FR-F700-EC Series Instruction Manual Supplement

The following specifications are added for the FR-F700-EC series.

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1 Addition of option connector 2

The option connector 2 is added. Multiple plug-in options are available. (For the communication option, install it in the option connector 2 (the bottom connector).)



2 Additional Functions

2.1 Acceleration/deceleration time switching frequency (Pr. 147)

When output frequency reaches *Pr. 147 Acceleration/deceleration time switching frequency* or higher, the acceleration/ deceleration time automatically switches to *Pr. 44 Second acceleration/deceleration time* and *Pr. 45 Second deceleration time* settings. The RT signal is not necessary for switching the acceleration/deceleration time.

Parameter Number	Name	Initial Value	Setting Range	Description
147	Acceleration/ deceleration time switching	9999	0 to 400Hz	The frequency where the acceleration/ deceleration time switches to the time set in <i>Pr:44</i> and <i>Pr:45</i> .
	frequency		9999	No function

The parameter can be set when Pr. 160 User group read selection = "0".

Pr. 147 setting	Acceleration/deceleration time	Description
9999 (initial value)	Pr. 7, Pr. 8	Acceleration/deceleration time is not automatically changed.
0.00Hz	Pr.44, Pr. 45	Second acceleration/deceleration time is applied from the start.
$0.01Hz \le Pr. 147 \le set frequency$	Output frequency < <i>Pr. 147</i> : <i>Pr. 7, Pr. 8</i> <i>Pr. 147</i> ≤ output frequency: <i>Pr. 44, Pr. 45</i>	Acceleration/deceleration time is automatically changed. *
Set frequency < Pr. 147	Pr. 7, Pr. 8	Not changed as the frequency has not reached the switchover frequency. *

* Even if the output frequency is lower than the *Pr. 147* setting, the acceleration/deceleration time is changed to the second acceleration/ deceleration time by the RT signal.



2.2 PTC thermistor protection level (Pr. 561)

Terminal 2 and terminal 10 are available for inputting of motor built-in PTC thermistor output. When the PTC thermistor input reaches to the resistance value set in *Pr. 561 PTC thermistor protection level*, inverter outputs PTC thermistor operation error signal (E.PTC) and trips.

To use terminal 2 as a PTC thermistor input, set voltage/current input switch of terminal 2 to OFF (initial setting), and set the input specification of terminal 2 to 0 to 5V input (*Pr. 73 Analog input selection* = "1 (initial value), 3, 5, 11, 13, or 15").

Parameter Number	Name	Initial Value	Setting Range	Description
561	PTC thermistor protection	0000	0.5 to $30k\Omega$	Set the PTC thermistor protection level (resistance value from terminal 2).
501	level	9999	9999	PTC thermistor protection with terminal 2 is invalid.

The above parameter can be set when Pr. 160 User group read selection = "0".



PTC thermistor input connection



- Check the characteristics of the using PTC thermistor, and set the resistance value within a protection providing temperature TN, just around the center of R1 and R2 in a left figure. If the *Pr. 561* setting is closer to R1 or R2, the working temperature of protection goes higher (protection works later), or lower (protection works earlier).
- PTC thermistor resistance can be displayed in operation panel (FR-DU07), parameter unit (FR-PU07), or RS-485 communication when PTC thermistor protection is active (*Pr. 561* ≠ "9999").

REMARKS

- When using terminal 2 as PTC thermistor input (*Pr.* 561 ≠ "9999"), terminal 2 is not available for analog frequency command. Also unavailable when using terminal 2 for PID control. Input the set point using *Pr.133* or via communications.
- For the power supply terminal of PTC thermistor input, do not use a power supply other than terminal 10 (external power supply, etc).
 Otherwise the PTC thermistor will not work properly.



Parameter Number	Name	Initial Value	Setting Range	Description
	DU/DU main diaplay data		0, 5, 6, 8 to 14, 17, 20,	
52	selection	0	23 to 25, 50 to 57, 64,	
	Sciection		67, 81 to 86 100	
774	PU/DU monitor selection 1	1	1 to 3, 5, 6, 8 to 14, 17,	64: PTC thermistor resistance
775	PU/DU monitor selection 2	2	20, 23 to 25, 40 to 42,	
776	PU/DU monitor selection 3	3	50 to 57, 64, 67, 81 to	
			86, 100, 9999	

To monitor the PTC thermistor resistance via communications, set as follows.

Communication		Setting	
Mitsubishi inverter protocol		Creatial manifestation No	
(computer link communication)		Special monitor selection No. while data. H40	
Modbus-RTU pr	otocol, BACnet MS/TP	Pogistor: 40264	
protocol		Register. 40204	
PLC function		D9211	
	FR-A7NC (CC-Link)	Monitor code: H40	
Communication option	FR-A7NL (LonWorks)	nvilnvMonCode: H0040	
	FR-A7ND (DeviceNet)	Class: 0x80, Instance: 1, Attribute: 74	
	ED A7ND (Profibus)	PPO type support specification PNU: P1.64 (PNU number 1, Sub-Index number 64)	
	FR-A/NF (FI01003)	PPO type non-support specification IND: 0000H PNU: 3FH	
	FR-A7NF (FL remote)	H1000020E	

2.3 Terminal 10 calibration for PTC thermistor (Pr. 986)

When using terminal 2 as PTC thermistor input, voltage calibration of terminal 10 is available.

Parameter Number	Name	Initial Value	Setting Range	Description
986		5.00V *2 (9999)	4 to 6V	Set the voltage between terminal 10 and terminal 5. (Setting increments: 0.01V)
	thermistor		8888	Set when a voltage measurement is unavailable.
			9999	Displayed when terminal 10 calibration has not been
			(Read only)	performed.

*1 The above parameter can be set when Pr. 160 User group read selection = "0".

*2 The initial value may slightly differ for each inverters.

- If the read value of *Pr. 986* is a voltage data (*Pr. 986* \neq 9999), the calibration is not necessary.
- If the read value of *Pr. 986* is "9999", the calibration of terminal 10 is necessary. Measure the voltage between terminal 10 and terminal 5 with a voltmeter, and set the voltage in *Pr. 986*.
- If the above calibration method is unavailable, short between terminal 10 and terminal 2, and set "8888" in Pr. 986.

REMARKS

- When the combination of the main circuit board and control circuit has been changed, check the read value of *Pr. 986.* If the read value is "9999", calibrate the terminal 10.
- · Calibrate while the main circuit power is ON.
- Pr. 986 is not displayed in the initial value change list.

2.4 Reset selection at main circuit power ON (Pr. 30)

At initial status, inverter resets at main circuit power ON when using separated power source for main circuit (R, S, T) and control circuit (R1, S1). With this parameter, you can select to perform inverter reset or not at main circuit power ON. (Refer to *page 102 of the Instruction Manual of the inverter* for other details.)

Parameter Number	Name	Initial Value	Setting Range	Description		
				Regeneration unit	Terminal for power supply to the inverter	Reset at main circuit power supply ON
			0			Reset
			100	Inverter without regenerative	N/L1, 3/L2, 1/L3	Not reset
	Regenerative function selection		10	function, brake unit (FR-BU2,	P/+, N/- (DC feeding mode 1)	-
		generative ction 0 ection	20	FR-BU, BU type) Brake unit (MT-BU5), power regeneration converter (MT- RC)	R/L1, S/L2, T/L3 - P/+, N/- (DC feeding mode 2)	Reset
			120			Not reset
30			1		R/1 S/1 2 T/1 3	Reset
			101		1011, 0/12, 1/13	Not reset
			11		P/+, N/- (DC feeding mode 1)	-
			21		R/L1, S/L2, T/L3 - P/+, N/- (DC feeding mode 2)	Reset
			121			Not reset
			2	High power factor converter (FR-HC, MT-HC), power regeneration common converter (FR-CV)	P/+, N/-	-

The above parameter can be set when Pr. 160 User group read selection = "0".

- Pr: 30 = "0, 1, 20, 21" With inverter reset (Settings of "20 and 21" are for power failure)
- Pr: 30 = "100, 101, 120, 121" Without inverter reset

2.5 Input terminal function selection (Pr. 178 to Pr. 189)

The following input signals are added. To input the following signals, set *Pr. 178 to Pr. 189* referring to the following table. (Refer to *page 110 of the Instruction Manual of the inverter* for other details.)

Setting	Signal Name	Function	Related Parameters	Refer to Page
50	SQ	Sequence start	Pr. 414, Pr. 415, Pr. 498, Pr. 506 to Pr. 515	46
51	X51	Fault clear signal	—	46
77	X77	Pre-charge end command	Pr. 127 to Pr. 130, Pr. 133, Pr. 134, Pr. 760 to Pr. 764	16
78	X78	Second pre-charge end command	Pr. 753 to Pr. 758, Pr. 765 to Pr. 769	21

— CAUTION =

• Changing the terminal assignment using *Pr.178* to *Pr.189* (Input terminal function selection) may affect the other functions. Set parameters after confirming the function of each terminal.

2.6 Output terminal function selection (Pr. 190 to Pr. 196)

The following output signals are added. To output the following signals, set *Pr. 190 to Pr. 196* referring to the following table. (Refer to *page 116 of the Instruction Manual of the inverter* for other details.)

Set	tting	Signal			Polatod	Pofor
Positive Logic	Negative Logic	Name	Function	Operation Parameters		to Page
49	149	Y49	During pre-charge operation	Output during the pre-charge operation		16
50	150	Y50	During second pre- charge operation		Pr. 127 to Pr. 134, Pr. 241, Pr. 553,	16
51	151	Y51	Pre-charge time over	Output when the pro-charged time exceeds	Pr. 554,	16
52	152	Y52	Second pre-charge time over	the time set in <i>Pr.764</i> or <i>Pr.769</i> .	Pr. 575 to Pr. 577, Pr. 753 to Pr. 769,	16
53	153	Y53	Pre-charge level over	Output when the pro-sharged amount	C42 to C45	16
54	154	Y54	Second pre-charge level over	exceeds the set level in <i>Pr.763</i> or <i>Pr.768</i> .		16
67	167	Y67	During power failure	Output during output shutoff due to power failure or under voltage.	Pr. 57	6
82	182	Y82	BACnet binary output	Control of binary output from BACnet is available.	—	35

Power failure signal (Y67 signal)

When output is shutoff due to a power failure or undervoltage, the Y67 signal turns ON regardless of the automatic restart after instantaneous power failure function setting.

Y67 signal turns OFF at power failure recovery or undervoltage recovery.

To use Y67 signal, set "67 (positive logic) or 167 (negative logic)" in any of *Pr. 190* to *Pr. 196* (Output terminal function selection) to assign the function.



CAUTION :

Changing the terminal assignment using *Pr.196* to *Pr.196* (Output terminal function selection) may affect the other functions. Set parameters after confirming the function of each terminal.

2.7 Speed detection hysteresis (Pr. 870)

This function prevents chattering of the speed detection signals.

When an output frequency fluctuates, the up to frequency signal (SU) and output frequency detection signals (FU, FU2) may repeat ON/OFF (chatters). Setting hysteresis to the detected frequency prevents chattering of these signals.

Parameter Number	Name	Initial Value	Setting Range	Description
870	Speed detection hysteresis	0Hz	0 to 5Hz	Set the hysteresis width for the detected frequency.

The above parameters can be set when Pr. 160 User group read selection = "0".



REMARKS

- Setting a higher value to this parameter slows the response of frequency detection signals (SU, FU and FU2).
- · The output frequency compared with the set frequency changes depending on the control method.

Control Method	Compared Output Frequency
V/F control	Output frequency
Simple magnetic flux vector control	Output frequency before slip compensation

CAUTION :

Changing the terminal assignment using *Pr. 190 to Pr. 196 (output terminal function selection)* may affect the other functions. Please set parameters after confirming the function of each terminal.

2.8 Speed setting reference (Pr. 505)

To display the machine speed, set in *Pr.* 37 the machine speed for operation with frequency set in *Pr.* 505. For example, when *Pr.* 505 = "50Hz" and *Pr.* 37 = "1000", "1000" is displayed on the running speed monitor when the running frequency is 50Hz. When running frequency is 25Hz, "500" is displayed. (Refer to *page 125 of the Instruction Manual of the inverter* for other details.)

Parameter Number	Name	Initial Value	Setting Range	Description
505	Speed setting reference	50Hz	1 to 120Hz	Set the reference speed for Pr. 37.

· Machine speed conversion formula ... Pr. 37 × frequency/Pr. 505 setting (Hz)

2.9 DU/PU, terminal CA/AM monitor display selection (Pr. 52, Pr. 54, Pr. 158)

⅀

The following monitors are added. To monitor the following items, set *Pr. 52, Pr. 54, and Pr. 158* referring to the following table. (Refer to *page 126 of the Instruction Manual of the inverter* for other details.)

Types of Monitor	Increments	Pr. 52 Parameter Setting Value	Pr. 54 (CA) Pr. 158 (AM) Parameter Setting Value	Full-scale value of the terminal CA and AM	Description
PTC thermistor resistance	0.01kΩ	64	×	-	Displays the PTC thermistor resistance at terminal 2 when PTC thermistor protection is active. (0.10kQ to $31.5k\Omega$) (Refer to <i>page 3</i>)
PID measured value 2	0.1%	67	67	100%/ C42 or C44	Displays the measured value. Monitoring is available even when PID control is inactive. (For details, refer to <i>page</i> 21.)
PLC function output	0.1%	×	70	100%	Desired values can be output from terminal CA and AM using the PLC function. Refer to <i>page 46</i>
BACnet reception status	1	81	×		Displays the reception status of BACnet communication (Refer to <i>page 35</i> for details)
BACnet token pass counter	1	82	×		Displays the count of received token
BACnet valid APDU counter	1	83	×		Displays the count of valid APDU detection
BACnet communication error counter	1	84	×	_	Displays the count of communication error
Terminal CA output level		85	85 (Pr: 54 only)	20mA	Displays actual output current level of terminal CA which is controlled by BACnet communication (Refer to <i>page 35</i> for details)
Terminal AM output level	_	86	86 (Pr. 158 only)	10V	Displays actual output voltage level of terminal AM which is controlled by BACnet communication (Refer to <i>page 35</i> for details)

2.10 Subtraction starting frequency (Pr. 263)

The setting range of *Pr:263 Subtraction starting frequency* is changed. (Refer to *page 140 of the Instruction Manual of the inverter* for other details.)

Parameter Number	Name	Initial Value	Setting Range	Description
263	263 Subtraction starting frequency		0 to 400Hz	When output frequency $\geq Pr. 263$ Decelerate from the speed obtained from output frequency minus $Pr. 262$. When output frequency $< Pr. 263$ Decelerate from output frequency
			9999	Decelerate from the speed obtained from output frequency minus Pr. 262.

The above parameter can be set when Pr. 160 User group read selection = "0".

2.11 4mA input check of current input (Pr. 573, Pr. 777, Pr. 778)

When inputting 4 to 20mA current to terminal 2 or terminal 4, decrease in analog current input is detected to enable continuous operation even if input has decreased.

Parameter Number	Name	Initial Value	Setting Range	Description
			1	When the analog input current drops to or below 2mA, the LF signal is output and inverter continues operation at the frequency (average value) just before current reaches 2mA.
			2	When the analog input current drops to or below 2mA, the fault (E.LCI) is output and the inverter output is shutoff.
573	4mA input check selection	9999	3	When the analog input current drops to or below 2mA, the alarm signal (LF) is output, and the fault (E.LCI) is output after deceleration to a stop. When the current rises to or above 3mA during the deceleration, the motor accelerates again to the set point and resumes normal operation.
			4	When the analog input current drops to or below 2mA, the alarm signal (LF) is output and the inverter continues operation at the <i>Pr</i> : 777 setting.
			9999	4mA input is not checked.
777	4mA input fault 777 operation		0 to 400Hz	Set the frequency to continue the operation when the analog input current drops to or below 2mA while <i>Pr: 573</i> ="4."
	frequency		9999	4mA input is not checked while Pr: 573 = "4."
778	Current input check filter	0	0 to 10s	Detection for an analog input current drop is performed for the time period of Pr . 778 while the analog input current \leq 2mA. Detection for an analog input current drop is cancelled for the time period of Pr . 778 while the analog input current > 3mA. Pr . 778 = 0. Immediately detected or the detection is cancelled.

The above parameters can be set when Pr. 160 User group read selection = "0".



* When Pr.573 = "1", input decrease is detected (LF signal output) even if the analog input value to bias frequency of terminal 2 or terminal 4 is set to 2mA or less using C2 (Pr. 902) or C5 (Pr. 904) and the value is not as bias frequency settings.

(1) Operation continuation (Pr. 573 = "1")

- · When the input current of terminal 4 (terminal 2) falls 2mA or below, output alarm output signal (LF) is output.
- When the current falls below 2mA, the output frequency (average value) before detection is retained and operation at the retained frequency continues.
- When the current input increases above 3mA, the LF signal output is turned OFF and the inverter operates according to the current input.
- For the LF signal, set "98 (positive logic) or 198 (negative logic)" in *Pr. 190 to Pr. 196 (output terminal function selection)* and assign functions to the output terminal.
- Since turning OFF the start command clears the retained frequency, the inverter does not operate at the retained frequency even if restarted.



During external operation (Pr. 573 = 1)



(2) Fault output (Pr. 573 = "2")

When the analog input current drops to or below 2mA, the fault (E.LCI) is output and the inverter output is shutoff.

(3) Fault output after deceleration to stop (Pr. 573 = "3")

When the analog input current drops to or below 2mA, the alarm (LF) is output and the motor decelerates to stop. After it is stopped, the fault (E.LCI) is output.

When the input current rises again during the deceleration (including the cases when the 4mA current input is invalid or no check is performed for the input current), the motor accelerates again to the set point and performs normal operation.



During PID control (reverse action) (Analog input current is restored during deceleration while Pr.573 =3)



(4) Continuing the operation at Pr. 777 setting (Pr. 573 = "4")

When the analog input current drops to or below 2mA, the alarm (LF) is output and the inverter continues operation at the set frequency of *Pr.* 777. When the analog input current is restored to or above 3mA, the alarm (LF) is cancelled.



REMARKS

When the *Pr.* 573 and *Pr.* 777 settings are changed after the detection for an input current drop, the inverter operates with the changed settings. However, the inverter operates with previous settings while in stop or in alarm.

2.12 Password function (Pr. 296, Pr. 297)

Registering 4-digit password can restrict parameter reading/writing.

Parameter Number	Name	Initial Value	Setting Range	Description	
296 Password lock level		0000	0 to 6, 99, 100 to 106, 199	Select restriction level of parameter reading/ writing when a password is registered.	
290		3333	9999	No password lock	
297 Pa	Password lock/unlock	9999	1000 to 9998	Register a 4-digit password	
			(0 to 5) *	Displays password unlock error count. (Reading only) (Valid when <i>Pr. 296</i> = "100" to "106")	
			9999 *	No password lock	

The above parameters can be set when Pr. 160 User group read selection = "0"

When Pr. 296 ≠ "9999" (with password lock), note that Pr. 297 is always available for setting regardless of Pr. 160 setting.

* "0 or 9999" can be set to Pr. 297 at any time although the setting is invalid (the displayed value does not change).

(1) Parameter reading/writing restriction level (Pr. 296)

•Level of reading/writing restriction by PU/NET mode operation command can be selected by Pr. 296.

	PU Mode Operation Command *3		NET Mode Operation Command *4				
Pr. 296 Setting			RS-485	Terminal	Communication Option		
	Read *1	Write *2	Read	Write *2	Read	Write *2	
9999	0	0	0	0	0	0	
0, 100 *6	×	×	×	×	×	×	
1, 101	0	×	0	×	0	×	
2, 102	0	×	0	0	0	0	
3, 103	0	0	0	×	0	×	
4, 104	×	×	×	×	0	×	
5, 105	×	×	0	0	0	0	
6, 106	0	0	×	×	0	×	
99, 199	Only parameters registered in the user group can be read/written. *5 (For the parameters not registered in the user group, same restriction level as "4, 104" applies.)						

O: enabled, x: restricted

*1 If the parameter reading is restricted by the Pr. 160 setting, those parameters are unavailable for reading even when "O" is indicated.

*2 If the parameter writing is restricted by the Pr. 77 setting, those parameters are unavailable for writing even when "O" is indicated.

*3 Parameter access from unit where parameter is written in PU operation mode (initially set to operation panel (FR-DU07), parameter unit) is restricted.

- *4 This restricts parameter access from the command source that can write a parameter under Network operation mode (initially RS-485 terminal or a communication option).
- *5 Read/write is enabled only in the simple mode parameters registered in the user group when *Pr.160 User group read selection* = "9999". *Pr.296* and *Pr.297* are always read/write enabled whether registered to a user group or not.

*6 If a communication option is installed, option fault (E.OPT) occurs, and inverter trips.

(2) Password lock/unlock (Pr.296, Pr.297)

<Lock>

1) Set parameter reading/writing restriction level. (Pr. 296 ≠ 9999)

Pr.296 Setting Value	Restriction of Password Unlock Error	Pr.297 Display
0 to 6, 99	No restriction	Always 0
100 to 106, 199	Restricted at fifth error	Displays error count (0 to 5)

* During [*Pr: 296* = any of "100 to 106, 199"], if password unlock error has occurred 5 times, correct password will not unlock the restriction. All parameter clear can unlock the restriction. (In this case, parameter settings are cleared.)

 Write a four-digit number (1000 to 9998) in *Pr. 297* as a password. (When *Pr. 296* = "9999", *Pr. 297* cannot be written.)
 When password is registered, parameter reading/writing is restricted with the restriction level set in *Pr. 296* until unlocking.

REMARKS

- · After registering a password, a read value of Pr. 297 is always one of "0" to "5".
- · When a password restricted parameter is read/written, L DL is displayed.
- Even if a password is registered, parameters which the inverter itself writes, such as inverter parts life, are overwritten as needed.
- Even if a password is registered, Pr. 991 PU contrast adjustment can be read/written when a parameter unit (FR-PU04/FR-PU07) is connected.

<Unlock>

There are two ways of unlocking the password.

- Enter a password in *Pr. 297*.
 Unlocked when a password is correct. If a password is incorrect, an error occurs and not unlocked.
 During [*Pr. 296* = any of "100 to 106, 199"], if password unlock error has occurred 5 times, correct password will not unlock the restriction. (During password lock)
- Perform all parameter clear.

CAUTION =

- If the password has been forgotten, perform all parameter clear to unlock the parameter restriction. In that case, other parameters are also cleared.
- · Parameter all clear can not be performed during the operation.
- Do not use the FR Configurator when parameter read is restricted (Pr: 296 = any of "0, 4, 5, 99, 100, 104, 105, 199").
- FR Configurator may not function properly.

REMARKS

· The password unlock method is different for operation panel/FR-PU07, RS-485 communication, and communication option.

	Operation panel/ FR-PU07	RS-485 communication	Communication option
All parameter clear	0	0	0
Parameter clear	×	×	0
	O December of sea her		I a a mana a fi ba a sum la alsa al

O:Password can be unlocked. x:Password cannot be unlocked.

For the method of parameter clear and all parameter clear with a communication option and a parameter unit (FR-PU07), refer to the Instruction Manual of each option. (Refer to page 261 of the Instruction Manual of the inverter for the operation panel (FR-DU07), page 196 for the Mitsubishi inverter protocol of RS-485 communication, and page 207 for Modbus-RTU communication protocol.)

(3) Parameter operation during password lock/unlock

Parameter operation		Unlo	cked	Password registered	Locked
		Pr. 296 = 9999 Pr. 297 = 9999	<i>Pr. 296 ≠</i> 9999 <i>Pr. 297</i> = 9999	<i>Pr. 296 ≠</i> 9999 <i>Pr. 297</i> = 0 to 4 (Read value)	Pr. 296 = 100 to 106, 199 Pr. 297 = 5 (Read value)
Pr 206	Read	O *1	0	0	0
FT. 290	Write	O *1	O *1	×	×
Pr 207	Read	O *1	0	0	0
11.277	Write	×	0	0	O *3
Performing parameter clear		0	0	× *4	× *4
Performing parameter all clear		0	0	O *2	O *2
Performing parameter copy		0	0	×	×

O: enabled, x: restricted

*1 Reading/writing is unavailable when there is restriction to reading by the Pr. 160 setting. (Reading is available in NET mode regardless of Pr. 160 setting.)

- *2 Unavailable during the operation.
- *3 Correct password will not unlock the restriction.
- *4 Parameter clear is available only from the communication option.

REMARKS

- When Pr. 296 = any of "4, 5, 104, 105" (password lock), the setting screen for PU JOG frequency is not displayed in the parameter unit (FR-PU04/FR-PU07).
- During password lock, parameter copy of the operation panel (FR-DU07)/the parameter unit (FR-PU07) cannot be performed.
- Parameter settings in the inverter can be read/written using GX Developer even when the password function (*Pr.296, Pr.297*) is valid. To use the password function and the PLC function at the same time, apply a lock to reading/writing of the ladder program by registering a keyword.

2.13 Operation selection at communication error (Pr.502, Pr.779)

For communication using RS-485 terminals or a communication option, operation at a communication error can be selected. The operation is active under the Network operation mode.

Parameter number	Name	Initial value	Setting range	Description			
				At error occurrence	Indication	Fault output	At error removal
			0	Coasts to stop	E.SER*	Output	Stops (E.SER)*
502	Stop mode selection at communication error	0	1	Decelerates to stop	E.SER after stop*	Output after stop	Stops (E.SER)*
			2	Decelerates to stop	E.SER after stop*	Without output	Restarts
			3	Continues running at Pr: 779	_	Without output	Operates normally
Operation frequency			0 to 400Hz	Motor runs at error.	Motor runs at the specified frequency at a communication error.		
/79	error	9999	9999	Motor runs at the frequency used before the communication error.			

* E.OP1 or E.OP2 appears when using a communication option.

The above parameters can be set when Pr. 160 User group read selection = "0."

- Select the stop operation at the retry count excess (*Pr. 335*, only with Mitsubishi inverter protocol) or at a signal loss detection (*Pr. 336*, *Pr. 539*).

· Operation at an error

Pr: 502 setting	Operation	Indication	Fault output
0 (Initial setting)	Coasts to stop	E.SER is lit*	Output
1	Decelerates to stop	E SER is lit after ston*	Output after stop
2	Decelerates to stop		Not output
3	Operates at the frequency set in <i>Pr</i> .779.	Normal indication	Not output

· Operation after the error is removed

Pr: 502 setting	Operation	Indication	Fault output					
0 (Initial setting)	Stop status continues	E.SER continues*	Output continues					
1								
2	Restarts	Normal indication	Not output					
3	Operates normally	Normal indication	Not output					

Fault removal

*E.OP1 or E.OP2 appears when using a communication option.

Fault recognition

●Pr: 502 ="0 (initial setting)"



•Pr: 502 ="1"



•Pr: 502 ="2"





- *1 E.OP1 or E.OP2 appears when using communication through communication option.
- *2 When a communication error is detected while Pr.502 = "3," the alarm (LF) is output to an output terminal of the inverter. To use the LF signal, assign the function to an output terminal by setting "98 (positive logic) or 198 (negative logic)" in any of Pr.190 to Pr.196 (Output terminal function selection).

REMARKS

- · Fault output indicates the fault output signal (ALM signal) and an alarm bit output.
- When the fault output setting is active, a fault record is saved in the faults history. (A fault record is written to the faults history at a fault output.)
- When the fault output setting is not active, a fault record is overwritten to the faults history temporarily but not stored. After the error is removed, the fault indication goes back to normal indication in the monitor, and the faults history goes back to the previous status.
- If *Pr. 502* is set to "1, 2, or 3," the normal deceleration time setting (settings like *Pr. 8, Pr. 44, and Pr. 45*) is applied as the deceleration time. Normal acceleration time setting (settings like *Pr. 7 and Pr. 44*) is applied as the acceleration time for restart.
- When *Pr.502* = "2 or 3," the inverter operates with the start command and the speed command, which were used before the error.
- If a communication line error occurs, then the error is removed during deceleration while *Pr. 502* = "2," the motor re-accelerates as soon as the error is removed.
- · These parameters are valid when communication is performed from the RS-485 terminals or a communication option.
- These parameters are valid under the Network operation mode. When performing communication with RS-485 terminals, set Pr. 551 PU mode operation command source selection="2 (initial setting)."
- *Pr.* 502 is valid for the device that has the command source under the Network operation mode. If a communication option is installed while *Pr.* 550 = "9999 (initial setting)," a communication error in RS-485 terminals occurs and *Pr.* 502 becomes invalid.
- If the communication error setting is disabled with *Pr. 502* = "3," *Pr. 335* = "9999," and *Pr. 539* = "9999," the inverter does not continue its operation with the frequency set by *Pr. 779* at a communication error.
- If a communication error occurs while continuous operation at Pr. 779 is selected with Pr. 502 = "3," the inverter operates at the frequency set in Pr. 779 even though the speed command source is at the external terminals.
- Example) If a communication error occurs while Pr. 339 = "2" and the external terminal RL is ON, the operation is continued at the frequency set in Pr. 779.

2.14 PID action selection (Pr. 128)

The following setting ranges are added for *Pr.128 PID action selection*. Measured value input, set point input and deviation value input from the PLC function, and combination input via communication and terminal 4 are available. (Refer to *page 219 of the inverter instruction manual* for other setting values.)

Pr. No.	Name	Initial Value	Setting Range	Description			
			10, 11, 20, 21	Refer to page 219 of the	Refer to page 219 of the inverter instruction manual for details.		
			40 *1, 140	PID reverse action M	Aeasured value (terminal 4 *2)		
			41 *1, 141	PID forward action S	Set point input (LONWORKS, CC-Link, BACnet)		
			50, 51, 60, 61	Refer to page 219 of the	e inverter instruction manual for details.		
	128 PID action selection		70 *3	PID reverse action D	Deviation value signal input		
		10	71 *3	PID forward action (F	PLC function)		
			80 *3	PID reverse action M	leasured value, set point input		
128			81 *3	PID forward action (F	PLC function)		
			90 *3	PID reverse action D	Deviation value signal input		
			01 *2	PID forward action (F	PLC function)		
			51 5	(N	Not applied to the inverter frequency)		
			100 *3	PID reverse action M	Measured value, set point input		
			101 *3	PID forward action (F	PLC function)		
				()	Not applied to the inverter frequency)		
			110, 111, 120, 121	Refer to page 219 of the	e inverter instruction manual for details.		

*1 PID control is available with turning X14 signal ON when Pr.128 = "40, 41".

*2 Input specification for the terminal is determined by Pr.267 Terminal 4 input selection.

*3 Refer to the FR-F700 PLC function programming manual for details of the PLC function.

2.15 Pre-charge function (Pr.760 to Pr. 769)

This function is to drive the motor at a certain speed before starting PID control. The motor is operated at *Pr. 127 PID control automatic switchover frequency* at start until a pre-charge ending condition is satisfied. PID control starts after a pre-charge ending condition is satisfied. (This function is useful for a pump with a long hose. Without this function, PID control would start before the pump is filled with water, and proper control would not be performed.) Pre-charge function is also valid for a start after the PID output suspension (SLEEP). PID output suspension (SLEEP) function is not performed until the pre-charge operation ends.

Parameter Number	er Name Initial Setting Value Range		Setting Range	Description	
760	Pre-charge fault	0	0	When the pre-charged amount exceeds <i>Pr. 763</i> or the pre- charged time exceeds <i>Pr. 764</i> , the output is immediately shutoff, and the fault (E.PCH) is output.	
760	selection	0	1	When the pre-charged amount exceeds <i>Pr. 763</i> or the pre- charged time exceeds <i>Pr. 764</i> , the motor decelerates to stop, and the fault (E.PCH) is output.	
764	Pre-charge ending	0000	0 to 100% *1	Set the measurement level to end the pre-charge operation.	
701	level		9999	Without pre-charge ending level	
762	Pro charge onding time	0000	0.0 to 3600s	Set the time to end the pre-charge operation.	
702	Fie-charge ending time	5555	9999	Without pre-charge ending time	
763	763 Pre-charge upper detection level		0 to 100% *1	Set the upper limit for the pre-charged amount. If the pre- charged amount exceeds the set level, the fault (E.PCH) is output.	
			9999	Without pre-charge upper detection level	
764	Pre-charge time limit	9999	0.0 to 3600s	Set the time limit for the pre-charge operation. If the pre- charged time exceeds the set level, the fault (E.PCH) is output.	
			9999	Without pre-charge time limit	
765	Second pre-charge	0	0	When the pre-charged amount exceeds <i>Pr. 768</i> or the pre- charged time exceeds <i>Pr. 769</i> while the RT signal is ON, the fault (E.PCH) is output.	
100	fault selection	0	1	When the pre-charged amount exceeds <i>Pr. 768</i> or the pre- charged time exceeds <i>Pr. 769</i> while the RT signal is ON, the motor decelerates to stop, and the fault (E.PCH) is output.	
766	Second pre-charge ending level	9999	0 to 100% *1	Set the measurement level to end the pre-charge operation, which is performed while the RT signal is ON.	
			9999	Without second pre-charge ending level	

Parameter Number	Name	Initial Value	Setting Range	Description	
767	Second pre-charge	9999	0.0 to 3600s	Set the time to end the pre-charge operation, which is performed while the RT signal is ON.	
	enang tine		9999	Without second pre-charge ending time	
768	Second pre-charge upper detection level	9999	0 to 100% *1	Set the upper limit for the pre-charged amount, which is charged while the RT signal is ON. If the pre-charged amount exceeds the set level, the fault (E.PCH) is output.	
			9999	Without second pre-charge ending level	
769	Second pre-charge time limit	9999	0.0 to 3600s	Set the time limit for the pre-charge operation, which is performed while the RT signal is ON. If the pre-charged time exceeds the set level, the fault (E.PCH) is output.	
			9999	Without second pre-charge time limit	

The above parameters can be set when Pr. 160 User group read selection = "0".

*1 Setting values of Pr. 761, Pr. 763, Pr. 766, Pr. 768 are without unit when "9999" is set to both of C42(Pr. 934) and C44(Pr. 935).

(1) Operation selection for the pre-charge function

The pre-charge function ends when any of the following conditions is satisfied. It also ends when the start signal turns OFF or the output is shutoff (except for the PID output suspension function (SLEEP)).

	Pre-charge ending condition	Related parameter
Measured amount	The measured amount reaches Pr. 766 Pre-charge ending level or higher.	Pr. 761
Time	The pre-charge operation lasts Pr. 767 Pre-charge ending time or longer.	Pr: 762
Signal	The pre-charge end command (X78) is input.	Pr. 178 to Pr. 189

Using parameters, set the pre-charge ending conditions and the pre-charge function to be valid or invalid.

Pr. 127	Pre-cha	arge ending con	dition *				
PID control automatic switchover frequency	Pr. 761Pr. 762Pre-chargePre-chargeending levelending time		Pre-charge end command (X77)	Pre-charge function	Valid pre-charge ending condition		
9999	-	-	-	Invalid		_	
		0000	Not assigned	invalia	-		
	9999	5555	Assigned		-	-	X77
		Other than 9999	Not assigned	Valid	-	Time	-
			Assigned		-	Time	X77
Other than	Other than 9999	0000	Not assigned		Measured amount	-	-
9999		9999	Assigned		Measured amount	-	X77
		Other than	Not assigned		Measured amount	Time	-
		9999	Assigned		Measured amount	Time	X77

* When two or more conditions are satisfied, the pre-charge operation ends by the first-satisfied condition.

· Starting the pre-charge operation

Pre-charge operation starts when a start command is given (after the PID output suspension (SLEEP) or the MRS (output shutoff) signal cancellation) while the pre-charge operation is set active by parameters.

Ending the pre-charge operation

The pre-charge operation ends and PID control starts when any of the ending conditions in the above table is satisfied.

REMARKS

- If the X77 or X78 signal is ON at start after the PID output suspension (SLEEP) or the output shutoff cancellation, PID control starts without performing the pre-charge operation.
- $\cdot~$ PID output suspension (SLEEP) is not performed until the pre-charge operation ends.
- During the pre-charge operation, it is regarded as integrated value = estimated value. The motor speed may drop shortly from the automatic switchover frequency depending on the parameter settings.
- Parameter changes and switchover to the second PID control are applied immediately. If PID control has not started when the
 settings were changed, PID control starts with changed settings. (If PID control has already started, these settings do not apply.
 If the changed settings already satisfy a condition to start PID control, the PID control starts as soon as these are changed.)

Additional Functions

Pre-charge operation

· When the measured amount reaches the pre-charge ending level





Time When the measured amount reaches the Pr. 761 setting or higher, the pre-charge operation ends, and PID control starts.

Pr. 761 Pre-charge ending level ≠ 9999







When the signal is input to end the pre-charge operation



When the pre-charging time reaches the *Pr. 762* setting or higher, the pre-charge operation ends, and PID control starts.

Pr. 761 Pre-charge ending level = 9999 *Pr. 762 Pre-charge ending time* ≠ 9999

When the X77 signal turns ON, the pre-charge operation ends, and the PID control starts.

(If a start command is given while the X77 signal is ON, the pre-charge operation is not performed, and PID control is performed from the beginning.)

Pr. 178 to Pr. 189 = X77 assigned

REMARKS

- If the X77 signal stays ON, the pre-charge operation is not performed after the PID output suspension (SLEEP). To enable the X77 signal function after the PID output suspension (SLEEP), confirm the during precharge operation signal (Y49) = OFF, and turn OFF the X77 signal.
- To perform PID control immediately after the PID output suspension (SLEEP), keep the X77 signal ON until the PID control ends.

Pre-charge operation at output shutoff

When the pre-charge operation is valid, the pre-charge operation is performed at the output shutoff cancellation. (The pre-charge operation is also performed even if the automatic restart after instantaneous power failure is valid.) When the output is shutoff during PID control, which is performed after the pre-charge operation



When the output is shutoff during the pre-charge operation



REMARKS

If the output shutoff is canceled while the X77 signal is ON, the pre-charge operation is not performed and PID control is performed.

•When the operation method is changed to PID control from another control

When the control method is changed to PID control from a control with higher priority in frequency command (multispeed setting, Jog operation, etc.), the motor is accelerated/decelerated until its speed reaches the automatic switchover frequency, and the pre-charge is performed.





The protective function is activated when the elapsed time or measured amount reaches the set level during the precharge operation. When the level is exceeded, Y51 to Y54 signals are turned ON depending on the control method, the output is shutoff, and the fault (E.PCH) is output. For *Pr. 760 Pre-charge fault selection*, select to shutoff the output and output the fault immediately after a fault occurrence (*Pr. 760* = 0), or to output the fault after deceleration to a stop (*Pr.* 760 = 0). (Pre-charge protective function is effective whether the pre-charge ending conditions are set or not.)

Pre-charge limit level setting is available when the following conditions are satisfied:

- Ending time (Pr. 762) < Time limit (Pr. 764)
- Ending level (Pr. 761) < Upper detection level (Pr. 763)

REMARKS

When the protective function activates (including during deceleration to stop), Y51 to Y54 signals are kept ON once they are output whether PID control is valid or invalid. If a fault occurs after deceleration to stop, the fault is output after the stop whether PID control is valid or invalid.

The output of signal Y51 to Y54 can be released by a reset or the retry operation.

Limit by time



The fault (E.PCH) is output when the elapsed time reaches *Pr.* 764 *Pre-charge time limit.* With *Pr.* 760 *Pre-charge fault selection*, you can select to shut off the output and output the fault immediately after E.PCH, or to output the fault after deceleration to a stop. Retry operation is performed at the fault output (E.PCH) only if *Pr.* 65 = "0 or 4."

The fault (E.PCH) is output when the measured amount exceeds *Pr*: 763 *Pre-charge upper detection level*. With *Pr*: 760 *Precharge fault selection*, you can select to shut off the output and output the fault immediately after E.PCH, or to output the fault after deceleration to a stop. Retry operation is performed at the fault output (E.PCH) only if *Pr*: 65 = "0 or 4."

2.16 Second PID function (Pr.753 to Pr. 758, Pr.765 to Pr.769)

When the RT signal is ON and *Pr. 753 Second PID action selection* \neq 9999, PID control is commanded by the second function parameters.

When Pr: 753 = 9999, normal PID control is performed even if the second functions are valid.

When the control method is switched from the second PID control to the normal PID control, the integral value is estimated. The integral value is estimated by calculating the integral term with the output frequency and the P term. This method is same as when the control method changes to PID control when the frequency reaches the automatic switchover frequency.

Parameter	Name	Initial Value	Setting Range	Description			
Number		Varao	10 *2 110	PID reverse action	Deviation value signal input		
			11 *2 111	PID forward action	(terminal 1 *4)		
			20 *2 120	PID reverse action	Measured value (terminal 4 *5)		
			20 2, 120	PID forward action	Set point (terminal $2 * 4$ or Pr 133)		
			40 *2 140	PID reverse action	Measured value (terminal 4 *5)		
			41 *2 141	PID forward action	Set point input (LONWORKS CC-Link BACnet)		
			50	PID reverse action	Deviation value signal input		
			51	PID forward action	(LONWORKS, CC-Link, BACnet)		
			60	PID reverse action	Measured value set point input		
			61	PID forward action	(LONWORKS, CC-Link, BACnet)		
753	Second PID action	0000	70 *6	PID reverse action	Deviation value signal input		
755	selection	3333	71 *6	PID forward action	(PLC function)		
			80 *6	PID reverse action	Measured value, set point input		
			81 *6	PID forward action	(PLC function)		
			90 *6	PID reverse action	Deviation value signal input		
			01 *0	BID forward action	(PLC function)		
			51.6	FID IOI waru action	(Not applied to the inverter frequency)		
			100 *6	PID reverse action	Measured value, set point input		
			101 *6	PID forward action	(PLC function)		
				Name I DID as start	(Not applied to the inverter frequency)		
			9999	control parameter settings.			
	Second PID control			Set the frequency at which the control is automatically changed			
754	754 automatic switchover frequency		0 to 400Hz	to PID control while	the RT signals is ON.		
			9999	Without second PIE	control automatic switchover function		
			0 to 100% to	Set the set point for	PID control, which is performed while the RT		
755 *1	Second PID action set	9999	0 10 100% *3	signal is ON.			
	point		9999	Terminal 2 input is the set point while the RT signal is ON.			
				Set the proportiona	band for PID control, which is performed		
				while the RT signal	is ON.		
				If the proportional band is narrow (parameter setting is small), the			
756	Second PID	1000/	0.1 to 1000%	manipulated variable varies greatly with a slight change of the			
756 1	proportional band	100%		response sensitivity (gain) improves but the stability deteriorates			
				e.g. hunting occurs.			
				Gain Kp = 1/proportional band			
			9999	Without second proportional band			
				Set the PID integral time for PID control, which is performed			
				while the RT signal is ON.			
				When deviation step is input, time (Ti) is the time required for			
757 *1	Second PID integral	1s	0.1 to 3600s	integral (I) action to provide the same manipulated variable as			
	time			A the integral time	UII.		
				As the integral time decreases, the set point is reached earlier			
			9999	Without second inte	aral control		
			0000	Set the PID differen	tial time for PID control, which is performed		
				while the RT signal	is ON.		
	Second DID		0.01 to	When deviation larr	p is input, time (Td) is the time required to		
758 *1	Second PID differential time	9999	10.00s	provide the manipu	provide the manipulated variable of only the proportional (P)		
				action. As the differ	ential time increases, greater response is		
				made to a deviation	change.		
			9999	Without second diff	Without second differential control		

Additional Functions



Parameter Number	Name	Initial Value	Setting Range	Description
765	Second pre-charge	0	0	When the pre-charged amount exceeds <i>Pr.</i> 768 or the pre- charged time exceeds <i>Pr.</i> 769 while the RT signal is ON, the fault (E.PCH) is output.
765	fault selection	0	1	When the pre-charged amount exceeds <i>Pr.</i> 768 or the pre- charged time exceeds <i>Pr.</i> 769 while the RT signal is ON, the motor decelerates to stop, and the fault (E.PCH) is output.
766	Second pre-charge	9999	0 to 100% *3	Set the measurement level to end the pre-charge operation, which is performed while the RT signal is ON.
	ending level		9999	Without second pre-charge ending level
767	Second pre-charge	9999	0.0 to 3600s	Set the time to end the pre-charge operation, which is performed while the RT signal is ON.
	ending time		9999	Without second pre-charge ending time
768	Second pre-charge upper detection level	9999	0 to 100% *3	Set the upper limit for the pre-charged amount, which is charged while the RT signal is ON. If the pre-charged amount exceeds the set level, the fault (E.PCH) is output.
			9999	Without second pre-charge ending level
769	Second pre-charge time limit	9999	0.0 to 3600s	Set the time limit for the pre-charge operation, which is performed while the RT signal is ON. If the pre-charged time exceeds the set level, the fault (E.PCH) is output.
			9999	without second pre-charge time limit

The above parameters can be set when Pr. 160 User group read selection = "0".

*1 The above parameters allow its setting to be changed during operation in any operation mode even if "0" (initial value) is set in Pr. 77 Parameter write selection.

*2 PID control is available with turning X14 signal ON when Pr.128 = "10, 11, 20, 21, 40, 41".

*3 Setting values of Pr.755, Pr.766, Pr.768 are without unit when "9999" is set to both of C42(Pr.934) and C44(Pr.935).

*4 Input specification for the terminals are determined by *Pr*.73 Analog input selection.

*5 Input specification for the terminal is determined by Pr.267 Terminal 4 input selection.

*6 Refer to the FR-F700 PLC function programming manual for details of the PLC function.

Normal PID control (RT signal is OFF)	Second PID control (RT signal is ON)
Pr.128 PID action selection	Pr:753 Second PID action selection
Pr.127 PID control automatic switchover frequency	Pr.754 Second PID control automatic switchover frequency
Pr.133 PID action set point	Pr.755 Second PID action set point
Pr.129 PID proportional band	Pr.756 Second PID proportional band
Pr.130 PID integral time	Pr.757 Second PID integral time
Pr.134 PID differential time	Pr.758 Second PID differential time
Pr.760 Pre-charge fault selection	Pr.765 Second pre-charge fault selection
Pr.761 Pre-charge ending level	Pr.766 Second pre-charge ending level
Pr.762 Pre-charge ending time	Pr.767 Second pre-charge ending time
Pr.763 Pre-charge upper detection level	Pr.768 Second pre-charge upper detection level
Pr.764 Pre-charge time limit	Pr.769 Second pre-charge time limit

REMARKS

The control switches between PID control and second PID control by the following operation:

· Turning ON/OFF the RT signal while Pr: 753 ≠ 9999

· Setting "9999" or a value other than "9999" in Pr. 753 while the RT signal is ON.

The RT signal acts as the second function selection signal and makes the other second functions valid.

In the initial setting, the RT signal is assigned to the RT terminal. By setting "3" to any of *Pr. 178 to Pr. 189 (Input terminal function selection)*, you can assign the RT signal to the other terminal.

2.17 Regeneration avoidance function (Pr. 665, Pr. 885)

Pr. 665 Regeneration avoidance frequency gain is added. Adjustment of regeneration avoidance function is available. And the setting range of *Pr. 885 Regeneration avoidance compensation frequency limit value* is changed to 0 to 30Hz. (Refer to *page 248 of the Instruction Manual of the inverter* for other details.)

Parameter Number	Name	Initial Value	Setting Range	Description
665	Regeneration avoidance frequency gain	100%	0 to 200%	Adjust responsiveness at activation of regeneration avoidance. A larger setting will improve responsiveness to the bus voltage change. However, the output frequency could become unstable. When vibration is not suppressed by decreasing the $Pr. 886$ setting, set a smaller value in $Pr. 665$.
885	Regeneration avoidance compensation	6Hz	0 to 30 Hz	Set the limit value of frequency which rises at activation of regeneration avoidance function.
	frequency limit value		9999	Frequency limit invalid

The above parameters can be set when Pr. 160 User group read selection = "0".

 If the frequency becomes unstable during regeneration avoidance operation, decrease the setting of *Pr. 886* Regeneration avoidance voltage gain. Reversely, if sudden regeneration causes an overvoltage fault, increase the setting.

When vibration is not suppressed by decreasing the *Pr. 886* setting, set a smaller value in *Pr. 665 Regeneration avoidance frequency gain.*

2.18 Initiating a fault (Pr.997)

A fault is initiated by setting the parameter.

This function is useful to check how the system operates at a fault.

Parameter number	Name	Initial value	Setting range	Description
997	Fault initiation	9999	16 to 18, 32 to 34, 48, 49, 64, 80 to 82, 96, 112, 128, 129, 144, 145, 160, 161, 162, 164 to 168, 176 to 179, 192 to 194, 196 to 199, 228 to 230, 241, 242, 245 to 247, 253	The setting range is same with the one for fault data codes of the inverter (which can be read through communication). Written data is not stored in EEPROM. When "0" is set, nothing happens.
			9999	The read value is always "9999." This setting does not initiate a fault.

The above parameters can be set when Pr. 160 User group read selection = "0".

(1) Fault initiation (Pr. 997)

- To initiate a fault, set the assigned number of the fault you want to initiate in Pr. 997 Fault initiation.
- The value set in Pr. 997 Fault initiation is not stored in EEPROM.
- When a fault occurs, the inverter trips, and the fault is displayed and output (ALM, ALM2).
- While the initiated fault is occurring, the fault is displayed as the latest fault in the faults history. After a reset, the faults history goes back to the previous status. (The fault generated by the fault initiation function is not saved in the faults history.)
- · Perform inverter reset to cancel the fault.



Setting (Data code)	Fault	Setting (Data code)	Fault	Setting (Data code)	Fault
16(H10)	E.OC1	144(H90)	E.OHT	194(HC2)	E.P24
17(H11)	E.OC2	145(H91)	E.PTC	196(HC4)	E.CDO
18(H12)	E.OC3	160(HA0)	E.OPT	197(HC5)	E.IOH
32(H20)	E.OV1	161(HA1)	E.OP1	198(HC6)	E.SER
33(H21)	E.OV2	162(HA2)	E.OP2	199(HC7)	E.AIE
34(H22)	E.OV3	164(HA4)	E.16*	228(HE4)	E.LCI
48(H30)	E.THT	165(HA5)	E.17*	229(HE5)	E.PCH
49(H31)	E.THM	166(HA6)	E.18*	230(HE6)	E.PID
64(H40)	E.FIN	167(HA7)	E.19*	241(HF1)	E.1
80(H50)	E.IPF	168(HA8)	E.20*	242(HF2)	E.2
81(H51)	E.UVT	176(HB0)	E.PE	245(HF5)	E.5
82(H52)	E.ILF	177(HB1)	E.PUE	246(HF6)	E.6
96(H60)	E.OLT	178(HB2)	E.RET	247(HF7)	E.7
112(H70)	E.BE	179(HB3)	E.PE2	253(HFD)	E.13
128(H80)	E.GF	192(HC0)	E.CPU		
129(H81)	E.LF	193(HC1)	E.CTE		

* Refer to the FR-F700 PLC function programming manual for details of the PLC function.

REMARKS

• If a fault is already occurring in the inverter, a fault cannot be initiated by Pr. 997.

The retry function is invalid for the fault initiated by the fault initiation function.
If another fault occurs after a fault has been initiated, the fault initiation does not change.

The fault is not saved in the faults history either.

2.19 Setting multiple parameters as a batch (Pr.999)

- Parameter settings are changed as a batch. Those include parameter settings for the extended PID display, the Mitsubishi human machine interface (GOT) connection, rated frequency settings of 50Hz/60Hz, and acceleration/deceleration time increment settings.
- Multiple parameters are changed automatically. Users do not have to consider each parameter number. (Parameter setting mode)

Parameter Number	Name	Initial value	Setting range	Description
			1	Normal PID setting
			2	Extended PID setting
			10	GOT initial setting (PU connector)
	Automatic parameter setting	9999	11	GOT initial setting (RS-485 terminals)
			20	50Hz rated frequency
999			21	60Hz rated frequency
			30	Acceleration/deceleration time (0.1s increment)
			31	Acceleration/deceleration time (0.01s increment)
			9999	No action

(1) Automatic parameter setting (Pr.999)

•Select which parameters to be automatically set, and set that to *Pr: 999*. Multiple parameter settings are changed automatically. *Refer to page 26* for the list of parameters that are changed automatically.

Pr.999 setting		Description	Operation in the parameter setting mode
1	Automatically applies parameters	the normal PID display settings in	$\mathcal{P}_{U} \cap \mathcal{Q}(AUTO) \to \mathcal{P}_{\mathcal{O}}(PID) \to Write "1"$
2	Automatically applies parameters	the extended PID display settings in	$\label{eq:alpha} \begin{array}{l} P_{i} = P_{i} \\ P_{i} \\ P_{i} = P_{i} \\ P_{i} $
10	Automatically sets the GOT connection with	e communication parameters for the a PU connector	ר (AUTO) → הָהֶר (GOT) → Write "1"
11	Automatically sets the GOT connection with	e communication parameters for the RS-485 terminals	$\label{eq:alpha} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array}\\ \end{array}\\ \end{array}\\ \begin{array}{c} \begin{array}{c} \end{array}\\ \end{array}\\ \end{array} \begin{array}{c} \begin{array}{c} \end{array}\\ \end{array} \begin{array}{c} \end{array} \begin{array}{c} \end{array}\\ \end{array} \begin{array}{c} \end{array}\\ \end{array}$
20	50Hz rated frequency	Sets the related parameters of the	\mathcal{R} (AUTO) $\rightarrow \mathcal{F} \mathcal{G} \mathcal{G}(F50) \rightarrow Write "1"$
21	60Hz rated frequency	power supply frequency	$\label{eq:automation} \begin{array}{l} \mathcal{R} \cup \mathcal{F} & \mathcal{G} \cup \mathcal{G}(AUTO) \rightarrow \mathcal{F} & \mathcal{G} \cup \mathcal{G}(F60) \rightarrow Write \ "1" \end{array}$
30	0.1s increment	Changes the setting increments of acceleration/deceleration time	$\exists \bigcup \bigcap (AUTO) \rightarrow \bigcap \bigcup (T0.1) \rightarrow Write "1"$
31	0.01s increment	parameters without changing acceleration/deceleration settings	ີ່ #ປຼິເມີ (AUTO) → [ີ ເມີ (T0.01) → Write "1"

REMARKS

If the automatic setting is performed, the selected settings including the changed parameter settings will be changed.



The following tables show which parameters are changed in each of the automatic parameter settings.

CAUTION

 If the automatic setting is performed with Pr. 999 or the parameter setting mode, the listed settings including the changed parameter settings (changed from the initial setting) will be automatically changed. Before performing the automatic setting, confirm that changing the listed parameters will not cause any problem.

•Normal PID setting/Extended PID display increment setting (Pr. 999 = "1, 2")

Parameter	Name	Initial value	<i>Pr:999</i> = "1" *1	<i>Pr:999</i> = "2" *2
759	PID unit selection	9999	9999	4
774	PU/DU monitor selection 1	9999	9999	52
775	PU/DU monitor selection 2	9999	9999	53
776	PU/DU monitor selection 3	9999	9999	54
934	PID display bias coefficient	9999	9999	0
935	PID display gain coefficient	9999	9999	100
—	3-line monitor start setting	9999	—	The 3-line monitor is displayed first.

*1 In this setting, the dedicated parameter list is not displayed while FR-PU07-01 is connected. (However, when another setting is made to activate the PID control, the list may be displayed according to the setting.

*2 Pr. 934 and Pr. 935 settings affect displays of other parameters. Perform automatic setting of the extended PID display increments first. By doing this, the dedicated parameter list will be displayed when FR-PU07-01 is connected. In the initial status, the Pr. 999 setting is applied for the display. After the setting, the Pr. 934 and Pr. 935 settings are applied.

The 3-line monitor is displayed first after the automatic setting while a parameter unit (FR-PU07(-01)) is connected.

• GOT initial setting (PU connector) (Pr. 999 = "10")

Parameter	Name	Initial value	Automatically set to
79	Operation mode selection	0	1
118	PU communication speed	192	192
119	PU communication stop bit length	1	10
120	PU communication parity check	2	1
121	Number of PU communication retries	1	9999
122	PU communication check time interval	9999	9999
123	PU communication waiting time setting	9999	0ms
124	PU communication CR/LF selection	1	1
340	Communication startup mode selection	0	0

REMARKS

Always perform an inverter reset after the initial setting.

· GOT initial setting (RS-485 terminals) (Pr. 999 = "11")

Parameter	Name	Initial value	Automatically set to
79	Operation mode selection	0	0
332	RS-485 communication speed	96	192
333	RS-485 communication stop bit length	1	10
334	RS-485 communication parity check selection	2	1
335	RS-485 communication retry count	1	9999
336	RS-485 communication check time interval	0s	9999
337	RS-485 communication waiting time setting	9999	0ms
340	Communication startup mode selection	0	1
341	RS-485 communication CR/LF selection	1	1
549	Protocol selection	0	0

REMARKS

Always perform an inverter reset after the initial setting.

Parameter	Name	Initial value	<i>Pr:999</i> = "21"	<i>Pr:999</i> = "20"
3	Base frequency	50Hz	60Hz	50Hz
4	Multi-speed setting (high speed)	50Hz	60Hz	50Hz
20	Acceleration/deceleration reference frequency	50Hz	60Hz	50Hz
55	Frequency monitoring reference	50Hz	60Hz	50Hz
66	Stall prevention operation reduction starting frequency	50Hz	60Hz	50Hz
125 (903)	Terminal 2 frequency setting gain frequency	50Hz	60Hz	50Hz
126 (905)	Terminal 4 frequency setting gain frequency	50Hz	60Hz	50Hz
263	Subtraction starting frequency	50Hz	60Hz	50Hz
266	Power failure deceleration time switchover frequency	50Hz	60Hz	50Hz
390	% setting reference frequency	50Hz	60Hz	50Hz
505	Speed setting reference	50Hz	60Hz	50Hz
584	Auxiliary motor 1 starting frequency	50Hz	60Hz	50Hz
585	Auxiliary motor 2 starting frequency	50Hz	60Hz	50Hz
586	Auxiliary motor 3 starting frequency	50Hz	60Hz	50Hz

• Acceleration/deceleration time increment (Pr: 999 ="30(0.1s) or 31(0.01s)")

Parameter	Name	Initial set increment	<i>Pr:999</i> = "30"	Pr:999 = "31"
7	Acceleration time	0.1s	0.1s	0.01s
8	Deceleration time	0.1s	0.1s	0.01s
16	Jog acceleration/deceleration time	0.1s	0.1s	0.01s
21	Acceleration/deceleration time increments	1	0 *	1*
44	Second acceleration/deceleration time	0.1s	0.1s	0.01s
45	Second deceleration time	0.1s	0.1s	0.01s
264	Power-failure deceleration time 1	0.1s	0.1s	0.01s
265	Power-failure deceleration time 2	0.1s	0.1s	0.01s
582	Auxiliary motor connection-time deceleration time	0.1s	0.1s	0.01s
583	Auxiliary motor disconnection-time acceleration time	0.1s	0.1s	0.01s

* The set value is changed for Pr. 21.

REMARKS

· When a parameter is set as the acceleration/deceleration time (0.1s), the 0.01s increment is dropped.

• When a parameter is set as the acceleration/deceleration time (0.01s), the parameters are limited at the maximum value of the parameter setting range. For example, *Pr.* 7 = "361.0s" when 0.1s increment is selected, and *Pr.* 7 = "360.00s" when 0.01s increment is selected.

2.20 Setting of FR-PU07-01

The following functions are available when using FR-PU07-01. Refer to the Instruction Manual [IB-0600421ENG] for the operation of the parameter unit FR-PU07-01.

- · PID display bias/gain setting menu
- · Unit selection for the PID parameter/PID monitored items
- PID set point direct setting menu
- Monitor name display on 3-line monitor

Operation key name and operation mode indication on LCD are partly different with FR-PU07 and FR-PU07BB.

Operation key		Operation mode indication on LCD			
FR-PU07-01	FR-PU07	FR-PU07-01		FR-PL	J07
AUTO key, HAND key	EXT key, PU key	Indication of A	UTO, HAND	Indication of	FEXT, PU
AUTO HAND	EXT PU	0.00 _{Hz}	0.00 Hz	0.00 _{Hz}	0.00 Hz

2.20.1 PID display bias/gain setting menu

The parameters, which need to be set first when FR-PU07-01 is connected, are displayed as a list. The bias and gain for the PID display (*Pr. 934* and *Pr. 935*) and setting for *Pr. 999 Automatic parameter setting* can be set in these simple steps.

Pressing (PISET) while the FR-PU07-01 is in the monitor mode brings up the dedicated menu screen. *Pr. 999* is displayed at the first turn ON of the inverter, or at the first turn ON after parameter clear. After *Pr. 999* is set, *Pr. 934* and *Pr. 935* are displayed on the dedicated parameter menu.

(This function is valid under PID control. If (PISET) is pressed while PID control is invalid, the monitor goes into the parameter setting mode.)



Example when setting value "2" is set once in Pr. 999

Display of the dedicated parameter menu differs depending on Pr. 999 setting and PID control condition.

	Dedicated parameter menu			
Condition	When PID control is unavailable	When PID control is available		
Pr.999 setting	(Pr. 128 < 50, and Pr. 753 < 50, and X14 signal not assigned)	(Pr. 128 ≥ 50, or Pr. 753 ≥ 50, or X14 signal assigned)		
Never set before	Pr. 999	Pr. 999, Pr. 934, Pr. 935		
1 (normal PID)	No display	Pr. 934, Pr. 935		
2 (extended PID)	Pr. 934, Pr. 935	Pr. 934, Pr. 935		

REMARKS

The parameters, which are displayed in the dedicated parameter menu, can be always read regardless of the *Pr. 160* setting. For writing, the same restriction as for the normal parameters is applied.

2.20.2 Unit selection for the PID parameter/PID monitored items (Pr. 759)

For the parameter unit (FR-PU07/FR-PU07-01), the display unit of parameters and monitored items, which are related to PID control, can be changed. When the displayed bias coefficient and gain coefficient for PID control are changed by *Pr. 934* and *Pr. 935*, the unit setting of *Pr. 759* is applied to the direct setting mode display, parameters and monitored items.

* The direct setting mode is available only for FR-PU07-01.

Parameter Number	Name	Initial Value	Setting Range	Description
759	PID unit selection	9999	0 to 43, 9999	Change the display unit of the parameters and monitored items, which are related to PID control.

<List of Pr: 759 settings and units>

Setting	Unit display	Unit name
9999	%	%
0		Not displayed
1	К	Kelvin
2	С	Degree Celsius
3	F	Degree Fahrenheit
4	PSI	Pound-force per Square Inch
5	MPa	Mega Pascal
6	kPa	Kilo Pascal
7	Ра	Pascal
8	bar	Bar
9	mbr	Milli Bar
10	GPH	Gallon per Hour
11	GPM	Gallon per Minute
12	GPS	Gallon per Second
13	L/H	Liter per Hour
14	L/M	Liter per Minute
15	L/S	Liter per Second

Setting	Unit display	Unit name
16	CFH	Cubic Feet per Hour
17	CFM	Cubic Feet per Minute
18	CFS	Cubic Feet per Second
19	CMH	Cubic Meter per Hour
20	CMM	Cubic Meter per Minute
22	ftM	Feet per Minute
23	ftS	Feet per Second
24	m/M	Meter per Minute
25	m/S	Meter per Second
26	lbH	Pound per Hour
27	lbM	Pound per Minute
28	lbS	Pound per Second
29	iWC	Inch of Water Column

Setting	Unit display	Unit name
30	iWG	Inch of Water Gauge
31	fWG	Feet of Water Gauge
32	mWG	Meter of Water Gauge
33	iHg	Inch of Mercury
34	mHg	Millimeter of Mercury
35	kgH	Kilo Gram per Hour
36	kgM	Kilo Gram per Minute
37	kgS	Kilo Gram per Second
38	ppm	Pulse per Minute
39	pps	Pulse per Second
40	kW	Kilo Watt
41	hp	Horse Power
42	Hz	Hertz
43	rpm	Revolution per Minute



[Parameters of which display units are changed]

Pr.	Parameter name
131	PID upper limit
132	PID lower limit
133	PID action set point
553	PID deviation limit
577	Output interruption cancel level
755	Second PID action set point
761	Pre-charge ending level
763	Pre-charge upper detection level
766	Second pre-charge ending level
768	Second pre-charge upper detection level
	•



How *Pr*: *133* is displayed when *Pr*: *759* = "4"

REMARKS

The Pr. 759 setting is also applied for the display unit of parameters and monitored items when using FR-PU07.

2.20.3 PID set point direct setting menu

The setting menu is used to input the PID set point (*Pr. 133, Pr. 755*) in simple steps under PID control. Pressing (FUNC) while the FR-PU07-01 is in the monitor mode starts the direct setting mode for the PID set point. (Valid under PID control. If (FUNC) is pressed while the PID control is invalid, the function menu is displayed.)



[Monitored items of which display units are changed]

Pr.52 setting	Monitor item
52	PID set point
53	PID measured value
54	PID deviation



How PID set value is displayed when *Pr*: 759 = "4"

In the direct setting mode, parameters can be always read or written regardless of the Pr. 77 and Pr. 160 settings.

2.20.4 3-line monitor selection (Pr. 774 to Pr.776)

For the parameter unit (FR-PU07)/operation panel (FR-DU07), the first, second, and third monitors can be changed. When using FR-PU07-01, the monitored items, which are set by Pr.774 to Pr.776, can be displayed in the 3-line monitor.

The Pr.52 DU/PU main display data selection setting is invalid when Pr.774 to Pr.776 ≠ 9999. Monitored item names are displayed during monitoring (Monitor name display in the 3-line monitor is available only for FR-PU07-01).

Parameter Number	Name	Initial Value	Setting Range	Description			
774	PU/DU monitor		1 to 3, 5, 6, 8 to	Select the monitored item to be displayed on the first monitor			
114	selection 1		14, 17, 20,	(first row in the 3-line monitor).			
775	PU/DU monitor	0000	23 to 25, 40 to	Select the monitored item to be displayed on the second			
115	selection 2	9999	42, 50 to 57,	monitor (second row in the 3-line monitor).			
776	PU/DU monitor selection 3	1	64, 67, 81 to 86, 100, 9999	Select the monitored item to be displayed on the third monitor (third row in the 3-line monitor).			

Setting	Monitor item	Setting	Monitor item
1	Output frequency	25	Cumulative power
2	Output current	40	PLC function user monitor 1 *3
3	Output voltage	41	PLC function user monitor 2 *3
5	Frequency setting value	12	PLC function upon monitor 2 *3
6	Running speed	42	PLC function user monitor 3 -
8	Converter output voltage	50	Power saving effect
9	Regenerative brake duty	51	Cumulative saving power
5		52	PID set point
10	function load factor	53	PID measured value
11	Output current peak value	54	PID deviation
10	Converter output voltage peak	55 ^{*1}	I/O terminal status
12	value	56 ^{*1}	Option input terminal status
13	Input power	57 ^{*1}	Option output terminal status
14	Output power	64	PTC thermistor resistance
17	Load meter	67	PID measured value 2
20	Cumulative energization time	81	RAC net reception status
23	Actual operation time	82	BAChet token pass counter
24	Motor load factor	02	BACHELIOKEN PASS COULLEL

Setting	Monitor item
83	BACnet valid APDU counter
84	BACnet communication error counter
85	Terminal CA output level
86	Terminal AM output level
100	Set frequency before operation
9999 ^{*2}	No selection

How the monitor is displayed when 759 = "4," Pr: 774 = "52," Pr: 775 = "53," and Pr: 776 = "54"

The monitor is displayed as Pr. 774 = "1," Pr. 775 = "2," and Pr. 776 = "3" when a parameter unit other than FR-DU07 is used.
 The monitor is displayed as Pr. 774 = "1," Pr. 775 = "2," and Pr. 776 = "3" when the monitor selection is valid.

*3 The setting is available when using PLC function. Refer to the FR-F700 PLC function programming manual for details of the PLC function.

3 Easy operation mode setting (easy setting mode)

Setting of *Pr. 79 Operation mode selection* according to combination of the start command and speed command can be easily made.





4 Function enhancement of Mitsubishi inverter protocol/Modbus-RTU protocol communication

4.1 Multi command (Mitsubishi inverter protocol)

In Mitsubishi inverter protocol, sending of multiple commands in one transmission, and receiving of multiple data are available.

Item	Read/ write	Instruction Code	Data Description	Number of Data Digits (format)
Multi command	Write/ Read	HF0	Available for writing 2 commands, and monitoring 2 items for reading data	10 digits (A2,C1/D)

Sending data format from computer to inverter

Format								Nur	nber	of Cha	aracte	rs							
i onnat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A2	ENQ	Inve stat	erter tion 1ber	Instru Cc (H	uction de F0)	Waiting time	Send data type *1	Receive data type *2		Data	a1 *3			Da	ta2 3		Suche	im eck	CR/ LF

Reply data format from inverter to computer (No data error detected)

F	ormat		Number of Characters																	
i onna		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	C1	STX	Inve stat num	erter tion 1ber	Send data type *1	Receive data type *2	Error code 1 *5	Error code 2 *5		Data	a1 *4			Da	ta2 4		ETX	Su che	im eck	CR/ LF

*1 Specify the data type of sending data (from computer to inverter).

*2 Specify the data type of reply data (from inverter to computer).

*3 Combination of data 1 and data 2 for sending

	0		
Data Type	Data 1	Data 2	Remarks
0	Run command (expansion)	Set frequency (RAM)	Pup command (expansion) is come as instruction and HEO
1	Run command (expansion)	Set frequency (RAM, EEPROM)	Run command (expansion) is same as instruction code HF9

*4 Combination of data 1 and data 2 for reply

Data Type	Data 1	Data 2	Remarks
0	Inverter status monitor (expansion)	Output frequency (speed)	Inverter status monitor (expansion) is same as instruction code H79
1	Inverter status monitor (expansion)	Special monitor	Replies the monitor item specified in instruction code HF3 for special monitor.

*5 Error code for sending data 1 is set in error code 1, and error code for sending data 2 is set in error code 2.

Mode error (HA), instruction code error (HB), data range error (HC) or no error (HF) is replied.

4.2 Inverter type monitor

Reading of connected inverter name and capacity is available for Mitsubishi inverter protocol and Modbus-RTU protocol.

[Mitsubishi inverter protocol]

	ltem	Read /write	Instruction Code	Data Description	Number of Data Digits (format)
e monitor	Inverter type	Read	H7C	Reading inverter type in ASCII code. "H20" (blank code) is set for blank area Example of FR-F740-EC H46, H52, H2D, H46, H37, H34, H30, H2D, H45, H43, H20H20	20 digits (B,E3/D)
Inverter type	Capacity	Read	H7D	Reading inverter capacity in ASCII code. Data is read in increments of 0.1kW, and rounds down to 0.01kW increments "H20" (blank code) is set for blank area Example 0.75K	6 digits (B,E2/D)

station number

•Data reading format

Reply data from the inverter to the computer (No data error detected)

Format		Number of Characters											
Tormat	1	2	3	4	5	6	7	8	9	10	11	12	13
E2	STX	Inve station	erter number		Read data						Si ch	um eck	CR/LF
Format						Numbe	r of Cha	racters					
Tormat	1	2	3	4 to 23 24 25								26	27
= 0	OTV	Inve	erter		Sum Sum								

Read data (Inverter model information)

ETX

check

CR/LF

[Modbus-RTU protocol]

STX

E3

Register	Definition	Read/Write	Remarks
44001 to 44010	Inverter type	Read	Reading inverter type in ASCII code. "H20" (blank code) is set for blank area Example of FR-F740-EC H46, H52, H2D, H46, H37, H34, H30, H2D, H45, H43, H20H20
44011 to 44013	Capacity	Read	Reading inverter capacity in ASCII code. Data is read in increments of 0.1kW, and rounds down to 0.01kW increments "H20" (blank code) is set for blank area Example 0.75K

4.3 Enhancement of special monitors and fault codes

The following special monitors and fault codes are added to Mitsubishi inverter protocol and Modbus-RTU protocol. [Special monitor selection No.]

Da	ata		
Mitsubishi inverter protocol	Modbus-RTU protocol	Description	Unit
H3A	40258	Option input terminal status 1 *2	_
H3B	40259	Option input terminal status 2 *3	_
H3C	40260	Option output terminal status *4	
H40	40264	PTC thermistor resistance	0.01kΩ
—	40267	PID measured value 2	0.1%
H4D	40277	32-bit cumulative power (lower 16-bit)	1kWh
H4E	40278	32-bit cumulative power (upper 16-bit)	1kWh
H4F	40279	32-bit cumulative power (lower 16-bit)	0.01kWh/0.1kWh *1
H50	40280	32-bit cumulative power (upper 16-bit)	0.01kWh/0.1kWh *1

*1 The setting depends on capacities. (01160 or less/01800 or more)

*2 Option input terminal 1 monitor details (input terminal status of FR-A7AX)-all terminals are OFF when an option is not fitted

	D15															bU
	X15	X14	X13	X12	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	X1	X0
*3	Option in	put term	inal 2 mo	nitor deta	ails (inpu	t termina	l status o	of FR-A7A	AX)-all te	rminals a	re OFF v	vhen an o	option is	not fitted		
	b15															b0
	_	_			_									_	_	DY
*4	Option o	utput terr	ninal mor	nitor deta	ils (outpu	ut termina	al status	of FR-A7	AY)-all te	rminals a	are OFF	when an	option is	not fitted	I	
	b15															b0
	—	—		I	_	_	RA3	RA2	RA1	Y6	Y5	Y4	Y3	Y2	Y1	Y0

[Fault code list]

Data	Description		Data	Description
HA2	E.OP2		HA8	E.20 *
HA4	E.16 *		HE4	E.LCI
HA5	E.17 *		HE5	E.PCH
HA6	E.18 *		HF2	E.2
HA7	E.19 *	1		

* Refer to the FR-F700 PLC function programming manual for details of the PLC function.

5 BACnet MS/TP protocol

Using BACnet MS/TP protocol, communication operation and parameter setting are available from the RS-485 terminals of the inverter.

 \mathbb{Z}

Parameter Number	Name	Initial Value	Setting Range	Description
52	DU/PU main display data selection	0 (output frequency)	0, 5, 6, 8 to 14, 17, 20, 23 to 25, 50 to 57, 67, 81 to 86, 100	 81: BACnet reception status 82: BACnet token pass counter (Displays the count of received token) 83: BACnet valid APDU counter (Displays the count of valid APDU detection)
774	PU/DU monitor selection 1		1 to 3, 5, 6, 8 to 14, 17, 20,	84: BACnet communication error counter (Displays the count of communication error)85: Terminal CA output level
775	PU/DU monitor selection 2	9999	23 to 25, 40 to 42, 50 to 57, 67.	(Same display as AnalogOutput0) 86: Terminal AM output level (Same display as AnalogOutput1)
776	PU/DU monitor selection 3		81 to 86, 100, 9999	The monitor of setting value "82 and 83" return to 0 if the count exceeds 9999. For the monitor of setting value "84", 9999 is the maximum.
331	RS-485 communication station number	0	0 to 127 *1	Set the inverter station number (node).
332	RS-485 communication speed	96	96, 192, 384, 768 *1 *2	Set the communication speed. The setting value \times 100 equals the communication speed. For example, the communication speed is 9600bps when the setting value is "96".
390	% setting reference frequency	50Hz	1 to 400Hz	Set a reference frequency of the set frequency.
549	Protocol selection	1	0 1 2	Mitsubishi inverter (computer link) protocol Modbus-RTU protocol BACnet MSTP protocol
726	Auto Baudrate/Max Master	255	0 to 255	Auto baud rate (bit7) Setting range: 0 (Inactive) 1 (Active) Max Master (bit0 to bit6) setting range: 0 to 127 Maximum address for master node
727	Max Info Frames	1	1 to 255	Set the maximum number of messages that the inverter can transmit while it owns the token.
728	Device instance number (Upper 3 digit)	0	0 to 419 (0 to 418)	Device identifier (Duplicated setting available) Setting range of the combination of <i>Pr. 728</i> and <i>Pr. 729</i> are "0 to 4194302".
729	Device instance number (Lower 4 digit)	0	0 to 9999 (0 to 4302)	When $Pr.728$ = "419", setting range of $Pr.729$ is "0 to 4302" When $Pr.729$ = "4303" or more, setting range of $Pr.728$ is "0 to 418"

The above parameters can be set when Pr. 160 User group read selection = "0".

*1 The inverter works with the initial parameter setting if a value other than the setting range is set.

*2 When using Auto baudrate, the communication speed is changed to the detected communication speed.

(1) Specifications

• Communication specifications (conforming to BACnet standard of physical medium EIA-485)

	ltem	Description				
Physical	medium	EIA-485 (RS-485)				
	Connection port	RS-485 terminal (PU connector is not available)				
	Data transfer method	NRZ encoding				
	Baud rate	9600bps, 19200bps, 38400bps, 76800bps				
	Start bit	Fixed to 1Bit				
	Data length	Fixed to 8Bit				
	Parity bit	Fixed to none				
	Stop bit	Fixed to 1Bit				
Network	topology	Bus topology				
Commu	vication mothod	Token passing (token bus)				
commu	ileation method	Master-slave (only the master is available for this product)				
Commu	nication protocol	MS/TP (master-slave/token passing LAN)				
Maximur	n connection	255 (up to 32 for one segment, addition with a repeater is available)				
Node nu	nber	0 to 127				
	Master	0 to 127 (this product is the master)				
Supporte standard	d property of BACnet object type	Refer to page 38				
Supported BIBBs (Annex K)		Refer to page 44				
BACnet s (Annex L	standard device profile)	Refer to page 44				
Segmen	tation	Not supported				
Device a	ddress binding	Not supported				

REMARKS

This product conforms to BACnet Application Specific Controller (B-ASC).

• This product is designed for multiple master network, therefore 2-wire type connection is supported.

• Node with network bias resistors

This product is a node with local bias resistors. Therefore at least one node must be a node with network bias resistors in the network configuration.

When configuring the network with only this products, refer to the following, and make the node with network bias resistors. (When using two sets in one segment, insert them into both end of the network.)



(2) BACnet reception status monitor (Pr.52)

Set *Pr. 52* = "81" to monitor BACnet communication status on the operation panel (FR-DU07) and parameter unit (FR-PU04/FR-PU07).

Status	Data	Description	LF signal
Idle	0	Never had BACnet communication	OFF
Automatic baud rate recognition	1	During automatic baud rate recognition (Communication error during automatic baud rate recognition is not counted)	OFF
Not joined the network	2	Waiting for a token to the own node	OFF
	10	Received a token to the own node	OFF
Data to the own node	11	Received a supported request to the own node (including broadcasting)	OFF
	12	Received an unsupported request to the own node (including broadcasting)	OFF
Data to the other node	20	Received a token to other nodes	OFF
Node separated	30	Separated from token passing after joined in it	OFF
	90	Detected a communication error	ON
Error data	91	Protocol error (LPDU, NPDU, APDU are not following the format regulations.)	ON

(3) % setting reference frequency (Pr. 390)

Setting of a reference frequency to the set frequency is available.

The setting value of *Pr. 390 % setting reference frequency* is 100% reference. The reference to the frequency command is converted to the set frequency in the following formula.

• Set frequency = Pr. 390 % setting reference frequency × Speed scale (Refer to page 39)



REMARKS

- The % setting reference frequency cannot be set at less than the minimum frequency resolution of the inverter.
- · The set frequency is written to RAM.
- The set frequency is applied at the writing of Speed scale. (The set frequency is not applied at the setting of Pr. 390.)

(4) Automatic baud rate recognition (Pr. 726 Auto Baudrate/Max Master)

Automatic changing of baud rate is available with *Pr.* 726 setting. When *Pr.* 726 = "128 to 255", turn the power ON from OFF or reset the inverter to start automatic baud rate recognition.

Pr. 726 setting	Description
0 to 127	Automatic baud rate recognition is invalid (Using <i>Pr. 332</i> setting for baud rate)
128 to 255	Inverter monitors the data on the communication bus, and changes the baud rate from <i>Pr. 332</i> setting. The recognized baud rate is written to <i>Pr. 332</i> .

REMARKS

- After the baud rate recognition, the recognized baud rate is written in EEPROM of *Pr. 332* regardless of *Pr. 342* Communication EEPROM write selection setting.
- BACnet status monitor displays "1" during automatic baud rate recognition.
- · Communication error count monitor is not performed during automatic baud rate recognition.

— CAUTION =

- · During automatic baud rate recognition, inverter does not transmit data, but only accepts data.
- Automatic baud rate recognition cannot finish if inverter is not connected to the communication bus. (BACnet protocol will not be established.)
- Automatic baud rate recognition cannot finish if inverter is receiving abnormal data continuously. (BACnet protocol will not be established.)



(5) Supported property of BACnet standard object type

R: Read only W: Read/Write (Commandable values not supported) C: Read/Write (Commandable values supported)

Object	Analog Input	Analog Output	Analog Value	Binary Input	Binary Output	Binary Value	Device
APDU Timeout	-		-				R
Application Software Version							R
Database Revision							R
Device Address Binding							R
Event State	R	R	R	R	R	R	
Firmware Revision							R
Max APDU Length Accepted							R
Max Info Frames							W
Max Master							W
Model Name							R
Number of APDU Retries							R
Object Identifier	R	R	R	R	R	R	R
Object List							R
Object Name	R	R	R	R	R	R	R
Object Type	R	R	R	R	R	R	R
Out Of Service	R	R	R	R	R	R	
Polarity				R	R		
Present Value	R	С	C •1	R	С	C ⁺1	
Priority Array		R	R +2		R	R+₂	
Protocol Object Types Supported							R
Protocol Revision							R
Protocol Services Supported							R
Protocol Version							R
Relinquish Default		R	R +2		R	R+₂	
Segmentation Supported							R
Status Flags	R	R	R	R	R	R	
System Status							R
Unit	R	R	R				
Vendor Identifier							R
Vendor Name							R

*1 This property is commandable for some instances of this object. Otherwise it is read/write.

*2 This property is supported only for instances of this object where the Present Value property is commandable.

(6) Supported BACnet object

ANALOG INPUT

Object Identifier	Object Name Present Value Access Type *1		Description	Unit
0	Terminal 1	R	Represents actual input voltage of terminal 1. (The range varies depending on the $Pr. 73$ and $Pr. 267$ settings. -10 to +10V (-100% to +100%), -5 to +5V (-100% to +100%))	percent (98)
1	Terminal 2	R	Represents actual input voltage (or input current) of terminal 2. (The range varies depending on the $Pr. 73$ and $Pr. 267$ settings. 0 to 10V (0% to 100%), 0 to 5V (0% to 100%), 0 to 20mA (0% to 100%))	percent (98)
2	Terminal 4	R	Represents actual input voltage (or input current) of terminal 4. (The range varies depending on the $Pr. 73$ and $Pr. 267$ settings. 2 to 10V (0% to 100%), 1 to 5V (0% to 100%), 4 to 20mA (0% to 100%))	percent (98)

*1 R: Read only W: Read/Write (Commandable values not supported) C: Read/Write (Commandable values supported)

ANALOG OUTPUT

Object Identifier	Object Name	Present Value Access Type *1	Description	Unit
0	Terminal CA	С	Controls actual output current level of terminal CA. Control is available when <i>Pr. 54 CA terminal function selection</i> = "85" ^{*2} . (Setting range: 0.0% to 100.0% (0 to 20mA))	percent (98)
1	Terminal AM	С	Controls actual output voltage level of terminal AM. Control is available when <i>Pr. 158 AM terminal function selection</i> = "86" ^{*2} . (Setting range: 0.0% to 100.0% (0 to 10V))	percent (98)

7/

*1 R: Read only W: Read/Write (Commandable values not supported) C: Read/Write (Commandable values supported)

*2 Available regardless of the operation mode, operation command source and speed command source.

ANALOG VALUE

Object Identifier	Object Name	Present Value Access Type ^{*1}	Description	Unit
1	Output frequency	R	Represents the output frequency monitor.	hertz (27)
2	Output current	R	Represents the output current monitor.	amperes (3)
3	Output voltage	R	Represents the output voltage monitor.	volts (5)
6	Running speed	R	Represents the running speed monitor.	revolution-per- minute (104)
8	Converter output voltage	R	Represents the converter output voltage monitor.	volts (5)
14	Output power	R	Represents the output power monitor.	kilowatts (48)
17	Load meter	R	Represents the load meter monitor.	percent (98)
20	Cumulative energization time	R	Represents the cumulative energization time monitor.	hours (71)
23	Actual operation time	R	Represents the actual operation time monitor.	hours (71)
25	Cumulative power	R	Represents the cumulative power monitor.	kilowatt-hours (19)
52	PID set point	R	Represents the PID set point monitor.	no-units (95)
54	PID deviation	R	Represents the PID deviation monitor. (minus display is available with reference to 0%, 0.1% increment)	no-units (95)
67	PID measured value 2	R	Represents the PID measured value 2 monitor.	no-units (95)
200	Alarm history 1	R	Represents the fault history 1 (the latest fault) monitor.	no-units (95)
201	Alarm history 2	R	Represents the fault history 2 (second fault in past) monitor.	no-units (95)
202	Alarm history 3	R	Represents the fault history 3 (third fault in past) monitor.	no-units (95)
203	Alarm history 4	R	Represents the fault history 4 (fourth fault in past) monitor.	no-units (95)
300	Speed scale *2	С	Controls the ratio to the frequency command. (Setting range: 0.00 to 100.00) (<i>Refer to page 37</i>)	percent (98)
310	PID set point CMD *2	С	Controls the PID set point. This object is the PID set point during PID operation if <i>Pr. 128 (Pr. 753)</i> = "60 or 61" (Setting range: 0.00 to 100.00) *3	no-units (95)
311	PID measured value CMD *2	С	Controls the PID measured value. This object is the PID measured value during PID operation if <i>Pr. 128 (Pr. 753)</i> = "60 or 61" (Setting range: 0.00 to 100.00) *3	no-units (95)
312	PID deviation CMD *2	С	Controls the PID deviation. This object is the PID deviation during PID operation if <i>Pr. 128 (Pr. 753)</i> = "50 or 51" (Setting range: -100.00 to 100.00)	percent (98)
398	Mailbox parameter	W	Access to the properties which are not defined as objects	no-units (95)
399	Mailbox value	W	are available. (Refer to page 42)	no-units (95)
10007	Acceleration time	W	Sets Pr.7 Acceleration time	seconds (73)
10008	Deceleration time	W	Sets Pr.8 Deceleration time	seconds (73)

*1 R: Read only W: Read/Write (Commandable values not supported) C: Read/Write (Commandable values supported) *2 If communication speed command source is except for NET, the setting value can be written, but not to be applied.

*3 When both C42 (Pr. 934) and C44 (Pr. 935) = "9999", setting range is smaller coefficient to larger coefficient of C42 (Pr. 934) and C44 (Pr. 935). Depending on a value, the writing value and the reading value may not be same at the minimum digit.



Object Identifier	Object Name	Present Value Access Type *1	Description (0: Inactive 1: Active)
0	Terminal STF	R	Represents actual input of terminal STF.
1	Terminal STR	R	Represents actual input of terminal STR.
2	Terminal AU	R	Represents actual input of terminal AU.
3	Terminal RT	R	Represents actual input of terminal RT.
4	Terminal RL	R	Represents actual input of terminal RL.
5	Terminal RM	R	Represents actual input of terminal RM.
6	Terminal RH	R	Represents actual input of terminal RH.
7	Terminal JOG	R	Represents actual input of terminal JOG.
8	Terminal MRS	R	Represents actual input of terminal MRS.
9	Terminal STOP	R	Represents actual input of terminal STOP.
10	Terminal RES	R	Represents actual input of terminal RES.
11	Terminal CS	R	Represents actual input of terminal CS.
100	Terminal RUN	R	Represents actual output of terminal RUN.
101	Terminal SU	R	Represents actual output of terminal SU.
102	Terminal IPF	R	Represents actual output of terminal IPF.
103	Terminal OL	R	Represents actual output of terminal OL.
104	Terminal FU	R	Represents actual output of terminal FU.
105	Terminal ABC1	R	Represents actual output of terminal ABC1.
106	Terminal ABC2	R	Represents actual output of terminal ABC2.

*1 R: Read only W: Read/Write (Commandable values not supported) C: Read/Write (Commandable values supported)

BINARY OUTPUT

Object Identifier	Object Name	Present Value Access Type *1	Description (0: Inactive 1: Active)
0	Terminal RUN CMD	С	Controls actual output of terminal RUN. Available when P_r 100 RUN terminal function selection = "82 or 182" ^{*2}
1	Terminal SU CMD	С	Controls actual output of terminal function selection = 02 of 102. Available when <i>Pr. 191 SU terminal function selection</i> = "82 or 182". ^{*2}
2	Terminal IPF CMD	С	Controls actual output of terminal IPF. Available when <i>Pr. 192 IPF terminal function selection</i> = "82 or 182". ^{'2}
3	Terminal OL CMD	С	Controls actual output of terminal OL. Available when <i>Pr. 193 OL terminal function selection</i> = "82 or 182". ^{*2}
4	Terminal FU CMD	С	Controls actual output of terminal FU. Available when <i>Pr. 194 FU terminal function selection</i> = "82 or 182". ¹²
5	Terminal ABC1 CMD	С	Controls actual output of terminal ABC1. Available when <i>Pr. 195 ABC1 terminal function selection</i> = "82 or 182". ^{*2}
6	Terminal ABC2 CMD	С	Controls actual output of terminal ABC2. Available when <i>Pr. 196 ABC2 terminal function selection</i> = "82 or 182". ^{*2}

*1 R: Read only W: Read/Write (Commandable values not supported) C: Read/Write (Commandable values supported)

*2 Available regardless of operation mode, operation command source and speed command source.

BINARY VALUE

Object Identifier	Object Name	Present Value Access Type *1	Description
0	Inverter running	R	Represents inverter running (RUN signal) status.
11	Inverter operation ready	R	Represents inverter operation ready (RY signal) status.
98	Alarm output	R	Represents alarm output (LF signal) status.
99	Fault output	R	Represents fault output (ALM signal) status.
200	Inverter running reverse	R	Represents inverter reverse running status.
300	Control input instruction AU	С	Controls the function assigned to terminal AU. Setting 1 of this object turns ON the signal assigned to <i>Pr. 184 AU terminal function selection</i> .
301	Control input instruction RT	С	Controls the function assigned to terminal RT. Setting 1 of this object turns ON the signal assigned to <i>Pr. 183 RT terminal function selection</i> .
302	Control input instruction RL	С	Controls the function assigned to terminal RL. Setting 1 of this object turns ON the signal assigned to <i>Pr. 180 RL terminal function selection</i> .
303	Control input instruction RM	С	Controls the function assigned to terminal RM. Setting 1 of this object turns ON the signal assigned to <i>Pr. 181 RM terminal function selection</i> .
304	Control input instruction RH	С	Controls the function assigned to terminal RH. Setting 1 of this object turns ON the signal assigned to <i>Pr. 182 RH terminal function selection</i> .
305	Control input instruction JOG *2	С	Controls the function assigned to terminal JOG. Setting 1 of this object turns ON the signal assigned to <i>Pr. 185 JOG terminal function selection</i> .
306	Control input instruction MRS	С	Controls the function assigned to terminal MRS. Setting 1 of this object turns ON the signal assigned to <i>Pr. 187 MRS terminal function selection</i> .
307	Control input instruction STOP *2	С	Controls the function assigned to terminal STOP. Setting 1 of this object turns ON the signal assigned to <i>Pr. 188 STOP terminal function selection</i> .
308	Control input instruction RES ^{*2}	С	Controls the function assigned to terminal RES. Setting 1 of this object turns ON the signal assigned to <i>Pr. 189 RES terminal function selection</i> .
309	Control input instruction CS ^{*2}	С	Controls the function assigned to terminal CS. Setting 1 of this object turns ON the signal assigned to <i>Pr. 186 CS terminal function selection</i> .
400	Run/Stop	С	Controls start/stop command. Start command is written after Speed scale is applied. *3 1: Run 0: Stop
401	Forward/Reverse	С	Controls forward/reverse rotation. *3 1: Reverse rotation 0: Forward rotation
402	Fault reset	С	Clears fault output status. (Release of an inverter fault without inverter reset is available.)

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*1 R: Read only W: Read/Write (Commandable values not supported) C: Read/Write (Commandable values supported)

*2 The following signals cannot be controlled by the network: Jog operation, automatic restart after instantaneous power failure, start self-holding and reset. Therefore control input instruction JOG, STOP, RES, and CS are invalid in the initial status. When using Control input instruction JOG, STOP, RES, and CS, change the signals with *Pr. 185, Pr. 186, Pr. 189, (input terminal function selection).* (Reset is available with ReinitializeDevice.)

*3 If communication speed command source is except for NET, the setting value can be written, but not to be applied.



Access to the properties which are not defined as objects are available by using "Mailbox parameter" and "Mailbox value".

To read a property, write the register of the intended property to "Mailbox parameter", and then read "Mailbox value". To write a property, write the register of the intended property to "Mailbox parameter", and then write a value to "Mailbox value".

BACnet registers

• System environment variable

Register	Definition	Read/Write	Remarks					
		Read/write	For write, set data as the operation mode setting. For read, data is read as the operation mode status.					
			Mode	Read Value	Written Value			
	Operation mode/ inverter setting		EXT	H0000	H0010 *			
			PU	H0001	H0011 *			
40010			EXT JOG	H0002	—			
40010			PU JOG	H0003	—			
				NET	H0004	H0014		
				PU+EXT	H0005	—		
			* Writing is availab The restrictions changes acco	ble depending on the Pr. depending on the opending to the compute	79 and Pr: 340 settings. operation mode er link specifications.			

•Real-time monitor

Refer to the Instruction Manual of the inverter for details of the monitor description.

		to me n	istractic	m mana	an oj n	ie inverie									
Register		0	escript	ion		Increm	ents	Re	gister		Descr	iption		Incre	ments
40201	Out	put frequ	iency/Sp	eed *4		0.01H	lz/1	4	0224	Motor loa	Motor load factor		0	.1%	
40202	Out	put curre	ent			0.01A/0	.1A*1	4	40225 Cumulative power			11	Wh		
40203	Out	put volta	ge			0.1	V	4	0250	Power sa	ving effe	ct		Va	iable
40205	Free	quency s	setting va	alue/Spee	ed	0.01H	lz/1	4	0251	Cumulativ	e saving	g power		Vai	iable
	sett	ing *4						4	0252	PID set p	oint			0	.1%
40206	Rur	ining spe	eed			1r/m	in	4	0253	PID meas	ured va	lue		0	.1%
40208	Cor	iverter o	utput vol	tage		0.1	V	4	0254	PID devia	tion			0	.1%
40209	Reg	enerativ	e brake	duty		0.15	%	4	0258	Option in	out termi	nal statu	s 1 *5		
40210	Elec	ctronic th I factor	nermal re	elay funct	tion	0.19	%	4	0259	Option in	out termi	nal statu	s 2 *6		_
40211	Out	put curre	ent peak	value		0.01A/0	.1A*1	4	0260	Option ou	tput terr	ninai stat	US *7		_
40212	Con	verter ou	tout volta	age peak	value	0.1	V	4	0264	PIC ther	mistor r	esistanc	е	0.0	01kΩ
40040						0.01kW/	0.1kW	4	0267	PID meas	ured va	ue 2		0	.1%
40213	Inpl	it power				*1	0.11/0/	4	0277	32-bit cumulative power (lower 16-bit)			11	Wh	
40214	Out	put powe	er			0.01KVV/	0.1600	4	0279	32-bit cumulative power		11	/\//b		
40215	Inpu	Input terminal status *2						40278		(upper 16-bit)					
40216	Out	put term	inal statu	IS *3		- 40279		32-bit cumulative power			0.01kWh/				
40217	Loa	Load meter				0.1%		(lower 16	-DIT)			0.11	(VVN *1		
40220	Cur	nulative	energiza	ition time	•	1h 40280		32-bit cur	nulative	power		0.0	IKWN/		
40223	Actu	ual opera	ation time	е		1h			(upper 10-bit)			0.11			
1 The se 2 Input te b15	tting d ermina	epends o I monitor	on capaci details	ties. (011	60 or le	ss/01800 c	or more)								b0
		_		CS	RES	STOP	MRS	JOG	RH	RM	RI	RT		STR	STE
2 Output	tormir	al monit	or dotaila	00	TILO	0101	MILCO	000		T CIVI	T.L		710	ont	011
b15	tennin		uetans												b0
—	—	_	—	—	—	_	—		ABC	2 ABC1	FU	OL	IPF	SU	RUN
4 When 5 Option	Pr:37 =	"1 to 99 terminal	98" or Pr: 1 monitor	144 = "2 details (i	to 10, 1 nput ter	02 to 110,' minal statu	the unit us of FR-	is an int A7AX)	egral va All OFF	lue (one inc if option is	rement). not insta	illed.			
b15	·				•										b0
X15 X	X14	X13	X12	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	X1	X0
6 Option	input	terminal 2	2 monitor	details (i	nput ter	minal statu	us of FR-	A7AX)	All OFF	if option is	not insta	illed.			
b15			r.				r				r	1	r		b0
-	—	_	—	-	—	—	—		-		—	—	—	_	DY
7 Option b15	outpu	t termina	l monitor	details (o	output te	rminal stat	us of FR	-A7AY)	All OF	F if option is	s not inst	alled.			b0
_	_	_	—	—	_	RA3	RA2	RA1	Y6	Y5	Y4	Y3	Y2	Y1	Y0

• Parameter

Parameters	Register	Parameter Name	Read/Write	Remarks
0 to 999	41000 to 41999	Refer to the parameter list of the inverter instruction manual for the parameter names.	Read/write	The parameter number + 41000 is the register number.
C2(902)	41902	Terminal 2 frequency setting bias (frequency)	Read/write	
C3(902)	42092	Terminal 2 frequency setting bias (analog value)	Read/write	The analog value (%) set to C3 (902) is read.
00(002)	43902	Terminal 2 frequency setting bias (terminal analog value)	Read	The analog value (%) of the voltage (current) applied to the terminal 2 is read.
125(903)	41903	Terminal 2 frequency setting gain (frequency)	Read/write	
C4(903)	42093	Terminal 2 frequency setting gain (analog value)	Read/write	The analog value (%) set to C4 (903) is read.
04(303)	43903	Terminal 2 frequency setting gain (terminal analog value)	Read	The analog value (%) of the voltage (current) applied to the terminal 2 is read.
C5(904)	41904	Terminal 4 frequency setting bias (frequency)	Read/write	
C6(004)	42094	Terminal 4 frequency setting bias (analog value)	Read/write	The analog value (%) set to C6 (904) is read.
00(904)	43904	Terminal 4 frequency setting bias (terminal analog value)	Read	The analog value (%) of the current (voltage) applied to the terminal 4 is read.
126(905)	41905	Terminal 4 frequency setting gain (frequency)	Read/write	
C7(905)	42095	Terminal 4 frequency setting gain (analog value)	Read/write	The analog value (%) set to C7 (905) is read.
67(303)	43905	Terminal 4 frequency setting gain (terminal analog value)	Read	The analog value (%) of the current (voltage) applied to the terminal 4 is read.
C8(930)	41930	Current output bias signal	Read/write	
C9(930)	42120	Current output bias current	Read/write	
C10(931)	41931	Current output gain signal	Read/write	
C11(931)	42121	Current output gain current	Read/write	
C42(934)	41934	PID display bias coefficient	Read/write	
	42124	PID display bias analog value	Read/write	The analog value (%) set to C43 (934) is read.
C43(934)	43934	PID display bias analog value (terminal analog value)	Read	The analog value (%) of the current (voltage) applied to the terminal 4 is read.
C44(935)	41935	PID display gain coefficient	Read/write	
	42125	PID display gain analog value	Read/write	The analog value (%) set to C45 (935) is read.
C45(935)	43935	PID display gain analog value (terminal analog value)	Read	The analog value (%) of the current (voltage) applied to the terminal 4 is read.

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• Faults history

Register	Definition	Read/Write	Remarks
40501	Fault history 1	Read/write	
40502	Fault history 2	Read	
40503	Fault history 3	Read	Being 2 bytes in length, the data is stored as
40504	Fault history 4	Read	"H00OO". Refer to the lowest 1 byte for the fault
40505	Fault history 5	Read	Performing write using the register 40501 batch-
40506	Fault history 6	Read	clears the faults history. Set any value as data.
40507	Fault history 7	Read	
40508	Fault history 8	Read	



Fault code list

Data	Description	Data	Description	Data	Description	Data	Description
H00	No fault	H52	E.ILF	HA6	E.18 *	HC6	E.SER
H10	E.OC1	H60	E.OLT	HA7	E.19 *	HC7	E.AIE
H11	E.OC2	H70	E.BE	HA8	E.20 *	HE4	E.LCI
H12	E.OC3	H80	E.GF	HB0	E.PE	HE5	E.PCH
H20	E.OV1	H81	E.LF	HB1	E.PUE	HE6	E.PID
H21	E.OV2	H90	E.OHT	HB2	E.RET	HF1	E.1
H22	E.OV3	H91	E.PTC	HB3	E.PE2	HF2	E.2
H30	E.THT	HA0	E.OPT	HC0	E.CPU	HF5	E.5
H31	E.THM	HA1	E.OP1	HC1	E.CTE	HF6	E.6
H40	E.FIN	HA2	E.OP2	HC2	E.P24	HF7	E.7
H50	E.IPF	HA4	E.16 *	HC4	E.CDO	HFD	E.13
H51	E.UVT	HA5	E.17 *	HC5	E.IOH		

* Refer to the FR-F700 PLC function programming manual for details of the PLC function.

Model information monitor

Register	Definition	Read/Write	Remarks				
44001 to 44010	Inverter type	Read	Reading inverter type in ASCII code. "H20" (blank code) is set for blank area Example of FR-F740-EC H46, H52, H2D, H46, H37, H34, H30, H2D, H45, H43, H20H20				
44011 to 44013	Capacity	Read	Reading inverter capacity in ASCII code. Data is read in increments of 0.1kW, and rounds down to 0.01kW increments "H20" (blank code) is set for blank area Example 0.75K				

(8) ANNEX A - PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (NORMATIVE)

(This annex is part of this Standard and is required for its use.)

BACnet Protocol Implementation Conformance Statement

Date: <u>1st Apr 2012</u> Vendor Name: <u>Missubishi Electric Corporation</u> Product Name: <u>Inverter</u> Product Model Number: <u>FR-F740-EC</u> Application Software Version: <u>8290A</u> Firmware Revision: <u>1.00</u> BACnet Protocol Revision: 4

Product Description:

BACnet Standardized Device Profile (Annex L):

BACnet Operator Workstation (B-OWS)

BACnet Building Controller (B-BC)

BACnet Advanced Application Controller (B-AAC)

BACnet Application Specific Controller (B-ASC)

BACnet Smart Sensor (B-SS)

BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B, DS-WP-B, DM-DDB-B, DM-DOB-B, DM-DCC-B, DM-RD-B

Segmentation Capability:

Segmented requests supportedWindow Size

Segmented responses supportedWindow Size

Standard Object Types Supported:

An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of proprietary properties and for each its property identifier, datatype, and meaning
- 6) List of any property range restrictions

Dynamic object creation and deletion is not supported.

Refer to page 38 for the supported object type of FR-F700-EC series.

Data Link Layer Options:

BACnet IP, (Annex J)
BACnet IP, (Annex J), Foreign Device
□ ISO 8802-3, Ethernet (Clause 7)
ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s)
MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
MS/TP slave (Clause 9), baud rate(s):
Point-To-Point, EIA 232 (Clause 10), baud rate(s):
Point-To-Point, modem, (Clause 10), baud rate(s):
LonTalk, (Clause 11), medium:
Other:

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) \square Yes \blacksquare No

Networking Options:

Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.

- Annex H, BACnet Tunneling Router over IP
- BACnet/IP Broadcast Management Device (BBMD)
 - Does the BBMD support registrations by Foreign Devices? Yes No

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously. ⊠ ANSI X3.4 □ IBM™/Microsoft™ DBCS □ ISO 8859-1 □ ISO 10646 (UCS-2) □ ISO 10646 (UCS-4) □ JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/ networks(s) that the gateway supports:

6 Operation by PLC function

I/O data read, write, etc. can be performed by accessing the inverter in the predetermined method using special relays, special registers, etc.

Operation, parameter read/write, etc. can be performed in accordance with the created sequence programs (built in the inverter) using input data from the control input terminals.

With the output signals, output data can be output to outside the inverter from the control output terminals as not only the inverter's status signals but also pilot lamp ON/OFF, interlock and other control signals set freely by the user.

Refer to FR-F700 PLC function programming manual [IB-0600420ENG] for details.

Parameter Number	Name	Initial Value	Setting Range	Description
	PLC function operation		0	PLC function is invalid
414	selection	0	1	PLC function is valid (Inverter reset is necessary to make this setting valid.)
			0	The inverter start signal is valid regardless of the sequence program execution key.
415	Inverter operation lock mode setting	0	1	The inverter start signal is valid only when the sequence program execution key is set to RUN. When the sequence program execution key is in the STOP position, the inverter does not start if the inverter start signal STF or STR is turned ON. (If the key is switched from RUN to STOP during inverter operation, the inverter is decelerated to a stop.)
498	PLC function flash memory clear	0	0 to 9999	9696: Flash memory clear Other than 9696: Flash memory is not cleared
506 to 515	Parameter 1 to 10 for user	0	0 to 65535	Inverter parameters <i>Pr. 506 to Pr. 515, Pr. 826 to Pr. 865</i> are used as user parameters. Since this parameter area and the devices used with the PLC function, D110 to D159, are accessible to each other, the values set in <i>ps. 506 to Ps. 515, Ps. 956 to Ps.</i> 955
826 to 865	Parameter 11 to 50 for user	- 0		can be used in a sequence program. The result of operation performed in the sequence program can also be monitored using <i>Pr. 506 to Pr. 515</i> , <i>Pr. 826 to Pr. 865</i> .

REMARKS

• When a fault occurs during PLC function, turning ON of X51 signal can release fault without interrupting PLC function. (Refer to the FR-F700 PLC function programming manual.)

7 Initial value change list function

Displays and sets the parameters changed from the initial value.



- Calibration parameters (C0 (Pr. 900) to C7 (Pr. 905), C42 (Pr. 934) to C45 (Pr. 935)) are not displayed even they are changed from the initial settings.
- Only simple mode parameter is displayed when simple mode is set (Pr. 160 = 9999 (initial value))
- Only user group is displayed when user group is set (Pr. 160 = "1").
- Pr. 160 is displayed independently of whether the setting value is changed or not.

8 Addition of protective function

(1) Addition of the error Message

A message regarding operational troubles is displayed. Output is not shut off.

Operation panel indication	LOCD	LOCA				
Name	Password lock	assword locked				
Description	Password function is active. Display and setting of parameter is restricted.					
Check point		—				
Corrective action	Enter the password in Pr. 297 Password lock/unlock to unlock the password function before operating.					
	(Refer to page 12.)					



(2) Addition of the faults

When a fault occurs, the inverter trips and a fault signal is output.

Operation Panel Indication	E.OP2	5.9 <i>0</i> .3	FR-PU04 FR-PU07(-01)	Option 2 Fault		
Name	Communication option fault					
Description	Stops the inverter output when a communication line fault occurs in the communication option.					
Check point	Check for a wrong option function setting and operation. Check that the plug-in option is plugged into the connector securely. Check for a break in the communication cable. Check that the terminating resistor is fitted properly.					
Corrective action	Check the c Connect the Check the c	ption function setting, plug-in option secure connection of commun	etc. ely. ication cable.			

Operation Panel Indication	E. 2	Ε.	2	FR-PU04 FR-PU07(-01)	Fault2	
Name	Option fault					
Description	Stops the inverter output when a contact fault is found between the inverter and the plug-in option, or when the communication option is connected to a connector other than the bottom connector. Appears when the switch for the manufacturer setting of the plug-in option is changed.					
Check point	Check that the plug-in option is plugged into the connector securely. (1 and 2 indicate the option connector numbers.) Check for excess electrical noises around the inverter. Check that the communication option is not fitted to the connector other than the bottom connector.					
Corrective action	 Connect the plug-in option securely. Take measures against noises if there are devices producing excess electrical noises around the inverter. If the problem still persists after taking the above measure, please contact your sales representative or distributor. Fit the communication option to the connector other than the bottom connector. Return the switch position for the manufacturer setting of the plug-in option to the initial status. (<i>Refer to instruction manual of each option</i>) 					

Operation Panel Indication	E.PCH	E.P.C.H	FR-PU04	Fault 14		
			FR-PU07	Fault		
			FR-PU07-01	Precharge Error		
Name	Pre-charge fault					
Description	When the pre-charged time exceeds the <i>Pr</i> .764 (<i>Pr</i> .769) <i>Pre-charge time limit</i> , or the pre-charged amount exceeds <i>Pr.</i> 763 (<i>Pr.</i> 768) <i>Pre-charge upper detection level</i> , the protective circuit activates, and the inverter output is shutoff. This function is available when <i>Pr.</i> 764 (<i>Pr.</i> 769) <i>Pre-charge time limit</i> or <i>Pr.</i> 763 (<i>Pr.</i> 768) <i>Pre-charge upper detection level</i> is set. This protective function is not available in the initial status. (<i>Refer to page 16.</i>)					
Check point	 Check if the <i>Pr.764 (Pr.769) Pre-charge time limit</i> setting is too low. Check if the <i>Pr. 763 (Pr. 768) Pre-charge upper detection level</i> setting is too low. Check if the automatic switchover frequency set in <i>Pr.127 (Pr.754)</i> is too low. Check if there is a break in the connection with a pump. 					
Corrective action	Set the <i>Pr.764 (Pr.769) Pre-charge time limit</i> setting higher. Set the <i>Pr.763 (Pr.768) Pre-charge upper detection level</i> setting higher. Set the automatic switchover frequency higher in <i>Pr.127 (Pr.754)</i> . Check the connection with a pump.					

Operation Panel Indication	E.LCI	E.L.C.I	FR-PU04	Fault 14	
			FR-PU07	Fault	
			FR-PU07-01	Lost mA Input	
Name	4mA input fault				
Description	When the analog input current stays at 2mA or lower for the time period set in <i>Pr.778 Current input check filter</i> , the protective circuit activates, and the inverter output is shutoff. The function is available when <i>Pr.573 4mA input check selection</i> ="2 or 3." This protective function is not available in the initial status. (<i>Refer to page 9.</i>)				
Check point	Check if the wire used for the analog current input has a break. Check if the <i>Pr.778 Current input check filter</i> setting is too low.				
Corrective action	Check the wiring for the analog current input. Set the <i>Pr.778 Current input check filter</i> setting higher.				

CAUTION =

 If protective functions of E.PCH, E.LCI are activated when using the FR-PU04, "Fault 14" appears. Also when the faults history is checked on the FR-PU04, the display is "E.14".