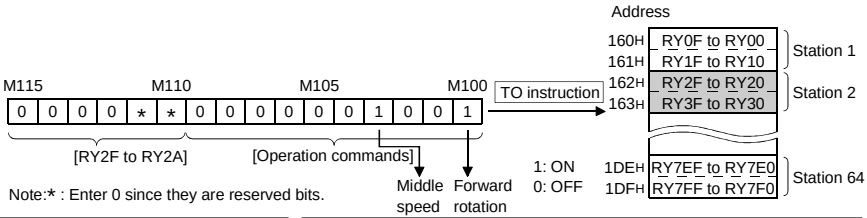
1) The following program changes the operation mode of station 2 inverter to network operation.
   Operation mode writing code number: FBH (hexadecimal)
   Network operation set data: 0000H (hexadecimal) (Refer to page 53, 66.)
   The reply code at the time of instruction code execution is set to D2. (Refer to page 55, 69.)



8.3 Program Example for Setting the Operation Commands

The following explains a program to write a running command for inverter operation to the buffer memory of the master.
The inverter is operated in accordance with the operation commands written to the remote outputs (addresses 160H to 1DFH).
The following program outputs the commands of forward rotation and middle speed signals to station 2 inverter (FR-A500(L)/F500(L) series):



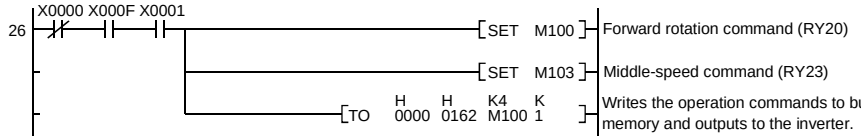


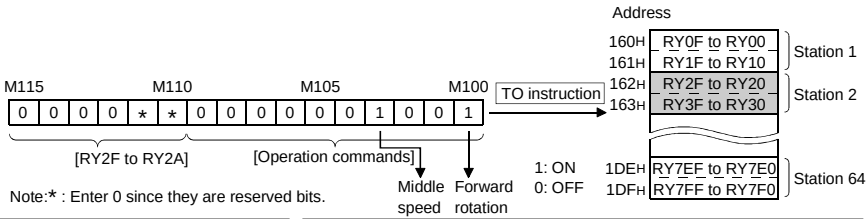
RY2F to RY2A
M110 .....
M111 .....
M112 ..... Monitor command
M113 ..... Frequency setting command (RAM)
M114 ..... Frequency setting command (E^2PROM)
M115 ..... Instruction code execution request

Operation commands
M100 ..... Forward rotation command
M101 ..... Reverse rotation command
M102 ..... High speed (RH)*1
M103 ..... Middle speed (RM)*1
M104 ..... Low speed (RL)*1
M105 ..... JOG
M106 ..... Second acceleration/ deceleration (RT)*1
M107 ..... Current input selection*1
M108 ..... Automatic restart after *1 instantaneous power failure (CS)*1
M109 ..... MRS

Input signal for signals marked with *1 can be changed by setting Pr. 180 to Pr. 186 (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 26 for details.

The following program outputs the commands of forward rotation and middle speed signals to the station 2 inverter (FR-V500 series):





RY2F to RY2A
M110 .....
M111 .....
M112 ..... Monitor command
M113 ..... Speed setting command (RAM)
M114 ..... Speed setting command (E PROM)
M115 ..... Instruction code execution request

Operation commands

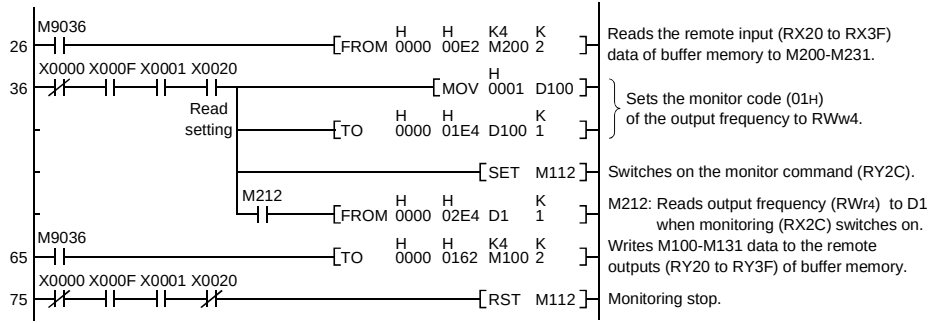
M100 ..... Forward rotation command	M105 ..... Second function (RT/DI4)*1
M101 ..... Reverse rotation command	M106 ..... DI11 *2
M102 ..... Low speed (RL/DI1)*1	M107 ..... DI12 *2
M103 ..... Middle speed (RM/DI2)*1	M108 ..... DI13 *3
M104 ..... High speed (RH/DI3)*1	M109 ..... MRS

*1 These signals are factory-set. You can change input signals by setting Pr. 180 to Pr. 183, Pr. 187 (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 30 for details.
*2 You can assign input signals by setting Pr. 400 to Pr. 402 (input terminal function selection).

8.4 Program Example for Monitoring the Output Frequency

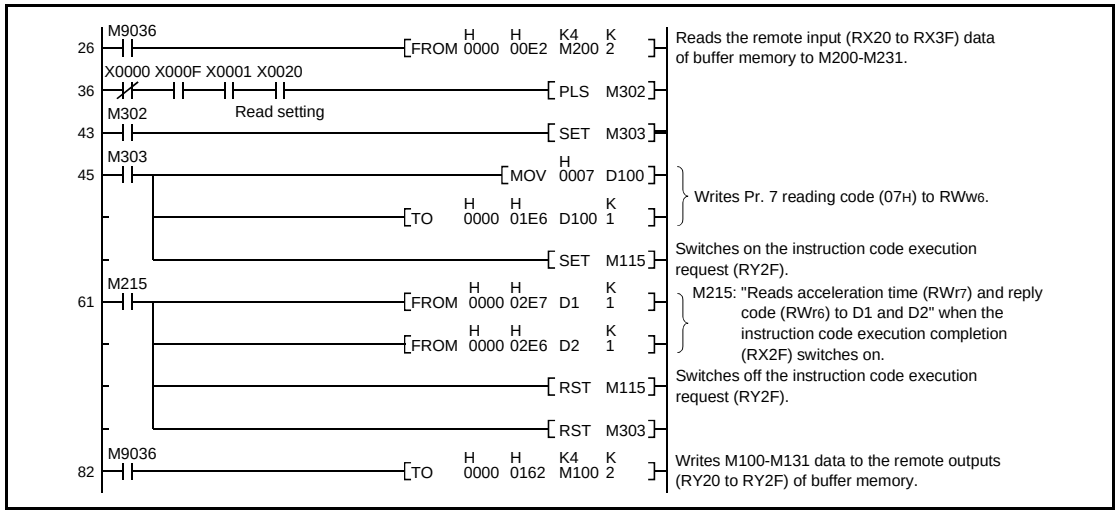
The following explains a program to read monitor functions of the inverter.

The following program reads the output frequency of station 2 inverter to D1.
Output frequency reading code number: 0001H (hexadecimal)
(Refer to page 56, 70 for the monitor code numbers.)
Example: The output frequency of 60Hz is indicated 1770H (6000).



8.5 Parameter Reading Program Example

1) The following program reads Pr. 7 "acceleration time" of station 2 inverter to D1.
   Pr. 7 "acceleration time" reading code number: 07H (hexadecimal)
   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 55, 69.)

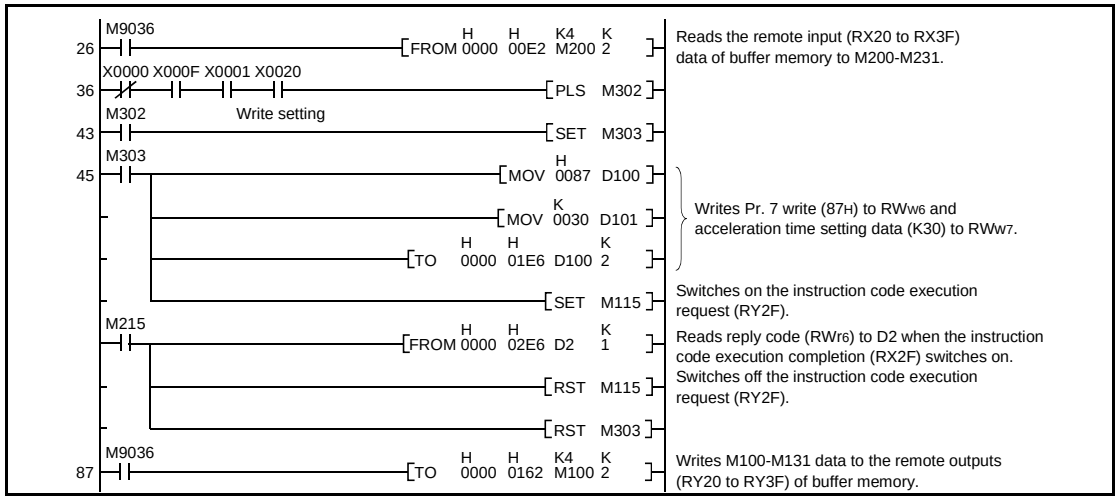


REMARKS

For parameters having numbers 100 and later, change their link parameter extension settings (set them to other than 0000H).

8.6 Parameter Writing Program Example

1) Program example which changes the Pr. 7 "acceleration time" setting of station 2 inverter to 3.0 s
   Acceleration time writing code number: 87H (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 55, 69.)



REMARKS

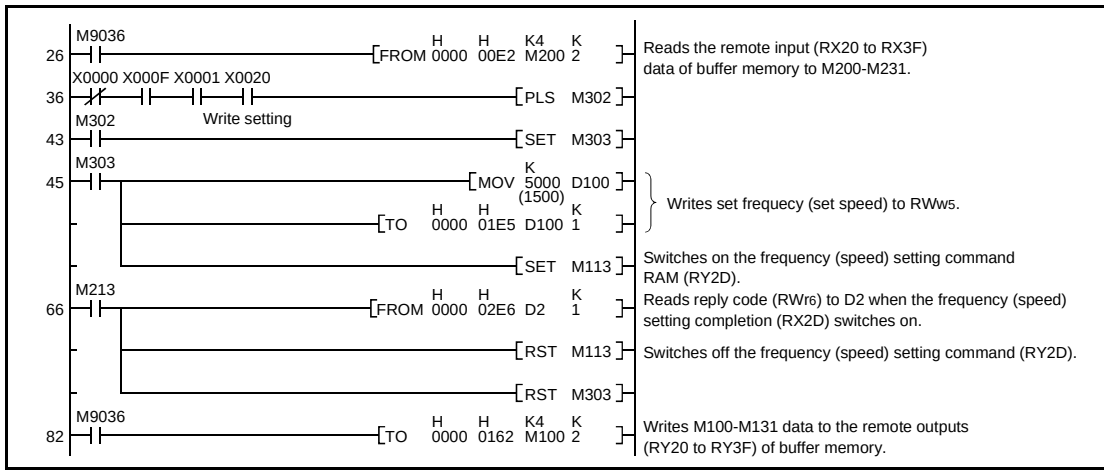
1. For parameters having numbers 100 and later, change their link parameter extension settings (set them to other than 0000H).
2. For other functions, refer to the instruction codes (page 53, 66).

8.7 Running Frequency (Running Speed) Setting Program Example

1) The following program changes the running frequency of station 2 inverter to 50.00Hz (running speed of 1500r/min).

Set frequency (set speed): K5000 decimal (K1500 decimal)

The reply code at the time of instruction code execution is set to D2. (Refer to page 55, 69.)



2) To continuously change the running frequency (speed) from the PLC

When the frequency (speed) setting completion (example: RX2D) switches on, make sure that the reply code in the remote register is 0000H and change the set data (example: RWw5) continuously.

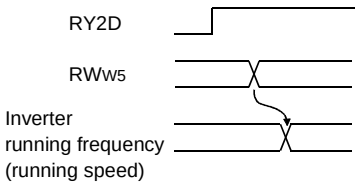
3) Program example for writing data to E^2PROM

Modify the above program as follows:

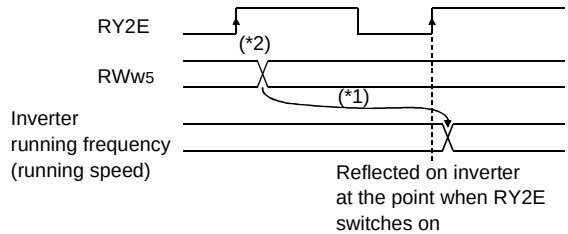
Change the frequency (speed) setting command from RY2D to RY2E.

Change the frequency (speed) setting completion RX2D to RX2E

<Timing chart for write to RAM>



<Timing chart for write to E^2PROM>



*1 For E^2PROM, write is made only once when RY2E is switched on.
*2 If the set data is changed with RY2E on, it is not returned on the inverter.

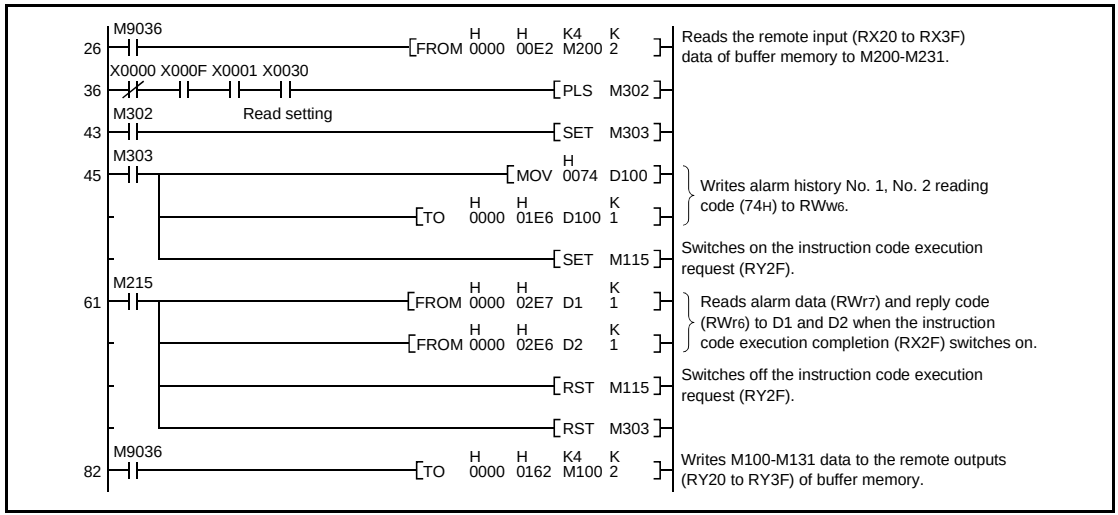
8.8 Alarm Definition Reading Program Example

1) The following program reads the alarm definition of station 2 inverter to D1.

Alarm (error) history No. 1, No. 2 reading code number: 74H (hexadecimal)

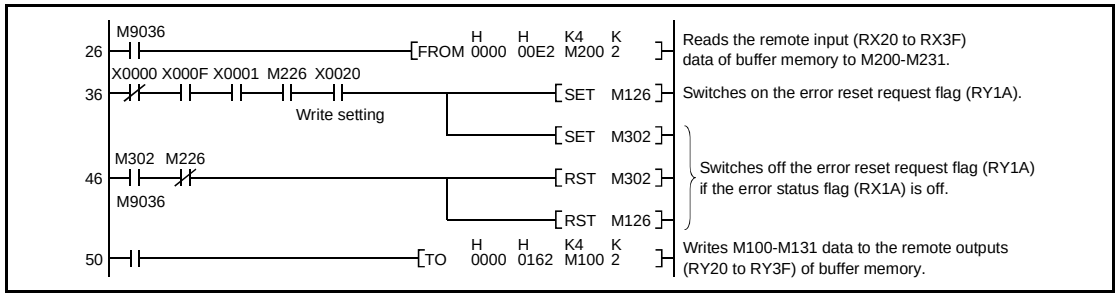
For the error code numbers, refer to page 58, 72.

The reply code at the time of instruction code execution is set to D2. (Refer to page 55, 69.)



8.9 Program Example for Resetting the Inverter at Inverter Error

1) The following program resets the station 2 inverter.



REMARKS

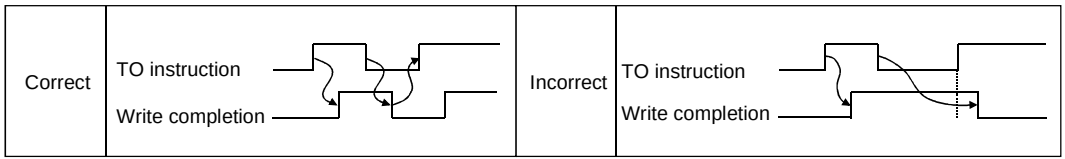
1. The above inverter reset using RY1A may be made only when an inverter error occurs. Also, inverter reset can be made independently of the operation mode.
2. When using the instruction code execution request (RYF) with the instruction code (FD_H) and data (9696_H) to reset the inverter, set "1" in Pr. 340 "link startup mode" (refer to page 19) or change the operation mode to the network operation mode. (For the program example, refer to page 78.)

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.OP3" 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.OP3".

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

5) When the main power of any inverter is restored, that inverter 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.

   Note that setting "1" in Pr. 340 "link startup mode selection" selects the network operation mode.

(3) Troubleshooting

1) Operation mode does not switch to CC-Link

- Check that the CC-Link units (FR-A5NC) and CC-Link dedicated cables are fitted properly. (Check for contact fault, break in the cable, etc.)
- Check that the 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.

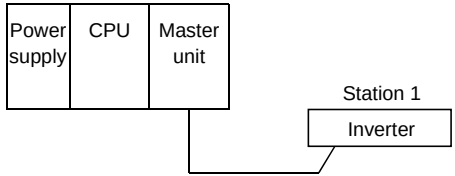
2) Inverter does not start in the network operation mode

- 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.

9. HOW TO CHECK FOR ERROR USING THE LEDS

9.1 When One Inverter Is Connected

1) The following example indicates the causes of faults which may be judged from the LED status of the CC-Link unit (FR-A5NC) 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:

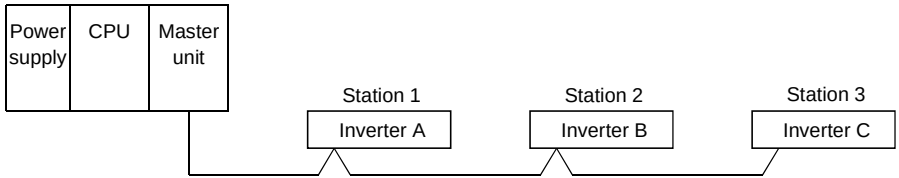


LED Status					Cause
RUN	L. RUN	SD	RD	L. ERR	
●	●	⊙	⊙	⊙	Normal communication is made but CRC error has occurred due to noise.
●	●	⊙	⊙	○	Normal communication
●	●	⊙	○	⊙	Hardware fault
●	●	⊙	○	○	Hardware fault
●	●	○	⊙	⊙	Cannot answer due to CRC error of receive data.
●	●	○	⊙	○	Data sent to the host station 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.
○	○	○	○	○	WDT error occurrence (hardware fault), power off, power supply failure

●: 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 CC-Link units (FR-A5NC) of the inverters under the condition that the SW, M/S and PRM LEDs of the master unit are off (the master unit setting is proper) in the system configuration shown below:



LED Status				Cause	Corrective Action
Master unit	Remote I/O unit				
	Station 1	Station 2	Station 3		
TIME ○ LINE ○ or TIME ● LINE ○	RUN ● L. RUN ● SD ● RD ● L. ERR ○	RUN ● L. RUN ● SD ● RD ● L. ERR ○	RUN ● L. RUN ● SD ● RD ● L. ERR ○	Normal	———
	RUN ○ L. RUN ○ SD ○ RD ○ L. ERR ○	RUN ● L. RUN ● SD ● RD ● L. ERR ○	RUN ● L. RUN ● SD ● RD ● L. ERR ○	Poor contact of the FR-A5NC with the inverter	Plug the FR-A5NC securely. Check the connector.

LED Status				Cause	Corrective Action
Master unit	Remote I/O unit				
	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-A5NC 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 CC-Link units and optical 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.

LED States				Cause	Corrective Action
Master unit	Inverters (FR-A5NC)				
	Station 1	Station 2	Station 3		
TIME ○ LINE ○ or TIME ● LINE ○	RUN ● L. RUN ○ SD * RD ● L. ERR ○	RUN ● L. RUN ● SD ● RD ● L. ERR ○	RUN ● L. RUN ○ SD * RD ● L. ERR ○	Since the L.RUN LEDs of the FR-A5NC on station 1 and the FR-A5NC 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, switch power on again.
	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 and SD LEDs of the FR-A5NC on station 2 are off, the transmission speed setting of the FR-A5NC on station 2 is wrong within the setting range (0 to 4).	After correcting the transmission speed setting, switch power on again.
	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-A5NC on station 3 flickers, the setting switch of the FR-A5NC on station 3 was moved during normal operation.	After returning the setting switch of the FR-A5NC to the original position, power on the inverter again.

LED States				Cause	Corrective Action
Master unit	Inverters (FR-A5NC)				
	Station 1	Station 2	Station 3		
TIME ● LINE ● or TIME ○ LINE ●	RUN ● L. RUN ○ SD ○ RD ● L. ERR ●	RUN ● L. RUN ● SD ● RD ● L. ERR ○	RUN ● L. RUN ● SD ● RD ● L. ERR ○	Since the L.RUN and SD LEDs of the FR-A5NC on station 1 are off and its L.ERR LED is on, the setting switch setting of the FR-A5NC on station 1 is outside the range (transmission speed: 5 to 9, station number: 65 or more).	After correcting the setting switch position of the FR-A5NC, switch power on again.
	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-A5NC on station 2 is on, the FR-A5NC itself on station 2 is affected by noise. (L.RUN may go off.)	Securely connect FG of each inverter and master unit to ground.
	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 LEDs of the FR-A5NC 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 ●	Terminal resistors are left unconnected. (L.RUN may go off.)	Check that the terminal resistors are connected.

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

REVISIONS

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

Print Date	*Manual Number	Revision
Oct., 1997	IB(NA)-66836-A	First edition
Jul., 1999	IB(NA)-66836-B	Partial changes • Terminal block arrangement • Program examples Additions • Adaptable inverters
Sep., 2001	IB(NA)-66836-C	Additions • CC-Link Ver. 1.10 specifications • Pr. 500 "communication error recognition waiting time" • Pr. 501 "communication error occurrence count display" • Pr. 502 "communication error-time stop mode selection" • Adaptable inverters
Mar., 2002	IB(NA)-66836-D	Additions • FR-V500 series compliant
Sep., 2003	IB(NA)-66836-E	Additions • Pr.340="10, 12, 20, 22" • Pr.349 "error reset selection during CC-Link communication" • Torque setting (RAM) read/write • Torque setting (E^2PROM) read/write