MITSUBISHI ELECTRIC

700 series

INVERTER
Plug-in option
FR-A7NL
INSTRUCTION MANUAL

LONWORKS® communication function

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

This section is specifically about safety matters

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

⚠ WARNING	Incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

The ⚠ CAUTION level may even lead to a serious consequence according to conditions. Both instruction levels must be followed because these are important to personal safety.

SAFETY INSTRUCTIONS

1. Electric Shock Prevention

⚠ WARNING

- While power is ON or when the inverter is running, do not open the front cover. You may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may accidentally touch 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 accidentally touch the charged inverter circuits and get an electric shock.
- Before wiring or inspection, power must be switched OFF. To confirm that, LED indication of the operation panel must be checked. (It must be OFF.) Any person who is involved in wiring or inspection shall wait for at least 10 minutes after the power supply has been switched OFF and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The plug-in option must be installed before wiring. Otherwise, you may get an electric shock or be injured.
- Do not touch the plug-in option or handle the cables with wet hands. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise you may get an electric shock.

2. Injury Prevention

⚠CAUTION

- The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
- Polarity must be correct. Otherwise burst, damage, etc. may occur.
- While power is ON or for some time after power-OFF, do not touch the inverter as they will be extremely hot. Doing so can cause burns.

3. Additional Instructions

Also the following points must be noted to prevent an accidental failure, injury, electric shock, etc.

1) Transportation and mounting

⚠CAUTION

- Do not install or operate the plug-in option if it is damaged or has parts missing.
- Do not stand or rest heavy objects on the product.
- The mounting orientation must be correct.
- Foreign conductive objects must be prevented from entering the inverter. That includes screws and metal fragments or other flammable substances such as oil.

2) Trial run

⚠CAUTION

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

3) Usage

⚠WARNING

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

⚠CAUTION

- When parameter clear or all parameter clear is performed, the required parameters must be set again before starting operations because all parameters return to the initial value.
- Static electricity in your body must be discharged before you touch the product. Otherwise the product may be damaged.

4) Maintenance, inspection and parts replacement

⚠CAUTION

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

5) Disposal

⚠CAUTION

- This inverter plug-in option must be treated as industrial waste.

6) General instruction

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

— CONTENTS —

1 PRE-OPERATION INSTRUCTIONS

1.1 Inverter model

The inverter models 55K and 75K stated in this Instruction Manual differ according to -NA, -EC, -CH(T) versions. Refer to the following correspondence table for each inverter model. (Refer to *the instruction manual of each inverter* for the inverter model.)

For example, "for the 75K or higher" indicates "for the FR-A740-01440-NA or higher" in the case of FR-A740 of NA version.

		NA	EC	CH
FR-F700	FR-F720-55K	FR-F720-02330-NA	—	—
	FR-F720-75K	FR-F720-03160-NA	—	—
	FR-F740-55K	FR-F740-01160-NA	FR-F740-01160-EC	FR-F740-55K-CH(T)
	FR-F740-75K	FR-F740-01800-NA	FR-F740-01800-EC	FR-F740-S75K-CH(T)
FR-A700	FR-A720-55K	FR-A720-02150-NA	—	—
	FR-A720-75K	FR-A720-02880-NA	—	—
	FR-A740-55K	FR-A740-01100-NA	FR-A740-01800-EC	FR-A740-55K-CHT
	FR-A740-75K	FR-A740-01440-NA	FR-A740-02160-EC	FR-A740-75K-CHT

1.2 Unpacking and product confirmation

Take the plug-in option out of the package, check the product name, and confirm that the product is as you ordered and intact.
This product is a plug-in option dedicated for the FR-A700/A701/F700(P)/FP700 series.

1.2.1 SERIAL number check

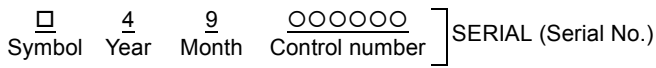
"Cumulative power (nvoDrvRunPower_I)" *(page 59)* can be monitored in 0.1kWh increments and the "reference speed setting (nciNmlSpeed)" *(page 106)* can be set with the number of motor poles for the FR-F700 series inverters with the following SERIAL or later.
Check the SERIAL number indicated on the rating plate or package.

· 55K or lower...in and after September 2004,
75K or higher...in and after August 2004

● **SERIAL number check**

Refer to *the Instruction Manual of the inverter* for the location of the rating plate.

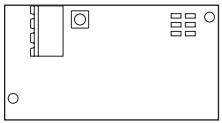
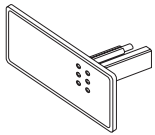
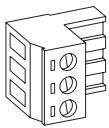
Rating plate example



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

1.2.2 Product confirmation

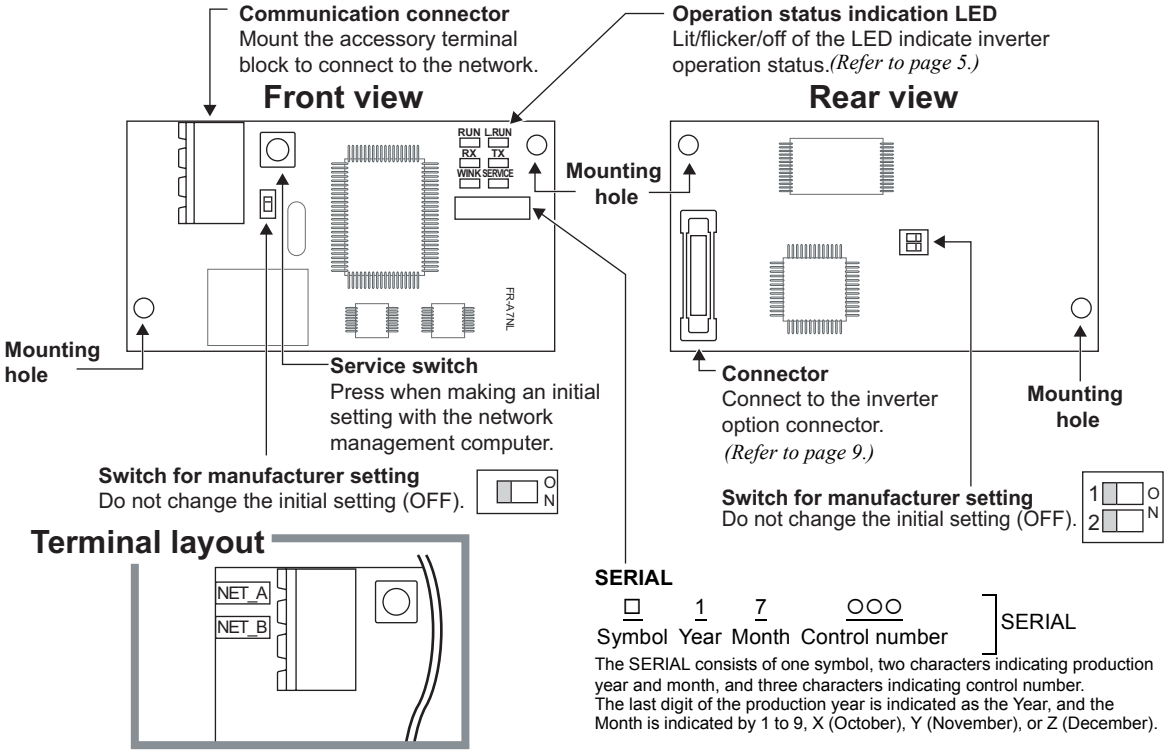
Check the enclosed items.

Plug-in option ..... 1 	Mounting screw (M3 × 6mm) ..... 2 *(Refer to page 9.)* 	Hex-head screw for option mounting (5.5mm) ..... 1 *(Refer to page 9.)* 	Communication option LED display cover..... 1 *(Refer to page 8.)* 
Terminal block ..... 1 *(Refer to page 15.)* 	Neuron® ID bar code sticker ..... 1 (Since one bar code sticker is for maker duplicate, three stickers are provided.)		

REMARKS

- Echelon®, LONWORKS®, LonMaker®, LONMARK® and Neuron® are registered trademarks of Echelon Corporation in the U.S.A. and other countries. Company and product names herein are the trademarks and registered trademarks of their respective owners.

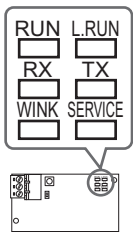
1.3 Parts


Communication connector
Mount the accessory terminal block to connect to the network.
Operation status indication LED
Lit/flicker/off of the LED indicate inverter operation status.(Refer to page 5.)
Front view
Rear view
RUN
L.RUN
RX
TX
WINK
SERVICE
FR-A7NL
Mounting hole
Mounting hole
Mounting hole
Service switch
Press when making an initial setting with the network management computer.
Connector
Connect to the inverter option connector.
(Refer to page 9.)
Switch for manufacturer setting
Do not change the initial setting (OFF).
ON
Switch for manufacturer setting
Do not change the initial setting (OFF).
1
2
ON
Terminal layout
NET_A
NET_B
SERIAL
□ 1 7 ○○○
Symbol Year Month Control number
SERIAL
The SERIAL consists of one symbol, two characters indicating production year and month, and three characters indicating control number.
The last digit of the production year is indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).

1.4 Operation status indication LED

Operation status indication LEDs indicate the operating status of the option unit according to the indication status.

Check the position of LEDs on *page 4*.

	Name	Function	LED Status	Status
	RUN	Display the unit operation status.	ON	Normal operation
			OFF	Alarm (watchdog timer expiration etc.) detection
	L.RUN	Display the handshaking status with the inverter.	ON	Normal operation
			OFF	Alarm detection
	RX	Display the receiving status of packet from the network.	ON (for about 50ms)	Receiving
			OFF	Stop receiving
	TX *1	Display the transmission status of packet to the network.	ON (for about 50ms)	Transmitting
			OFF	Stop transmission
	WINK	Display the receiving status of WINK message from the network.	Flicker three times	Receiving WINK message
			OFF	Stop
	SERVICE	Display the status of node and service switch.	ON	Service switch pressed status
			Flicker	Unconfigured status
			OFF	Configured status

*1 TX LED turns ON when the inverter autonomously sends data due to heartbeat and event driven functions even when the communication cable is not wired.

1.5 Specifications

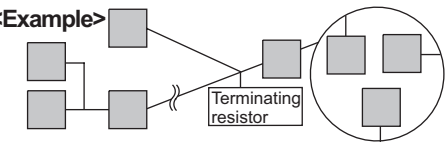
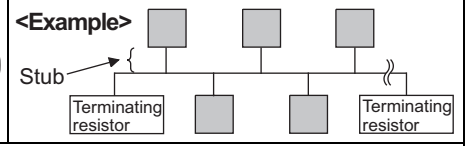
1.5.1 Inverter option specifications

Type		Inverter plug-in option type (can be mounted/dismounted to/from the inverter front face)
Number of nodes occupied		One inverter occupies one node.
Connection cable	**Free topology**	Twisted pair cable equivalent to EBT0.65mm × 1p *1
	Bus topology	Twisted pair cable equivalent to EBT1.3mm × 1p *2

*1 Commercially available product: F-LINK-L(1F) by Fujikura Ltd.

*2 Commercially available product: F-LINK-L 1.25(1S) by Fujikura Ltd.

1.5.2 Communication specifications

Number of units connected		64 units maximum including the inverter in the same segment.	
Communication speed		78kbps	
Maximum cable length		Free topology (connect a terminating resistor at any one point) Maximum: 500m <Example> 	Bus topology (connect a terminating resistor at both ends) Maximum: 2700m (The total length of each node stub should be 3m maximum.) <Example> 
Event reception and transmission	**Event reception**	Number of events receivable at a time : 20 Reception time per event : 100ms maximum (when not conflicting with event transmission)	
	Event transmission	Transmission time per event · Without bind : 200ms · With bind : [retry interval time] × [number of retries]	

2 INSTALLATION

2.1 Pre-installation instructions

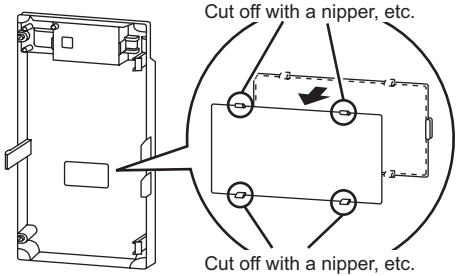
Make sure that the input power of the inverter is OFF.

⚠ CAUTION
⚠ **Do not mount or remove the plug-in option while the power is being input. Otherwise, the inverter and plug-in option may be damaged.**
⚠ **Static electricity in your body must be discharged before you touch the product. Otherwise the product may be damaged.**

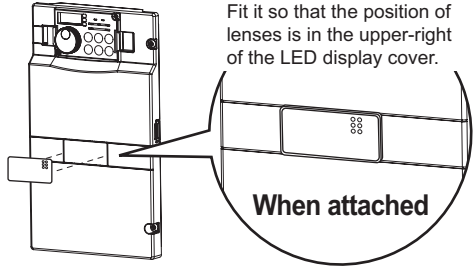
2.2 Installation of the communication option LED display cover

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

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



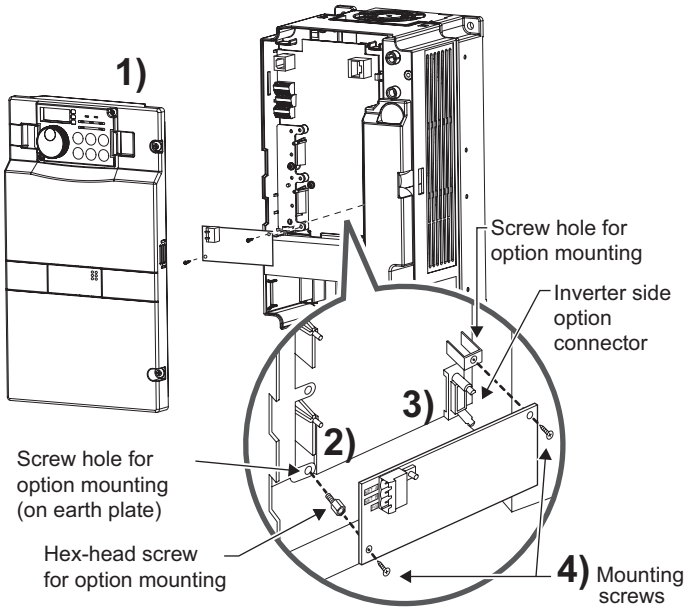
2) Fit the communication option LED display cover to the front of the inverter front cover and push it into until fixed with hooks.



⚠ CAUTION

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

2.3 Installation procedure



1) Remove the inverter front cover.

2) Mount the hex-head screw for option mounting into the inverter screw hole (on earth plate) (size 5.5mm, tightening torque 0.56N·m to 0.75N·m).

3) Securely fit the connector of the plug-in option to the inverter connector along the guides.

4) Securely fix the both right and left sides of the plug-in option to the inverter with the accessory mounting screws. (Tightening torque 0.33N·m to 0.40N·m)
If the screw holes do not line up, the connector may not have been plugged securely. Check for loose plugging.

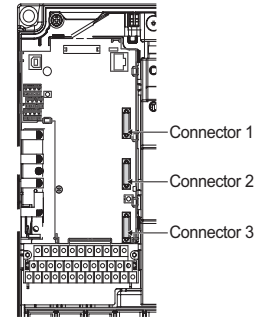
REMARKS

- Remove a plug-in option after removing two screws on both left and right sides. (The plug-in option is easily removed if the control circuit terminal block is removed before.)

CAUTION

- **One of "E. 1 to E. 3 " (option fault) appears when the inverter cannot recognize the option because it is improperly mounted, etc. Different indication will appear according to the mounted position (connector 1, 2, or 3).**
- **For an inverter having several option connectors, use the bottom connector to mount the option.**

  If it is connected to a connector other than the bottom connector, "E. 1 " or "E. 2 " (option fault) will appear and its operation will be disabled. Different indication will appear according to the mounted position (connector 1 or 2).
- **The number of available option connectors differs by the model. The table below shows how the fault indication differs according to the number of connectors and their mounting positions.**



Example of FR-A700

Number of option connectors	3		2		1	
Mounting position and fault indication	Connector 1 (top connector)	E. 1	Connector 1 (top connector)	E. 1	Connector 1	E. 1
	Connector 2 (middle connector)	E. 2	Connector 2 (bottom connector)	E. 2	—	—
	Connector 3 (bottom connector)	E. 3	—	—	—	—

(Refer to *Chapter 1 of the Instruction Manual of the inverter* **for the number of option connectors.**

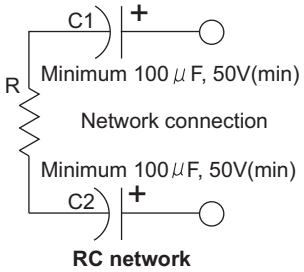
- **Take caution not to drop a hex-head screw for option mounting or mounting screw during mounting and removal.**
- **Pull the option straight out when removing. Otherwise, the connector may be damaged.**

3.1 System configuration example

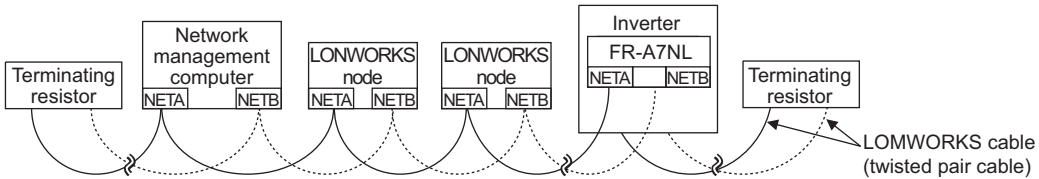
(1) Mount the communication option (FR-A7NL) on the inverter. *(Refer to page 9.)*

(2) Connect the LONWORKS node, option unit, network management computer, and terminating resistor with the cable for LONWORKS communication.
Select a terminating resistor so that resistance values of R of the RC network are the same as shown below.
· Free topology *(Refer to page 6)* ..... R = 52.3Ω ±1% 1/8W
· Bus topology *(Refer to page 6)* ..... R = 105Ω ±1% 1/8W

(3) Install the network management tool on the network management computer to assign the network address and bind (association function) the network variable, etc. to the LONWORKS node.



(Example) Bus topology (without stub)



REMARKS

- The network management tool is not included with this product. Please purchase it separately. For the network management tool, LonMaker by Echelon Co. is recommended.
- When the option unit has been replaced because of a fault or others, perform "Commission" or "Replace" from the network management tool after switching on the inverter. After performing "Commission" or "Replace", reset the inverter (switch power off once, then on again or turn the RES signal on).
- Use the network management computer in the earthed status. Use the isolated power supply if the computer can not be earthed (grounded).

3.2 Wiring

(1) Strip off the sheath of the cable for LONWORKS communication. If the length of the sheath peeled is too long, a short circuit may occur among neighboring wires. If the length is too short, wires might come off.
Use the recommended cables. *(Refer to page 6)*
Wire the stripped cable after twisting it to prevent it from becoming loose.
(Do not solder it.)

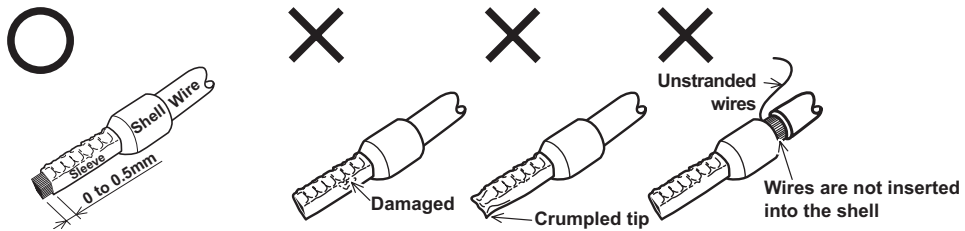
Use a blade type terminal as required.

REMARKS

- Information on blade terminals
  Commercially available product examples (as of Jul. 2010)

Terminal Screw Size	Wire Size (mm^2)	Blade Terminal Model		Maker
		With insulation sleeve	Without insulation sleeve	
M3	0.3, 0.5	AI 0,5-6WH	A 0,5-6	Phoenix Contact Co.,Ltd.
	0.75	AI 0,75-6GY	A 0,75-6	

Blade terminal crimping tool: CRIMPFOX 6T-F/6 (Phoenix Contact Co., Ltd.)
Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve.
Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate, or the face is damaged.



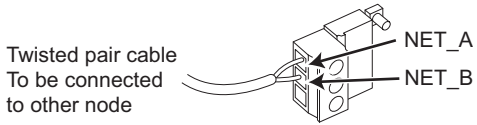
(2) Loosen the terminal screw and insert the cable into the terminal.
Tighten the fastening screws to the recommended tightening torques. Leave the other end of the cable unconnected.

Screw Size	Tightening Torque	Cable Size	Screwdriver
M3	0.5N·m to 0.6N·m	$0.3mm^2$ to $0.75mm^2$	Small ⊖ flat-blade screwdriver (Tip thickness: 0.4mm /tip width: 2.5mm)

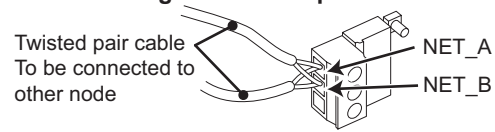
CAUTION

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

<When using one twisted pair cable>



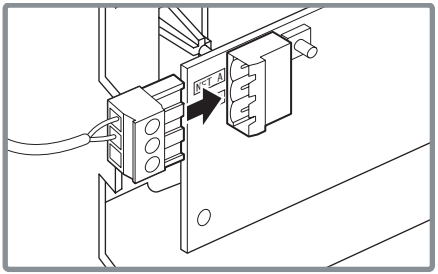
<When using two twisted pair cables>



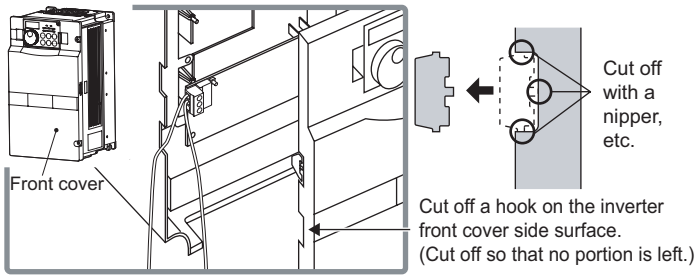
REMARKS

· Change the number of twisted pair cables to insert in NET_A and NET_B according to the system used.

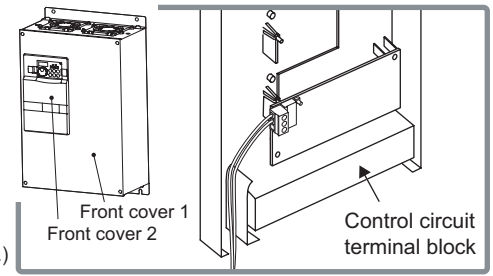
(3) Connect the terminal block to the connector for communication of the communication option.



(4) For wiring of **the inverter which has one front cover**, route wires between the control circuit terminal block and front cover. If wires cannot be routed between the control circuit terminal block and front cover (approx 7mm), remove a hook of the front cover, and use the space became available.
For wiring of **the inverter which has front cover 1 and 2**, use the space on the left side of the control circuit terminal block.



Inverter which has one front cover



Inverter which has front covers 1 and 2

REMARKS

- When the hook of the inverter front cover is cut off for wiring, the protective structure (JEM1030) changes to open type (IP00).

⚠ CAUTION

⚠ **When performing wiring using the space between the inverter front cover and control circuit terminal block, take caution not to subject the cable to stress.**

⚠ **After wiring, wire offcuts must not be left in the inverter. They may cause an error, failure or malfunction.**

4.1 Parameter list

The following parameters are used for the communication option (FR-A7NL).
Perform setting as required.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value	Refer to Page
79	Operation mode selection	0 to 4, 6, 7	1	0	*19*
338	Communication operation command source	0, 1	1	0	*22*
339	Communication speed command source	0, 1, 2	1	0	*22*
340 *3	Communication startup mode selection	0, 1, 2, 10, 12	1	0	*19*
342	Communication EEPROM write selection	0, 1	1	0	*26*
349 *1	Communication reset selection	0, 1	1	0	*33*
387 *1	Initial communication delay time	0 to 120s	0.1s	0s	*89*
388 *1	Send time interval at heart beat	0 to 999.8s	0.1s	0s	*93*
389 *1	Minimum sending time at heart beat	0 to 999.8s	0.1s	0.5s	*93*
390 *1	% setting reference frequency	1 to 400Hz	0.01Hz	60Hz/50Hz *2	*91*
391 *1	Receive time interval at heart beat	0 to 999.8s	0.1s	0s	*103*
392 *1	Event driven detection width	0.00 to 163.83%	0.01%	0%	*108*
500 *1	Communication error execution waiting time	0 to 999.8s	0.1s	0	*27*
501 *1	Communication error occurrence count display	0	1	0	*28*
502 *1, *3	Stop mode selection at communication error	0, 1, 2, 3	1	0	*28*
550 *3	NET mode operation command source selection	0, 1, 9999	1	9999	*22*
779 *4	Operation frequency during communication error	0 to 400Hz, 9999	0.01Hz	9999	*28*

*1 Parameters which can be displayed when the plug-in option (FR-A7NL) is mounted. (On the FR-F700P (FR-F700-NA) series inverters, *Pr. 502* appears even when no option is mounted.)
*2 60Hz for the Japanese and NA models and 50Hz for the EC and CH models.
*3 The setting is applied after an inverter reset or power-ON.
*4 The setting is available for the FR-F700P (FR-F700-NA) series inverters.

4.2 Operation mode setting

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

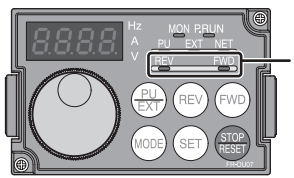
(1) PU operation [PU]..... Controls the inverter from the keys on the operation panel (FR-DU07) mounted on the inverter.

(2) External operation [EXT] ... Controls the inverter by switching ON/OFF external signals connected to the control circuit terminals of the inverter.
(The inverter is factory-set to this mode.)

(3) Network operation [NET] ... Controls the inverter with instructions from the network via the communication option.
(The operation signal and running frequency can be entered from the control circuit terminals depending on the *Pr. 338 Communication operation command source* and *Pr. 339 Communication speed command source* settings. *Refer to page 23*.)

4.2.1 Operation mode indicators

FR-DU07



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

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

(1) Operation mode switching conditions

Before switching the operation mode, check that:

1) The inverter is at a stop;
2) Both the STF and STR signals are OFF; and
3) The *Pr. 79 Operation mode selection* setting is correct.
   (Set with the operation panel of the inverter.)
   Refer to *the Instruction Manual of the inverter* for details of *Pr. 79*.

(2) Operation mode selection at power-ON and at restoration from an instantaneous power failure

The operation mode at power ON and at restoration from an instantaneous power failure can be selected.
Set a value other than "0" in *Pr. 340* to select the Network operation mode.
After Network operation mode has started, parameter write from the network is enabled.

REMARKS

- Change of the *Pr. 340* setting is applied after power-ON or an inverter reset.
- *Pr. 340* can be changed with the operation panel in any operation mode.

Pr. 340 Setting	*Pr. 79* Setting	Operation Mode at Power on or Power Restoration	Operation Mode Switchover
0 (initial value)	0 (initial value)	External operation mode	Switching among the External, PU, and NET operation mode is enabled *1
	1	PU operation mode	PU operation mode fixed
	2	External operation mode	Switching between the External and Net operation mode is enabled Switching to the PU operation mode is disallowed
	3, 4	External/PU combined operation mode	Operation mode switching is disallowed
	6	External operation mode	Switching among the External, PU, and NET operation mode is enabled while running.
	7	X12 (MRS) signal ON .....external operation mode	Switching among the External, PU, and NET operation mode is enabled *1
		X12 (MRS) signal OFF....external operation mode	External operation mode fixed (Forcibly switched to External operation mode.)
1, 2 *2	0	NET operation mode	Same as when *Pr. 340* = "0"
	1	PU operation mode	
	2	NET operation mode	
	3, 4	External/PU combined operation mode	
	6 *4	NET operation mode	
	7	X12 (MRS) signal ON.....NET operation mode	
		X12 (MRS) signal OFF....external operation mode	
10, 12 *2	0	NET operation mode	Switching between the PU and NET operation mode is enabled *3
	1	PU operation mode	Same as when *Pr. 340* = "0"
	2	NET operation mode	NET operation mode fixed
	3, 4	External/PU combined operation mode	Same as when *Pr. 340* = "0"
	6 *4	NET operation mode	Switching between the PU and NET operation mode is enabled while running *3
	7	External operation mode	Same as when *Pr. 340* = "0"

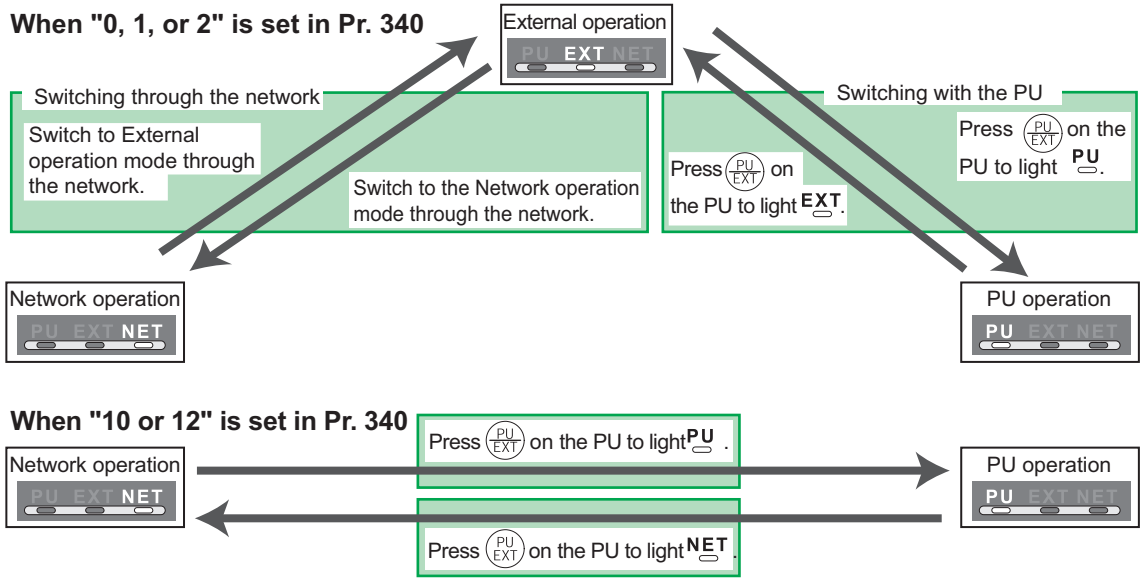
*1 Operation mode cannot be directly changed between the PU operation mode and Network operation mode.

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

*3 Operation mode can be changed between the PU operation mode and Network operation mode with PU/EXT on the operation panel (FR-DU07) and X65 signal.

*4 *Pr. 79* = "6" and *Pr. 128* to *Pr. 134 (PID control)* are not activated simultaneously. Switchover mode and PID control are made invalid, and the inverter performs the same operation as when "0" is set in *Pr. 79*.

(3) Operation mode switching method



For the switching method with the external terminal, refer to *the Instruction Manual of the inverter*.
Refer to *page 47* and *81* for a switching method through the network.

CAUTION

- When starting the inverter in the Network operation mode at power ON or an inverter reset, set a value other than 0 in *Pr. 340*. *(Refer to page 19)*
- When setting a value other than 0 in *Pr. 340*, make sure that the initial settings of the inverter are correct.

4.3 Operation and speed command source (Pr. 338, Pr. 339, Pr. 550)

(1) Select command source for the Network operation mode *(Pr. 550)*

A control location for the Network operation mode can be selected from either the inverter RS-485 terminals or a communication option.

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

Parameter Number	Name	Initial Value	Setting Range	Description
550	NET mode operation command source selection	9999	0	Command source is at a communication option (Command source is not at inverter RS-485 terminals)
			1	Command source is at inverter RS-485 terminals (Command source is not at a communication option)
			9999	Automatic recognition of the communication option Normally, command source is at RS-485 terminals. When a communication option is mounted, the command source is at a communication option.

Refer to *the Instruction Manual of the inverter* for details.

(2) Selection of command source for the Network operation mode (*Pr. 338*, *Pr. 339*)

- There are two command types: the start command, which controls the signals related to the inverter start command and function selection, and the speed command, which controls signals related to frequency setting.
- In Network operation mode, commands from the external terminals and communication are as listed below.

Control Location Selection					*Pr. 338 Communication operation command source*	0:NET			1:External			Remarks
					Pr. 339 Communication speed command source	0: NET	1: External	2: External	0: NET	1: External	2: External	
Fixed functions (Functions equivalent to terminals)					Running frequency from communication	NET	—	NET	NET	—	NET	
					Terminal 2	—	External	—	—	External	—	
					Terminal 4	—	External		—	External		
					Terminal 1	Compensation						
Selective functions	*Pr. 178 to Pr. 189* settings	0	RL	Low-speed operation command/ remote setting clear	NET	External		NET	External		*Pr. 59* = "0" (multi-speed) *Pr. 59* = "1, 2" (remote)	
		1	RM	Middle-speed operation command/ remote setting deceleration	NET	External		NET	External			
		2	RH	High-speed operation command/ remote setting acceleration	NET	External		NET	External			
		3	RT	Second function selection	NET			External				
		4	AU	Terminal 4 input selection	—	Combined		—	Combined			
		5	JOG	Jog operation selection	—			External				
		6	CS	Selection of automatic restart after instantaneous power failure, flying start	External							
		7	OH	External thermal relay input	External							
		8	REX	15-speed selection	NET	External		NET	External		*Pr. 59* = "0" (multi-speed)	
		9	X9	Third function	NET			External				
		10	X10	Inverter run enable signal	External							
		11	X11	FR-HC connection, instantaneous power failure detection	External							
		12	X12	PU operation external interlock	External							

Control Location Selection					*Pr. 338 Communication operation command source* / *Pr. 339 Communication speed command source*	0:NET			1:External			Remarks
						0: NET	1: External	2: External	0: NET	1: External	2: External	
Selective functions	*Pr. 178 to Pr. 189* settings	13	X13	External DC injection brake operation is started		NET			External			
		14	X14	PID control valid terminal		NET	External		NET	External		
		15	BRI	Brake opening completion signal		NET			External			
		16	X16	PU-External operation switchover		External						
		17	X17	Load pattern selection forward rotation reverse rotation boost		NET			External			
		18	X18	V/F switchover		NET			External			
		19	X19	Load torque high speed frequency		NET			External			
		20	X20	S-pattern acceleration/deceleration C switching terminal		NET			External			
		22	X22	Orientation command		NET			External			
		23	LX	Pre-excitation		NET			External			
		24	MRS	Output stop		Combined			External			*Pr. 79* ≠ "7"
				PU operation interlock		External						*Pr. 79* = "7" When the X12 signal is not assigned
		25	STOP	Start self-holding selection		—			External			
		26	MC	Control mode switchover		NET			External			
		27	TL	Torque limit selection		NET			External			
		28	X28	Start time tuning		NET			External			
		37	X37	Traverse function selection		NET			External			
		42	X42	Torque bias selection 1		NET			External			
		43	X43	Torque bias selection 2		NET			External			
		44	X44	P/PI control switchover		NET			External			
		50	SQ	Sequence start		External and NET*			External			* The signal is valid when there are inputs from external terminals and NET.

Control Location Selection					*Pr. 338 Communication operation command source* / *Pr. 339 Communication speed command source*	0:NET			1:External			Remarks
						0: NET	1: External	2: External	0: NET	1: External	2: External	
Selective functions	*Pr. 178 to Pr. 189* settings	51	X51	Fault clear signal		Combined			External			
		60	STF	Forward rotation command		NET			External			
		61	STR	Reverse rotation command		NET			External			
		62	RES	Inverter reset		External						
		63	PTC	PTC thermistor input		External						
		64	X64	PID forward rotation action switchover		NET	External		NET	External		
		65	X65	PU/NET operation switchover		External						
		66	X66	External/NET operation switchover		External						
		67	X67	Command source switchover		External						
		68	NP	Conditional position pulse train sign		External						
		69	CLR	Conditional position droop pulse clear		External						
		70	X70	DC feeding operation permission		NET			External			
		71	X71	DC feeding cancel		NET			External			
		72	X72	PID integral value reset		NET	External		NET	External		
		74	X74	Magnetic flux decay output shutoff signal		NET			External			
		77	X77	Pre-charge end command		NET	External		NET	External		
		78	X78	Second pre-charge end command		NET	External		NET	External		

[Explanation of table]
External :Control by signal from external terminal is only valid.
NET :Control from network is only valid
Combined :Operation from either external terminal or communication is valid.
— :Operation from either external terminal or computer is invalid.
Compensation :Control by signal from external terminal is only valid if *Pr. 28 Multi-speed input compensation* setting is "1".

REMARKS

- The *Pr. 338* and *Pr. 339* settings can be changed while the inverter is running when *Pr. 77* = 2. Note that the setting change is applied after the inverter has stopped. Until the inverter has stopped, communication operation command source and communication speed command source before the setting change are valid.
- Available signals vary with the inverter. Refer to *the Instruction Manual of the inverter* for the details.

4.3.1 Communication EEPROM write selection (Pr. 342)

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

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

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

REMARKS

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

4.4 Operation at communication error occurrence

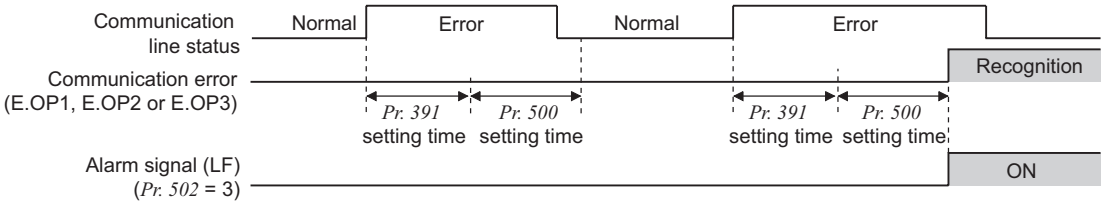
4.4.1 Operation selection at communication error occurrence (Pr. 500 to Pr. 502)

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

(1) Waiting time for the communication line error output after a communication error

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

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



When a communication line error occurs and lasts longer than the time set in *Pr. 500*, it is recognized as a communication error.

If the communication returns to normal within the time, it is not recognized as a communication error, and the operation continues.

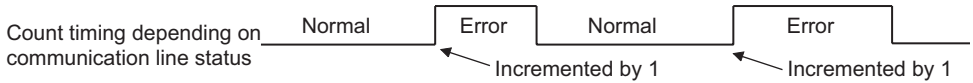
REMARKS

- For detection of communication error, set the heartbeat receive time interval (*Pr. 391*) and set the send time interval from the other node shorter than the heartbeat receive time interval.
  When data is not received for more than the heartbeat receive time interval after the first reception, it is considered as a communication line error, then "option fault (E.OP1, E.OP2 or E.OP3)" is displayed and the inverter stops.
  (Refer to page 103.)

(2) Displaying and clearing the communication error count

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

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



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

CAUTION

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

(3) Inverter operation at a communication error occurrence

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

Parameter Number	Name	Setting Range	Description
502	Stop mode selection at communication error	0 (initial value), 1, 2, 3	Refer to *page 29*
779 *	Operation frequency during communication error	0 to 400Hz	Motor runs at the specified frequency at a communication error.
		9999 (initial value)	Motor runs at the frequency used before the communication error.

* The setting is available for the FR-F700P (FR-F700-NA) series inverters.

About setting

●Operation at an error occurrence

Error Definition	*Pr. 502* Setting	Operation	Indication	Fault Output
Communication line	0	Continued *	Normal indication *	Not provided *
	1			
	2			
	3			
Communication option itself	0, 3	Coast to stop	E. 1, E. 2 or E. 3 lit	Provided
	1, 2	Decelerated to stop	E. 1, E. 2 or E. 3 lit after stop	Provided after stop

* When the communication returns to normal within the time period set in *Pr. 500*, the communication option error (E.OP1, E.OP2 or E.OP3) does not occur.

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

Error Definition	*Pr. 502* Setting	Operation	Indication	Fault Output
Communication line	0	Coast to stop	E.OP1, E.OP2 or E.OP3 lit	Provided
	1	Decelerated to stop	E.OP1, E.OP2 or E.OP3 lit after stop	Provided after stop
	2			Not provided
	3	Continued *	Normal indication	
Communication option itself	0, 3	Coast to stop	E. 1, E. 2 or E.3 lit	Provided
	1, 2	Decelerated to stop	E. 1, E. 2 or E.3 lit after stop	Provided after stop

* The FR-F700P (FR-F700-NA) series inverters operate according to the *Pr.779* setting.

●Operation at error removal

Error Definition	*Pr. 502* Setting	Operation	Indication	Fault Output
Communication line	0	Kept stopped	E.OP1, E.OP2 or E.OP3 kept lit	Kept provided
	1			
	2	Restart	Normal indication	Not provided
	3	Operates normally		
Communication option itself	0, 3	Kept stopped	E. 1, E. 2 or E.3 kept lit	Kept provided
	1, 2			

CAUTION

- **Communication line error [E.OP1 (fault data: HA1), E.OP2 (fault data: HA2) and E.OP3 (fault data: HA3)] are errors that occur on the communication line. Communication option error [E. 1 (fault data: HF1), E. 2 (fault data: HF2) and E. 3 (fault data: HF3)] are errors that occur in the communication circuit inside the option.**
- **Fault output indicates the fault output signal (ALM signal) and fault bit output.**
- **When the fault output setting is active, fault records are stored in the faults history.**
  When the fault output setting is not active, fault record is overwritten to the faults history temporarily but not stored.
  After the error is removed, the fault indication is reset, changing the display back to normal, and the last fault is displayed in the faults history.
- **When the *Pr. 502* setting is "1" or "2", the deceleration time is the ordinary deceleration time setting (e.g. *Pr. 8*, *Pr. 44*, *Pr. 45*).**
- **The acceleration time at a restart is the ordinary acceleration time setting (e.g. *Pr. 7*, *Pr. 44*).**
- **When the *Pr. 502* setting is "2", the operation/speed command at a restart is the one given before the error occurrence.**
- **When a communication line error occurs at the *Pr. 502* setting of "2", removing the error during deceleration causes acceleration to restart at that point. (Acceleration is not restarted if the error is that of the option unit itself.)**

4.4.2 Fault and measures

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

Fault Location	Status		Operation Mode		
			Network Operation	External Operation	PU Operation
Inverter	Inverter operation		**Inverter trip**	Inverter trip	Inverter trip
	Data communication		**Continued**	Continued	Continued
Communication line	Inverter operation		**Inverter trip** *	Continued	Continued
	Data communication		**Stop**	Stop	Stop
Communication option	Communication option connection error	Inverter operation	**Inverter trip** *	Inverter trip *	Inverter trip *
		Data communication	**Continued**	Continued	Continued
	Error of communication option itself	Inverter operation	**Inverter trip** *	Continued	Continued
		Data communication	**Stop**	Stop	Stop

* Depends on the *Pr. 502* setting.

(2) Measures at error occurrences

Fault Indication	Error Definition	Measures
E.OP1, E.OP2, E.OP3	Communication line error	Check the LED status on the option unit and remove the cause of the fault. (Refer to *page 5* for LED indication status) Check the other nodes on the network. Inspect the master.
E.1, E.2, E.3	Option fault	Check the connection between the inverter and option unit for poor contact, etc. and remove the cause of the error. Mount the communication option to the bottom connector.

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

4.5 Inverter reset

(1) Operation conditions of inverter reset

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

Resetting Method			Operation Mode		
			Network Operation	External Operation	PU Operation
Reset from the network	Inverter reset (Command request network variable) *(Refer to page 79)* *1		Enabled	Disabled	Disabled
	Error reset at inverter fault (Inverter input signal network variable) *(Refer to page 60)* *2	*Pr.349* = 0	Enabled	Enabled	Enabled
		Pr.349 = 1		Disabled	Disabled
Turn ON the inverter RES signal (terminal RES)			Enabled	Enabled	Enabled
Switch OFF inverter power			Enabled	Enabled	Enabled
Reset from the PU/DU	Inverter reset		Enabled	Enabled	Enabled
	Reset at inverter fault		Enabled	Enabled	Enabled

*1 Inverter reset can be made any time.
*2 Reset can be made only when the protective function of the inverter is activated.

CAUTION

- **When a communication line error has occurred, reset cannot be made from the network.**
- **The inverter is set to the External operation mode if it has been reset in Network operation mode in the initial status.**
  To resume the network operation, the inverter must be switched to the Network operation mode again.
  Set a value other than "0" in *Pr. 340* to start in the Network operation mode. *(Refer to page 19.)*
- **The inverter cannot be controlled for about 1s after release of a reset command .**

(2) Error reset operation selection at inverter fault

When used with the communication option (FR-A7NL), an error reset command* from network can be set invalid in the External operation mode or PU operation mode.

Parameter Number	Name	Initial Value	Setting Range	Function
349	Communication reset selection	0	0	Error reset* is enabled independently of operation mode
			1	Error reset* is enabled only in the network operation mode

* nviInvAlarmReset *(Refer to page 60.)*

4.6 Frequency and speed settings

Frequency setting, monitoring, and parameter setting via FR-A7NL are always performed in 0.01Hz increments regardless of the *Pr. 37 Speed display* setting.
The set speed and monitored values via FR-A7NL are converted to rotations per minute according to the *Pr. 144 Speed setting switchover* setting as shown below.

Speed or monitored value (1r/min) = frequency × 120/number of motor poles (*Pr.144**)

∗ When *Pr. 144* = "102 to 110," the formula is calculated with the value of (*Pr.144* - 100). When *Pr. 144* = "0", the formula is calculated with 4 poles.

REMARKS

· Refer to *the Instruction Manual of the inverter* for the details of *Pr.37* and *Pr.144.*

5 FUNCTION OVERVIEW

5.1 XIF file

Using the configuration software, network setting is easily done.
To use the configuration software, an XIF file is necessary. XIF file is used to recognize device features and functions. For details of installation and XIF file usage, refer to *the configuration software manual*.

XIF file can be downloaded from
Mitsubishi Electric FA Network Service MELFANS web
http://www.MitsubishiElectric.co.jp/melfansweb or obtained from your sales representative.

CAUTION

- Check the manufactured date of your FR-A7NL, and use the appropriate XIF file. (For how to find the SERIAL number (manufactured date), *refer to page 2*.) An incorrect XIF file will disrupt normal operation. For details, refer to MELFANS web or contact your sales representative.
- Since memory for write enable application is not installed in the inverter, Mitsubishi does not provide application files (file extensions such as .nxe, .apb).

5.2 Output from the inverter to the network

Main items to be output from the inverter (FR-A7NL) to the network and their descriptions are explained below.

Item	Description	Refer to Page
Object status	You can check the condition of the node.	*48*
Speed monitor	You can monitor the output frequency in 0.005% increments.	*51*
Inverter output signal	You can monitor the output terminal status of the inverter.	*53*
Output frequency monitor	You can monitor the output frequency in 0.1/0.01Hz or 0.005% increments.	*56, 57, 78*
Output current monitor	You can monitor the output current in 0.1A increments.	*58*
Output voltage monitor	You can monitor the output voltage in 0.1V increments.	*58*
Actual operation time monitor	You can monitor the actual operation time of the inverter.	*58*
Cumulative power monitor	You can monitor the cumulative power of the inverter.	*59*
Fault occurrence definition	At inverter fault occurrence, you can confirm the fault definition.	*61*
Product information	You can output the maker name and type as a character string.	*64*
Emergency stop status	You can confirm the emergency stop status of the inverter.	*66*
Fault status	You can check whether the inverter is in the fault status or not.	*67*
Monitor data	You can check the monitor value corresponding to the monitor code set.	*77*
Command reply	You can check the replies to command requests, such as operation mode selection, parameter write, and inverter reset, from the inverter in ASCII code.	*86*

Item	Description	Refer to Page
Command reply (binary)	You can check the replies to command requests, such as operation mode selection, parameter write, and inverter reset, from the inverter in binary code. A command reply in binary code requires less communication data amount than a command reply in ASCII code does.	*87*

REMARKS

· Refer to *the Instruction Manual of the inverter* for functions controllable from the network in each operation mode.

5.3 Input from the network to the inverter

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

Item	Description	Refer to Page
Object request	You can make a request to know the object status.	*47*
Start and stop/simple speed setting	You can perform start/stop and simple frequency setting.	*49*
Speed adjustment	You can perform frequency setting in 0.005% increments.	*50*
Inverter input signal	You can execute functions assigned to the inverter input terminals.	*52*
Set frequency write destination selection	You can select either of RAM or EEPROM as the write destination of set frequencies.	*54*
Set frequency	You can set the set frequency in 0.1/0.01Hz or 0.005% increments.	*55, 78*
Fault reset	You can reset the inverter at an inverter fault occurrence.	*60*
Emergency stop command	You can make an emergency stop of the inverter.	*65*
PID set point	You can input the set point for PID control.	*69*
PID measured value	You can input the current measured value for PID control.	*70*
PID deviation	You can input the current deviation for PID control.	*71*
Monitor code	You can input a code to select a monitor type.	*72*
Command request	You can make command requests, such as operation mode selection, parameter write, inverter reset, to the inverter in ASCII code.	*79*
Command request (binary)	You can make command requests, such as operation mode selection, parameter write, or inverter reset, to the inverter in binary code. A command request in binary code requires less communication data amount than a command request in ASCII code does.	*80*

Item	Description	Refer to Page
Initial communication delay time	You can set the time from when the inverter starts until when data is sent to the network.	*89*
Forward/reverse rotation prevention	You can prevent rotation in the wrong direction.	*90*
% setting reference frequency	You can set the reference frequency of set frequency (nviInvSetFreqP) and output frequency (nvoInvOutFreqP).	*91*
Maximum frequency	You can set the maximum frequency of the inverter.	*92*
Minimum frequency	You can set the minimum frequency of the inverter.	*92*
Heartbeat send time interval	You can set the heartbeat send time interval of output network variables.	*93*
Minimum heartbeat send time	You can set the minimum heartbeat send time of output network variables.	*93*
Acceleration time	You can set the motor acceleration time.	*96*
Deceleration time	You can set the motor deceleration time.	*97*
PID action selection	You can choose the operation of PID control.	*98*
PID proportional band	You can set the proportional band for PID control.	*100*
PID integral time	You can set the integral time for PID control.	*100*
PID differential time	You can set the differential time for PID control.	*101*
PID manipulated bias	You can set the manipulated variable at 0%.	*101*
PID manipulated gain	You can set the manipulated variable at 100%.	*102*
Heartbeat receive time interval	You can set the heartbeat receive time interval of input network variables.	*103*
Maximum speed	You can set the maximum speed of the inverter.	*105*
Minimum speed	You can set the minimum speed of the inverter.	*105*
Reference speed setting	You can set the reference speed of maximum speed, minimum speed, speed adjustment, speed monitor.	*106*

Item	Description	Refer to Page
Reference frequency setting	You can set the reference frequency of maximum speed, minimum speed, speed adjustment, speed monitor.	*107*
Default value of speed adjustment	You can set the default value of speed adjustment.	*107*
Event driven detection width	You can set the event driven detection width of the monitor-related output network variables.	*108*

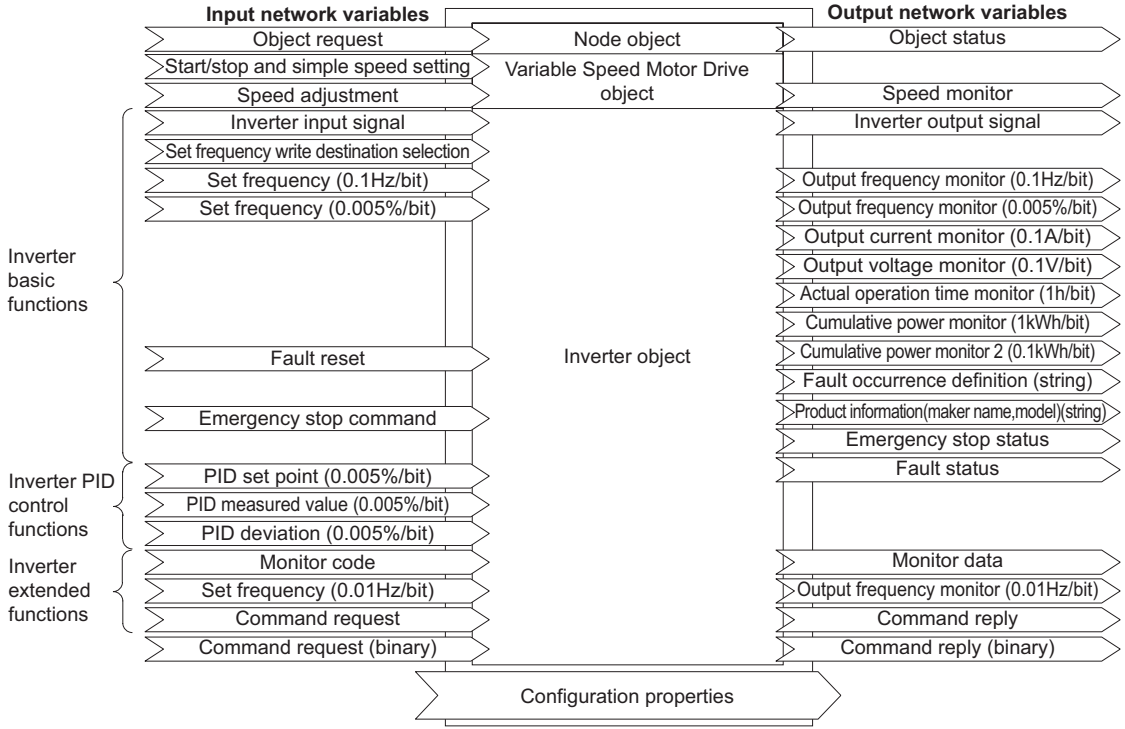
REMARKS

· Refer to *the Instruction Manual of the inverter* for functions controllable from the network in each operation mode.

6 NETWORK VARIABLES

6.1 Object map

This chapter describes detailed object definitions for use of LONWORKS system.



6.2 Network variable list

No.	Type *4	Function	Network Variables		In/ Out	Setting Value Storage Location	Size (byte)	Initial Value	Refer to Page
			Variables	Name					
1	SN	Object request	SNVT_obj_request	nviRequest	In	—	3	H0	47
2	SN	Object status	SNVT_obj_status	nvoStatus	Out		6	H0	48
3	SN	Start/stop and simple speed setting	SNVT_switch	nviDrvSpeedStpt	In		2	state=HFF value=0	49
4	SN	Speed adjustment	SNVT_lev_percent	nviDrvSpeedScale	In		2	100.00%	50
5	SN	Speed monitor	SNVT_lev_percent	nvoDrvSpeed	Out		2	0.000%	51
6	SN	Inverter input signal	SNVT_state	nviInvInputSig	In		2	0	52
7	SN	Inverter output signal	SNVT_state	nvoInvOutputSig	Out		2	H8000	53
8	SN	Set frequency write destination selection	SNVT_switch	nviInvSetFreqSw	In		2	state=H0 value=0	54
9	SN	Set frequency (0.1Hz/bit) *1	SNVT_freq_hz	nviInvSetFreq	In	RAM/ EEPROM of the inverter	2	H7FFF	55
10	SN	Set frequency (0.005%/bit)	SNVT_lev_percent	nviInvSetFreqP	In		2	100.00%	55
11	SN	Output frequency monitor (0.1Hz/bit) *1	SNVT_freq_hz	nvoInvOutFreq	Out	—	2	0.0Hz	56
12	SN	Output frequency monitor (0.005%/bit)	SNVT_lev_percent	nvoInvOutFreqP	Out		2	0.000%	57
13	SN	Output current monitor (0.1A/bit) *1	SNVT_amp	nvoDrvCurnt	Out		2	0.0A	58
14	SN	Output voltage monitor (0.1V/bit) *1	SNVT_volt	nvoDrvVolt	Out		2	0.0V	58
15	SN	Actual operation time monitor (1 h/bit)	SNVT_time_hour	nvoDrvRunHours	Out	EEPROM of the inverter	2	0h	58
16	SN	Cumulative power monitor(1kWh/bit)	SNVT_elec_kwh	nvoDrvRunPower	Out		2	0kWh	59

No.	Type *4	Function	Network Variables		In/ Out	Setting Value Storage Location	Size (byte)	Initial Value	Refer to Page
			Variables	Name					
17	SN	Fault reset	SNVT_switch	nviInvAlarmReset	In	—	2	state=H0 value=H0	60
18	SN	Fault occurrence definition (string)	SNVT_str_asc	nvoInvAlarmStr	Out		31	0	61
19	SN	Product information (maker name, type) (string)	SNVT_str_asc	nvoInvTypeInfo	Out		31	MITSUBISHI FR-A7NL	64
20	SN	Emergency stop command	SNVT_hvac_emerg	nviEmergOverride	In		1	H0	65
21	SN	Emergency stop status	SNVT_hvac_emerg	nvoEmergStatus	Out		1	H0	66
22	SN	Fault status	SNVT_switch	nvoDrvAlarm	Out		2	state=H0 value=H0	67
23	SN	PID set point (0.005%/bit)	SNVT_lev_percent	nviInvPIDTarget	In		2	0.000%	69
24	SN	PID measured value (0.005%/bit)	SNVT_lev_percent	nviInvPIDValue	In		2	0.000%	70
25	SN	PID deviation (0.005%/bit)	SNVT_lev_percent	nviInvPIDDev	In		2	0.000%	71
26	SN	Monitor code	SNVT_count	nviInvMonCode	In		2	0	72
27	SN	Monitor data	SNVT_count	nvoInvMonData	Out		2	0	77
28	SN	Set frequency (0.01Hz/bit)	SNVT_count	nviInvSetFreq2	In	RAM/ EEPROM of the inverter	2	0.00Hz	78
29	SN	Output frequency monitor (0.01Hz/bit)	SNVT_count	nvoInvOutFreq2	Out	—	2	0.00Hz	78
30	SN	Command request	SNVT_str_asc	nviInvCmdReq	In		31	0	79
31	SN	Command reply	SNVT_str_asc	nvoInvCmdReply	Out		31	0	86
32	SC	Initial communication delay time (0.1s/bit)	SNVT_time_sec	nciPwUpOutTm	In	Pr. 387	2	0s	89

No.	Type *4	Function	Network Variables		In/ Out	Setting Value Storage Location	Size (byte)	Initial Value	Refer to Page
			Variables	Name					
33	SC	Forward/reverse rotation prevention	SNVT_count	nciInvFwdRevLock	In	*Pr. 78*	2	*2	*90*
34	SC	% set reference frequency (0.1Hz/bit) *1	SNVT_freq_hz	nciInvSetFreqBas	In	*Pr. 390*	2	60Hz <50Hz> *3	*91*
35	SC	Maximum frequency (0.1Hz/bit) *1	SNVT_freq_hz	nciInvMaxFreq	In	*Pr. 1*	2	*2	*92*
36	SC	Minimum frequency (0.1Hz/bit) *1	SNVT_freq_hz	nciInvMinFreq	In	*Pr. 2*	2	*2	*92*
37	SC	Heartbeat send time interval (0.1s/bit)	SNVT_time_sec	nciSndHrtBt	In	*Pr. 388*	2	0	*93*
38	SC	Minimum heartbeat send time (0.1s/bit)	SNVT_time_sec	nciMinOutTm	In	*Pr. 389*	2	0.5s	*93*
39	SC	Acceleration time (0.1s/bit)	SNVT_time_sec	nciRampUpTm	In	*Pr. 7*	2	*2	*96*
40	SC	Deceleration time (0.1s/bit)	SNVT_time_sec	nciRampDownTm	In	*Pr. 8*	2	*2	*97*
41	SC	PID action selection	SNVT_count	nciInvPIDSwitch	In	*Pr. 128*	2	*2	*98*
42	SC	PID proportional band (0.1%/bit)	SNVT_count	nciInvPIDPro	In	*Pr. 129*	2	*2	*100*
43	SC	PID integral time (0.1s/bit)	SNVT_time_sec	nciInvPIDIntTm	In	*Pr. 130*	2	*2	*100*
44	SC	PID differential time (0.1s/bit) *1	SNVT_time_sec	nciInvPIDDiffTm	In	*Pr. 134*	2	*2	*101*
45	SC	PID manipulated variable bias (0.1Hz/bit) *1	SNVT_freq_hz	nciInvPIDOpeBias	In	*C2 (Pr. 902)*	2	*2	*101*
46	SC	PID manipulated variable gain (0.1Hz/bit) *1	SNVT_freq_hz	nciInvPIDOpeGain	In	*Pr.125 (Pr. 903)*	2	*2	*102*
47	SC	Heartbeat receive time interval (0.1s/bit)	SNVT_time_sec	nciRcvHrtBt	In	*Pr. 391*	2	0s	*103*
48	SC	Maximum speed (0.005%/bit)	SNVT_lev_percent	nciMaxSpeed	In	*Pr. 1*	2	*2	*105*
49	SC	Minimum speed (0.005%/bit)	SNVT_lev_percent	nciMinSpeed	In	*Pr. 2*	2	*2	*105*

No.	Type *4	Function	Network Variables		In/ Out	Setting Value Storage Location	Size (byte)	Initial Value	Refer to Page
			Variables	Name					
50	SC	Reference speed setting (1r/min/bit)	SNVT_rpm	nciNmlSpeed	In	*Pr. 390*	2	1800r/min <1500r/min> *3	*106*
51	SC	Reference frequency setting (0.1Hz/bit) *1	SNVT_freq_hz	nciNmlFreq	In	*Pr. 390*	2	60Hz <50Hz> *3	*107*
52	SC	Speed adjustment default value	SNVT_lev_percent	nciDrvSpeedScale	In	—	2	100.00%	*107*
53	SC	Event driven detection width (0.005%/bit)	SNVT_lev_percent	nciInvEvtDuty	In	*Pr. 392*	2	0%	*108*
54	SN	Cumulative power monitor 2 (0.1kWh/bit)	SNVT_elec_kwh_l	nvoDrvRunPower_l	Out	EEPROM of the inverter	4	0kWh	*60*
55	SN	Command request (binary)	SNVT_preset	nviInvCmdBinReq	In	—	14	0	*80*
56	SN	Command reply (binary)	SNVT_preset	nvoInvCmdBinRply	Out	—	14	0	*87*
57 to 62	System reserved								

*1 Displayed in 0.01 increments on the operation panel (FR-DU07).

*2 Refer to *the Instruction Manual of the inverter* for the corresponding parameter initial values.

*3 Values within parenthesis are initial values for EC and CH versions.

*4 SN denotes "SNVT" (standard network variable). SC denotes "SCPT" (configuration property).

REMARKS

- Write conditions of configuration property is same as those of the inverter parameter. Write conditions are restricted by *Pr. 77 Parameter write selection*. When writing to configuration property during inverter operation, set "2" in *Pr. 77*. Refer to *the Instruction Manual of the inverter* for details of *Pr. 77*.

6.3 LONWORKS object

6.3.1 Setting range of object ID

The setting values of object ID are 0 to 4 and are as listed below.
When any values 5 to 65535 are set for object ID, invalid_id bit of object status (nvoStatus) becomes 1 and a command set for object request is made invalid. *(Refer to page 48)*

Object ID	Description
0	Node object
1	Variable speed motor drive object [LONMARK object]
2	Inverter basic function
3	Inverter PID control function
4	Inverter extended function

6.3.2 Object request (network input SNVT_obj_request nviRequest)

You can make a request to get the object status.

Member Name		Description		Initial Value
object_id		Stores the object ID.		H0
object_request	H0	RQ_NORMAL	In external operation mode *3, it shifts to the network operation mode.	
	H1	RQ_DISABLED	Makes the inverter object invalid.	
	H2	RQ_UPDATE_STATUS	Update object status (nvoStatus).	
	H3	RQ_SELF_TEST	Not supported.*1	
	H4	RQ_UPDATE_ALARM	Updates in_alarm bit of the object status (nvoStatus).	
	H5	RQ_REPORT_MASK	Changes bit (invalid_id, invalid_request, disabled, manual_control, in_alarm, in_override, report_mask) supported by object status (nvoStatus) to "1".	
	H6	RQ_OVERRIDE	Not supported.*1	
	H7	RQ_ENABLE	Makes the inverter object valid.	
	H8	RQ_RMV_OVERRIDE	Not supported.*1	
	H9	RQ_CLEAR_STATUS	Clears all bits of the object status (nvoStatus) to "0".	
	HA	RQ_CLEAR_ALARM	Clears in_alarm bit of object status (nvoStatus) to "0".*2	
	HB	RQ_ALARM_NOTIFY_ENABLED	Not supported. *1	
	HC	RQ_ALARM_NOTIFY_DISABLED		
	HD	RQ_MANUAL_CTRL	Shifts the inverter to the external operation mode.	
	HE	RQ_REMOTE_CTRL	Shifts the inverter to the network operation mode.	
	HF	RQ_PROGRAM	Not supported.*1	
	HFF	RQ_NUL	Nothing is done.	
	—	Other than the above	Not supported. *1	

*1 Changes the invalid_request of the object status (nvoStatus) to "1" when data is set. *(Refer to page 48)*

*2 Use fault reset (nviInvAlarmReset) to reset the fault status of the inverter *(Refer to page 60.)*

*3 Can also be switched from switchover mode.
(For details of switchover mode, refer to *the Instruction Manual of the inverter.*)

6.3.3 Object status (network output SNVT_obj_status nvoStatus)

You can indicate the condition of the node.

Member Name	Description	Initial Value
object_id	The setting value of object request (nviRequest) written to object_id is displayed.	H0
invalid_id	Changes to "1" if an illegal object ID is specified in object_id of the object request (nviRequest),	
invalid_request	Changes to "1" if object_request not supported by the object request (nviRequest) is set.	
disabled	Changes to "1" if the object of the inverter is invalid.	
out_of_limits	Not supported. *	
open_circuit		
out_of_service		
Mechanical_fault		
feedback_failure		
over_range		
under_range		
electrical_fault		
unable_to_measure		
comm_failure		
fail_self_test		
self_test_in_progress		
locked_out		
manual_control	Changes to "1" if the operation mode of the inverter is other than the network operation mode.	
in_alarm	Changes to "1" during the inverter is in the fault status.	
in_override	Changes to "1" if the operation mode of the inverter is network operation mode and run command and speed command are not given via the network.	
report_mask	Not supported. *	
programming_mode		
programming_fail		
alarm_notify_disabled		

* "0" is always set in the unsupported functions bit position.

6.4 Variable speed motor drive object

6.4.1 Start/stop and simple speed setting (network input SNVT_switch nviDrvSpeedStpt)

You can set "start/stop" and "simple setting of set frequency".

- Set start/stop in state.
  The rotation direction (forward/reverse rotation) is determined by whether "speed adjustment (nviDrvSpeedScale)" is positive or negative. *(Refer to page 50)*
- Set simple speed setting in value.
  As the set frequency, set its ratio to "speed adjustment (nviDrvSpeedScale)" (0.5% increments).

nviDrvSpeedStpt		Operation *	
State	Value	nviInvSetFreq = "H7FFF"	nviInvSetFreq = "0Hz to 400Hz"
H0	NA	Stop	
H1	0 (initial value)	Run at a 0% frequency.	
	0.5 to 100%	Run at a 0.5 to 100% frequency. (nciNmlFreq × nviDrvSpeedStpt × nviDrvSpeedScale)	Run at an nviInvSetFreq frequency.
H2 to HFF (initial value: HFF)	NA	No operation	

* Operation of nviDrvSpeedStpt differs according to nviInvSetFreq. *(Refer to page 55)*

REMARKS

- The variable is initialized to "HFF" at power-on or if it is not updated at the "heartbeat receive time interval (nciRcvHrtBt)" *(refer to page 103)*.
- The inverter operates at 100% frequency even if the value exceeding "100%" is set when state = "H1".
- Updating nviDrvSpeedScale resets the start command depending on the state of nviDrvSpeedStpt.

6.4.2 Speed adjustment (0.005% increments) (network input SNVT_lev_percent nviDrvSpeedScale)

You can set the set frequency in 0.005% increments on the assumption that the frequency set in "reference frequency setting (nciNmiFreq) is 100%. *(Refer to page 107)*

- When the state of nviDrvSpeedStpt is H1, the motor is placed in forward rotation status if nviDrvSpeed Scale value is positive and placed in reverse rotation status if the value is negative.
- When state of nviDrvSpeedStpt is H0, the motor is at a stop status.

Data Name	Initial Value	Range	Increments
nviDrvSpeedScale	100.00% (NciDrvSpeedScale value) *(Refer to page 107)*	-163.840% to 163.830%	0.005%/bit

- Data acceptance timing ..... At network variable receive (nv_update_occurs event)

The frequency to be written to the inverter actually is as shown in the following formula.

Set frequency = | (reference frequency setting × speed adjustment × simple speed setting) |

Example:
When "Simple speed setting (nviDrvSpeed Stpt.value)" = 50%, "Reference frequency setting (nciNmlFreq)" = 60.0Hz, and "Speed adjustment (nviDrvSpeedScale)" = -150%, output frequency is (60.00Hz × (-150%) × 50%) = -45Hz. Therefore, a reverse command of 45Hz is given.

REMARKS

- The variable is initialized to "100.00%" at power-on or if it is not updated within the set "heartbeat receive time interval (nciRcvHrtBt)". *(Refer to page 103)*
- Control can not be exercised at less than the minimum frequency resolution (0.01Hz) of the inverter.
- To make the change of "reference frequency setting (nciNmlFreq)" reflected to the operation speed, a value is need to be written to speed adjustment (nviDrvSpeedScale)

6.4.3 Speed monitor (0.005% increments) (network output SNVT_lev_percent nvoDrvSpeed)

You can set the frequency command in 0.005% increments on the assumption that the frequency set in "reference frequency setting (nciNmiFreq)" is 100%. *(Refer to page 107)*

· A positive value indicates the motor is in the forward rotation status and a negative value indicates that the motor is in the reverse rotation status.

Data Name	Initial Value	Range	Increments
nvoDrvSpeed	0.000%	-163.840% to 163.830%	0.005%/bit

· Data send event ..... When data changes in 0.005% increments
· Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

Output frequency is as shown in the following formula.

Output frequency = | (reference frequency setting × speed monitor × simple speed setting) *|

* Refer to *page 107* for reference frequency setting and *page 49* for simple speed setting.

Example:
When "reference frequency setting (nciNmlFreq)" = 60.0Hz and "speed setting monitor (nvoDrvSpeed)" = -150%, "simple speed setting (nviDrvSpeedStpt.value)" = 50%, output frequency is (60.0Hz × (-150%) × 50%) = -45Hz.
Therefore, a reverse rotation of 45Hz is given.

REMARKS

· Monitoring is disabled at less than the minimum frequency resolution (0.01Hz) of the inverter.

6.5 Inverter basic functions

6.5.1 Inverter input signal (network input SNVT_state nviInvInputSig)

A 16-bit-wide input signal to the inverter.

- The initial value of all bits are "0".
- Data acceptance timing ..... At network variable receive (nv_update_occurs event)

Bit	Signal Name	Description	
0	Forward rotation command *2	0: Stop command 1: Forward rotation start	A start command is input to the inverter when the bit is 1.
1	Reverse rotation command *2	0: Stop command 1: Reverse rotation start	A stop command is given when both bits are 1.
2	High-speed operation command (terminal RH function) *1	Functions assigned to terminals RH, RM, RL, JOG, RT, AU, CS, MRS, STOP, and RES are activated.	
3	Middle-speed operation command (terminal RM function) *1		
4	Low-speed operation command (terminal RL function) *1		
5	JOG operation command (terminal JOG function) *1		
6	Second function selection (terminal RT function) *1		
7	Current input selection (terminal AU function) *1		
8	Selection of automatic restart after instantaneous power failure (terminal CS function) *1		
9	Output stop (terminal MRS function) *1		
10	Start self-holding selection (terminal STOP function) *1		
11	Inverter reset (RES terminal function) *1		
12 to 15	Not used	System reserved	

*1 Signal names are initial values. Using *Pr. 180* to *Pr .189*, you can change input signal functions. Note that some of signals do not accept a command from the network according to the *Pr. 338* and *Pr. 339* settings. *(Refer to page 23)* Refer to *the Instruction Manual of the inverter* for details of *Pr. 180* to *Pr. 189*.

*2 The signals set in Bit 0 and Bit 1 cannot be changed. Even if a setting is changed with *Pr. 178* or *Pr. 179*, the changed setting becomes invalid. Refer to *the Instruction Manual of the inverter* for the details of *Pr. 178* and *Pr. 179*

6.5.2 Inverter output signal (network output SNVT_state nvoInvOutputSig)

A 16-bit-wide output signal to the inverter.

· Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

Bit	Signal Name	Description
0	During forward running	0: Other than during forward running (during stop, during reverse running) 1: During forward running
1	During reverse running	0: Other than during reverse running (during stop, during forward running) 1: During reverse running
2	During running (terminal RUN function) *1	Functions assigned to terminals RUN, SU, OL, IPF, FU, ABC1 and ABC2 are activated.
3	Up to frequency (terminal SU function) *1	
4	Overload alarm (terminal OL function) *1	
5	Instantaneous power failure (terminal IPF function) *1	
6	Frequency detection (terminal FU function) *1	
7	Fault (terminal ABC1 function) *1	
8	— (terminal ABC2 function) *1	
9 to 13	Not used	System reserved
14	Error status flag	The bit is 1 when the output stops due to the occurrence of an inverter fault. *2
15	Ready signal	The bit is 1 when the inverter becomes ready for operation after power-ON.

*1 Signal names are initial values. Using *Pr. 190* to *Pr . 196*, you can change output signal functions. Refer to *the Instruction Manual of the inverter* for details of *Pr. 190* to *Pr. 196*.

*2 When the retry function is used, the signal turns on according to the retry setting. Refer to *the Instruction Manual of the inverter* for the retry function.

6.5.3 Set frequency write destination selection (network input SNVT_switch nviInvSetFreqSw)

When writing the set frequency of any of the following network variables, you can select either of the internal memories of the inverter, RAM and EEPROM, as the write destination.

Target network variables	Increment	Refer to page
nviInvSetFreq	0.1Hz	55
nviInvSetFreqP	0.005%	55
nviInvSetFreq2	0.01Hz	78

State	Value	Write Destination	Operation
H0 (initial value)	N/A (not used/initial value: 0)	RAM	Switching power OFF erases the written values. You can prevent the write life of the EEPROM from becoming shorter.
H1		RAM, EEPROM	Switching power OFF does not erase the written value.
H2 to HFF		—	Invalid

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

CAUTION

· **When changing the set frequency frequently, set "RAM write."**
With "write to EEPROM" being selected, frequent setting of the set frequency will shorten the life of the EEPROM.

6.5.4 Set frequency (0.1Hz increments) (network input SNVT_freq_hz nviInvSetFreq)

The set frequency can be set in 0.1Hz increments.

Data Name	Initial Value	Range	Increments
nviInvSetFreq	H7FFF	0.0Hz to 400.0Hz, H7FFF	0.1Hz/bit

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· When H7FFF is set, the set frequency is as set in "start/stop/simple speed setting (nviDrvSpeedStpt)". *(Refer to page 49)*
· H7FFF is not reflected as the actual set frequency value.
· Regardless of the *Pr. 37* setting, the value is always set in frequency (Hz).

6.5.5 Set frequency (0.005% increments) (network input SNVT_lev_percent nviInvSetFreqP)

You can monitor the output frequency of the inverter in 0.005% increments on the assumption that the frequency set in "% set reference frequency (nciInvSetFreqBas)" is 100%. *(Refer to page 91)*

Data Name	Initial Value	Range	Increments
nviInvSetFreqP	100.000%	0.000% to 163.830%	0.005%/bit

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

Example:
When "% set reference frequency (nciInvSetFreqBas)" = 60.0Hz and "set frequency (nviInvSetFreqP)" = 50.000%, set frequency = 60 × 0.5 = 30Hz.

REMARKS

· Control cannot be exercised at less than the minimum frequency resolution (0.01Hz) of the inverter.

6.5.6 Output frequency monitor (0.1Hz increments) (network output SNVT_freq_hz nvoInvOutFreq)

You can monitor the output frequency of the inverter in 0.1Hz increments.

Data Name	Initial Value	Range	Increments
nvoInvOutFreq	0.0Hz	0.0Hz to 400.0Hz	0.1Hz/bit

- Data send event ..... When data changes in 0.1Hz increments
- Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

REMARKS

- This variable is similar to "output frequency monitor (0.005% increments)" but may sometimes differ from it in data send timing since they are different in mutual resolution. *(Refer to page 57)*
- Regardless of the *Pr. 37* setting, the value is always displayed in frequency (Hz).

6.5.7 Output frequency monitor (0.005% increments) (network output SNVT_lev_percent nvoInvOutFreqP)

You can monitor the output frequency of the inverter in 0.005% increments on the assumption that the frequency set in "% set reference frequency (nciInvSetFreqBas) " is 100%. *(Refer to page 91.)*

Data Name	Initial Value	Range	Increments
nvoInvOutFreqP	0.000%	0.000% to 163.830%	0.005%/bit

· Data send event ..... When data changes in 0.005% increments
· Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93.)*

Example:
When inverter output frequency = 90.0Hz and % set reference frequency = 60.0Hz,

$\frac{90.0\text{Hz}}{60.0\text{Hz}} = 1.5$ Therefore, the monitoring value is 150.000%.

REMARKS

· Monitoring is disabled at less than the minimum frequency resolution (0.01Hz) of the inverter.
· This variable is similar to "output frequency monitor (0.1Hz increments)" but may sometimes differ from it in data send timing since they are different in mutual resolution. *(Refer to page 56)*

6.5.8 Output current monitor (0.1A increments) (network output SNVT_amp nvoDrvCurnt)

You can monitor the output current of the inverter in 0.1A increments.

Data Name	Initial Value	Range	Increments
nvoDrvCurnt	0.0A	0.0A to 3276.7A	0.1A/bit

- Data send event ..... When data changes in 0.1A increments
- Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93.)*

6.5.9 Output voltage monitor (0.1V increments) (network output SNVT_volt nvoDrvVolt)

You can monitor the output voltage of the inverter in 0.1V increments.

Data Name	Initial Value	Range	Increments
nvoDrvVolt	0.0V	0.0V to 3276.7V	0.1V/bit

- Data send event ..... When data changes in 0.1V increments
- Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

6.5.10 Actual operation time monitor (1h increments) (network output SNVT_time_hour nvoDrvRunHours)

You can monitor the actual operation time (cumulative inverter output time) of the inverter in 1h increments.

Data Name	Initial Value	Range	Increments
nvoDrvRunHours	0h	0 to 65534h	1h/bit

- Data send event ..... When data changes in 1h increments
- Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

6.5.11 Cumulative power monitor (1kWh increments) (network output SNVT_elec_kwh nvoDrvRunPower)

You can monitor the cumulative power of the inverter in 1kWh increments.
You can select monitoring data from either BCD code data or binary data according to *Pr. 170 Watt-hour meter clear*. The initial value is binary data. (For details of *Pr. 170*, refer to *the Instruction Manual of the inverter.*)

Data Name	Initial Value	*Pr. 170*	Range	Increments
nvoDrvRunPower	0kWh	10	0 to 9999kWh (BCD code data)	1kWh/bit *
		9999 (initial value)	0 to 65535kWh (binary data)	

* The digit of monitoring data shifts according to the *Pr. 891* setting. Refer to *the Instruction Manual of the inverter* for details of *Pr. 891*.

REMARKS

· When the numerical value exceeds the maximum value in the monitoring range, the value returns to 0 and is recounted from 0.

· Data send event ..... When data changes in 1kWh increments.
· Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

6.5.12 Cumulative power monitor 2 (0.1kWh increments) (network output SNVT_elec_kwh_l nvoDrvRunPower_l)

You can monitor cumulative power of the inverter in 32-bit data and 0.1kWh increments.

Data Name	Initial Value	Inverter Capacity	Range	Increments
NvoDrvRunPower_l	0kWh	55K or lower	0 to 42949672.9kWh	0.1kWh/bit
		75K or higher	0 to 214748364.6kWh	

Cumulative power monitor 2 is available for the FR-F700 (55K or lower) inverters manufactured in September 2004 or later and the FR-F700 (75K or higher) inverters manufactured in August 2004 or later. *(Refer to page 2)* (The inverter models 55K and 75K differ according to -NA and -EC versions. *Refer to page 1*.)

REMARKS

· If the value exceeds the maximum value of the monitor range, the value returns to 0 and is recounted from 0.

- Data send event ..... at data change in 0.1kWh increments
- Data send timing ..... depends on the settings of *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

6.5.13 Fault reset (network input SNVT_switch nviInvAlarmReset)

You can reset the inverter at inverter fault occurrence.

Data Name	Initial Value	Range		Operation
		state	value	
nviInvAlarmReset	H0	H0	Don't care (not used)	Without fault reset
		H1		Execute a fault reset.
		H2 to HFF		Invalid

· Data acceptance timing..... When network variables are being received and state = 1 (nv_update_occurs event)
· Setting "1" in *Pr. 349* disables the fault reset command in operations other than network operation.

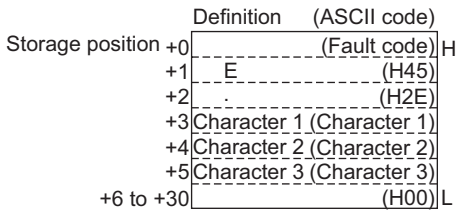
REMARKS

· You can reset the inverter at inverter fault occurrence. When the inverter is not during a fault, performing this operation does not reset the inverter.

6.5.14 Fault occurrence definition (network output SNVT_str_asc nvoInvAlarmStr)

At inverter fault occurrence, you can confirm the fault definition of the inverter with a character string.

- If an inverter fault occurs at power-on/inverter reset, data is not sent before the *Pr.387 Initial communication delay time* (nciPwUpOutTm) *(Refer to page 89).*
- The initial setting of +0 to +30 is 0.
- Data send timing ..... At inverter fault occurrence



Fault Code Correspondence Table

Definition	+0	+1	+2	+3	+4	+5	+6 to +30
	Fault Code	E	.	Character 1	Character 2	Character 3	
OC1	H10	E(H45)	.(H2E)	O(H4F)	C(H43)	1(H31)	
OC2	H11			O(H4F)	C(H43)	2(H32)	
OC3	H12			O(H4F)	C(H43)	3(H33)	
OV1	H20			O(H4F)	V(H56)	1(H31)	
OV2	H21			O(H4F)	V(H56)	2(H32)	
OV3	H22			O(H4F)	V(H56)	3(H33)	
THT	H30			T(H54)	H(H48)	T(H54)	
THM	H31			T(H54)	H(H48)	M(H4D)	
FIN	H40			F(H46)	I(H49)	N(H4E)	
IPF	H50			I(H49)	P(H50)	F(H46)	
UVT	H51			U(H55)	V(H56)	T(H54)	
ILF	H52			I(H49)	L(H4C)	F(H46)	
OLT	H60			O(H4F)	L(H4C)	T(H54)	
SOT	H61			S(H53)	O(HF4)	T(H54)	

Definition	+0	+1	+2	+3	+4	+5	+6 to +30
	Fault Code	E	.	Character 1	Character 2	Character 3	
BE	H70	E(H45)	.(H2E)	B(H42)	E(H45)	Space(H20)	
GF	H80			G(H47)	F(H46)	Space(H20)	
LF	H81			L(H4C)	F(H46)	Space(H20)	
OHT	H90			O(H4F)	H(H48)	T(H54)	
PTC	H91			P(H50)	T(H54)	C(H43)	
OPT	HA0			O(H4F)	P(H50)	T(H54)	
OP1	HA1			O(H4F)	P(H50)	1(H31)	
OP2	HA2			O(H4F)	P(H50)	2(H32)	
OP3	HA3			O(H4F)	P(H50)	3(H33)	
PE	HB0			P(H50)	E(H45)	Space(H20)	
PUE	HB1			P(H50)	U(H55)	E(H45)	
RET	HB2			R(H52)	E(H45)	T(H54)	
PE2	HB3			P(H50)	E(H45)	2(H32)	
CPU	HC0			C(H43)	P(H50)	U(H55)	
CTE	HC1			C(H43)	T(H54)	E(H45)	
P24	HC2			P(H50)	2(H32)	4(H34)	
CDO	HC4			C(H43)	D(H44)	O(H4F)	
IOH	HC5			I(H49)	O(H4F)	H(H48)	
SER	HC6			S(H53)	E(H45)	R(H52)	
AIE	HC7			A(H41)	I(H49)	E(H45)	
USB	HC8			U(H55)	S(H53)	B(H42)	
OS	HD0			O(H4F)	S(H53)	Space(H20)	
OSD	HD1			O(H4F)	S(H53)	D(H44)	
ECT	HD2			E(H45)	C(H43)	T(H54)	
OD	HD3			O(H4F)	D(H44)	Space(H20)	
MB1	HD5			M(H4D)	B(H42)	1(H31)	

Definition	+0	+1	+2	+3	+4	+5	+6 to +30
	Fault Code	E	.	Character 1	Character 2	Character 3	
MB2	HD6	E(H45)	.(H2E)	M(H4D)	B(H42)	2(H32)	
MB3	HD7			M(H4D)	B(H42)	3(H33)	
MB4	HD8			M(H4D)	B(H42)	4(H34)	
MB5	HD9			M(H4D)	B(H42)	5(H35)	
MB6	HDA			M(H4D)	B(H42)	6(H36)	
MB7	HDB			M(H4D)	B(H42)	7(H37)	
EP	HDC			E(H45)	P(H50)	Space(H20)	
E1	HF1			E(H45)	1(H31)	Space(H20)	
E2	HF2			E(H45)	2(H32)	Space(H20)	
E3	HF3			E(H45)	3(H33)	Space(H20)	
E4	HF4			E(H45)	4(H34)	Space(H20)	
E5	HF5			E(H45)	5(H35)	Space(H20)	
E6	HF6			E(H45)	6(H36)	Space(H20)	
E7	HF7			E(H45)	7(H37)	Space(H20)	
E8	HF8			E(H45)	8(H38)	Space(H20)	
E10	HFA			E(H45)	1(H31)	0(H30)	
E11	HFB			E(H45)	1(H31)	1(H31)	
E13	HFD			E(H45)	1(H31)	3(H33)	
E14	HFE			E(H45)	1(H31)	4(H34)	
E15	HFF			E(H45)	1(H31)	5(H35)	

* Value in parentheses is in ASCII code.

REMARKS

- Output faults vary by the inverter. Refer to *the Instruction Manual of the inverter* for the details.
- E14 will occur when the option cannot recognize fault definitions.

6.5.15 Product information (maker name, type) (network output SNVT_str_asc nvoInvTypeInfo)

When a fault occurs in the inverter, you can send the "maker name (MITSUBISHI)" and "model (FR-A7NL)" data as a character string (ASCII).

At power-ON or inverter reset, the data is sent after *Pr. 387 Initial communication delay time* (nciPwUpOutTm). *(Refer to page 89)*.

· Data send timing ..... At power-ON, at inverter reset, and at an inverter fault occurence

Storage position		Data (ASCII code)	
	+0	M	H
	+1	I	
	+2	T	
	+3	S	
	+4	U	
	+5	B	
	+6	I	
	+7	S	
	+8	H	
	+9	I	
	+10	(20H)	
	+11	F	
	+12	R	
	+13	-	
	+14	A	
	+15	7	
	+16	N	
	+17	L	
+18 to	+30	(00H)	L

6.5.16 Emergency stop command (network input SNVT_hvac_emerg nviEmergOverride)

You can give an emergency stop command during inverter operation.
If "EMERG_SHUTDOWN" is requested during inverter operation, the inverter decelerates to a stop in any operation mode.

Data Name	Initial Value	Range	Description
nviEmergOverride	H0	H0	EMERG_NORMAL Emergency stop cancel
		H4	EMERG_SHUTDOWN Emergency stop
		HFF	EMERG_NUL Invalid (no operation)

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

(1) Emergency Stop	(2) Emergency Stop Cancel
· The deceleration time depends on the *Pr. 8*, *Pr. 44,* and other settings. · When the inverter starts decelerating under the emergency stop command, " PS " appears in the display section of the operation panel (FR-DU07) and the inverter is put in an emergency stop status. · An emergency stop status cannot be canceled unless emergency stop cancel operation is performed. · During occurrence of a communication line error, an emergency stop command is not accepted. · During an inverter stop, an emergency stop command is invalid.	· During an inverter stop, turn OFF all start commands (forward rotation command, reverse rotation command) and request "EMERG_NORMAL". When the inverter recognizes this status, it cancels the emergency stop and also " PS " appears in the display section disappears. · During deceleration made under an emergency stop command, performing emergency stop cancel operation will not cancel an emergency stop immediately. Perform emergency stop cancel operation during an inverter stop.

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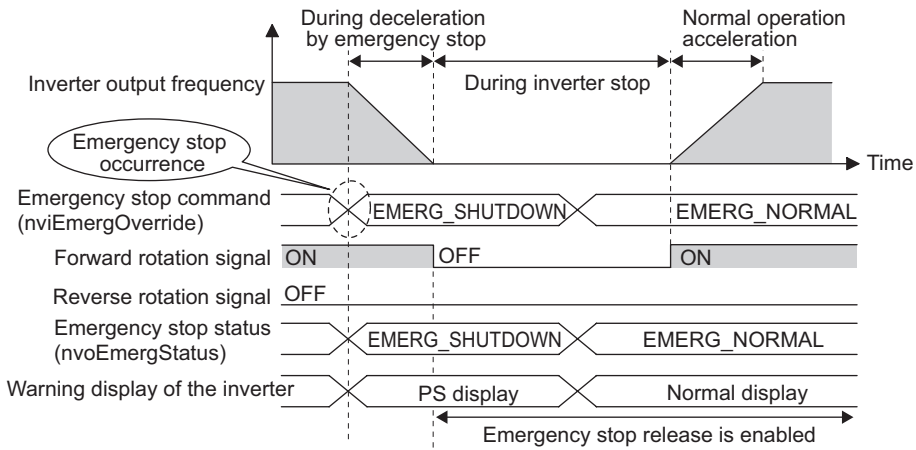
6.5.17 Emergency stop status (network output SNVT_hvac_emerg nvoEmergStatus)

The emergency stop status of the inverter can be checked.

Data Name	Initial Value	Range	Description
nvoEmergStatus	H0	H0	EMERG_NORMAL During normal or emergency stop cancel
		H4	EMERG_SHUTDOWN During emergency stop

- Data send event ..... When the value data changes at emergency stop command receive
- Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93.)*

Emergency Stop Operation Timing Chart



6.5.18 Fault status (network output SNVT_switch nvoDrvAlarm)

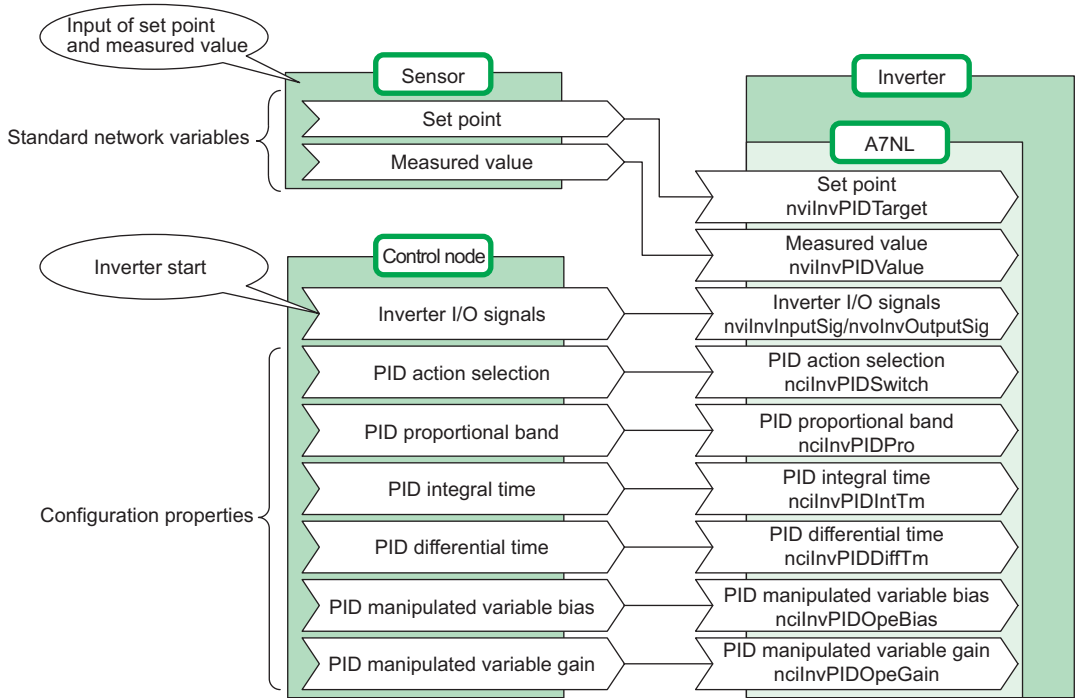
You can indicate the fault status of the inverter.

Data Name	Range		Operation
	State	Value	
nvoDrvAlarm	H0 (initial value)	Don't care (not used) (initial value: 0)	Inverter normal
	H1		During inverter fault

· Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93.)*

6.6 Inverter PID control functions

System configuration example



6.6.1 PID set point (network input SNVT_lev_percent nviInvPIDTarget)

Enter the target value of air volume, temperature, etc. in 0.005% increments.

Data Name	Initial Value	Range	Increments
nviInvPIDTarget	0.000%	0.00% to 100.00%	0.005%/bit

· Data acceptance timing..... At network variable receive (nv_update_occurs event)

Example:
When setting 30°C as the set point using a 10°C/0% and 50°C/100% detector,

$\frac{(30 - 10)}{(50 - 10)} \times 100 = 50\%$. As the PID set point, input 50.00%.

REMARKS

· Control cannot be exercised at less than the minimum resolution (0.01%) of the inverter.
· When the value outside of the range is input, the input value is made invalid and the inverter operates with the value set last time.

6.6.2 PID measured value (network input SNVT_lev_percent nviInvPIDValue)

Enter the measured value of air volume, temperature, etc. in 0.005% increments.

Data Name	Initial Value	Range	Increments
nviInvPIDValue	0.000%	0.00% to 100.00%	0.005%/bit

· Data acceptance timing..... At network variable receive (nv_update_occurs event)

Example:
When the measured value is 25°C on a 10°C/0% and 50°C/100% detector,

$\frac{(25 - 10)}{(50 - 10)} \times 100 = 37.5\%$. As the PID measured value, input 37.50%.

REMARKS

· Control cannot be exercised at less than the minimum resolution (0.01%) of the inverter.
· When the value outside of the range is input, the input value is made invalid and the inverter operates with the value set last time.

6.6.3 PID deviation (network input SNVT_lev_percent nviInvPIDDev)

Input the set value of air volume, temperature, etc. in 0.005% increments.

Data Name	Initial Value	Range	Increments
nviInvPIDDev	0.000%	-100.00% to +100.00%	0.005%/bit

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

Example:
When the set point is 25°C and the current temperature is 30°C on a 10°C/0% and 50°C/100% detector (deviation: +5°C),

$$\frac{(30 - 25)}{(50 - 10)} \times 100 = 12.5\% \quad .$$ As the PID deviation, input 12.50%.

REMARKS

· Control cannot be exercised at less than the minimum resolution (0.01%) of the inverter.
· When the value outside of the range is input, the input value is made invalid and the inverter operates with the value set last time.

6.7 Inverter extended functions

6.7.1 Monitor code (network input SNVT_count nviInvMonCode)

Set the desired monitored item that you want to monitor.
The monitor value enters "monitor data (nvoInvMonData)". *(Refer to page 77)*

Data Name	Initial Value	Range	Increments
nviInvMonCode	H0	H0 to H0064	—

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

<Monitor Code Table>

If an unlisted monitor code is set in any of H0 to H0064, the monitored data (nvoInvMonData) becomes an undetermined invalid value.

Code	Description	Increments	100% Value of Event Driven Detection Width *(Refer to page 108)*	Compatible model		
				A700/ A701	F700(P)	FP700
H0000	No monitoring *1	—	—	○	○	○
H0001	Output frequency *12	0.01Hz *3	*Pr. 55 Frequency monitoring reference* setting	○	○	○
H0002	Output current	0.01A/0.1A *2	*Pr. 56 Current monitoring reference* setting	○	○	○
H0003	Output voltage	0.1V	200V class: 400V, 400V class: 800V	○	○	○
H0005	Frequency setting	0.01Hz *3	*Pr. 55 Frequency monitoring reference* setting	○	○	○
H0006	Running speed	1r/min	1000r/min	○	○	○
H0007	Motor torque	0.1%	100%	○	—	—
H0008	Converter output voltage	0.1V	200V class: 400V, 400V class: 800V	○	○	○
H0009	Regenerative brake duty	0.1%	100%	○*15	○*4	—
H000A	Electronic thermal relay function load factor	0.1%	100%	○	○	○

Code	Description	Increments	100% Value of Event Driven Detection Width *(Refer to page 108)*	Compatible model		
				A700/ A701	F700(P)	FP700
H000B	Output current peak value	0.01A/0.1A *2	*Pr. 56 Current monitoring reference*	○	○	○
H000C	Converter output voltage peak value	0.1V	200V class: 400V, 400V class: 800V	○	○	○
H000D	Input power	0.01kW/ 0.1kW *2	Rated inverter power × 2	○	○	○
H000E	Output power	0.01kW/ 0.1kW *2	Rated inverter power × 2	○	○	○
H000F	Input terminal status *7	—	— *18	○	○	○
H0010	Output terminal status *8	—	— *18	○	○	○
H0011	Load meter	0.1%	100%	○	○	○
H0012	Motor excitation current	0.01A/0.1A *2	*Pr. 56 Current monitoring reference*	○	—	—
H0013	Position pulse *5	—	— *18	○	—	—
H0014	Cumulative energization time	1h	— *18	○	○	○
H0016	Orientation status *5	—	— *18	○	—	—
H0017	Actual operation time	1h	— *18	○	○	○
H0018	Motor load factor	0.1%	200%	○	○	○
H0019	Cumulative power	1kWh	— *18	○	○	○
H0020	Torque command	0.1%	100%	○	—	—
H0021	Torque current command	0.1%	100%	○	—	—
H0022	Motor output	0.01kW/ 0.1kW *2	— *18	○	—	—
H0023	Feedback pulse *5	—	— *18	○	—	—
H002E	Motor temperature	—	— *18	○*6	—	—
H0032	Power saving effect	—	The monitor description differs according to the *Pr. 895*, *Pr. 896* and *Pr. 897* settings. *16	○	○	○
H0033	Cumulative saving power *17	—	— *18	○	○	○
H0034	PID set point	0.1%	100%	○	○	○

Code	Description	Increments	100% Value of Event Driven Detection Width *(Refer to page 108)*	Compatible model		
				A700/ A701	F700(P)	FP700
H0035	PID measured value	0.1%	100%	○	○	○
H0036	PID deviation	0.1%	100%	○	○	○
H003A	Option input terminal monitor 1 *9	—	— *18	○	—	—
H003B	Option input terminal monitor 2 *10	—	— *18	○	—	—
H003C	Option output terminal monitor *11	—	— *18	○	—	—
H0041	Output power (with regenerative display)	0.1kW/ 1kW*2	Inverter rated power × 2	○*14	—	—
H0042	Cumulative regenerative power	1kWh	— *18	○*14	—	—
H004D	32-bit cumulative power (lower 16 bits)	1kWh	— *18	—	○*13	—
H004E	32-bit cumulative power (upper 16 bits)	1kWh	— *18	—	○*13	—
H004F	32-bit cumulative power (lower 16 bits)	0.01kWh/ 0.1kWh *2	— *18	—	○*13	—
H0050	32-bit cumulative power (upper 16 bits)	0.01kWh/ 0.1kWh *2	— *18	—	○*13	—

*1 The value of the monitored data (nvoInvMonData) is always 0.

*2 The setting depends on the inverter capacity. (55K or lower / 75K or higher)
(The inverter models 55K and 75K differ according to -NA and -EC versions. *Refer to page 1.*)

*3 Regardless of the *Pr.37* setting, the value is always displayed in frequency (Hz). For the details, refer to *the Instruction Manual of the inverter*.

*4 The setting is available for the 75K or higher. (The inverter models 75K differ according to -NA and -EC versions. *Refer to page 1.*)

*5 Monitoring is enabled only when the FR-A7AP or FR-A7AL is mounted.

*6 Monitoring is enabled only for FR-A700 with FR-A7AZ mounted.

*7 Input terminal monitor details

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

The terminal functions are assigned with *Pr.178* to *Pr.189*.
(Refer to *the Instruction Manual of the inverter* for the details of *Pr.178* to *Pr.189*.)

*8 Output terminal monitor details

b15															b0
—	—	—	—	—	—	—	—	—	ABC2	ABC1	FU	OL	IPF	SU	RUN

The terminal functions are assigned with *Pr.190* to *Pr.196*.
(Refer to *the Instruction Manual of the inverter* for the details of *Pr.190* to *Pr.196*.)

*9 Details of option input terminal monitor 1 (input terminal status of FR-A7AX)
—all terminals are 0 when no option is fitted.

b15															b0
X15	X14	X13	X12	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	X1	X0

*10 Details of option input terminal monitor 2 (input terminal status of FR-A7AX)
—all terminals are 0 when no option is fitted.

b15															b0
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	DY

*11 Details of option output terminal monitor (output terminal status of FR-A7AY/A7AR)
—all terminals are 0 when no option is fitted.

b15															b0
—	—	—	—	—	—	RA3	RA2	RA1	Y6	Y5	Y4	Y3	Y2	Y1	Y0

*12 Set *Pr. 430* ≠ "9999" to select the pulse monitor when using an FR-A700/A701 series inverter under position control (*Pr. 800* = "3").
*13 Monitoring is enabled only for the FR-F700P series and the FR-F700-NA series inverters.
*14 Monitoring is enabled only for the FR-A701 series inverters.
*15 Monitoring is enabled only for the FR-A700 series inverters.
*16 The monitor description differs according to the *Pr. 895* to *Pr. 897* settings.
(Refer to *the Instruction Manual of the inverter* for details of *Pr. 895* to *Pr. 897*.)

Monitor Description		Increments		100% Value
		55K or lower	75K or higher	
1)	Power savings	0.01kW	0.1kW	Rated inverter power
2)	Power saving rate	0.1%		100%
3)	Energy saving average value	0.01kW	0.1kW	Rated inverter power
4)	Power saving rate average value	0.1%		100%
5)	Power saving amount average value	0.01		Rated inverter power $\times \frac{Pr.\ 896}{100}$ (Note that the value higher than 65535 is 65535.)

(The inverter models 55K and 75K differ according to -NA and -EC versions. *Refer to page 1.*)

*17 The monitor description differs according to the *Pr. 896* and *Pr. 899* settings.
(Refer to *the Instruction Manual of the inverter* for details of *Pr. 896* and *Pr. 899*.)
*18 The monitored data (nvoInvMonDate) is updated only if it is different from the previously monitored data, regardless of the *Pr. 392* setting.

6.7.2 Monitor data (network output SNVT_count nvoInvMonData)

You can monitor the monitored item set in "monitor code (nviInvMonCode)". *(Refer to pege 72)*

Data Name	Initial Value	Range	Increments
nvoInvMonData	0	0 to 65535	Refer to the monitor code table. *(Page 72)*

· Data send event ..... When the monitor value data changes
· Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

Example:
If the monitor value is 60.00Hz, "6000" is displayed.

6.7.3 Set frequency (0.01Hz increments) (network input SNVT_count nviInvSetFreq2)

You can set the set frequency in 0.01Hz increments.

Data Name	Initial Value	Range	Increments
nviInvSetFreq2	0.00Hz	0.00Hz to 400.00Hz	0.01Hz/bit

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

Example:

If you want to set 120.00Hz, set "12000", the value 100 times greater than the desired frequency.

REMARKS

· Regardless of the *Pr. 37* setting, the value is always set in frequency (Hz).

6.7.4 Output frequency monitor (0.01Hz increments) (network output SNVT_count nvoInvOutFreq2)

You can monitor the output frequency of the inverter in 0.01Hz increments.

Data Name	Initial Value	Range	Increments
nvoInvOutFreq2	0.00Hz	0.00Hz to 400.00Hz	0.01Hz/bit

· Data send event ..... When the data changes in 0.01Hz increments

· Data send timing ..... As set in *Pr. 388 Send time interval at heart beat* and *Pr. 389 Minimum sending time at heart beat*. *(Refer to page 93)*

Example:

If the monitor value is 120.00Hz, "12000", the value 100 times greater, is displayed.

REMARKS

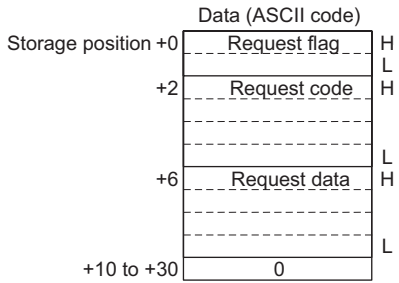
· Regardless of the *Pr. 37* setting, the value is always set in frequency (Hz).

6.7.5 Command request (network input SNVT_str_asc nviInvCmdReq)

You can set the instruction code and written data for executing operation mode rewrite, parameter read and write, faults history reference, parameter clear, etc.
The format is as shown below. The data to be set are in ASCII code. The initial setting of +0 to +30 is 0.

Request flag	H01	Command request is made
	Other than H01	Command request is not made
Request code	Refer to the command list on the *page 81* to set the instruction code.	
Request data	Set the data at writting. (Set H0000 at reading.)	

· Data acceptance timing..... At network variable receive (nv_update_occurs event) and when request flag = 1



Setting example 1

When writing "*Pr. 7 Acceleration time* = 10.0s"

	Data (ASCII code)	
+0	0 (H30)	H
	1 (H31)	L
+2	0 (H30)	H
	0 (H30)	
	8 (H38)	
	7 (H37)	L
+6	0 (H30)	H
	0 (H30)	
	6 (H36)	
	4 (H34)	L
+10 to +30	0	

Setting example 2

When resetting the inverter

	Data (ASCII code)	
+0	0 (H30)	H
	1 (H31)	L
+2	0 (H30)	H
	0 (H30)	
	F (H46)	
	D (H44)	L
+6	9 (H39)	H
	6 (H36)	
	9 (H39)	
	6 (H36)	L
+10 to +30	0	

Refer to *page 85* for the command processing procedure.

6.7.6 Command request (binary) (network input SNVT_preset nviInvCmdBinReq)

The actions that were unavailable with network variables can be set with binary data. Examples include the setting of instruction codes for operation mode change, parameter reading/writing, fault history reference, and parameter clear, and the setting of writing data. The format is as shown below. Data to be set are in binary code. A command request in binary code requires less communication data amount than a command request in ASCII code does. The initial setting of +0 to +13 is 0.

Function code	H02: LN_LEARN_VALUE	Command request is made.
	H02: Other than LN_LEARN_VALUE	Command request is not made.
Request code	Refer to the command list on *page 81* to set the instruction code.	
Writing data	Set the data at writing. (Set value is ignored during reading.)	

· Data acceptance timing ..... At the network variable reception (nv_update_occurs event) while the function code = 2.

Storage position	Member	Content (binary data)	
+0	learn	Function code	
+1	selector	Invalid (Set value is ignored.)	H
		Request code	L
+3	value[0]	Invalid (Set value is ignored.)	H
	value[1]	Invalid (Set value is ignored.)	
	value[2]	Upper bytes of writing data	
	value[3]	Lower bytes of writing data	L
+7	day	Invalid (Set value is ignored.)	H
		Invalid (Set value is ignored.)	L
+9	hour	Invalid (Set value is ignored.)	
+10	minute	Invalid (Set value is ignored.)	
+11	second	Invalid (Set value is ignored.)	
+12	millisecond	Invalid (Set value is ignored.)	H
		Invalid (Set value is ignored.)	L

Setting example 1

When writing *Pr.7 Acceleration time* = 10.0s

Storage position	Content (binary data)	
+0	H02	
+1	H00	H
	H87	L
+3	H00	H
	H00	
	H00	
	H64	L
+7	H00	H
	H00	L
+9	H00	
+10	H00	
+11	H00	
+12	H00	H
	H00	L

Setting example 2

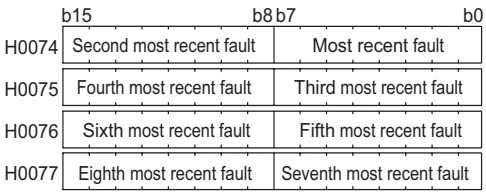
When resetting the inverter

Storage position	Content (binary data)	
+0	H02	
+1	H00	H
	HFD	L
+3	H00	H
	H00	
	H96	
	H96	L
+7	H00	H
	H00	L
+9	H00	
+10	H00	
+11	H00	
+12	H00	H
	H00	L

* Refer to *page 85* for the command processing procedure.

Command List

<table>
<tr><th>Item</th><th>Read/ Write</th><th>Instruction Code</th><th>Data Description</th></tr>
<tr><td rowspan="2">Operation mode</td><td>Read</td><td>H007B</td><td>H0000: Network operation mode
H0001: External operation mode, External JOG operation mode
H0002: PU operation mode, External/PU combined operation modes 1 and 2, PUJOG operation mode</td></tr>
<tr><td>Write</td><td>H00FB</td><td>H0000: Network operation mode
H0001: External operation mode
H0002: PU operation mode (Pr.79 = "6")</td></tr>
<tr><td>Fault definition</td><td>Read</td><td>H0074 to H0077</td><td>H0000 to HFFFF:
Last two fault definitions

Refer to the fault code correspondence table (page 61).
 
</td></tr>
<tr><td>Set frequency (RAM)</td><td rowspan="2">Read</td><td>H006D</td><td rowspan="2">Read set frequency/speed from RAM or EEPROM.
·H0000 to HFFFF:
Set frequency .... Increments 0.01Hz
(Regardless of the Pr. 37 setting, the value is always displayed in frequency (Hz).</td></tr>
<tr><td>Set frequency (EEPROM)</td><td>H006E</td></tr>
</table>

Item	Read/ Write	Instruction Code	Data Description
Set frequency (RAM)	Write	H00ED	Write set frequency/speed to RAM or EEPROM. · H0000 to H9C40 (0 to 400.00Hz): Frequency .... Increments 0.01Hz (Regardless of the *Pr. 37* setting, the value is always set in frequency (Hz).) · To change the set frequency consecutively, write data to the inverter RAM. (Code number: HED)
Set frequency write (RAM and EEPROM)	Write	H00EE	
Parameter	Read	H0000 to H0063	· Refer to the instruction code in the parameter list in *the Instruction Manual of the inverter* to read and write as required. Write to *Pr. 77* and *Pr. 79* is disabled. When setting *Pr.100* and later, link parameter extended setting must be set. · Set 65520 (HFFF0) as a parameter value "8888" and 65535 (HFFFF) as "9999". · When changing the parameter values frequently, set "1" in *Pr. 342* to write them to RAM. *(Refer to page 26.)*
	Write	H0080 to H00E3	
Faults history batch clear	Write	H00F4	H9696: Clears the faults history as a batch

<table>
<tr><th>Item</th><th>Read/ Write</th><th>Instruction Code</th><th>Data Description</th></tr>
<tr><td>Parameter clear
All parameter clear</td><td>Write</td><td>H00FC</td><td>All parameters return to the initial values.
Whether to clear communication parameters or not can be selected according to data. (○: Clear, ×: Not clear)
Refer to the Instruction Manual of the inverter for parameter clear, all clear, and communication parameters.
<table>
<tr><th>Clear Type</th><th>Data</th><th>Communication Pr.</th></tr>
<tr><td rowspan="2">Parameter clear</td><td>H9696</td><td>○ *1</td></tr>
<tr><td>H5A5A</td><td>× *2</td></tr>
<tr><td rowspan="2">All parameter clear</td><td>H9966</td><td>○ *1</td></tr>
<tr><td>H55AA</td><td>× *2</td></tr>
</table>
When clear is executed for H9696 or H9966, communication-related parameter settings also return to the initial values. When resuming operation, set the parameters again.
Executing clear will clear the instruction codes H00EC, H00F3, H00FF settings.</td></tr>
<tr><td>Inverter reset</td><td>Write</td><td>H00FD</td><td>H9696: Inverter reset.</td></tr>
<tr><td rowspan="2">Link parameter extended setting</td><td>Read</td><td>H007F</td><td rowspan="2">Parameter description is changed according to the H00 to H09 setting.
Refer to the instruction code of the Instruction Manual of the inverter for details of the values.</td></tr>
<tr><td>Write</td><td>H00FF</td></tr>
<tr><td rowspan="2">Second parameter changing *3</td><td>Read</td><td>H006C</td><td rowspan="2">When setting the bias / gain (C2 to C7, C12 to C19, C38 to C41 *4) parameters
H00: Frequency *5
H01: Analog value set in parameters
H02: Analog value input from the terminal</td></tr>
<tr><td>Write</td><td>H00EC</td></tr>
</table>

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

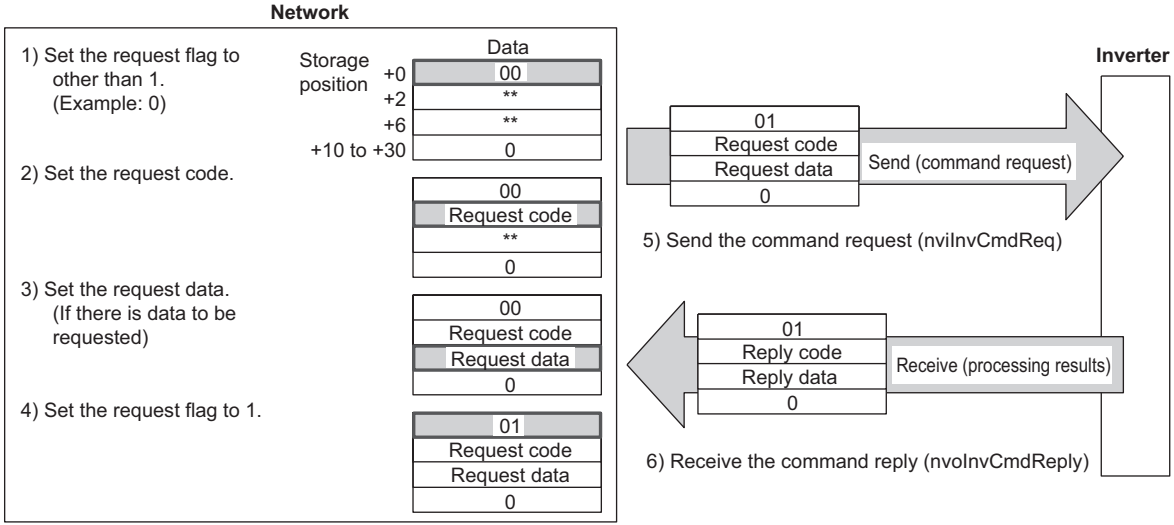
*2 Even if parameter clear is commanded with H5A5A or H55AA, turning OFF the power during the clearing process will return the communication parameters to initial values.

*3 This setting can be made when the link parameter extended setting = "1, 9".

*4 *C12 to C19, C38 to C41* are available with the FR-A700/A701 series only. Refer to the parameter list of the inverter for instruction code.

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

Command processing is performed in the following procedure.
(Example: command request (nviInvCmdReq) and command reply (nvoInvCmdReply))



6.7.7 Command reply (network output SNVT_str_asc nvoInvCmdReply)

Gives a reply to the command requested in "command request (nviInvCmdReq) *(Refer to page 79)*". The data entered are the reply code and read data as the command processing results.
The format is as shown below. The data to be set are in ASCII code. The initial setting of +0 to +30 is 0.

Reply flag	H01	Reply to command request
Reply code (Results in response to the command request enter)	H0000	Normal completion of command
	Other than H0000	Command execution error
		H0001: Mode error (different operation mode)
		H0002: Instruction code error (specified instruction code does not exist)
		H0003: Data range error (data written is outside the range)
Reply data	The data is set at reading. (A given value is set at writing.)	

· Data send event ..... At command processing completion

Storage position	Data (ASCII code)		Setting example 1: When *Pr. 8 Deceleration time* with "5.0s" set in is read		Setting example 2: When the most recent fault (E.THM) and second most recent fault in past (E.OC1) are read	
+0	Request flag	H	0 (H30)	H	0 (H30)	H
		L	1 (H31)	L	1 (H31)	L
+2	Reply code	H	0 (H30)	H	0 (H30)	H
			0 (H30)		0 (H30)	
			0 (H30)		0 (H30)	
		L	0 (H30)	L	0 (H30)	L
+6	Reply data	H	0 (H30)	H	1 (H31)	H
			0 (H30)		0 (H30)	
			3 (H33)		3 (H33)	
		L	2 (H32)	L	1 (H31)	L
+10 to +30	0		0		0	

Refer to *page 85* for the command processing procedure.

6.7.8 Command reply (binary) (network output SNVT_preset nvoInvCmdBinRply)

A reply to the command requested in "command request (binary) (nviInvCmdBinReq)" *(refer to page 80)* is given. The reply code and read data are included in the command processing results.
The format is as shown below. The data to be set are in binary code. A command reply in binary code requires less communication data amount than a command reply in ASCII code does. The initial values of +0 to +13 is 0.

Function code	H02: LN_LEARN_VALUE	Normal completion of command
	HFF: LN_NUL	Command execution error
Reply data	The data is set at reading. (A given value is set at writing.)	

●Relationship between function codes and reply data

Command execution results (function code)	Request code type set in nviInvCmdBinReq	Reply data content
H02 (Normal completion of command)	Read command	Read data
	Write command	Written data (echo back)
HFF (Command execution error)	Write command	H01: Mode error (The operation mode is different.)
	Read/write command	H02: Instruction code error (An non-existent instruction code is specified.)
	Write command	H03: Data range error (Out-of-range data is written.)

- Data transmission event.....At the completion of command processing

Storage position	Member	Content (binary data)	
+0	learn	Function code	
+1	selector	H00 (fixed)	H
		Echo back of the request code	L
+3	value[0]	H00 (fixed)	H
	value[1]	H00 (fixed)	
	value[2]	Upper bytes of reply data	
	value[3]	Lower bytes of reply data	L
+7	day	H00 (fixed)	H
		H00 (fixed)	L
+9	hour	H00 (fixed)	
+10	minute	H00 (fixed)	
+11	second	H00 (fixed)	
+12	millisecond	H00 (fixed)	H
		H00 (fixed)	L

Setting example 1

When *Pr.1 Maximum frequency* setting of "60.00Hz" is read

Storage position	Content (binary data)	
+0	H02	
+1	H00	H
	H01	L
+3	H00	H
	H00	
	H17	
	H70	L
+7	H00	H
	H00	L
+9	H00	
+10	H00	
+11	H00	
+12	H00	H
	H00	L

Setting example 2

When out-of-range data, "0x7FFF," is written to *Pr.2 Minimum frequency*

Storage position	Content (binary data)	
+0	HFF	
+1	H00	H
	H82	L
+3	H00	H
	H00	
	H00	
	H03	L
+7	H00	H
	H00	L
+9	H00	
+10	H00	
+11	H00	
+12	H00	H
	H00	L

* Refer to *page 85* for the command processing procedure.

6.8 Configuration properties

6.8.1 Initial communication delay time (network input config SNVT_time_sec nciPwUpOutTm)

You can set the time from when the inverter starts until when data is sent to LONWORKS at power-ON or inverter reset.

REMARKS

- The parameter setting becomes valid at power-ON or inverter reset.
- The delay time at power-ON and inverter reset is set, and this setting does not affect normal data transmission.

Data Name		Initial Value	Range	Increments
nciPwUpOutTm		0s	0.0s to 120.0s	0.1s/bit
Parameter	**Name**			
387	Initial communication delay time			

- Data acceptance timing ..... At network variable receive (nv_update_occurs event)

6.8.2 Forward/reverse rotation prevention (network input config SNVT_count nciInvFwdRevLock)

You can limit the rotation direction of the inverter. (Use this function to prevent a motor from rotating in the opposite direction in a system where the rotation direction is always the same, such as an air conditioning fan.)

Data Name	Initial Value	Range		Operation	Setting Value Storage Location
		state	value		
nciInvFwdRevLock	Initial value of *Pr. 78*	H0	Not used	Both forward rotation and reverse rotation enabled	*Pr.78*
		H1		Reverse rotation disabled	
		H2		Forward rotation disabled	

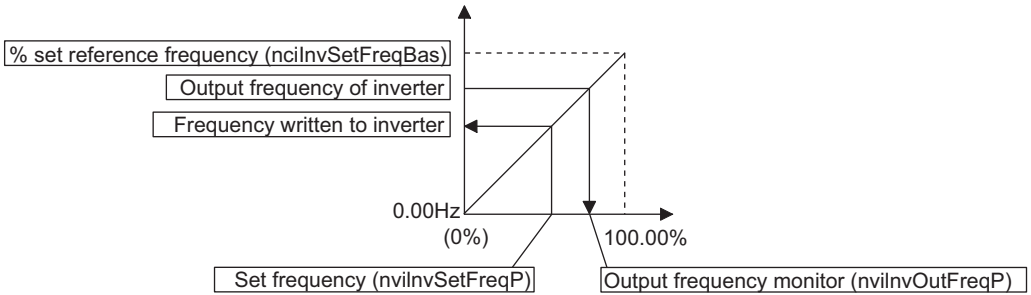
· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for details of *Pr. 78*.

6.8.3 % set reference frequency (network input config SNVT_freq_hz nciInvSetFreqBas)

You can set the reference frequency of "set frequency (nviInvSetFreqP)" *(refer to page 55)* and "output frequency monitor (nvoInvOutFreqP)" *(refer to page 57)*.
The % set reference frequency cannot be set at less than the minimum frequency resolution of the inverter.



Data Name		Initial Value	Range	Increments
nciInvSetFreqBas		60Hz / 50Hz *	1.0Hz to 400.0Hz	0.1Hz/bit
Parameter	**Name**		1.00Hz to 400.00Hz	0.01Hz
390	% setting reference frequency			

* 60Hz for the Japanese and NA versions and 50Hz for the EC and CH versions.

· Data acceptance timing..... At network variable receive (nv_update_occurs event)

6

6.8.4 Maximum frequency (0.1Hz increments) (network input config SNVT_freq_hz nciInvMaxFreq)

You can set the maximum frequency to be output by the motor to the inverter in 0.1Hz increments.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvMaxFreq	Initial value of *Pr. 1*	0.0Hz to 400.0Hz	0.1Hz/bit	*Pr.1/Pr.18*

· Data acceptance timing ..... At network variable receive (nv_update_occurs event))

REMARKS

· Refer to *the Instruction Manual of the inverter* for details of *Pr. 1* to *Pr. 18*.

6.8.5 Minimum frequency (0.1Hz increments) (network input config SNVT_freq_hz nciInvMinFreq)

You can set the minimum frequency to be output by the motor to the inverter in 0.1Hz increments.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvMinFreq	Initial value of *Pr.2*	0.0Hz to 120.0Hz	0.1Hz/bit	*Pr.2*

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for details of *Pr. 2*.

6.8.6 Heartbeat send time interval (network input config SNVT_time_sec nciSndHrtBt)

The time interval to transmit network variables to the network can be set.

Data Name		Initial Value	Range	Increments
nciSndHrtBt		0s	0.0s to 999.8s	0.1s/bit
Parameter	**Name**			
388	Send time interval at heart beat			

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

6.8.7 Minimum heartbeat send time (network input config SNVT_time_sec nciMinOutTm)

The minimum time interval to transmit network variables to the network can be set.

Data Name		Initial Value	Range	Increments
nciMinOutTm		0.5s	0.0s to 999.8s	0.1s/bit
Parameter	**Name**			
389	Minimum sending time at heart beat			

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

●Heartbeat send time (*Pr.388*, *Pr.389*)

Pr. 388 Setting	*Pr. 389* Setting	Operation
0	0	Sends data when data send event occurs. * Network variables outputting data frequently (frequent changes) causes network congestion. In such cases, adjust by setting *Pr. 392 Event driven detection width*, *Pr. 388* and *Pr. 389*.
Other than 0	0	Checks presence or absence of data send event and sends data when an event occurs. Sends data after the heartbeat send time interval (*Pr. 388* setting) has elapsed if there is no event.
0	Other than 0	Checks for presence or absence of data send event at interval of minimum heartbeat send time (*Pr. 389* setting). Sends data if an event is present.
Pr. 388 > *Pr. 389* (Other than 0)		Checks for presence or absence of data send event at an interval of minimum heartbeat send time (*Pr. 389* setting). Sends data if an event presents. Sends data after the heartbeat send time interval (*Pr. 388* setting) has elapsed if there is no event.
Pr. 388 ≤ *Pr. 389* (Other than 0)		Sends data at an interval of minimum heartbeat send time (*Pr. 389* setting) independently of presence and absence of data send event.

REMARKS

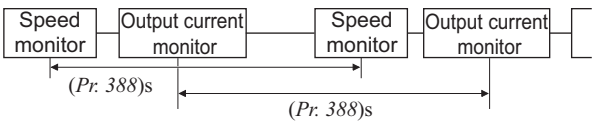
- At power-on and inverter reset, data is not sent before the *Pr. 387 Initial communication delay time* (nciPwUpOutTm). *(Refer to page 89)*

The network variables subject to the heartbeat send time

Function (Increment)	Network Variables		In/Out	Refer to Page
	Variable	Name		
Speed monitor (0.005%/bit)	SNVT_lev_percent	nvoDrvSpeed	Out	*51*
Inverter output signal	SNVT_state	nvoInvOutputSig	Out	*53*
Output frequency monitor (0.1Hz/bit)	SNVT_freq_hz	nvoInvOutFreq	Out	*56*
Output frequency monitor (0.005%/bit)	SNVT_lev_percent	nvoInvOutFreqP	Out	*57*
Output current monitor (0.1A/bit)	SNVT_amp	nvoDrvCurnt	Out	*58*
Output voltage monitor (0.1V/bit)	SNVT_volt	nvoDrvVolt	Out	*58*
Actual operation time monitor (1h/bit)	SNVT_time_hour	nvoDrvRunHours	Out	*58*
Cumulative power monitor (1kWh/bit)	SNVT_elec_kwh	nvoDrvRunPower	Out	*59*
Emergency stop status	SNVT_hvac_emerg	nvoEmergStatus	Out	*66*
Fault status	SNVT_switch	nvoDrvAlarm	Out	*67*
Monitor data	SNVT_count	nvoInvMonData	Out	*77*
Output frequency monitor (0.01Hz/bit)	SNVT_count	nvoInvOutFreq2	Out	*78*
Cumulative power monitor 2 (0.1kWh/bit)	SNVT_elec_kwh_l	nvoDrvRunPower_l	Out	*60*

REMARKS

- The *Pr. 388* (*Pr. 389*) setting determines the time interval between a network variable transmissions. The number of monitors selected by a network administration tool, such as LonMaker, does not affect the time interval.
  For example, when the speed monitor and output current monitor are bound, the send time interval of the speed monitor is *Pr. 388* (*Pr. 389*)s and the send time interval of the output current monitor is also *Pr. 388* (*Pr. 389*)s.
  In addition, the actual send time interval is 1.1s due to constraints of each data send time even when the *Pr. 388 Send time interval at heart beat* is set to 1.0s or less. (It takes 1.2s when monitor data is set.)



6.8.8 Acceleration time (network input config SNVT_time_sec nciRampUpTm)

The acceleration time taken for the motor to reach the set frequency (1 to 400Hz) of *Pr. 20 Acceleration/deceleration reference frequency* from 0Hz can be set.

Data Name	Initial Value	*Pr. 21* Setting	Range *	Increments	Setting Value Storage Location
nciRampUpTm	Initial value of *Pr. 7*	0 (Initial value)	0.0s to 3600.0s	0.1s/bit	*Pr. 7*
		1	0.00s to 360.00s	0.01s/bit	

* The setting range changes according to the *Pr. 21 Acceleration/deceleration time increments* setting. When *Pr. 21* = "1", the setting value multiplied by 0.1 is written to the inverter. After the *Pr. 21* setting is changed, set the acceleration time again.
<Example>
If the *Pr. 21* setting is changed from "0" to "1" while the acceleration time is "5.0s," the acceleration time automatically changes to "0.5s."

· Data acceptance timing..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for the details of *Pr. 7, Pr. 20*, and *Pr. 21.*

6.8.9 Deceleration time (network input config SNVT_time_sec nciRampDownTm)

The deceleration time taken for the motor to reach 0Hz from the set frequency (1 to 400Hz) of *Pr. 20 Acceleration/deceleration reference frequency* can be set.

Data Name	Initial Value	*Pr. 21* Setting	Range *	Increments	Setting Value Storage Location
nciRampDownTm	Initial value of *Pr. 8*	0 (Initial value)	0.0s to 3600.0s	0.1s/bit	*Pr. 8*
		1	0.00s to 360.00s	0.01s/bit	

* The setting range changes according to the *Pr. 21 Acceleration/deceleration time increments* setting. When *Pr. 21* = "1", the setting value multiplied by 0.1 is written to the inverter. After the *Pr. 21* setting is changed, set the deceleration time again.
<Example>
If the *Pr. 21* setting is changed from "0" to "1" while the deceleration time is "5.0s," the deceleration time automatically changes to "0.5s."

· Data acceptance timing..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for the details of *Pr. 8*, *Pr. 20*, and *Pr. 21*.

6.8.10 PID action selection (network input config SNVT_count nciInvPIDSwitch)

Whether or not the PID control will be executed can be set for the inverter.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvPIDSwitch	Initial value of *Pr. 128*	10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101, 110, 111, 120, 121	—	*Pr. 128*

nciInvPIDSwitch Setting		Set point input	Deviation and measured value input	Operation
State	Value			
10, 110 *1, *3	N/A (not used)	Set point signal input (terminal 2)	Deviation value signal input (terminal 1)	PID reverse action
11, 111 *1, *3				PID forward action
20, 120 *1, *3			Measured value signal input (terminal 4)	PID reverse action
21, 121 *1, *3				PID forward action
50 *1		Set point communication input (network)	Deviation value communication input (network)	PID reverse action
51 *1				PID forward action
60 *1			Measured value communication input (network)	PID reverse action
61 *1				PID forward action
70 *2		Set point PLC input (PLC function)	Deviation value signal input (PLC function)	PID reverse action
71 *2				PID forward action
80 *2			Measured value signal input (PLC function)	PID reverse action
81 *2				PID forward action
90 *2			Deviation value signal input (PLC function) (Not reflected to the inverter frequency)	PID reverse action
91 *2				PID forward action
100 *2			Measured value signal input (PLC function) (Not reflected to the inverter frequency)	PID reverse action
101 *2				PID forward action

*1 Precautions for 50, 51, 60, 61, 110, 111, 120, 121 settings
- PID control is made valid independently of ON/OFF of the X14 terminal.
- Input the set point and setting value (deviation input) in % increments. At this time, the set frequency of *C2 (Pr. 902) Terminal 2 frequency setting bias frequency* is equivalent to 0 % and the set frequency of *Pr. 125 (Pr. 903) Terminal 2 frequency setting gain frequency* is equivalent to 100%.
- The settings of *Pr. 338 Communication operation command source* and *Pr. 339 Communication speed command source* are made valid. *(Refer to page 23)*
- When *Pr. 79* = 6 (switchover mode), both PID function and switchover mode are made invalid.

*2 They can be set for the FR-A700-NA/EC and FR- F700-NA only.
Refer to *the FR-A700/F700 PLC function programming manual* for details of the PLC function.

*3 The setting values "110, 111, 120, 121" are only for the FR-F700(P) series.

· Data acceptance timing....At network variable receive when the inverter is at a stop (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for use of PID control function.

6.8.11 PID proportional band (network input config SNVT_count nciInvPIDPro)

You can set the proportional band of the PID control of the inverter.
To disable integral control, set "0.0%" or "6553.5".

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvPIDPro	Initial value of *Pr. 129*	0.0% to 1000.0%, 6553.5	0.1%/bit	*Pr. 129*

· Data acceptance timing....At network variable receive when the inverter is at a stop (nv_update_occurs event)
Set the value 10 times greater than the desired value in nciInvPIDPro.
Example:
If you want to set 50.0%, set "500", the value 10 times greater than 50.0.

REMARKS

· Refer to *the Instruction Manual of the inverter* for use of PID control function.

6.8.12 PID integral time (network input config SNVT_time_sec nciInvPIDIntTm)

You can set the integral time of the PID control of the inverter.
To disable integral control, set "0.0s" or "6553.5".

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvPIDIntTm	Initial value of *Pr. 130*	0.0s to 3600.0s, 6553.5	0.1s/bit	*Pr. 130*

· Data acceptance timing....At network variable receive when the inverter is at a stop (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for use of PID control function.

6.8.13 PID differential time (network input config SNVT_time_sec nciInvPIDDiffTm)

You can set the differential time of the PID control of the inverter.
To disable differential control, set "0.0s" or "6553.5".

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvPIDDiffTm	Initial value of *Pr. 134*	0.0s to 10.0s, 6553.5	0.1s/bit	*Pr. 134*

· Data acceptance timing....At network variable receive when the inverter is at a stop (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for use of PID control.

6.8.14 PID manipulated variable bias (0.1Hz increments) (network input config SNVT_freq_hz nciInvPIDOpeBias)

You can set the manipulated variable of the inverter in 0.1Hz increments when the deviation (difference between set point and measured value) under PID control is 0%.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvPIDOpeBias	Initial value of *C2 (Pr. 902)*	0.0Hz to 400.0Hz	0.1Hz/bit	*C2 (Pr. 902)*

· Data acceptance timing..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for use of PID control and details of *C2 (Pr. 902)*.

6.8.15 PID manipulated variable gain (0.1Hz increments) (network input config SNVT_freq_hz nciInvPIDOpeGain)

You can set the manipulated variable of the inverter in 0.1Hz increments when the deviation (difference between set point and process variable) under PID control is 100%.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciInvPIDOpeGain	Initial value of *Pr. 125 (Pr. 903)*	0.0Hz to 400.0Hz	0.1Hz/bit	*Pr. 125(Pr. 903)*

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for use of PID control and details of *Pr. 125 (Pr. 903)*.

6.8.16 Heartbeat receive time interval (network input config SNVT_time_sec nciRcvHrtBt)

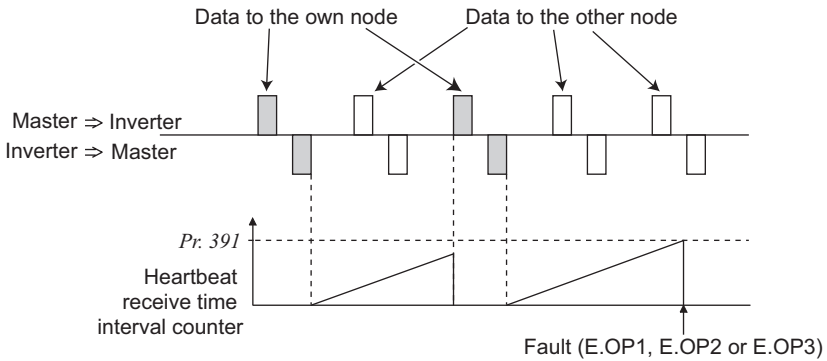
You can set the time interval at which input network variables data is received from the network.
When the receive interval time from the network has risen above the setting, it is considered as a communication line error, then "communication option fault (E.OP1, E.OP2 or E.OP3)" is displayed and the inverter stops.

Data Name		Initial Value	Range	Increments
nciRcvHrtBt		0s	0.0s to 999.8s	0.1s/bit
Parameter	**Name**			
391	Receive time interval at heart beat			

· Data acceptance timing....At network variable receive (nv_update_occurs event)

REMARKS

· For the data send to other nodes, the counters of heartbeat receive time interval are not cleared.



Network variables supported

The following network variables are subject to the receive interval time.

Function	Network Variables		In/Out	Refer to Page
	Variable	Name		
Start and stop/simple speed setting	SNVT_switch	nviDrvSpeedStpt	In	*49*
Speed adjustment	SNVT_lev_percent	nviDrvSpeedScale	In	*50*
Inverter input signal	SNVT_state	nviInvInputSig	In	*52*
Set frequency (0.1Hz/bit)	SNVT_freq_hz	nviInvSetFreq	In	*55*
Set frequency (0.005%/bit)	SNVT_lev_percent	nviInvSetFreqP	In	*55*
PID set point (0.005%/bit)	SNVT_lev_percent	nviInvPIDTarget	In	*69*
PID measured value (0.005%/bit)	SNVT_lev_percent	nviInvPIDValue	In	*70*
PID deviation (0.005%/bit)	SNVT_lev_percent	nviInvPIDDev	In	*71*
Set frequency (0.01Hz/bit)	SNVT_count	nviInvSetFreq2	In	*78*

REMARKS

- The communication line error detection is invalid when *Pr. 502 Stop mode selection at communication error* = "3".

6.8.17 Maximum speed (0.005% increments) (network input config SNVT_lev_percent nciMaxSpeed)

You can set the maximum speed to be output by the inverter to the motor.
Set the speed in 0.005% increments using the setting value of "reference speed setting (nciNmlSpeed) *(page 107)*" or "reference frequency setting (nciNmlFreq) *(page 106)*" as reference.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciMaxSpeed	Initial value of *Pr. 1*	0.000% to 163.830%	0.005%/bit	*Pr. 1/Pr. 18*

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for details of *Pr. 1* or *Pr. 18*.
· The setting value exceeding 163.830% is made invalid.
· Control cannot be exercised at less than the minimum frequency resolution (0.01Hz) of the inverter.

6.8.18 Minimum speed (0.005% increments) (network input config SNVT_lev_percent nciMinSpeed)

You can set the minimum speed to be output by the inverter to the motor.
Set the speed in 0.005% increments using the setting value of "reference speed setting (nciNmlSpeed) *(page 107)*" or "reference frequency setting (nciNmlFreq) *(page 107)*" as reference.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciMinSpeed	Initial value of *Pr. 2*	0.000% to 163.830%	0.005%/bit	*Pr. 2*

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *the Instruction Manual of the inverter* for details of *Pr. 2*.
· The setting value exceeding 163.830% is made invalid.
· Control cannot be exercised at less than the minimum frequency resolution (0.01Hz) of the inverter.

6.8.19 Reference speed setting (network input config SNVT_rpm nciNmlSpeed)

Set the speed used as the reference of "speed adjustment (nviDrvSpeedScale) *(page 50)*", "speed monitor (nvoDrvSpeed) *(page 51)*, "maximum speed (nciMaxSpeed) *(page 105)*" and "minimum speed (nciMinSpeed) *(page 105)*".

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciNmlSpeed	1800r/min / 1500r/min *	30r/min to 12000r/min	1r/min/bit	*Pr. 390*

* 1800r/min for the Japanese and NA versions and 1500r/min for the EC and CH versions.

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

The setting of reference speed setting (nciNmlSpeed) is changed from speed increments to frequency increments, then written to *Pr. 390*.

$$\text{Frequency} = \frac{\text{Number of motor poles} \times \text{speed}}{120}$$ (the calculation result is rounded down.)

· Set the number of motor poles in *Pr. 144*. (2, 4, 6, 8, 10 poles)
· When *Pr. 144* = "0", it is considered as 4 poles.
· The number of motor poles setting is available for the FR-F700 (55K or lower) inverters manufactured in September 2004 or later and the FR-F700 (75K or higher) inverters manufactured in August 2004 or later.
(The inverter models 55K and 75K differ according to -NA and -EC versions. *Refer to page 1.*)
The number of motor poles is always four for the inverter that the number of motor poles setting is unavailable. *(Refer to page 2)*
· Refer to *the Instruction Manual of the inverter* for details of *Pr. 144*.

REMARKS

· Refer to *page 91* for details of *Pr. 390*.

6.8.20 Reference frequency setting (network input config SNVT_freq_hz nciNmlFreq)

Set the frequency used as the reference of "speed adjustment (nviDrvSpeedScale)" *(page 50)*, "speed monitor (nvoDrvSpeed)" *(page 51)*, "maximum speed (nciMaxSpeed)" *(page 105)* and "minimum speed (nciMinSpeed)" *(page 105)*.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciNmlFreq	60Hz / 50Hz *	1.0Hz to 400.0Hz	0.1Hz/bit	*Pr. 390*

* 60Hz for the Japanese and NA versions and 50Hz for the EC and CH versions.

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· Refer to *page 91* for details of *Pr. 390*.

· To make the change of "reference frequency setting (nciNmlFreq)" be reflected to the operation speed, a value is need to be written to speed adjustment (nviDrvSpeedScale)

6.8.21 Speed adjustment default value (network input config SNVT_lev_percent nciDrvSpeedScale)

You can set the default value of "speed adjustment (nviDrvSpeedScale) *(Refer to page 50)*.

Data Name	Initial Value	Range	Increments	Setting Value Storage Location
nciDrvSpeedScale	100.00%	-163.840% to 163.830%	0.005%/bit	—

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

· Write and read the setting value from the network. You cannot read and write from the inverter.

· The value stored in the inverter is rounded up. For example, 1.005% is rounded up to 1.010%.

6.8.22 Event driven detection width (network input config SNVT_lev_percent nciInvEvtDuty)

The event driven detection width (varying width) can be set for the monitor-related output network variables.
The 100% reference value, which is used as the basis of the detection width, varies with the network variables.
This setting can reduce traffic jams caused by the occurrence of many send events due to consecutive value changes.

Data Name		Initial Value	Range	Increments
nciInvEvtDuty		0%	0.000% to 163.830%	0.005%/bit
Parameter	**Name**		0.00% to 163.83%	0.01%
392	Event driven detection width			

· Data acceptance timing ..... At network variable receive (nv_update_occurs event)

REMARKS

- Control cannot be executed at less than the minimum frequency resolution (0.01Hz) of the inverter.
- The value stored in the inverter is rounded up. For example, 1.005% is rounded up to 1.010%.
- When the inverter operation status has changed, e.g. from a stop to startup or from running to a stop, the monitor value is output even when the value is within the event driven detection width.

(Example) When output frequency monitor = "100%", *Pr. 392 Event driven detection width* = "100%", and *Pr. 390 % setting reference frequency* = "60Hz" (set frequency)

As the monitor is output once when starting from the stop status, the starting monitor output is 0.5Hz when the starting frequency is set to 0.5Hz. Therefore, the second monitor output is equal to or more than "0.5Hz + 60Hz (*Pr. 390* setting × *Pr. 392* setting)" = "60.5Hz". (This is not the monitor output when the frequency reaches 60Hz. Use the SU signal to detect output frequency, etc.)

● Network variables that allow setting of event driven detection width

Name of Network Variables	In/ Out	100% Value	Formula of Detection Width (0.005% increments)	Refer to Page
Speed monitor (0.005%/bit) SNVT_lev_percent nvoDrvSpeed	Out	—	As network variables supported and SNVT of detection width are the same type, set the value directly.	51
Output frequency monitor (0.1Hz/bit) SNVT_freq_hz nvoInvOutFreq	Out	% set reference frequency	$\frac{\text{Varying width of frequency monitor value}}{\text{\% setting reference frequency}} \times 100\%$	56
Output frequency monitor (0.005%/bit) SNVT_lev_percent nvoInvOutFreqP	Out	—	As network variables supported and SNVT of detection width are the same type, set the value directly.	57
Output current monitor (0.1A/bit) SNVT_amp nvoDrvCurnt	Out	Rated inverter current	$\frac{\text{Varying width of current monitor value}}{\text{Rated inverter current}} \times 100\%$	58
Output voltage monitor (0.1V/bit) SNVT_volt nvoDrvVolt	Out	Rated inverter voltage (200V class: 200VAC, 400V class: 400VAC)	$\frac{\text{Varying width of voltage monitor value}}{\text{Rated inverter voltage}} \times 100\%$	58
Monitor data SNVT_count nvoInvMonData	Out	The reference value of 100% differs according to the monitor description. *(Refer to page 72)*	$\frac{\text{Varying width of monitor data value}}{\text{Reference value of each monitor}} \times 100\%$	77
Output frequency monitor (0.01Hz/bit) SNVT_count nvoInvOutFreq2	Out	% set reference frequency	$\frac{\text{Varying width of frequency monitor value}}{\text{\% setting reference frequency}} \times 100\%$	78
Cumulative power monitor 2 (0.1kWh/bit) SNVT_elec_kwh_l nvoDrvRunPower_l	Out	Rated inverter power × 2	$\frac{\text{Varying width of cumulative power monitor value}}{\text{Rated inverter power} \times 2} \times 100\%$	60

Method for event driven detection... | Previous value - present value | ≥ event driven detection width

Operation mode does not switch to Network operation mode.

- Check that the communication option (FR-A7NL) and LONWORKS dedicated cables are fitted properly. (Check for contact fault, break in the cable, etc.)
- Check that the node addresses are set to the correct positions.
- Check that operation mode switchover conditions are satisfied. *(Refer to page 19)*
- Check that the operation mode switching network variable is running.
- Check that the operation mode switching network variable has been written correctly.

The inverter does not start in Network operation mode.

- Check that the inverter starting network variable has been written correctly.
- Check that the inverter starting network variable is running.

"E.OP1", "E.OP2", "E.OP3", "E.1", "E.2" or "E.3" is displayed.

- Refer to *page 31*.

Setup example

The following is an example of procedure to perform LONWORKS communication with the FR-A7NL.

(1) Confirmation of installation and connection

1) Check that the FR-A7NL is mounted on the option connector of the inverter. *(Refer to page 9)*
2) Check that the twisted pair cable is connected to NET_A and NET_B of the terminal block supplied securely. *(Refer to page 12)*
3) Check that the terminating resistor is connected with a LONWOKRS cable. (Please fabricate a terminating resistor.) *(Refer to page 11)*

(2) Parameter setting of the inverter (when the network operation mode is always set)

1) Set "0" (simple mode+extended parameters display) in *Pr. 160 User group read selection*.
2) Set a value other than "0" in *Pr. 340 Communication startup mode selection. (Refer to page 19)*
3) Set "0 or 2" in *Pr. 79 Operation mode selection*. *(Refer to page 19)*

REMARKS

By making parameter setting of 2) and 3) above, the inverter operates in network operation mode when the inverter power is switched on. (It is not necessary to change the operation mode with network variables.)

(3) Switch on the inverter power from off

Power on the inverter (inverter reset) again to change the mode to network operation mode.

(4) Perform LONWORKS communication setting

Perform LONWORKS communication setting with software necessary for LONWORKS communication such as "LonMaker for Windows, Visio 2000".
(For a setting method, refer to *the manual of software used*.)
Communication setting is complete if "SERVICE" LED of the FR-A7NL is not flickering.

(5) Check the status of the network variables

1) Power on the inverter (inverter reset) again and reflect the current network variables of the inverter to LonMaker Browser.
2) Set LonMaker Browser to "Monitor All On" to turn on monitoring of the inverter network variables. (When "Monitor All off" is set, only the initial value of network variables the inverter sent to LonMaker Browser can be referred. To always check network variables, set "Monitor All On".)

(6) Setup is completed

Example of inverter parameter clear

The following shows procedure to make LONWORKS communication again when inverter parameter clear is performed from LONWORKS communication.

(1) Perform parameter clear

Perform parameter clear via network or with the operation panel or parameter unit.
When performing with the operation panel or parameter unit, the procedure is the same as that of the inverter.

When performing via the network (LONWORKS), use the command request (SNVT_str_asc nviInvCmdReq) (*refer to page 79*) of network variables.

Data set by command request:
Request flag = H01
Request code = H00FC
Request data = H5A5A, H55AA

- Parameter for communication is also cleared when H9696 and H9966 are set as request data.
  (Refer to page 83)
- When *Pr. 79* = "2", resetting is necessary as the set value is cleared.

(2) Check the status of the network variables

Set LonMaker Browser to "Monitor All On" to turn on monitoring of the inverter network variables.
(When "Monitor All off" is set, only the initial value of network variables the inverter sent to LonMaker Browser can be referred. To always check network variables, set "Monitor All On".)

(3) LONWORKS communication resetting is complete

MEMO

REVISIONS

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

Print Date	*Manual Number	Revision
May 2004	IB(NA)-0600168ENG-A	First edition
Jul. 2004	IB(NA)-0600168ENG-B	Addition · Compatible with the FR-F700 series 75K or higher · Compatible with the FR-F700-EC series and FR-F700-CH series.
Nov. 2004	IB(NA)-0600168ENG-C	Partial modification Selection of number of motor poles of reference speed setting Addition · Compatible with the FR-F700-NA series. · Cumulative power monitor 2
Dec. 2005	IB(NA)-0600168ENG-D	Addition Compatible with the FR-A700 series.
Nov. 2011	IB(NA)-0600168ENG-E	Addition · Screw tightening torque of the plug-in option · FR-F700P series compatibility · FR-A701 series compatibility · Command requests (binary) and command replies (binary) for network variables

INVERTER

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