



High Performance, Multifunction Inverter

FRENIC-MEGA

About this document

This manual, a supplement for the FRENIC-MEGA series of inverters having a ROM version 4000 or later, contains addition to the FRENIC-MEGA Instruction Manuals (INR-SI47-1183b-E, INR-SI47-1223c-E, INR-SI47-1334-E and INR-SI47-1335a-E). For other descriptions, refer to the original manuals.

Icons

The following icons are used throughout this manual.



This icon indicates information which, if not heeded, can result in the inverter not operating to full efficiency, as well as information concerning incorrect operations and settings which can result in accidents.



This icon indicates a reference to more detailed information.

Checking the inverter's ROM version

The inverter's ROM version can be checked on Menu #5 "Maintenance Information" (5_ /4) as a 4-digit code. For the detailed keypad operation, refer to the inverter original manuals.

About newly added functions

The functions listed below are newly added to the FRENIC-MEGA series of inverters having a ROM version 4000 or later. For details about those functions, refer to Section 2 "Details of Function Codes Added".

Inverter's ROM Version	Newly Added Functions
4000 or later	(1) Function extension of zero speed control Added select of not permit zero speed control (d24=2) at the startup and stop. (2) Setting value for Fuji premium efficiency motor added Added select of motor characteristics 5 to function codes P99, A39, b39 and r39, it was possible to set motor parameter appropriate to Fuji premium efficiency motor.



At the time of data copy, *CPEr* is blinking in the case of copy the reading copy data previous product than the inverter's ROM version 4000. You can continue to copy to press the key. In this case added function codes by upgraded are not copied.

1 Function Code Tables

Listed below are function codes added or modified in the inverters having a ROM version 4000 or later.

Code	Name	Data setting range	Change when running	Data copying	Default setting	Drive control					Refer to page
						V/f	PG V/f	w/o PG	w/ PG	Torque control	
P02	Motor 1 (Rated capacity)	0.01 to 1000 kW (when P99 = 0, 2 to 5) 0.01 to 1000 HP (when P99 = 1)	N	Y1 Y2	*1	Y	Y	Y	Y	Y	6
P99	Motor 1 Selection	0: Motor characteristics 0 (Fuji standard motors, 8-series) 1: Motor characteristics 1 (HP rating motors) 2: Motor characteristics 2 (Fuji motors exclusively designed for Vector control) 3: Motor characteristics 3 (Fuji standard motors, 6-series) 4: Other Motors 5: Motor characteristics 5 (Fuji premium efficiency motors)	N	Y1 Y2	0	Y	Y	Y	Y	Y	6
A16	Motor 2 (Rated capacity)	0.01 to 1000 kW (when A39 = 0, 2 to 5) 0.01 to 1000 HP (when A39 = 1)	N	Y1 Y2	*1	Y	Y	Y	Y	Y	6
A39	Motor 2 Selection	0: Motor characteristics 0 (Fuji standard motors, 8-series) 1: Motor characteristics 1 (HP rating motors) 2: Motor characteristics 2 (Fuji motors exclusively designed for Vector control) 3: Motor characteristics 3 (Fuji standard motors, 6-series) 4: Other Motors 5: Motor characteristics 5 (Fuji premium efficiency motors)	N	Y1 Y2	0	Y	Y	Y	Y	Y	6
b16	Motor 3 (Rated capacity)	0.01 to 1000 kW (when b39 = 0, 2 to 5) 0.01 to 1000 HP (when b39 = 1)	N	Y1 Y2	*1	Y	Y	Y	Y	Y	6
b39	Motor 3 Selection	0: Motor characteristics 0 (Fuji standard motors, 8-series) 1: Motor characteristics 1 (HP rating motors) 2: Motor characteristics 2 (Fuji motors exclusively designed for Vector control) 3: Motor characteristics 3 (Fuji standard motors, 6-series) 4: Other Motors 5: Motor characteristics 5 (Fuji premium efficiency motors)	N	Y1 Y2	0	Y	Y	Y	Y	Y	6
r16	Motor 4 (Rated capacity)	0.01 to 1000 kW (when r39 = 0, 2 to 5) 0.01 to 1000 HP (when r39 = 1)	N	Y1 Y2	*1	Y	Y	Y	Y	Y	6
r39	Motor 4 Selection	0: Motor characteristics 0 (Fuji standard motors, 8-series) 1: Motor characteristics 1 (HP rating motors) 2: Motor characteristics 2 (Fuji motors exclusively designed for Vector control) 3: Motor characteristics 3 (Fuji standard motors, 6-series) 4: Other Motors 5: Motor characteristics 5 (Fuji premium efficiency motors)	N	Y1 Y2	0	Y	Y	Y	Y	Y	6
d24	Zero speed Control	0: Not permit at startup 1: Permit at startup 2: Not permit	N	Y	0	N	N	Y	Y	N	8

*1 Factory defaults are depended on motor capacity.

Table1 Motor parameters

[1] If you select Fuji premium efficiency motor in motor selection.
(Function codes P99/A39/b39/r39=5)

■ Three-phase 200V class series for Asia (FRN_ _G1■-2A)

Motor capacity (kW)	Nominal Applied motor (kW)	Rated current (A)	No-load current (A)	%R1 (%)	%X (%)	Rated slip frequency (Hz)	Iron loss factor 1	Magnetic saturation factor 1	Magnetic saturation factor 2	Magnetic saturation factor 3	Magnetic saturation factor 4	Magnetic saturation factor 5	Magnetic saturation extension factor a	Magnetic saturation extension factor b	Magnetic saturation extension factor c	Torque current under vector control	Induced voltage factor under vector control	For particular manufactures	Starting mode (Auto search delay time 2)
P02/A16 b16/r16	P03/A17 b17/r17	2.69	1.71	3.84	9.58	2.00	P13/A27 b27/r27	P16/A30 b30/r30	P17/A31 b31/r31	P18/A32 b32/r32	P19/A33 b33/r33	P20/A34 b34/r34	P21/A35 b35/r35	P22/A36 b36/r36	P23/A37 b37/r37	P55/A55 b55/r55	P56/A56 b56/r56	P57/A57 b57/r57	H46
0.75 to 1.49	0.75	2.69	1.71	3.84	9.58	2.00	4.31	92.5	85.1	71.8	59.1	46.7	108.6	117.3	128.3	2.07		0.050	0.5
1.50 to 2.19	1.5	5.51	3.63	3.66	9.95	1.67	4.21	89.6	79.6	66.1	54.1	42.9	115.5	131.1	148.4	4.14		0.085	
2.20 to 3.69	2.2	7.88	5.01	3.07	9.79	1.67	3.94	89.4	79.3	65.8	53.9	42.7	115.5	131.1	148.4	6.08		0.092	0.6
3.70 to 5.49	3.7	12.85	7.79	3.07	9.91	1.17	3.59	92.0	84.2	70.7	58.2	45.9	112.8	126.0	141.4	10.22		0.102	0.8
5.50 to 7.49	5.5	18.01	9.67	2.47	8.94	1.00	2.86	92.0	84.2	70.5	58.3	46.1	112.8	126.2	144.6	15.19		0.137	1.0
7.50 to 10.99	7.5	23.32	10.71	2.32	9.68	1.00	2.36	92.4	84.8	71.5	59.2	46.8	110.1	120.9	136.5	20.72		0.158	1.2
11.00 to 14.99	11	33.32	13.66	1.67	10.81	1.00	2.56	92.5	85.2	72.2	59.8	47.4	110.7	122.1	139.0	30.39	95	0.207	1.3
15.00 to 18.49	15	44.77	16.96	1.46	10.81	0.83	2.32	92.8	85.7	72.8	60.3	47.9	108.7	118.1	132.8	41.44		0.242	
18.50 to 21.99	18.5	56.95	25.12	1.13	11.50	0.67	1.86	92.9	85.8	73.1	61.0	48.8	109.4	119.1	131.6	51.11		0.240	2.0
22.00 to 29.99	22	68.13	30.80	1.08	11.27	0.83	1.91	92.7	85.5	72.6	60.5	48.5	110.5	121.3	135.2	60.77		0.238	
30.00 to 36.99	30	92.82	41.80	1.02	11.19	0.83	1.91	92.3	84.8	71.8	59.8	47.9	111.4	123.2	139.0	82.87		0.244	2.3
37.00 to 44.99	37	113.90	50.42	0.91	11.90	0.67	1.61	93.3	86.7	74.3	62.0	49.7	107.3	114.9	124.8	102.2		0.321	2.5
45.00 to 54.99	45	137.70	59.49	0.91	12.17	0.67	1.58	93.2	86.5	73.9	61.7	49.5	107.9	116.3	128.6	124.3		0.318	

Other than above capacities, these settings become the same as selecting function code P99=0 (Fuji standard motors, 8-series).

■ Three-phase 400V class series for Asia (FRN_ _G1■-4A)

Motor capacity (kW)	Nominal Applied motor (kW)	Rated current (A)	No-load current (A)	%R1 (%)	%X (%)	Torque current under vector control
P02/A16 b16/r16		P03/A17 b17/r17	P06/A20 b20/r20	P07/A21 b21/r21	P08/A22 b22/r22	P55/A55 b55/r55
0.75 to 1.49	0.75	1.47	0.98	4.32	10.79	1.10
1.50 to 2.19	1.5	3.01	2.05	4.18	11.36	2.20
2.20 to 3.69	2.2	4.29	2.83	3.51	11.18	3.22
3.70 to 5.49	3.7	6.98	4.41	3.51	11.34	5.42
5.50 to 7.49	5.5	9.75	5.48	2.84	10.27	8.05
7.50 to 10.99	7.5	12.55	6.06	2.70	11.25	10.98
11.00 to 14.99	11	17.86	7.73	1.90	12.29	16.11
15.00 to 18.49	15	23.97	9.60	1.66	12.27	21.97
18.50 to 21.99	18.5	30.60	14.21	1.28	13.10	27.09
22.00 to 29.99	22	36.63	17.43	1.23	12.85	32.22
30.00 to 36.99	30	49.90	23.66	1.16	12.75	43.93
37.00 to 44.99	37	61.24	28.53	1.03	13.47	54.18
45.00 to 54.99	45	74.00	33.67	1.04	13.87	65.90

Other than above capacities, these settings become the same as selecting function code P99=0 (Fuji standard motors, 8-series).
Function codes P12, P13, P16 to P23, P56, P57 and H46 parameters are equal to the parameters of three-phase 200V class series for Asia.

■ Three-phase 200V class series for Japan andTaiwan (FRN_ _G1■-2J/T)

Motor capacity (kW)	Nominal Applied motor (kW)	Rated current (A)	No-load current (A)	%R1 (%)	%X (%)	Torque current under vector control
P02/A16 b16/r16		P03/A17 b17/r17	P06/A20 b20/r20	P07/A21 b21/r21	P08/A22 b22/r22	P55/A55 b55/r55
0.75 to 1.49	0.75	3.50	1.87	5.49	13.71	2.28
1.50 to 2.19	1.5	6.90	3.96	5.04	13.70	4.56
2.20 to 3.69	2.2	9.50	5.46	4.07	12.98	6.69
3.70 to 5.49	3.7	15.50	8.50	4.07	13.15	11.24
5.50 to 7.49	5.5	21.00	10.55	3.17	11.47	16.71
7.50 to 10.99	7.5	27.50	11.68	3.01	12.56	22.79
11.00 to 14.99	11	40.00	14.90	2.21	14.28	33.43
15.00 to 18.49	15	54.00	18.50	1.94	14.34	45.58
18.50 to 21.99	18.5	68.00	27.40	1.48	15.10	56.22
22.00 to 29.99	22	84.00	33.60	1.46	15.29	66.85
30.00 to 36.99	30	116.0	45.60	1.40	15.38	91.16
37.00 to 44.99	37	137.0	55.00	1.20	15.75	112.4
45.00 to 54.99	45	166.0	64.90	1.21	16.14	136.7

Other than above capacities, these settings become the same as selecting function code P99=0 (Fuji standard motors, 8-series).
Function codes P12 to P23, P56, P57 and H46 parameters are equal to the parameters of three-phase 200V class series for Asia.

■ Three-phase 400V class series for Japan, Taiwan and EU (for FRN_ _ _G1■-4J/T/E)

Motor capacity (kW)	Nominal Applied motor (kW)	Rated current (A)	No-load current (A)	%R1 (%)	%X (%)	Torque current under vector control
P02/A16 b16/r16		P03/A17 b17/r17	P06/A20 b20/r20	P07/A21 b21/r21	P08/A22 b22/r22	P55/A55 b55/r55
0.75 to 1.49	0.75	1.80	0.94	5.49	13.71	1.14
1.50 to 2.19	1.5	3.50	1.98	5.04	13.70	2.28
2.20 to 3.69	2.2	4.80	2.73	4.07	12.98	3.34
3.70 to 5.49	3.7	7.80	4.25	4.07	13.15	5.62
5.50 to 7.49	5.5	10.50	5.28	3.17	11.47	8.36
7.50 to 10.99	7.5	13.50	5.84	3.01	12.56	11.40
11.00 to 14.99	11	20.00	7.45	2.21	14.28	16.71
15.00 to 18.49	15	27.00	9.25	1.94	14.34	22.79
18.50 to 21.99	18.5	34.00	13.70	1.48	15.10	28.11
22.00 to 29.99	22	42.00	16.80	1.46	15.29	33.43
30.00 to 36.99	30	58.00	22.80	1.40	15.38	45.58
37.00 to 44.99	37	69.00	27.50	1.20	15.75	56.22
45.00 to 54.99	45	83.00	32.45	1.21	16.14	68.37

Other than above capacities, these settings become the same as selecting function code P99=0 (Fuji standard motors, 8-series).
Function codes P12 to P23, P56, P57 and H46 parameters are equal to the parameters of three-phase 200V class series for Asia.

2 Details of Function Codes Added

P02 Motor 1 (Rated capacity) Related function codes : A16, b16, r16

P02 specifies the rated capacity of the motor. Enter the rated value given on the nameplate of the motor.

Data for P02	Unit	Function
0.01 to 1000	kW	When P99 (Motor 1 Selection) = 0, 2 to 5
	HP	When P99 (Motor 1 Selection) = 1

When accessing function code P02 with the keypad, take into account that the P02 data automatically updates the data of function codes P03, P05 through P23, P53 through P56 and H46.

 Note When accessing function code P02 with the communications link, other function codes are not automatically updated.

P99 Motor 1 selection Related function codes : A39, b39, r39

P99 specifies the motor type to be used.





Data for P99	Motor type
0	Motor characteristics 0 (Fuji standard motors, 8-series)
1	Motor characteristics 1 (HP rating motors)
2	Motor characteristics 2 (Fuji motors exclusively designed for vector control)
3	Motor characteristics 3 (Fuji standard motors, 6-series)
4	Other motors
5	Motor characteristics 5 (Fuji premium efficiency motors)

To select the motor drive control or to run the inverter with the integrated automatic control functions such as auto torque boost and torque calculation monitoring, it is necessary to specify the motor parameter correctly. First select the motor type with P99 (Motor 1 Selection) from Fuji standard motors 8-series, 6-series, Fuji motors exclusively designed for vector control and Fuji premium efficiency motors, next specify the motor rated capacity with P02, and then initialize the motor parameters with H03. This process automatically configures the related motor parameters (F09, F11, P01, P03, P05 through P23, P53 through P56, H46 and d90).

The data of H13 (Restart Mode after Momentary Power Failure (Restart time)) depends on the motor capacity, but the process stated above does not change it. Specify and adjust the data during a test run if needed.

H03 Data Initialization

H03 initializes the current function code data to the factory defaults or initializes the motor parameters.

To change the H03 data, it is necessary to press the  +  keys or  +  keys (simultaneous keying).

Data for H03	Function
0	Disable initialization (Settings manually made by the user will be retained.)
1	Initialize all function code data to the factory defaults
2	Initialize motor 1 parameters in accordance with P02 (Rated capacity) and P99 (Motor 1 selection)
3	Initialize motor 2 parameters in accordance with A16 (Rated capacity) and A39 (Motor 2 selection)
4	Initialize motor 3 parameters in accordance with b16 (Rated capacity) and b39 (Motor 3 selection)
5	Initialize motor 4 parameters in accordance with r16 (Rated capacity) and r39 (Motor 4 selection)

- To initialize the motor parameters, set the related function codes as follows.

Step	Item	Action	Function code			
			1st motor	2nd motor	3rd motor	4th motor
(1)	Motor selection	Selects the motor type	P99	A39	b39	r39
(2)	Motor (rated capacity)	Sets the motor capacity (kW)	P02	A16	b16	r16
(3)	Data initialization	Initialize motor parameters	H03=2	H03=3	H03=4	H03=5
Function code data to be initialized		If "Data=0, 1, 3, 4 or 5" in Step (1)	P01, P03, P05 to P23, P53 to P56, H46, F09, F11, d90	A05, A07, A15, A17, A19 to A37, A53 to A56	b05, b07, b15, b17, b19 to b37, b53 to b56	r05, r07, r15, r17, r19 to r37, r53 to r56
		If "Data=2" in Step(1), function codes listed at the right are also initialized	F04, F05	A02, A03	b02, b03	r02, r03

- Upon completion of the initialization, the H03 data reverts to "0" (factory default).
- If P02, A16, b16 or r16 data is set to a value other than the nominal applied motor rating, data initialization with H03 internally converts the specified value forcibly to the standard nominal applied motor rating.
- Motor parameters to be initialized are for motors listed below under V/f control. When the base frequency, rated voltage, and the number of poles are different from those of the listed motors, or when non-Fuji motors or non-standard motors are used, change the rated current data to that printed on the motor nameplate.

Motor selection		V/f control data
Data = 0 or 4	Fuji standard motors, 8-series	4 poles 220V/60Hz(200V/50Hz) ^{*1} , 415V/50Hz(400V/50Hz) ^{*2}
Data = 2	Fuji motors exclusively designed for vecotr control	4 poles —/50Hz, —/50Hz
Data = 3	Fuji standard motors, 6-series	4 poles 220V/50Hz(200V/50Hz) ^{*1} , 415V/50Hz(400V/50Hz) ^{*2}
Data = 5	Fuji premium efficiency motors	4 poles 220V/50Hz(200V/50Hz) ^{*1} , 415V/50Hz(400V/50Hz) ^{*2}
Data = 1	HP rating motors	4 poles 230V/60Hz, 460V/60Hz

^{*1}200V/50Hz for the FRN_ _ _G1■-2J/T ^{*2}400V/50Hz for the FRN_ _ _G1■-4J/T/E

Note

When accessing function code P02 with the keypad, take into account that P02 data automatically updates data of function codes P03, P05 through P23, P53 through P56 and H46. Also, when accessing function code A16, b16 or r16, data of related function codes for each are automatically updated. When accessing function code P02, A16, b16 or r16 with the communications link, other function codes for each are not automatically updated.

Note

Inverter's ROM version 4000 or later, F09, F11 and d90 are newly target for initialization in a state of H03=2. In H03=3, A05 and A07, in H03=4, b05 and b07 or in H03=5, r05 and r07 data for each are newly target for initialization. F09, A05, b05 or r05 data (torque boost) is initialized to become Table 2 value in accordance with motor capacity.

Table 2 Initialization value by motor capacity
In the case of P99/A39/b39/r39 data=0, 1, 2, 3 or 4

Motor capacity setting range (kW)	Torque boost F09/A05/b05/r05
P02/A16/b16/r16	
0.01 to 0.39	8.4
0.40 to 0.74	7.1
0.75 to 1.49	6.8
1.50 to 2.19	
2.20 to 3.69	
3.70 to 5.49	
5.50 to 7.49	4.9
7.50 to 10.99	4.4
11.00 to 14.99	3.5
15.00 to 18.49	2.8
18.50 to 21.99	2.2
22.00 to 29.99	
30.00 or above	
	0.0

In the case of P99/A39/b39/r39 data=5

Motor capacity setting range (kW)	Torque boost F09/A05/b05/r05	
	HD	LD
P02/A16/b16/r16		
0.01 to 0.39	8.4	8.4
0.40 to 0.74	7.1	7.1
0.75 to 1.49	3.8	3.2
1.50 to 2.19	3.0	2.4
2.20 to 3.69	2.5	2.1
3.70 to 5.49	2.4	2.0
5.50 to 7.49	1.9	1.9
7.50 to 10.99	1.8	1.8
11.00 to 14.99	1.3	1.3
15.00 to 18.49	1.2	1.2
18.50 to 21.99	0.9	0.9
22.00 to 29.99		
30.00 or above		
	0.0	0.0

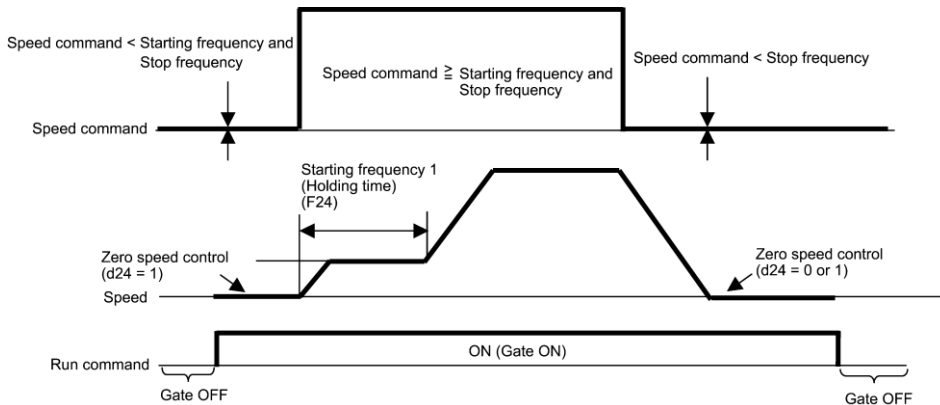
d24 Zero speed control

To enable zero speed control under vector control with speed sensor and vector control without speed sensor, it is necessary to set the speed command (frequency command) at below the starting and stop frequencies. If the starting and stop frequencies are 0.0Hz, however, the zero speed control is enabled only when the speed command is 0.00Hz. d24 specifies the operation for the zero speed control at the startup and stop of the inverter.

Data for d24	At startup zero speed control	At stop zero speed control	Descriptions
0	Not allowed	Allowed	Even setting the speed command at below the starting and stop frequencies and turning a run command ON does not enable the zero speed control. To enable the zero speed control, set the speed command at above the starting frequency and then start up the inverter again.
1	Allowed	Allowed	Setting the speed command at below the starting and stop frequencies and turning a run command ON enables the zero speed control.
2	Not allowed	Not allowed	The zero speed control is not enabled to regardless of speed command.

The table below shows the conditions for zero speed control to be enabled or disabled.

	Speed command	Run command	Operation		
			d24 data=0	d24 data=1	d24 data=2
At startup	Below the starting and stop frequencies	OFF	Stop (Gate OFF)		
		ON	Stop (Gate OFF)	Zero speed control	Stop (Gate OFF)
At stop	Below the stop frequency	ON	Zero speed control	Zero speed control	Stop (Gate OFF)
		OFF	Stop (Gate OFF)		



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Supplement to Instruction Manual

First Edition, December 2017

Fuji Electric Co., Ltd

The purpose of this instruction manual is to provide accurate information in handling, setting up and operating of the FRENIC-MEGA series of inverters. Please feel free to send your comments regarding any errors or omissions you may have found, or any suggestions you may have for generally improving the manual.

In no event will Fuji Electric Co., Ltd. be liable for any direct or indirect damages resulting from the application of the information in this manual.