Changes for the Better











Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001(standards for quality assurance management systems)



Evolution of the inverter for fan and pump applications, energy savings for buildings and factories as a whole



%

1. More Energy Savings

(1) Upgrade of the renown Optimum Excitation Control!

•Achieved a higher level of energy savings during acc./dec. to say nothing of during constant speed.



AU/PTC switchover switch

> Connector with/without EMC filter

> > Combed shaped wiring cover D

Built-in

EMC filter

(2) The effect of energy savings is obvious A

•The effect of energy savings can be confirmed using the operation panel, output terminal (FM, AM terminal) and via networks with the newly developed energy saving

B Removable terminal block

Photo:FR-F740-5.5k

Ex. of Power Savings

[Energy Saving Monitor List] Power saving monitor (kW)

Power saving rate (%) Power saving amount (kWh) Power saving amount charge (\$) Power saving average value (kW) Power saving rate average value (%) Power saving charge average value (\$) Annual power saving amount (kWh) Annual power saving amount charge (\$)

> A Easy operation with the setting dial of the operation panel



V/F Characteristic (2) Enhanced PID function

excitation control and optimum

V/F pattern working together

BEST

• Energy savings in low speed region ... PID shutoff (sleep control) function •Shorter PID startup time ... PID automatic switchover function

- •Monitor of set point/measured value/deviation possible ... PID monitor ·Convenient for HVAC usage ... forward/reverse operation switchover is simple with an external signal
- Corresponds to a wide range of detectors ... set point and measured value for PID input can either be voltage (0 to 5V/0 to 10 V) or current (4 to 20mA)

(3) Adoption of the original operation continuation at instantaneous power failure function

•Operation continues without the motor coasting when an Input instantaneous power failure Power Supply occurred in fan and blower Output applications. Frequer *The inverter may trip and the motor may coast depending on the load condition



RELIABLE **3.** Long Life and Simple Maintenance EASY

Basi

Frequency

(1) Operating life of parts are further lengthened

- Adoption of newly developed long life cooling fan (design life of 10 years*1) Longer operating life is further enhanced with the use of ON/OFF control of cooling fan. •Adoption of long life capacitor (design life of 10 years*^{1, 2})
- A capacitor with specification of 5000 hours at 105°C ambient temperature is adapted. *1 Ambient temperature: yearly average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value. *2 Output current: 80% of the rated current of Mitsubishi standard 4P motor

(2) State of the art longevity diagnostic method

•Degrees of deterioration of main circuit capacitor, control circuit capacitor or inrush current limit circuit can be diagnosed by monitor. •Trouble can be avoided with the self-diagnostic alarms* that is output when the life span is near.

*Any of alarm for main circuit capacitor, control circuit capacitor, inrush current limit circuit and cooling fan can be output

(3) Maintenance timer

- •Maintenance timer output function can also inform of
- maintenance time for peripheral equipments.
- Average output current value and maintenance timer value are output as pulses

(5) Improved workability

Easy replacement of cooling fan C

- •The installation position of the cooling fan is in the upper portion of the inverter. Fan replacement is easily done without having to remove the main circuit wires.
- •Wiring is easy with the combed shaped wiring cover D ·Wiring cover can be reinstalled after wiring. (200V class 22K or less, 400V class 30K or less)





(4) Restart after instantaneous power failure function

•Restart can be made without stopping the motor when the motor is coasting due to an instantaneous power failure.

(5) Flying start

•Smoothly restarts a motor that is rotating even in the opposite direction due to the windmill effect.

(6) Regeneration avoidance function

 Possible to avoid regeneration overvoltage alarm by automatically increasing the frequency and continue operation if the fan happens to rotate faster due to the effect of another fan in the same duct.

(7) PTC thermistor input **I**

•Protection of the motor can be certain since the built-in PTC of the motor can be input directly in addition to the electronic thermal relay function. PTC thermistor input...Positive Temperature Coefficient Thermistor

(8) Commercial power-supply switchover sequence

•Switchover to commercial power-supply operation is simple using R1 and S1 terminals of the control circuit and commercial power-supply switchover sequence.

(4) Update is also easy

Removable terminal block B

•When exchanging the inverter, the control circuit terminals can be exchanged. The removable terminal block of the FR-F500 series can be used.

(The terminal block of the FR-F700 series is compatible with that of the FR-F500 series

Note that some functions of the ER-E700 series are restricted when using the terminal block of the FR-F500 series.) FR-F700 series

FR-F500 series



• Possible to copy parameters with operation panel A •Parameter setting for multiple inverters is simple by copy with the operation panel.

Alarm history

•Alarm history (alarm details and frequency, current, voltage and cumulative energization time at time of alarm occurrence) can be displayed on the operation panel and the cause of a trouble can be checked. (up to 8 past alarms)

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Full of attractive features!

4. Free of Environmental Worries 5. Simple Operation

(1) Reduction of electromagnetic noises **E F**

•Inverter noises have been reduced with the adoption of new technologies.

Newly developed noise filter (EMC filter)

•Because of the built-in EMC filter, the inverter itself can comply with the EMC Directive (2nd environment^{*1}) by setting the connector to "with filter" (*2,*3).



*1: Refer to the EMC instruction manual for compliance conditions.

- *2: Leakage current will increase when the EMC filter is selected.
 *3: Since the leakage current when using the EMC filter for the 200V class 0.75K and
- 1.5K is small, the filter is always valid (a setting connector is not provid

• Because of the built-in capacitive filter and zero-phase reactor (55K or less), connecting the optional DC reactor to the inverter will comply with the electric installation work common specification and machine installation work common specification (2001) written under the general editorship of the Japanese Ministry of land, infrastructure and transportation.

	Capacitive filter	Zero-phase reactor	DC reactor
		Standard (Built-in)	
75K or more	Standard (Built-in)	Option (Sell separately)	Standard (supplied)

(2) Countermeasures for harmonic current output

•Small AC reactor (FR-HAL)/DC reactor (FR-HEL)

•AC reactor and DC reactor options for the control of harmonics current output has been miniaturized. (DC reactor is supplied with the 75K or more as standard.)

• Connection with high power factor converter (FR-HC/MT-HC) is possible

•Connection is possible to high power-factor converter for effective suppressions of power-supply harmonics (coefficient K5=0).

(3) Equipped with inrush current limit circuit

•Because of the built-in inrush current limit circuit, the current at power on is restricted.

(1) Equipped with operation panel with the popular setting dial A

•Operation is easy with the popular setting dial

•Frequency and parameters can be set without frustrations. •Settings can be made quickly or slowly depending on fast the dial is being turned.

•Settings are certain due to the "clicking" sensation and notch on dial.



•Operation panel is detachable and can be installed on the

front cover. (Cable connector option is required.) PU/EXT (operation mode) switchover key is available. •Dial/key operation lock function is available.



(2) FR Configurator (setup software)

•From start up to maintenance of the inverter is simple •Possible to save and print parameter setting file making parameter management simple

(Possible to use communications connecting to any of PU connector and RS-485 terminals)



6. Enhanced Network

(1) RS-485 terminal is standard equipped G H

•RS-485 terminals are available in addition to the PU. connector. RS-485 communication can be performed using the operation panel or parameter unit. Since terminals for input and output are provided separately, multi-drop connection is easily done.

•Modbus-RTU (Binary) protocol has been added for communications in addition to computer link.

(2) Possible to correspond with major networks

•Possible to connect with LonWorks, CC-Link Ver.1.1 and Ver.2.0. DeviceNet_™ and Profibus-DP when used with communication options







(1) Complies with UL, cUL, EN (LVD) standards



(2) Possible to switch sink/source with one-touch

Standard Specificatior

Outline Dimension Drawings

Terminal Connectio Diagram Terminal Specificatio Explanation

Operation Panel

ramete List

anati of

Protective Functions

•Possible to switch the logic of I/O terminals. Possible to use in all regions

(3) Wide voltage range

•Accommodate both 240V power supply (55K or less) and 480V power supply as standard

8. Wide Range of Functions

(1) Remote output function

•You can utilize the on/off of the inverter's output signals instead of the remote output function of the programmable logic controller.

(2) Enhanced I/O is standard

•12 contact inputs, 3 analog inputs, 5 open collector outputs, 2 relay outputs, analog output and pulse output are all standard. •Possible to assign variety of functions to contact inputs, open collector outputs and relay outputs

•Possible to switch between voltage and current for the analog input. •Possible to display the ON/OFF status of the I/O terminals on the operation panel

(3) Simple magnetic flux vector control is possible

• High torque in low speed region is possible with simple magnetic flux vector control

(120% torque is possible at 3Hz with slip compensation)

	V/F + Optimum Excitation	Simple Magnetic Flux Vector
For torque	_	O
For energy savings	O	—

ree-phase 200V class	Three-phase 400V class	Applied Motor (kW)	Three-phase 200V class	Three-phase 400V class
•		75	•	•
•	•	90	•	•
•	•	110	•	•
•	•	132	_	•
•	•	160	_	•
•	•	185	-	•
•	•	220	—	•
•	•	250	_	•
•	•	280	-	•
•	•	315	—	•
•	•	355	_	•
•	•	400	_	•
•		450	—	•
•	•	500	_	•
		560	_	•

able models Not availa

Connection with Peripheral Devices



Peripheral devices necessary for driving the FR-F700 series inverter are indicated below.



Refer to page 49 for the option list and details.

Why Can the Inverter Save Energy?

The load torque of a motor-driven machine generally changes depending on speed. On the other hand, motor output is proportional to the product of load torque and speed as indicated in the following formula, and therefore, necessary motor output varies with speed.

Motor output P = T × N/(9550 × η) [kW]

- T : Motor shaft-equivalent load torque [N·m]
- N: Motor speed [r/min]
- η : Machine efficiency

When this motor is operated by the inverter, the inverter output provides the frequency f appropriate to the motor speed, and the then output voltage V is determined by a "V/f = constant" pattern in the case of a constant-torque load. For example, when the motor is operated at middle speed, f, i.e. output voltage V, decreases, and therefore, the inverter output power V \times I reduces if the output current I is constant.

Proportionately, the inverter input current decreases and the power consumption reduces. Namely, when the motor output reduces, the input power of the inverter also decreases as a matter of course.

The fundamental principle of energy saving by the inverter is to eliminate wasted power consumption by minimizing loss caused by the other devices and minimizing the motor output as compared to the other system (for example, commercial power supply operation or secondary resistance control of wound-rotor motor). A maximum energy saving effect is produced on a fan, pump or like by the variable-torque load characteristic that reduces load torque as speed decreases.

Motor speed control enables substantial energy-saving operation as compared to commercial power supply operation.



¥670,000

For example, when a 15kW motor is operated at 60% air volume and the power charge is 17 yen/kW \cdot h, the power charge as much as below can be saved in a year.

(1)Damper control

 $15kW \times 0.9 \times 17 yen \times 24h \times 365 days = 2.01 million yen$ (2)Inverter control

 $15kW \times 0.3 \times 17 yen \times 24h \times 365 days \doteq 0.67 million yen$

(1) - (2) = energy-saving effect Approx. 1.34 million yen

F700 SERIES

Aotor

Rating

•200V class

	Type FR-F720-□□K	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Ap	plied motor capacity (kW)*1	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
	Rated capacity (kVA)*2	1.6	2.7	3.7	5.8	8.8	11.8	17.1	22.1	27	32	43	53	65	81	110	132	165
Output	Rated current (A)*3	4.2 (3.6)	7.0 (6.0)	9.6 (8.2)	15.2 (13)	23 (20)	31 (26)	45 (38)	58 (49)	70 (60)	85 (72)	114 (97)	140 (119)	170 (145)	212 (180)	288 (244)	346 (294)	432 (367)
õ	Overload current rating*4		120% 60s, 150% 3s (inverse time characteristics)															
	Voltage*5		Three-phase 200 to 240V															
ЛУ	Rated input AC voltage/frequency		Three-phase 200 to 220V 50Hz, 200 to 240V 60Hz															
supply	Permissible AC voltage fluctuation		170 to 242V 50Hz, 170 to 264V 60Hz															
e.	Permissible frequency fluctuation									±5%								
Pow	Power supply system capacity (kVA)*6	2.5	4.5	5.5	9	12	17	20	28	34	41	52	65	79	99	110	132	165
Pro	otective structure (JEM 1030)∗8				Encle	osed ty	pe (IP2	20)*7						Oper	n type (IP00)		
Со	oling system	Self-c	ooling							Force	d air c	ooling						
Approx. mass (kg)			2.2	3.5	3.5	3.5	6.5	6.5	7.5	13	13	14	23	35	35	67	70	70

•400V class

	Type FR-F740-□□K	0.75	1.5	2.2	3.7	5.5	7.	5 1	1	15	18.5	22	30	37	45	55
Ap	blied motor capacity (kW)*1	0.75	1.5	2.2	3.7	5.5	7.5	5 1	1	15	18.5	22	30	37	45	55
	Rated capacity (kVA)*2	1.6	2.7	3.7	5.8	8.8	12.	2 17	.5 2	22.1	26.7	32.8	43.4	53.3	64.8	80.8
Output	Rated current (A)*3	2.1 (1.8)	3.5 (3.0)	4.8 (4.1)	7.6 (6.4)	11.5 (9.8	-	_	-	29 (24)	35 (30)	43 (36)	57 (48)	70 (60)	85 (72)	106 (90)
õ	Overload current rating*4					120%	60s, 15	0% 3s	(invers	se time	charact	eristics)				
	Voltage*5						TI	nree-ph	ase 38	30 to 4	80V					
١٧	Rated input AC voltage/frequency		Three-phase 380 to 480V 50Hz/60Hz													
supply	Permissible AC voltage fluctuation		323 to 528V 50Hz/60Hz													
	Permissible frequency fluctuation								±5%							
Power	Power supply system capacity (kVA)*6	2.5	4.5	5.5	9	12	17	2	0	28	34	41	52	66	80	100
Pro	tective structure (JEM 1030)*8		Enclosed type (IP20)*7 Open type (IP00)													
Со	oling system	S	elf-cooli	ing						Force	d air coo	oling				
Ap	prox. mass (kg)	3.5	3.5	3.5	3.5	3.5	6.5	5 6.	5	7.5	7.5	13	13	23	35	35
										0.00	045	255	400	450		
	Type FR-F740-□□K	75	90	110	132	160	185	220	250	280) 315	355	400	450	500	560
Ар	Type FR-F740-DDK blied motor capacity (kW)*1	75	90 90	110 110	132 132	160	185	220	250 250	280			400	450	500	560 560
Ар		-		_	-) 315	355				
	blied motor capacity (kW)*1	75	90	110	132	160	185	220	250	280 416 547) 315 3 464 3 610	355 520 683	400 586 770	450	500	560
Output de	lied motor capacity (kW)*1 Rated capacity (kVA)*2	75 110 144	90 137 180	110 165 216	132 198 260	160 247 325 (276)	185 275 361 (306)	220 329 432 (367)	250 366 481 (408)	280 416 547 (464) 315 3 464 3 610	355 520 683) (580)	400 586 770 (654)	450 659 866	500 733 962	560 833 1094
	lied motor capacity (kW)*1 Rated capacity (kVA)*2 Rated current (A)*3	75 110 144	90 137 180	110 165 216	132 198 260	160 247 325 (276)	185 275 361 (306) 60s, 15	220 329 432 (367)	250 366 481 (408) (invers	280 416 547 (464 se time) 315 6 464 7 610 9 (518 charact	355 520 683) (580)	400 586 770 (654)	450 659 866	500 733 962	560 833 1094
Output	lied motor capacity (kW)*1 Rated capacity (kVA)*2 Rated current (A)*3 Overload current rating*4	75 110 144	90 137 180	110 165 216	132 198 260	160 247 325 (276) 120%	185 275 361 (306) 60s, 15	220 329 432 (367) 0% 3s nree-ph	250 366 481 (408) (invers	280 416 547 (464 se time 80 to 4) 315 6 464 7 610 9 (518 charact	355 520 683) (580) eristics)	400 586 770 (654)	450 659 866	500 733 962	560 833 1094
Output	lied motor capacity (kW)*1 Rated capacity (kVA)*2 Rated current (A)*3 Overload current rating*4 Voltage*5	75 110 144	90 137 180	110 165 216	132 198 260	160 247 325 (276) 120%	185 275 361 (306) 60s, 15 Three-p	220 329 432 (367) 0% 3s nree-ph	250 366 481 (408) (invers ase 38 80 to 4	280 416 547 (464 se time 80 to 4 480V 5) 315 6 464 7 610 9) (518 charact 80V 0Hz/60H	355 520 683) (580) eristics)	400 586 770 (654)	450 659 866	500 733 962	560 833 1094
supply Output	lied motor capacity (kW)*1 Rated capacity (kVA)*2 Rated current (A)*3 Overload current rating*4 Voltage*5 Rated input AC voltage/frequency	75 110 144	90 137 180	110 165 216	132 198 260	160 247 325 (276) 120%	185 275 361 (306) 60s, 15 Three-p	220 329 432 (367) 0% 3s nree-ph hase 3	250 366 481 (408) (invers ase 38 80 to 4	280 416 547 (464 se time 80 to 4 480V 5) 315 6 464 7 610 9) (518 charact 80V 0Hz/60H	355 520 683) (580) eristics)	400 586 770 (654)	450 659 866	500 733 962	560 833 1094
Output	lied motor capacity (kW)*1 Rated capacity (kVA)*2 Rated current (A)*3 Overload current rating*4 Voltage*5 Rated input AC voltage/frequency Permissible AC voltage fluctuation	75 110 144	90 137 180	110 165 216	132 198 260	160 247 325 (276) 120%	185 275 361 (306) 60s, 15 Three-p	220 329 432 (367) 0% 3s nree-ph hase 3	250 366 481 (408) (invers ase 38 80 to 4 28V 50	280 416 547 (464 se time 80 to 4 480V 5) 315 3 464 7 610 9) (518 charact 80V 0Hz/60H Hz	355 520 683) (580) eristics)	400 586 770 (654)	450 659 866	500 733 962	560 833 1094
Power supply Output	Died motor capacity (kW)*1 Rated capacity (kVA)*2 Rated current (A)*3 Overload current rating*4 Voltage*5 Rated input AC voltage/frequency Permissible AC voltage fluctuation Permissible frequency fluctuation	75 110 144 (122)	90 137 180 (153)	110 165 216 (183)	132 198 260 (221)	160 247 325 (276) 120%	185 275 361 (306) 60s, 15 Three-p 3	220 329 432 (367) 0% 3s nree-ph hase 3 23 to 5 329	250 366 481 (408) (invers ase 38 80 to 4 28V 50 ±5%	280 416 547 (464 se time 80 to 4 480V 5 0Hz/60 416) 315 3 464 7 610 9) (518 charact 80V 0Hz/60H Hz	355 520 683) (580) eristics)	400 586 770 (654)	450 659 866 (736)	500 733 962 (817)	560 833 1094 (929)
A Power supply Output	lied motor capacity (kW)*1 Rated capacity (kVA)*2 Rated current (A)*3 Overload current rating*4 Voltage*5 Rated input AC voltage/frequency Permissible AC voltage fluctuation Permissible frequency fluctuation Power supply system capacity (kVA)*6	75 110 144 (122)	90 137 180 (153)	110 165 216 (183)	132 198 260 (221)	160 247 325 (276) 120%	185 275 361 (306) 60s, 15 Three-p 3	220 329 432 (367) 0% 3s nree-ph hase 3 23 to 5 329 Oper	250 366 481 (408) (invers ase 38 80 to 4 28V 50 ±5% 366 n type	280 416 547 (464 se time 80 to 4 480V 5 0Hz/60 416	315 464 610 (518 charact 80V 0Hz/60H Hz 464	355 520 683) (580) eristics)	400 586 770 (654)	450 659 866 (736)	500 733 962 (817)	560 833 1094 (929)

*1. The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

*2. The rated output capacity indicated assumes that the output voltage is 220V for 200V class and 440V for 400V class.
*3. When operating the inverter with the carrier frequency set to 3kHz or more, the carrier frequency automatically decreases if the inverter output

current exceeds the value in parenthesis of the rated current. This may cause the motor noise to increase.
*4. The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty,

4. The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

*5. The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.

*6. The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

*7. When the hook of the inverter front cover is cut off for installation of the plug-in option, the inverter changes to an open type (IP00).

*8. FR-DU07 : IP40 (Except for the PU connector).

Common	specifications
	Specifications

	ntrol system		High carrier frequency PWM control (V/F control)/optimum excitation control/simple magnetic flux vector control
100	tput frequency	range	0.5 to 400Hz
Fre	quency ting resolution	Analog input	0.015Hz/0 to 60Hz (terminal 2, 4: 0 to 10V/12bit) 0.03Hz/0 to 60Hz (terminal 2, 4: 0 to 5V/11bit, 0 to 20mA/11bit, terminal 1: 0 to ±10V/12bit) 0.06Hz/0 to 60Hz (terminal 1: 0 to ±5V/11bit)
500	ang resolution	Digital input	0.01Hz
Fre	quency	Analog input	Within ±0.2% of the max. output frequency (25°C ± 10°C)
acc	curacy	Digital input	Within 0.01% of the set output frequency
Fre acc Volt	tage/frequency	characteristics	Base frequency can be set from 0 to 400Hz Constant torque/variable torque pattern or adjustable 5 points V/F can be selected
Sta	rting torque		120% (3Hz) when set to simple magnetic flux vector control and slip compensation
Acc	celeration/dece	leration time setting	0 to 3600s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode can be selected.
	injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) variable
Sta	Il prevention of	peration level	Operation current level can be set (0 to 150% adjustable), whether to use the function or not can be selected
	quency ting signal	Analog input	Terminal 2, 4: 0 to 10V, 0 to 5V, 4 to 20mA can be selected Terminal 1: -10 to +10V, -5 to 5V can be selected
		Digital input	Four-digit BCD or16-bit binary using the setting dial of the operation panel (when used with the option FR-A7AX)
Sta	rt signal		Available individually for forward rotation and reverse rotation. Start signal automatic self-holding input (3-wire input) can be selected.
Inp	ut signals		You can select any twelve signals using Pr.178 to Pr.189 (input terminal function selection) from among multi speed selection, second function selection, terminal 4 input selection, JOG operation selection, selection of automatic restart after instantaneous power failure, external thermal relay input, HC connection (inverter operation enable signal), HC connection (instantaneous power failure detection), PU operation/external inter lock signal, PID control enable terminal, PU operation, external operation switchover, output stop, start self-holding selection, forward rotation command, inverter reset, PTC thermistor input, PID forward reverse operation switchover, NET-external operation switchover, command source switchover.
Op	erational functi	ons	Maximum and minimum frequency settings, frequency jump operation, external thermal relay input selection, polarity reversible operation, automatic restart after instantaneous power failure operation, original operation continuation at instantaneous power failure, commercial power supply-inverter switchover operation, forward/reverse rotation prevention, operation mode selection, PID control, computer link operation (RS-485).
Output signals	Operating status		You can select any seven signals using Pr.190 to Pr.196 (output terminal function selection) from among inverter running, up-to-speed, instantaneous power failure /undervoltage, overload warning, output frequency detection, second output frequency detection, regenerative brake prealarm*4, electronic thermal relay function pre-alarm, PU operation mode, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward rotation reverse rotation output, commercial power supply-inverter switchover MC1, commercial power supply-inverter switchover MC2, commercial power supply-inverter switchover MC3, fan fault output, heatsink overheat pre-alarm, inverter running start command on, deceleration at an instantaneous power failure, PID control activated, during retry, during PID output suspension, life alarm, alarm output 3 (power-off signal), power savings average value update timing, current average monitor, alarm output (2 points) and alarm code of the inverter can be output (4 bit) from the open collector.
Our		When used with the FR-A7AY, FR-A7AR (option)	You can select any seven signals using Pr.313 to Pr. 319 (extension output terminal function selection) from among control circuit capacitor life, main circuit capacitor life, cooling fan life, inrush current limit circuit life and the above stated signals. (Only positive logic can be set for terminals of the FR-A7AR.)
	Pulse/analog	g output	Selection can be made from output frequency, motor current (steady or peak value), output voltage, frequency setting value, running speed, converter output voltage (steady or peak value), electronic thermal relay function load factor, input power, output power, load meter, reference voltage output, motor load factor, power saving effect, regenerative brake duty ⁴ , PID set value, PID measured value using Pr.54 "FM terminal function selection (pulse train output)" and Pr.158 "AM terminal function selection (analog output)".
PU		Operating status	Output frequency, motor current (steady or peak value), output voltage, frequency setting, running speed, converter output voltage (steady or peak value), electronic thermal relay function load factor, input power, output power, load meter, cumulative energization time, actual operation time, motor load factor, cumulative energization power, power saving effect, cumulative saving power, regenerative brake duty 4, PID set point, PID measured value, PID deviation
	R-DU07/ -PU04)		value, inverter I/O terminal monitor, input terminal option monitor*1, output terminal option monitor*1, option fitting status monitor*2, terminal assignment status*2
		Alarm definition	Alarm definition is displayed when the protective function is activated, the output voltage/current/frequency/cumulative energization time right before the protection function was activated and the past 8 alarm definitions are stored
		Interactive guidance	Operation guide/trouble shooting with a help function*2 Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage
oto -t'		otion	Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, instantaneous power failure occurrence, undervoltage, input phase failure, motor overload, output side earth (ground) fault overcurrent, output phase failure, external thermal relay operation, PTC thermistor operation, option alarm, parameter error, PU disconnection, retry
	ve/warning fun		count excess, CPU alarm, operation panel power supply short circuit, 24VDC power output short circuit, output current detection value excess, inrush resistance overheat, communication alarm (inverter), analog input alarm, internal circuit alarm (15V power supply), fan fault, overcurrent stall prevention, overvoltage stall prevention, electronic thermal relay function prealarm, PU stop, maintenance timer alarm*1, brake transistor alarm*4, parameter write error, copy operation error, operation panel lock, parameter copy alarm
Am	bient temperat	ure	-10°C to +50°C (non-freezing)
Am	bient humidity	1010	90%RH or less (non-condensing)
0	rage temperate	ue-3	-20°C to +65°C Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)
Sto	noenhoro		TITUOUTS (WITTOUT COTTOSIVE YAS, HAITITADIE YAS, UITTIIST, UUST ATU UITTEUC.)
Atm	nosphere tude, vibration		Maximum 1000m above seal level, 5.9m/s ² or less at 10 to 55Hz (directions of X, Y, Z axes) *5

*1. Can be displayed only on the operation panel (FR-DU07).
*2. Can be displayed only on the parameter unit (FR-PU04).
*3. Temperature applicable for a short period in transit, etc.
*4. Only the 75K or more functions.

*5. 2.9m/s^2 or less for the 185K or more.

Outline Dimension Drawings

REARDL F700 SERIES

• FR-F720-0.75K, 1.5K



• FR-F720-2.2K, 3.7K, 5.5K

• FR-F740-0.75K, 1.5K, 2.2K, 3.7K, 5.5K



TRADE F700 Series

- FR-F720-7.5K, 11K, 15K
- FR-F740-7.5K, 11K, 15K, 18.5K





Protective Functions

Options

Instructions

Motor

Compatibility

Warranty

Inquiry

REARD F700 SERIES

• FR-F720-37K, 45K, 55K

• FR-F740-37K, 45K, 55K



• FR-F740-75K, 90K



Features

Peripheral Devices Why energy savings?

Standard Specifications

•FR-F740-110K



•FR-F720-75K, 90K, 110K •FR-F740-132K, 160K



Options

Instructions

Motor

Compatibility

Warranty

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• FR-F740-185K, 220K, 250K, 280K, 315K, 355K



Inverter Type	W	W1	W2	Н	H1	H2	H3	D
FR-F740-185K, 220K	498	200	49	1010	985	15	10	380
FR-F740-250K, 280K, 315K	680	300	40	1010	985	15	10	380
FR-F740-355K	790	315	80	1330	1300	15	15	440

• DC reactor supplied



* Remove the eye nut after installation of the product.

Inverter Type	w	W1	н	H1	D	S	S1	S2	ф	Mass (kg)		
FR-F740-185K(FR-HEL-H185K)	175	150	405	370	240	M8	M6		M12	29		
FR-F740-220K(FR-HEL-H220K)	175	150	405	370	240	M8	M6	M6	M12	30		
FR-F740-250K(FR-HEL-H250K)	190	165	440	400	250	M8	M8	M8	M12	35		
FR-F740-280K(FR-HEL-H280K)	190	165	440	400	255	M8	M8	M8	M16	38		
FR-F740-315K(FR-HEL-H315K)	210	185	495	450	250	M10	M8	M8	M16	42		
FR-F740-355K(FR-HEL-H355K)	210	185	495	450	250	M10	M8	M8	M16	46		
	(Unit: r											

FRORD F700 Series

• FR-F740-400K





Instructions

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• FR-F740-500K, 560K



• Operation panel (FR-DU07)





Terminal Connection Diagram



CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables.
- · Be sure to use the inverter and motor after grounding (earthing) them.
- This connection diagram assumes that the control circuit is sink logic (initial setting). Refer to the instruction manual for the connection in the case of source logic.

REDEDL F700 SERIES

Features

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Explanations of Parameters

> Protective Functions

> > Options

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Motor

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Terminal Specification Explanation

R/L1, S/L2, T/L3 U, V, W R1/L11, S1/L21 P/+, N/- P/+, P1 PR, PX STF STR STR STOP RH, RM, RL JOG	Earth (Ground) Forward rotation start Reverse rotation start Start self-holding selection Multi-speed selection	Connect to the commercial power supply. Connect a three-phase squirrel-cage motor. Connected to the AC power supply terminals R/L1 and S/L2. To reta alarm output, apply external power to this terminal. Connect the brake unit (FR-BU, BU, MT-BU5), power regeneration CV), power regeneration converter (MT-RC) or high power factor co For the 55K or less, remove the jumper across terminals P/+ - P1 and (For the 75K or more, a DC reactor is supplied as standard.) se terminals PR and PX or the jumper connected. For earthing (grounding) the inverter chassis. Must be earthed (ground Turn on the STF signal to start forward rotation and turn it off to stop. Turn on the STR signal to start reverse rotation and turn it off to stop. Turn on the STOP signal to self-hold the start signal.	common converter (FR- onverter (FR-HC, MT-HC). nd connect the DC reactor.							
U, V, W R1/L11, S1/L21 P/+, N/- P/+, P1 PR, PX STF STR STOP RH, RM, RL JOG	Power supply for control circuit Brake unit connection DC reactor connection Please do not remove or u Earth (Ground) Forward rotation start Reverse rotation start Start self-holding selection Multi-speed selection	Connected to the AC power supply terminals R/L1 and S/L2. To reta alarm output, apply external power to this terminal. Connect the brake unit (FR-BU, BU, MT-BU5), power regeneration CV), power regeneration converter (MT-RC) or high power factor co For the 55K or less, remove the jumper across terminals P/+ - P1 ar (For the 75K or more, a DC reactor is supplied as standard.) se terminals PR and PX or the jumper connected. For earthing (grounding) the inverter chassis. Must be earthed (ground Turn on the STF signal to start forward rotation and turn it off to stop.	common converter (FR- onverter (FR-HC, MT-HC). Ind connect the DC reactor. unded). When the STF and STR signals are turned on simultaneously, the stop							
P/+, N/- P/+, P1 PR, PX STF STR STOP RH, RM, RL JOG	circuit Brake unit connection DC reactor connection Please do not remove or u Earth (Ground) Forward rotation start Reverse rotation start Start self-holding selection Multi-speed selection	alarm output, apply external power to this terminal. Connect the brake unit (FR-BU, BU, MT-BU5), power regeneration CV), power regeneration converter (MT-RC) or high power factor co For the 55K or less, remove the jumper across terminals P/+ - P1 ar (For the 75K or more, a DC reactor is supplied as standard.) se terminals PR and PX or the jumper connected. For earthing (grounding) the inverter chassis. Must be earthed (ground Turn on the STF signal to start forward rotation and turn it off to stop. Turn on the STR signal to start reverse rotation and turn it off to stop.	common converter (FR- onverter (FR-HC, MT-HC). Ind connect the DC reactor. unded). When the STF and STR signals are turned on simultaneously, the stop							
P/+, P1 PR, PX STF STR STOP RH, RM, RL JOG	DC reactor connection Please do not remove or u Earth (Ground) Forward rotation start Reverse rotation start Start self-holding selection Multi-speed selection	CV), power regeneration converter (MT-RC) or high power factor cc For the 55K or less, remove the jumper across terminals P/+ - P1 at (For the 75K or more, a DC reactor is supplied as standard.) se terminals PR and PX or the jumper connected. For earthing (grounding) the inverter chassis. Must be earthed (ground Turn on the STF signal to start forward rotation and turn it off to stop. Turn on the STR signal to start reverse rotation and turn it off to stop.	unded). When the STF and STR signals are turned on simultaneously, the stop							
PR, PX	Please do not remove or u Earth (Ground) Forward rotation start Reverse rotation start Start self-holding selection Multi-speed selection	(For the 75K or more, a DC reactor is supplied as standard.) se terminals PR and PX or the jumper connected. For earthing (grounding) the inverter chassis. Must be earthed (grou Turn on the STF signal to start forward rotation and turn it off to stop. Turn on the STR signal to start reverse rotation and turn it off to stop.	unded). When the STF and STR signals are turned on simultaneously, the stop							
STF STR STOP RH, RM, RL JOG	Earth (Ground) Forward rotation start Reverse rotation start Start self-holding selection Multi-speed selection	For earthing (grounding) the inverter chassis. Must be earthed (grounding) the inverter chassis. Must be earthed (ground Turn on the STF signal to start forward rotation and turn it off to stop.	When the STF and STR signals are turned on simultaneously, the stop							
STF STR STOP RH, RM, RL JOG	Forward rotation start Reverse rotation start Start self-holding selection Multi-speed selection	Turn on the STF signal to start forward rotation and turn it off to stop. Turn on the STR signal to start reverse rotation and turn it off to stop.	When the STF and STR signals are turned on simultaneously, the stop							
STR STOP RH, RM, RL JOG	Reverse rotation start Start self-holding selection Multi-speed selection	stop. Turn on the STR signal to start reverse rotation and turn it off to stop.	signals are turned on simultaneously, the stop							
STOP RH, RM, RL JOG	Start self-holding selection Multi-speed selection	stop.								
RH, RM, RL JOG	selection Multi-speed selection									
JOG	· · · ·									
		Multi-speed can be selected according to the combination of RH, RM and RL signals.								
	Jog mode selection	Furn on the JOG signal to select Jog operation (initial setting) and turn on the start signal (STF or STR) to start Jog operation.								
RT	Second acceleration/ deceleration time selection	Turn on the RT signal to select second acceleration/deceleration time. When the second function such as "second torque boost" and "second V/F (base frequency)" are set, turning on the RT signal selects these functions.								
MRS	Output stop	Turn on the MRS signal (20ms or more) to stop the inverter output. Use to shut off the inverter output when stopping the motor by elect	romagnetic brake.							
RES	Reset	Used to reset alarm output provided when protective function is activated. Turn on the RES								
AU	Terminal 4 input selection	Terminal 4 is made valid only when the AU signal is turned on. (The can be set between 4 and 20mADC.) Turning the AU signal on makes terminal 2 (voltage input) invalid	frequency setting signal							
	PTC input	AU terminal is used as PTC input terminal (thermal protection of the motor). When using it as PTC input terminal, set the AU/PTC switch to PTC.								
CS	Selection of automatic restart after instantaneous power failure	When the CS signal is left on, the inverter restarts automatically at p restart setting is necessary for this operation. In the initial setting, a								
SD	Contact input common (sink)	Common terminal for contact input terminal (sink logic) and termina terminal for 24VDC 0.1A power supply (PC terminal). Isolated from								
PC	External transistor common, 24VDC power supply, contact input common (source)	When connecting the transistor output (open collector output), such controller (PLC), when sink logic is selected, connect the external p transistor output to this terminal to prevent a malfunction caused by be used as 24VDC 0.1A power supply. When source logic has beer serves as a contact input common.	ower supply common for undesirable currents. Can							
10E	Frequency setting power	When connecting the frequency setting potentiometer at an initial	10VDC, permissible load current 10mA.							
10	supply	Change the input specifications when connecting it to terminal 10E.	5VDC, Permissible load current 10mA.							
2	Frequency setting (voltage)	Inputting 0 to 5VDC (or 0 to 10V, 4 to 20mA) provides the maximum (10V, 20mA) and makes input and output proportional. Use <i>Pr.73</i> to to 5VDC (initial setting), 0 to 10VDC, and 4 to 20mA. Voltage input: Input resistance $10k\Omega \pm 1k\Omega$ Maximum permissible v Current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible cu	switch from among input 0 oltage 20VDC							
4	Frequency setting (current)	Inputting 4 to 20mADC (or 0 to 5V, 0 to 10V) provides the maximum (5V, 10V) makes input and output proportional. This input signal is v signal is on (terminal 2 input is invalid). Use $Pr.267$ to switch between to 5VDC, 0 to 10VDC (initial setting). Voltage input: Input resistance $10k\Omega \pm 1k\Omega$ Maximum permissible v Current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input: Input resistance $250\Omega \pm 2\%$ Maximum permissible current input mathematical permissible current permissible current mathematical permissible current permissi	valid only when the AU n the input 4 to 20mA and 0 oltage 20VDC urrent 30mA							
1	Frequency setting auxiliary	Inputting 0 to ±5 VDC or 0 to ±10VDC adds this signal to terminal 2 signal. Use <i>Pr.73</i> to switch between the input 0 to ±5VDC and 0 to ± Input resistance $10k\Omega \pm 1k\Omega$, Maximum permissible voltage ± 20VD	10VDC (initial setting).							
_	Frequency setting common	Common terminal for frequency setting signal (terminal 2, 1 or 4) ar AM. Do not earth (ground).	nd analog output terminal							
	AU CS SD PC 10E 10 2 4	AUTerminal 4 input selectionPTC inputSelection of automatic restart after instantaneous power failureSDContact input common (sink)PC24VDC power supply, contact input common (source)10EFrequency setting power supply2Frequency setting (voltage)4Frequency setting (current)1Frequency setting auxiliary5Frequency setting	RES Reset Used to reset alarm output provided when protective function is actisignal for more than 0.1s, then turn it off. Recover about 1s after reset is cancelled. AU Terminal 4 input selection Turning the AU signal on makes terminal 2 (voltage input) invalid. PTC input Terminal 4 is used as PTC input terminal 2 (voltage input) invalid. Selection of automatic restart after instantaneous power failure Contact input common (sink) When the CS signal is left on, the inverter restarts automatically at p restart setting is necessary for this operation. In the initial setting, a failure SD Contact input common (sink) Common terminal for 24VDC 0.1A power supply (PC terminal). Isolated from terminal for 24VDC 0.1A power supply. contact input common (source) When connecting the transistor output (open collector output), such controller (PLC), when sink logic is selected, connect the external p transistor output to this terminal to. 10E Frequency setting power (source) When connecting the frequency setting potentiometer at an initial status, connect it to terminal 10. 2 Frequency setting (urrent) The putting 10 to 5VDC (or 0 to 10V, 4 to 20mA) provides the maximur (10V, 20mA) and makes input and output proportional. Use <i>Pr.73</i> to signal is on (terminal 2 invalid). Use <i>Pr.26</i> to switch between to 5VDC (or 10 to 10V, 2 to 20mA) provides the maximur (5V, 10V) makes input and output proportional. This input signal is signal is on (terminal 2 invalid). Use <i>Pr.26</i> to switch between the input resistance 10K0 ± 1KΩ Maximum permissible v Current input: input resistance 250Ω							

REDHIL F700 SERIES

Ту	ре	Terminal Symbol	Terminal Name	Description		1					
				Changeover contact output indicates that the inverter protective fun							
	Relay	A1, B1, C1	Relay output 1 (alarm output)	output stopped. Abnormal: No conduction across B-C (Across A-C (B-C Continuity (No conduction across A-C) Contact capacity: 230V/ 30VDC 0.3A		Features					
		A2, B2, C2	Relay output 2	1 changeover contact output Contact capacity: 230VAC 0.3A (Pow	er factor=0.4) 30VDC 0.3A	Те					
		RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched high during stop or DC injection brake operation.*1		Devices argy Is?					
	L	SU	Up to frequency	Switched low when the output frequency reaches within the range of ±10% (initial value) of the set frequency. Switched high during acceleration/deceleration and at a stop. ¹	Permissible load 24VDC 0.1A (a voltage drop is 3.4V	Peripheral Devices Why energy savings?					
gnal	Open collector	OL	Overload alarm	cancelled. *1							
ut sig	Ope	IPF	Instantaneous power failure	Switched low when an instantaneous power failure and under voltage protections are activated. *1	Alarm code (4bit) output (Refer to <i>page 36</i>)	Standard Specifications					
Control circuitoutput signal		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency. *1		Outline Dimension Drawings					
trol ci		SE	Open collector output common								
Cor	Pulse	FM	For meter		Output item: Output frequency (initial setting) Permissible load current 2mA	Terminal Connection Diagram Terminal Specification Explanation					
				Select one e.g. output frequency from monitor items. *2 The output signal is proportional to the magnitude of the corresponding monitoring item.	1440 pulses/s at 60Hz Output item: Output frequency (initial setting)	Operation Panel					
	Analog	АМ	Analog signal output		Output signal 0 to 10VDC Permissible load current 1mA (load impedance 10k Ω or more) Resolution 8 bit	Parameter List					
	Communication	PU connector PU connector		With the PU connector, communication can be made through RS-4 (for connection on a 1:1 basis only) . Conforming standard : EIA-485(RS-485) . Transmission format : Multidrop . Communication speed : 4800 to 38400bps	35.	Explanations of Parameters					
				. Overall length : 500m		e S					
u uuuuuuuuu		RS-485 RS-485 RXD+	Inverter transmission terminal Inverter reception	With the RS-485 terminal, communication can be made through RS Conforming standard : EIA-485 (RS-485) Transmission format : Multidrop link	-485.	Protective Functions					
		terminal RXD-									
		SG	Earth (Ground)	Overall length : 500m		su					
_		CAUTION				Options					
	Th		magad if power is applic	ad to the invertor output terminals (II, V, W). Never perform s		ō					

- CAUTION -

· The inverter will be damaged if power is applied to the inverter output terminals (U, V, W). Never perform such wiring.

· Indicates that terminal functions can be selected from Pr. 178 to Pr. 196 (I/O terminal function selection)

*1. Low indicates that the open collector output transistor is on (conducts). High indicates that the transistor is off (does not conduct).

*2. Not output during inverter reset.

Instructions

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Explanation of the Operation Panel (FR-DU07)

Operation mode indication PU: Lit to indicate PU operation mode. EXT: Lit to indicate external operation mode. NET: Lit to indicate network operation mode. **Rotation direction indication** FWD: Lit during forward rotation REV: Lit during reverse rotation Forward/reverse operation On: Flickering: When the frequency command is Unit indication not given even if the · Hz: Lit to indicate frequency. forward/reverse command is given. · A: Lit to indicate current. · V: Lit to indicate voltage. (Flicker when the set frequency monitor is **Monitor indication** displayed.) Lit to indicate monitoring mode. No function Monitor(4-digit LED) Shows the frequency, parameter number, etc. **Operation command** FWD forward rotation FWE **Operation command** REV reverse rotation NODE SE Setting dial (Setting dial: Mitsubishi inverter dial) Stop operation Used to change the Alarms can be reset frequency setting and parameter values. SET Used to set each setting. If pressed during operation, monitor changes as below; 8888 MOD Running Output Output Mode frequency current voltage switchover Used to change Energy saving monitor is displayed when the each setting mode. energy saving monitor of Pr. 52 is set. **Operation mode switchover** Used to switch between the PU and external operation mode. When using the external operation mode (operation using a separately connected frequency setting potentiometer and start signal), press this key to light up the EXT indication. (Change the Pr:79 value to use the combined mode.) PU: PU operation mode

F700 SERIES

EXT: External operation mode

Basic operation



Inquiry

Parameter List

For simple variable-speed operation of the inverter, the initial setting of the parameters may be used as they are. Set the necessary parameters to meet the load and operational specifications. Parameter setting, change and check can be made from the operation panel (FR-DU07). For details of parameters, refer to the instruction manual.

F700 SERIES

POINT

Only simple mode parameters are displayed by the initial setting of *Pr.160 User group read selection*. Set *Pr.160 User group read selection* as required.

Simple mode parameter

Parameter Number	Name	Range	Increments	Initial Value	Refer to page
0	Torque boost	0 to 30%	0.1%	6/4/3/2/1.5/1%*2	28
1	Maximum frequency	0 to 120Hz	0.01Hz	120/60Hz*1	28
2	Minimum frequency	0 to 120Hz	0.01Hz	0Hz	28
3	Base frequency	0 to 400Hz	0.01Hz	60Hz	28
4	Multi-speed setting (high speed)	0 to 400Hz	0.01Hz	60Hz	28
5	Multi-speed setting (middle speed)	0 to 400Hz	0.01Hz	30Hz	28
6	Multi-speed setting (low speed)	0 to 400Hz	0.01Hz	10Hz	28
7	Acceleration time	0 to 3600/ 360s	0.1/0.01s	5s/15s *₃	28
8	Deceleration time	0 to 3600/ 360s	0.1/0.01s	10s/30s*3	28
9	Electronic thermal O/L relay	0 to 500/ 0 to 3600A*1	0.01/0.1A*1	Rated inverter output current	29
60	Energy saving control selection	0, 4, 9	1	0	34
79	Operation mode selection	0, 1, 2, 3, 4, 6, 7	1	0	37
125	Terminal 2 frequency setting gain frequency	0 to 400Hz	0.01Hz	60Hz	39
126	Terminal 4 frequency setting gain frequency	0 to 400Hz	0.01Hz	60Hz	39
160	User group read selection	0, 1, 9999	1	9999	40

•Extended mode parameter

Remarks

• The parameters marked with
indicate simple mode parameters.

• The shaded parameters in the table allow its setting to be changed during operation even if "0" (initial value) is set in *Pr.* 77 *Parameter write selection.*

Function	Parameters	Name	Setting Range	Increments	Initial Value	Refer to page
	© 0	Torque boost	0 to 30%	0.1%	6/4/3/2/1.5/1%*2	28
	© 1	Maximum frequency	0 to 120Hz	0.01Hz	120/60Hz*1	28
	© 2	Minimum frequency	0 to 120Hz	0.01Hz	0Hz	28
suc	© 3	Base frequency	0 to 400Hz	0.01Hz	60Hz	28
Basic functions	© 4	Multi-speed setting (high speed)	0 to 400Hz	0.01Hz	60Hz	28
fun	© 5	Multi-speed setting (middle speed)	0 to 400Hz	0.01Hz	30Hz	28
Isic	© 6	Multi-speed setting (low speed)	0 to 400Hz	0.01Hz	10Hz	28
Ba	© 7	Acceleration time	0 to 3600/ 360s	0.1/0.01s	5s/15s*3	28
	© 8	Deceleration time	0 to 3600/ 360s	0.1/0.01s	10s/30s*₃	28
	© 9	Electronic thermal O/L relay	0 to 500/ 0 to 3600A*1	0.01/0.1A*1	Rated inverter output current	29
L.	10	DC injection brake operation frequency	0 to 120Hz, 9999	0.01Hz	3Hz	29
ctio (e	11	DC injection brake operation time	0 to 10s	0.1s	0.5s	29
DC Injection Brake	12	DC injection brake operation voltage	0 to 30%	0.1%	4/2/1%*4	29
	13	Starting frequency	0 to 60Hz	0.01Hz	0.5Hz	29
	14	Load pattern selection	0, 1	1	1	29
u	15	Jog frequency	0 to 400Hz	0.01Hz	5Hz	29
Jog operation	16	Jog acceleration/deceleration time	0 to 3600/360s	0.1/0.01s	0.5s	29

*1 Differ according to capacities. (55K or less/75K or more)

*2 Differ according to capacities. (0.75K/1.5K to 3.7K/5.5K, 7.5K/11K to 37K/45K, 55K/75K or more)

*3 Differ according to capacities. (7.5K or less/11K or more)

*4 Differ according to capacities. (7.5K or less/11K to 55K/75K or more)

REDED F700 Semies

Function	Parameters	Name	Setting Range	Increments	Initial Value	Refer to page	
	17	MRS input selection	0, 2	1	0	29	ú
	18	High speed maximum frequency	120 to 400Hz	0.01Hz	120/60Hz*1	28	Features
	19	Base frequency voltage	0 to 1000V, 8888, 9999	0.1V	9999	28	Fea
ation ation s	20	Acceleration/deceleration reference frequency	1 to 400Hz	0.01Hz	60Hz	28	vices
Acceleration and deceleration times	21	Acceleration/deceleration time increments	0, 1	1	0	28	Peripheral Devices Why energy savings?
uo	22	Stall prevention operation level	0 to 150%, 9999	0.1%	120%	30	rd tions
Stall prevention	23	Stall prevention operation level compensation factor at double speed	0 to 200%, 9999	0.1%	9999	30	Standard Specifications
Multi-speed setting	24 to 27	Multi-speed setting 4 speed to 7 speed	0 to 400Hz, 9999	0.01Hz	9999	28	on Outline Dimension Drawings
	28	Multi-speed input compensation selection	0, 1	1	0	30	Terminal Connection Diagram Terminal Specification Explanation
—	29	Acceleration/deceleration pattern selection	0, 1, 2, 3	1	0	30	Termi Termin E
	30	Regenerative function selection	0, 2/0, 1, 2*1	1	0	31	el u
٩	31	Frequency jump 1A	0 to 400Hz, 9999	0.01Hz	9999	31	Operation Panel
Frequency jump	32	Frequency jump 1B	0 to 400Hz, 9999	0.01Hz	9999	31	õ
Icy]	33	Frequency jump 2A	0 to 400Hz, 9999	0.01Hz	9999	31	
nen	34	Frequency jump 2B	0 to 400Hz, 9999	0.01Hz	9999	31	Parameter List
req	35	Frequency jump 3A	0 to 400Hz, 9999	0.01Hz	9999	31	barar Li
Ш	36	Frequency jump 3B	0 to 400Hz, 9999	0.01Hz	9999	31	ц <u>т</u>
	37	Speed display	0, 1 to 9998	1	0	31	ions ters
λ μ	41	Up-to-frequency sensitivity	0 to 100%	0.1%	10%	31	Explanations of Parameters
uen	42	Output frequency detection	0 to 400Hz	0.01Hz	6Hz	31	Expl Par
Frequency detection	43	Output frequency detection for reverse rotation	0 to 400Hz, 9999	0.01Hz	9999	31	Protective Functions
	44	Second acceleration/deceleration time	0 to 3600/360s	0.1/0.01s	5s	28	otec uncti
	45	Second deceleration time	0 to 3600/360s, 9999	0.1/0.01s	9999	28	모뜨
SL	46	Second torque boost	0 to 30%, 9999	0.1%	9999	28	
ction	47	Second V/F (base frequency)	0 to 400Hz, 9999	0.01Hz	9999	28	Options
Second functions	48	Second stall prevention operation current	0 to 150%	0.1%	120%	30	do
becon	49	Second stall prevention operation frequency	0 to 400Hz, 9999	0.01Hz	0Hz	30	tions
0,	50	Second output frequency detection	0 to 400Hz	0.01Hz	30Hz	31	Instructions
	51	Second electronic thermal O/L relay	0 to 500A, 9999 / 0 to 3600A, 9999*1	0.01/0.1A*1	9999	29	Ins
ions	52	DU/PU main display data selection	0, 5, 6, 8 to 14, 17, 20, 23 to 25, 50 to 57, 100	1	0	32	Motor
Monitor functions	54	FM terminal function selection	1 to 3, 5, 6, 8 to 14, 17, 21, 24, 50, 52, 53	1	1	32	2
itor	55	Frequency monitoring reference	0 to 400Hz	0.01Hz	60Hz	32	oility
Mon	56	Current monitoring reference	0 to 500/0 to 3600A*1	0.01/0.1A*1	Rated inverter output current	32	Compatibility
latic art ons	57	Restart coasting time	0, 0.1 to 5s, 9999/ 0, 0.1 to 30s, 9999*1	0.1s	9999	33	
Automatic restart functions	58	Restart cushion time	0 to 60s	0.1s	1s	33	Warranty
	59	Remote function selection	0, 1, 2, 3	1	0	33	
	© 60	Energy saving control selection	0, 4, 9	1	0	34	>
—	65	Retry selection	0 to 5	1	0	34	Inquiry
*1 Differ a		apacities. (55K or less/75K or more)		•	U U	07	Pul

Function	Parameters	Name	Setting Range	Increments	Initial Value	Refer to page
	66	Stall prevention operation reduction starting frequency	0 to 400Hz	0.01Hz	60Hz	30
	67	Number of retries at alarm occurrence	0 to 10, 101 to 110	1	0	34
Retry	68	Retry waiting time	0 to 10s	0.1s	1s	34
R	69	Retry count display erase	0	1	0	34
	70	Special regenerative brake duty *2	0 to 10%	0.1%	0%	31
	71	Applied motor	0, 1, 2, 20	1	0	34
	72	PWM frequency selection	0 to 15/0 to 6, 25*1	1	2	35
	73	Analog input selection	0 to 7, 10 to 17	1	1	35
	74	Input filter time constant	0 to 8	1	1	36
—	75	Reset selection/disconnected PU detection/PU stop selection	0 to 3, 14 to 17	1	14	36
	76	Alarm code output selection	0, 1, 2	1	0	36
	77	Parameter write selection	0, 1, 2	1	0	36
	78	Reverse rotation prevention selection	0, 1, 2	1	0	36
	© 79	Operation mode selection	0, 1, 2, 3, 4, 6, 7	1	0	37
e : flux ntrol	80	Motor capacity (simple magnetic flux vector control)	0.4 to 55kW, 9999 /0 to 3600kW, 9999*1	0.01/0.1kW*1	9999	37
Simple magnetic flux vector control	90	Motor constant (R1)	0 to 50Ω, 9999 /0 to 400mΩ, 9999*1	0.001Ω/ 0.01mΩ*1	9999	37
	100	V/F1 (first frequency)	0 to 400Hz, 9999	0.01Hz	9999	38
ĻL	101	V/F1 (first frequency voltage)	0 to 1000V	0.1V	0V	38
\geq	102	V/F2 (second frequency)	0 to 400Hz, 9999	0.01Hz	9999	38
ints	103	V/F2 (second frequency voltage)	0 to 1000V	0.1V	0V	38
od I	104	V/F3 (third frequency)	0 to 400Hz, 9999	0.01Hz	9999	38
Adjustable 5 points V/F	105	V/F3 (third frequency voltage)	0 to 1000V	0.1V	0V	38
tab	106	V/F4 (fourth frequency)	0 to 400Hz, 9999	0.01Hz	9999	38
djus	107	V/F4 (fourth frequency voltage)	0 to 1000V	0.1V	0V	38
Ac	108	V/F5 (fifth frequency)	0 to 400Hz, 9999	0.01Hz	9999	38
	109	V/F5 (fifth frequency voltage)	0 to 1000V	0.1V	0V	38
	117	PU communication station	0 to 31	1	0	38
	118	PU communication speed	48, 96, 192, 384	1	192	38
ъб	119	PU communication stop bit length.	0, 1, 10, 11	1	1	38
ecto	120	PU communication parity check	0, 1, 2	1	2	38
inu	121	Number of PU communication retries	0 to 10, 9999	1	1	38
PU connector communication	122	PU communication check time interval	0, 0.1 to 999.8s, 9999	0.1s	9999	38
E S	123	PU communication waiting time setting	0 to 150ms, 9999	1	9999	38
	124	PU communication CR/LF presence/ absence selection	0, 1, 2	1	1	38
	© 125	Terminal 2 frequency setting gain frequency	0 to 400Hz	0.01Hz	60Hz	39
_	© 126	Terminal 4 frequency setting gain frequency	0 to 400Hz	0.01Hz	60Hz	39
	127	PID control automatic switchover freqeuncy	0 to 400Hz, 9999	0.01Hz	9999	39
PID operation	128	PID action selection	10, 11, 20, 21, 50, 51, 60, 61	1	10	39
era	129	PID proportional band	0.1 to 1000%, 9999	0.1%	100%	39
do	130	PID integral time	0.1 to 3600s, 9999	0.1s	1s	39
	131	PID upper limit	0 to 100%, 9999	0.1%	9999	39
	132	PID lower limit	0 to 100%, , 9999	0.1%	9999	39
	133	PID action set point	0 to 100%, 9999	0.01%	9999	39
	134	PID differential time apacities, (55K or less/75K or more)	0.01 to 10.00s, 9999	0.01s	9999	39

*1 Differ according to capacities. (55K or less/75K or more)
*2 Setting can be made for the 75K or more.

THURD F700 SERIES

Function	Parameters	Name	Setting Range	Increments	Initial Value	Refer to page	
er	135	Commercial power-supply switchover sequence output terminal selection	0, 1	1	0	39	res
owe ter r	136	MC switchover interlock time	0 to 100s	0.1s	1s	39	Features
al p iver ove	137	Waiting time at a start	0 to 100s	0.1s	0.5s	39	LL LL
Commercial power supply-inverter switch-over	138	Commercial power-supply operation switchover selection at an alarm	0, 1	1	0	39	Devices hergy gs?
Com sul	139	Automatic switchover frequency between inverter and commercial power- supply operation	0 to 60Hz, 9999	0.01Hz	9999	39	Peripheral Devices Why energy savings?
с s	140	Backlash acceleration stopping frequency	0 to 400Hz	0.01Hz	1Hz	30	Standard Specifications
last	141	Backlash acceleration stopping time	0 to 360s	0.1s	0.5s	30	Star
Backlash measures	142	Backlash deceleration stopping frequency	0 to 400Hz	0.01Hz	1Hz	30	
	143	Backlash deceleration stopping time	0 to 360s	0.1s	0.5s	30	utline ensic wing
	144	Speed setting switchover	0, 2, 4, 6, 8, 10, 102, 104, 106, 108, 110	1	4	31	Outline Dimension Drawings
PU	145	PU display language selection	0 to 7	1	0	40	Terminal Connection Diagram Terminal Specification Explanation
_	148	Stall prevention level at 0V input.	0 to 150%	0.1%	120%	30	minal C Diag ninal Sp Explar
ctio	149	Stall prevention level at 10V input.	0 to 150%	0.1%	150%	30	Ter
lete	150	Output current detection level	0 to 150%	0.1%	120%	40	5_
Current detection	151	Output current detection signal delay time	0 to 10s	0.1s	0s	40	Operation Panel
Cur	152	Zero current detection level	0 to 150%	0.1%	5%	40	Ŭ
	153	Zero current detection time	0 to 1s	0.01s	0.5s	40	ter
	154	Voltage reduction selection during stall prevention operation	0, 1	1	1	30	Parameter List
	155	RT signal reflection time selection	0, 10	1	0	40	<u> </u>
_	156	Stall prevention operation selection	0 to 31, 100, 101	1	0	30	ons ers
	157	OL signal output timer	0 to 25s, 9999	0.1s	0s	30	Explanations of Parameters
—	158	AM terminal function selection	1 to 3, 5, 6, 8 to 14, 17, 21, 24, 50, 52, 53	1	1	32	Expli
—	159	Automatic switchover ON range between commercial power-supply and inverter operation	0 to 10Hz, 9999	0.01Hz	9999	39	Protective Functions
	©160	User group read selection	0, 1, 9999	1	9999	40	Fur
_	161	Frequency setting/key lock operation selection	0, 1, 10, 11	1	0	41	s
U (0	162	Automatic restart after instantaneous power failure selection	0, 1, 10, 11	1	0	33	Options
Automatic restart functions	163	First cushion time for restart	0 to 20s	0.1s	0s	33	
uton rest inct	164	First cushion voltage for restart	0 to 100%	0.1%	0%	33	suo
AL	165	Stall prevention operation level for restart	0 to 150%	0.1%	120%	33	Instructions
ent ction	166	Output current detection signal retention time	0 to 10s, 9999	0.1s	0.1s	40	_
Current detection	167	Output current detection operation selection	0, 1	1	0	40	Motor
	168 169	Parameter for manufacturer setting. Do not s	et.			1	~
Ð	170	Cumulative power meter clear	0, 10, 9999	1	9999	32	atibilit
Cumulative monitor clear	171	Operation hour meter clear	0, 9999	1	9999	32	ty Compatibility
	172	User group registered display/batch clear	9999, (0 to 16)	1	0	40	Warranty
User group	173	User group registration	0 to 999, 9999	1	9999	40	
- G	174	User group clear	0 to 999, 9999	1	9999	40	Inquiry

FRANKI F700 SERIES

Function	Parameters	Name	Setting Range	Increments	Initial Value	Refer to page
	178	STF terminal function selection	0 to 8, 10 to 12, 14, 16, 24, 25, 60, 62, 64 to 67, 9999	1	60	41
Input terminal function assignment	179	STR terminal function selection	0 to 8, 10 to 12, 14, 16, 24, 25, 61, 62, 64 to 67, 9999	1	61	41
issi	180	RL terminal function selection		1	0	41
on a	181	RM terminal function selection	0 to 8, 10 to 12, 14, 16,	1	1	41
nctio	182	RH terminal function selection	24, 25, 62, 64 to 67, 9999	1	2	41
fur	183	RT terminal function selection		1	3	41
rminal	184	AU terminal function selection	0 to 8, 10 to 12, 14, 16, 24, 25, 62 to 67, 9999	1	4	41
t tei	185	JOG terminal function selection		1	5	41
Indi	186	CS terminal function selection	0 to 8 10 to 12 14 16	1	6	41
-	187	MRS terminal function selection	0 to 8, 10 to 12, 14, 16, 24, 25, 62, 64 to 67, 9999	1	24	41
	188	STOP terminal function selection	,,, ,	1	25	41
	189	RES terminal function selection		1	62	41
	190	RUN terminal function selection	0 to 5, 7, 8, 10 to 19, 25,	1	0	41
	191	SU terminal function selection	26, 45 to 47, 64, 70, 90 to	1	1	41
ant	192	IPF terminal function selection	96, 98, 99, 100 to 105, 107, 108, 110 to 116, 125,	1	2	41
inal	193	OL terminal function selection	126, 145 to 147, 164, 170,	1	3	41
sigr	194	FU terminal function selection	190 to 196, 198, 199, 9999	1	4	41
ut te as:	195	ABC1 terminal function selection	0 to 5, 7, 8, 10 to 19, 25,	1	99	41
Output terminal function assignment	196 ABC2 terminal function selection		26, 45 to 47, 64, 70, 90, 91, 94 to 96, 98, 99, 100 to 105, 107, 108, 110 to 116, 125, 126, 145 to 147, 164, 170, 190, 191, 194 to 196, 198, 199, 9999	1	9999	41
Multi-speed setting	232 to 239	Multi-speed setting 8 speed to 15 speed	0 to 400Hz, 9999	0.01Hz	9999	28
	240	Soft-PWM operation selection	0, 1	1	1	35
	241	Analog input display unit switchover	0, 1	1	0	39
	242	Terminal 1 added compensation amount (terminal 2)	0 to 100%	0.1%	100%	35
	243	Terminal 1 added compensation amount (terminal 4)	0 to 100%	0.1%	75%	35
	244	Cooling fan operation selection	0, 1	1	1	42
u	245	Rated slip	0 to 50%, 9999	0.01%	9999	42
satio	246	Slip compensation time constant	0.01 to 10s	0.01s	0.5s	42
Slip compensation	247	Constant-output region slip compensation selection	0, 9999	1	9999	42
_	250	Stop selection	0 to 100s, 1000 to 1100s, 8888, 9999	0.1s	9999	42
	251	Output phase failure protection selection	0, 1	1	1	42
L	252	Override bias	0 to 200%	0.1%	50%	35
	-					
Frequency compensation function	253	Override gain	0 to 200%	0.1%	150%	35
Frequency compensatio function		Override gain Life alarm status display	0 to 200% (0 to 15)	0.1%	150%	35
	253	-				
	253 255	Life alarm status display	(0 to 15)	1	0	42
	253 255 256	Life alarm status display Inrush current limit circuit life display	(0 to 15) (0 to 100%)	1 1%	0 100%	42 42
Erequency Life check compensatio	253 255 256 257	Life alarm status display Inrush current limit circuit life display Control circuit capacitor life display	(0 to 15) (0 to 100%) (0 to 100%)	1 1% 1%	0 100% 100%	42 42 42 42

REDED F700 series

Function	Parameters	Name	Setting Range	Increments	Initial Value	Refer to page	
	261	Power failure stop selection	0, 1, 2	1	0	43	s
Power failure stop	262	Subtracted frequency at deceleration start	0 to 20Hz	0.01Hz	3Hz	43	Features
ilure	263	Subtraction starting frequency	0 to 120Hz, 9999	0.01Hz	60Hz	43	
er fa	264	Power-failure deceleration time 1	0 to 3600/ 360s	0.1/0.01s	5s	43	evices 3y
owe	265	Power-failure deceleration time 2	0 to 3600/ 360s, 9999	0.1/0.01s	9999	43	ieral De iy energ avings
	266	Power failure deceleration time switchover frequency	0 to 400Hz	0.01Hz	60Hz	43	Peripheral Devices Why energy savings?
—	267	Terminal 4 input selection	0, 1, 2	1	0	35	Standard Specifications
	268	Monitor decimal digits selection	0, 1, 9999	1	9999	32	anda cifica
	269	Parameter for manufacturer setting. Do no Rotation direction detection selection at					Ste Ste
—	299	restarting	0, 1, 9999	1	9999	33	5 0
	331	RS-485 communication station	0 to 31(0 to 247)	1	0	38	tline ensio wing:
	332	RS-485 communication speed	3, 6, 12, 24, 48, 96, 192, 384	1	96	38	Outline Dimension Drawings
	333	RS-485 communication stop bit length	0, 1, 10, 11	1	1	38	ation
c	334	RS-485 communication parity check selection	0, 1, 2	1	2	38	Terminal Connection Diagram Terminal Specification Explanation
RS-485 communication	335	RS-485 communication number of retries	0 to 10, 9999	1	1	38	
unmu	336	RS-485 communication check time interval	0, 0.1 to 999.8s, 9999	0.1s	0s	38	Operation Panel
35 cor	337	RS-485 communication waiting time setting	0 to 150ms, 9999	1	9999	38	9 G
3S-48	338	Communication operation command source	0, 1	1	0	44	Parameter List
_	339	Communication speed command source	0, 1, 2	1	0	44	Parai L
	340	Communication startup mode selection	0, 1, 2, 10, 12	1	0	37	
	341	RS-485 communication CR/LF selection	0, 1, 2	1	1	38	Explanations of Parameters
	342	Communication EEPROM write selection	0, 1	1	0	38	of of rame
	343 495	Communication error count	—	1	0	38	Exp Pa
tput	495	Remote output selection Remote output data 1	0, 1 0 to 4095	1	0	44 44	e si
Remote output	497	Remote output data 2	0 to 4095	1	0	44	Protective Functions
	503	Maintenance timer	0 (1 to 9998)	1	0	44	suc
Maintenance	504	Maintenance timer alarm output set time	0 to 9998, 9999	1	9999	44	ns Options
	549	Protocol selection	0, 1	1	0	38	Instructions
icatio	550	NET mode operation command source selection	0, 1, 9999	1	9999	44	<u> </u>
Communication	551	PU mode operation command source selection	1, 2	1	2	44	Motor
tor	555	Current average time	0.1 to 1.0s	0.1s	1s	44	ity
Current average monitor	556	Data output mask time	0.0 to 20.0s	0.1s	0s	44	atibili
Current average monitor	557	Current average value monitor signal output reference current	0 to 500/0 to 3600A*1	0.01/0.1A*1	Rated inverter current	44	Compatibility
	563	Energization time carrying-over times	0 to 65535	1	0	32	>
	564	Operating time carrying-over times	0 to 65535	1	0	32	Warranty
	571	Holding time at a start	0.0 to 10.0s, 9999	0.1s	9999	29	Wal
	575	Output interruption detection time	0 to 3600s, 9999	0.1s	1s	39	
PID control	576	Output interruption detection level	0 to 400Hz	0.01Hz	0Hz	39	<u>i</u>
0	577 611	Output interruption release level	900 to 1100%	0.1%	1000%	39	Inquiry
*1 Differ a		Acceleration time at a restart	0 to 3600s, 9999	0.1s	5/15s*1	33	J

*1 Differ according to capacities. (55K or less/75K or more)

THORAL F700 Series

Function	Parameters	Name	Setting Range	Increments	Initial Value	Refer to page
_	867	AM output filter	0 to 5s	0.01s	0.01s	32
	872	Input phase failure protection selection	0, 1	1	0	42
ion	882	Regeneration avoidance operation selection	0, 1	1	0	45
unct	883	Regeneration avoidance operation level	300 to 800V	0.1V	380V/760V*1	45
Regeneration avoidance function	884	Regeneration avoidance at deceleration detection sensitivity	0 to 5	1	0	45
Reg voida	885	Regeneration avoidance compensation frequency limit value	0 to 10Hz, 9999	0.01Hz	6Hz	45
ອ	886	Regeneration avoidance voltage gain	0 to 200%	0.1%	100%	45
er	888	Free parameter 1	0 to 9999	1	9999	45
Free parameter	889	Free parameter 2	0 to 9999	1	9999	45
	891	Cumulative power monitor digit shifted times	0 to 4, 9999	1	9999	32
r	892	Load factor	30 to 150%	0.1%	100%	45
Energy saving monitor	893	Energy saving monitor reference (motor capacity)	0.1 to 55/0 to 3600kW*2	0.01/0.1kW∗2	Inverter rated capacity	45
aving 1	894	Control selection during commercial power-supply operation	0, 1, 2, 3	1	0	45
y sa	895	Power saving rate reference value	0, 1, 9999	1	9999	45
erg	896	Power unit cost	0 to 500, 9999	0.01	9999	45
ц Ш	897	Power saving monitor average time	0, 1 to 1000h, 9999	1	9999	45
	898	Power saving cumulative monitor clear	0, 1, 10, 9999	1	9999	45
	899	Operation time rate (estimated value)	0 to 100%, 9999	0.1%	9999	45
	C0 (900)	FM terminal calibration	—	—		46
	C1 (901)	AM terminal calibration	—	_		46
	C2 (902)	Terminal 2 frequency setting bias frequency	0 to 400Hz	0.01Hz	0Hz	39
eters	C3 (902)	Terminal 2 frequency setting bias	0 to 300%	0.1%	0%	39
parameters	125 (903)	Terminal 2 frequency setting gain frequency	0 to 400Hz	0.01Hz	60Hz	39
	C4 (903)	Terminal 2 frequency setting gain	0 to 300%	0.1%	100%	39
Calibration	C5 (904)	Terminal 4 frequency setting bias frequency	0 to 400Hz	0.01Hz	0Hz	39
	C6 (904)	Terminal 4 frequency setting bias	0 to 300%	0.1%	20%	39
	126 (905)	Terminal 4 frequency setting gain frequency	0 to 400Hz	0.01Hz	60Hz	39
	C7 (905)	Terminal 4 frequency setting gain	0 to 300%	0.1%	100%	39
	989	Parameter copy alarm release	10/100	1	10/100*2	-
\supset	990	PU buzzer control	0, 1	1	1	46
ΡN	© 991	PU contrast adjustment	0 to 63	1	58	46
S	Pr.CL	Parameter clear	0, 1	1	0	46
Clear parameters	ALLC	All parameter clear	0, 1	1	0	46
Clear amete	Er.CL	Alarm history clear	0, 1	1	0	46
ar	PCPY	Parameter copy	0, 1, 2, 3	1	0	46

*1 The initial value differs according to the voltage class. (200V class / 400V class)
*2 Differ according to capacities. (55K or less/75K or more)

Explanations of Parameters





Manual torque boost

7 Pr.0 Torque boost

Pr.46 Second torque boost

You can compensate for a voltage drop in the low-frequency region to improve motor torque reduction in the low-speed region.

- Motor torque in the low-frequency range can be adjusted to the load to increase the starting motor torque.
- The starting torque boost can be changed by switching terminal RT.
- When simple magnetic flux vector control is selected in *Pr.* 80, the settings of *Pr.* 0 and *Pr.* 46 are invalid.





Maximum/minimum frequency

7 Pr.2 Minimum frequency

7 Pr.1 Maximum frequency

Pr.18 High speed maximum frequency

You can limit the motor speed.

- Clamp the upper and lower limits of the output frequency.
- When you want to perform operation above 120Hz, set the upper limit of the output frequency to *Pr. 18*.

(When *Pr. 18* is set, *Pr. 1* automatically switches to the frequency of *Pr. 18*. When *Pr. 1* is set, *Pr. 18* is automatically changed to the frequency set in *Pr. 1.*)





Base frequency, voltage

Pr.47 Second V/F (base frequency)

7 Pr.3 Base frequency

Pr.19 Base frequency voltage

19, 47

- Used to adjust the inverter outputs (voltage, frequency) to the motor rating.
- When operating a standard motor, generally set the rated frequency of the motor to *Pr. 3* Base frequency. When running the motor using commercial power supply-inverter switch-over operation, set *Pr. 3* to the same value as the power supply frequency.
- When you want to change the base frequency when switching multiple motors with one inverter, use the Pr. 47 Second base frequency.
- Use Pr. 19 Base frequency voltage to set the base voltage (e.g. rated motor voltage).





Pr.6 Multi-speed setting (low speed)

Pr.24 Multi-speed setting (speed4) Pr.26 Multi-speed setting (speed 6) Pr.232 Multi-speed setting (speed 8) Pr.234 Multi-speed setting (speed 10) Pr.236 Multi-speed setting (speed 12) Pr.238 Multi-speed setting (speed 14)

Pr.25 Multi-speed setting (speed 5) Pr.27 Multi-speed setting (speed 7) Pr.233 Multi-speed setting (speed 9) Pr.235 Multi-speed setting (speed 11) Pr.237 Multi-speed setting (speed 13) Pr.239 Multi-speed setting (speed 15)

Can be used to change the preset speed in the parameter with the contact signals.

Any speed can be selected by merely turning on-off the contact signals (RH, RM, RL, REX signals).

- The inverter operates at frequencies set in *Pr. 4* when RH signal is on, *Pr. 5* when RM signal is on and *Pr. 6* when RL signal is on.
- Frequency from speed 4 to speed 15 can be set according to the combination of the RH, RM, RL and REX signals. Set the running frequencies to *Pr. 24 to Pr. 27, Pr. 232 to Pr. 239.* (In the initial value setting, speed 4 to 15 are unavailable.)



*1 When turning RH, RM and RL off and REX on with "9999" set in *Pr. 232* "multi speed setting (8 speed), the inverter operates at frequency set in *Pr. 6*

Pr. 7, 8 **Pr.** 20, 21, 44, 45

Acceleration/deceleration time setting

7 Pr.7 Acceleration time

7 Pr.8 Deceleration time

 Pr.20 Acceleration/deceleration reference frequency

 Pr.21 Acceleration/deceleration time increments
 Pr.44 Second acceleration/deceleration time

 Pr.45 Second deceleration time

- Used to set motor acceleration/deceleration time.
- Set a larger value for a slower speed increase/decrease or a smaller value for a faster speed increase/decrease.
- Use *Pr. 7 Acceleration time* to set the acceleration time required to reach *Pr. 20 Acceleration/deceleration reference frequency* from OHz.
- Use *Pr. 8 Deceleration time* to set the deceleration time required to stop from the *Pr. 20 Acceleration/deceleration reference frequency.*



Inquiry

Features

ramete List

Protective Functions

Options

uctions

Instru

Motor

Compatibility

Warrantv

F700 SERIES

Setting "1" (initial value)

For variable-torque load



Motor protection from overheat (electronic thermal relay function)

Pr.9 Electronic thermal O/L relay <u>Pr.51 Second electronic thermal O/L relay</u>

Set the current of the electronic overcurrent protection to protect the motor from overheat. This feature provides the optimum protective characteristics, including reduced motor cooling capability, at low speed.

- This function detects the overload (overheat) of the motor, stops the operation of the inverter's output transistor, and stops the output.
- Set the rated current [A] of the motor in Pr.9.
- When using a motor with an external thermal relay, etc., set "0" in *Pr. 9* to make the electronic thermal relay function invalid. (Note that the output transistor protection of the inverter (E.THT) functions.)
- When using the Mitsubishi constant-torque motor

1) Set "1" in Pr.71.

(This provides a 100% continuous torque characteristic in the low-speed range.)

2) Set the rated motor current in Pr. 9.

• When the RT signal is on, thermal protection is provided based on the *Pr*: 51 setting.

Use this function when rotating two motors of different rated currents individually by a single inverter. (When rotating two motors together, use external thermal relays.)

Pr. 10 to 12 DC injection brake

Pr.10 DC injection brake operation frequency Pr.12 DC injection brake operation voltage Pr.11 DC injection brake operation time

The DC injection brake can be operated at a motor stop to adjust the stop timing and braking torque.



<i>Pr.12</i> Initial Value		When Using the Mitsubish Constant Torque Motor	When Using the Energy Saving Motor	
3.7K or less	4%	\leftarrow	←	
5.5K to 7.5K	4%	2% *	3%	
11K or more	2%	←	←	
75K or more	1%	\leftarrow	←	

If the *Pr.* 71 initial value is changed to the setting for use with a constant-torque motor, the *Pr.* 12 setting changes to the corresponding value in the above table.



Starting frequency

Pr.13 Starting frequency

Pr.571 Holding time at a start

You can set the starting frequency and hold the set starting frequency for a certain period of time.

Set these functions when you need the starting torque or want smooth motor drive at a start.





14 V/F pattern matching applications

Pr. 14 Load pattern selection

You can select the optimum output characteristic (V/F characteristic) for the application and load characteristics.

Setting "0" For constant-torque load



Pr.)_{15, 16} Jog operation

<u>Pr.15 Jog frequency</u> <u>Pr.16 Jog acceleration/deceleration time</u> You can set the frequency and acceleration/deceleration time for jog operation. Jog operation can be performed from either the outside or PU.

Can be used for conveyor positioning, test operation, etc.





Logic selection of output stop signal (MRS)

Pr.17 MRS input selection

The inverter output can be shut off by the MRS signal. The logic of the MRS signal can also be selected.





- (Pr.) 19 Refer to the section about Pr. 3.

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Pr. 22, 23, 48, 49, 66, 148, 149, 154, 156, 157

Stall prevention operation

Pr.22 Stall prevention operation level

 Pr.23 Stall prevention operation level compensation factor at double speed

 Pr.48 Second stall prevention operation current
 Pr.49 Second stall prevention operation frequency

 Pr.66 Stall prevention operation reduction starting frequency

 Pr.148 Stall prevention level at 0V input.

 Pr.154 Voltage reduction selection during stall prevention operation

 Pr.156 Stall prevention operation selection

 Pr.157 OL signal output timer

This function monitors the output current and automatically changes the output frequency to prevent the inverter from coming to an alarm stop due to overcurrent, overvoltage, etc. It can also limit stall prevention and fast-response current limit operation during acceleration/deceleration, driving or regeneration.

• Stall prevention

If the output current exceeds the limit value, the output frequency of the inverter is automatically varied to reduce the output current. Also the second stall prevention function can restrict the output frequency range in which the stall prevention function is valid. (*Pr.*49)

- Fast-response current limit
- If the current exceeds the limit value, the output of the inverter is shut off to prevent an overcurrent.
- Set in *Pr.* 22 the ratio of the output current to the rated inverter current at which stall prevention operation will be performed. Normally set this parameter to120% (initial value).
- When "9999" is set in *Pr.* 22, stall prevention operation level can be changed by the signal to the auxiliary input terminal (terminal 1). For the adjustment of bias/gain of analog signal, use *Pr.* 148 and *Pr.* 149.
- During high-speed operation above the rated motor frequency, acceleration may not be made because the motor current does not increase. If operation is performed in a high frequency range, the current at motor lockup becomes smaller than the rated output current of the inverter, and the protective function (OL) is not executed if the motor is at a stop.

To improve the operating characteristics of the motor in this case, the stall prevention level can be reduced in the high frequency region. This function is effective for performing operation up to the high speed region on a centrifugal separator etc. Normally, set 60Hz in *Pr.* 66 and 100% in *Pr.* 23.

• By setting "9999" (initial value) in *Pr. 23 Stall prevention operation level compensation factor at double speed*, the stall prevention operation level is constant at the *Pr. 22* setting up to 400Hz.



- Setting "9999" in *Pr. 49* Second stall prevention operation frequency and turning the RT signal on make *Pr. 48 Second stall prevention operation current* valid.
- The stall prevention operation level from 0Hz to the output frequency set in *Pr. 49* can be set in *Pr. 48*.



Pr. 49 Setting	Operation
0 (initial value)	Second stall prevention function is not activated
0.01Hz to 400Hz	If the output frequency is less than the frequency set in Pr. 49, the second stall prevention operation function is activated. (during constant speed or deceleration)
9999	The second stall prevention function is performed according to the RT signal. RT signal on Stall level <i>Pr. 48</i> RT signal off Stall level <i>Pr. 22</i>

• Stall prevention operation and fast response current restriction function can be restricted according to the operation condition using *Pr. 156*.

(Pr.) 24 to 27 \rightarrow Refer to the section about *Pr.4 to Pr.6*

Pr.²⁸ Input compensation of multispeed and remote setting

Pr.28 Multi-speed input compensation selection

By inputting the frequency setting compensation signal (terminal 1, 2), the speed (frequency) can be compensated for relative to the multi-speed setting or the speed setting by remote setting function.

Pr. 28 Setting	Definition
0 (initial value)	Without compensation
1	With compensation

Pr. 29, 140 to 143

Acceleration/ deceleration pattern and back lash measures

Pr.29 Acceleration/deceleration pattern selection Pr.141 Backlash acceleration stopping time Pr.143 Backlash deceleration stopping time

Pr.140 Backlash acceleration stopping frequency Pr.142 Backlash deceleration stopping frequency

You can set the acceleration/deceleration pattern suitable for application.

You can also set the backlash measures that stop acceleration/ deceleration once at the parameter-set frequency and time during acceleration/deceleration.

- Linear acceleration/deceleration (setting "0", initial value)
 - When the frequency is changed for acceleration, deceleration, etc. in inverter operation, the output frequency is changed linearly (linear acceleration/deceleration) to reach the set frequency without straining the motor and inverter.
- S-pattern acceleration/deceleration A (setting "1")
 - For machine tool spindle applications, etc.

Use when acceleration/deceleration must be made in a short time to a high-speed region of not lower than base frequency.

- S-pattern acceleration/deceleration B (setting "2")
 - For prevention of load shifting in conveyor and other applications Since acceleration/deceleration is always made in an S shape from current frequency (f2) to target frequency (f1), this function eases shock produced at acceleration/ deceleration and is effective for load collapse prevention, etc.
- Backlash measures (setting "3", *Pr.140* to *Pr.143*)
 - To avoid backlash, acceleration/ deceleration is temporarily stopped. Set the acceleration/deceleration stopping frequency and time in *Pr. 140 to Pr. 143*.



Setting value "1" [S-pattern acceleration / deceleration A] fb

Time

20

frequer

Output -



[Anti-backlash measure function] \bigtriangleup \bigtriangleup \bigtriangleup $\rashef{algebra}$ Pr.142 Pr.142Pr.141 Pr.143



Selection of regeneration unit

Pr.30 Regenerative function selection Pr.70 Special regenerative brake duty *

- Use the high power factor converter (FR-HC) to reduce harmonics, improve the power factor, or continuously use the regenerative mode.
- For the 75K or more, use the brake unit MT-BU5 or BR5 when the regenerative brake duty is need to be increased due to frequent starts and stops. Use the high power factor converter MT-HC to reduce harmonics, improve the power factor, or continuously use the regenerative mode.

<55K or less>

Pr.

Pr.30 Setting	Regeneration Unit
0 (initial value)	Brake unit (FR-BU, BU)
2	High power factor converter (FR-HC), power regeneration common converter (FR-CV)
<75K or more>	

Pr.30 Setting	Pr.70 Setting *	Regeneration Unit
0 (initial value)	_	Not used
1	0%	Power regeneration converter (MT-RC)
1	10%	Brake unit (MT-BU5)
2		High power factor converter (MT-HC)

* Pr.70 Special regenerative brake duty can be set for the 75K or more inverter.

Avoid mechanical resonance ^{31 to 36} points (frequency jump)

Pr.31 Frequency jump 1APr.33 Frequency jump 2APr.35 Frequency jump 3AWhen it is desired toavoid resonanceattributable to thenatural frequency of amechanical system,these parameters allowresonant frequencies tobe jumped.



- Up to three areas may be set, with the jump frequencies set to either the top or bottom point of each area.
- The value set to 1A, 2A or 3A is a jump point and operation in the jump zone is performed at these frequencies.
- Frequency jump is not performed if the initial value is set to "9999".
- During acceleration/deceleration, the running frequency within the set area is valid.

Speed display and speed setting

Pr.37 Speed display

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Pr.144 Speed setting switchover

You can change the PU (FR-DU07) monitor display or frequency setting to motor speed or machine speed.

• When the running speed monitor is selected, each monitor and setting are determined according to the combination of *Pr. 37* and *Pr. 144*. (The units within the thick frame are the initial values.)

Pr. 37 Setting	Pr. 144 Setting	Output Frequency Monitor	Set Frequency Monitor	Running Speed Monitor	Frequency Setting Parameter Setting
	0	Hz	Hz	r/min *1	Hz
0	2 to 10	Hz	Hz	r/min *1	Hz
Ū	102 to 110	r/min *1	r/min *1	r/min *1	r/min *1
	0	Hz	Hz	Machine speed *1	Hz
1 to 9998	2 to 10	Machine speed *1	Machine speed *1	Machine speed *1	Machine speed *1
	102 to 110	Hz	Hz	r/min *1	Hz

Motor speed r/min conversion formula

...... Frequency × 120/number of motor poles (*Pr. 144*) Machine speed conversion formula*Pr. 37* × frequency/60Hz

For *Pr.* 144 in the above formula, the value is "*Pr.* 144-100" when "102 to 110" is set in *Pr.* 144 and the value is "4" when *Pr.* 37=0 and *Pr.* 144=0.

 $^{\ast}2$ The increments for Hz are 0.01Hz, machine speed are 1m/min and r/min are 1r/min



Pr.42 Output frequency detection

Pr.43 Output frequency detection for reverse rotation

Pr.50 Second output frequency detection

Pr.41 Up-to-frequency sensitivity

The inverter output frequency is detected and output at the output signals.

- If the set frequency is considered as 100%, output frequency can be adjusted between ±1% and ±100% with *Pr. 41*.
- This parameter can be used to ensure that the running frequency has been reached to provide the operation start signal etc. for related equipment.



- When the output frequency reaches or exceeds the setting of *Pr. 42*, the output frequency detection signal (FU) is output. This function can be used for electromagnetic brake operation, open signal, etc.
- When the detection frequency is set in *Pr. 43*, frequency detection for reverse rotation use only can also be set. This function is effective for switching the timing of electromagnetic brake operation between forward rotation (rise) and reverse rotation (fall) during vertical lift operation, etc.
- When outputting a frequency detection signal besides the FU signal, set the detection frequency to *Pr. 50*. The FU2 signal is output when the output frequency reaches or exceeds the *Pr. 50* setting.



(Pr.) 44, 45 \rightarrow Refer to the section about *Pr.7*, *Pr.8*

- Pr.) 46 + Refer to the section about Pr. 0.
- Pr.) 47 \rightarrow Refer to the section about *Pr. 3*.
- Pr. 48, 49 Refer to the section about *Pr. 22* and other relevant parameters.
- **Pr.** 50 **Refer to the section about** *Pr. 41* and other relevant parameters.
- **Pr.**) 51 \rightarrow Refer to the section about *Pr.* 9.

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Change of DU/PU monitor descriptions Cumulative monitor clear

Pr.52 DU/PU main display data selection Pr.54 FM terminal function selection Pr.158 AM terminal function selection Pr.171 Operation hour meter clear Pr.563 Energization time carrying-over times Pr.867 AM output filter

Pr.170 Cumulative power meter clear Pr.268 Monitor decimal digits selection Pr.564 Operating time carrying-over times

Pr.891 Cumulative power monitor digit shifted times

The monitor to be displayed on the main screen of the operation panel (FR-DU07) / parameter unit (FR-PU04) can be selected.

		Pr.52 Pa Setting	rameter g Value	Pr.54 (FM)	Full Scale
Types of Monitor	Increments	DU LED	PU main monitor	Pr.158 (AM) Setting	Value
Output frequency	0.01Hz	0/100		1	Pr:55
Output current	0.01A/ 0.1A*6	0/100		2	Pr.56
Output voltage	0.1V	0/1	0/100		200V class : 400V 400V class : 800V
Alarm display	—		00	—	—
Frequency setting	0.01Hz	5	*1	5	Pr.55
Running speed	1(r/min)	6	*1	6	Value of <i>Pr. 55</i> represented in terms of <i>Pr. 37</i> value
Converter output voltage	0.1V	8	*1	8	200V class : 400V 400V class : 800V
Regenerative brake duty *5	0.1%	9	*1	9	Brake duty set in <i>Pr</i> : 30 and <i>Pr</i> : 70
Electronic thermal relay function load factor	0.1%	10	*1	10	Electronic thermal relay function operation level
Output current peak value	0.01A/ 0.1A*6	11	*1	11	Pr.56
Converter output voltage peak value	0.1V	12	*1	12	200V class : 400V 400V class : 800V
Input power	0.01kW/ 0.1kW*6	13	*1	13	Rated inverter power $\times 2$
Output power	0.01kW/ 0.1kW*6	14	*1	14	Rated inverter power $\times 2$
Input terminal status	—		*1		
Output terminal status	—	55	*1	—	—
Option input terminal status	_	56	×	_	
Option output terminal status	_	57	×	_	
Load meter	0.1%	1	7	17	Pr:56
Reference voltage output				21	—
Cumulative energization time *2	1h	2	0	—	—
Actual operation time *2, 3	1h	23		—	_
Motor load factor	0.1%	24		24	200%
Cumulative power	0.01kWh/ 0.1kWh *4, *6	2	5	_	—
Power saving effect	Variable according	5	0	50	Inverter capacity
Cumulative saving power	to parameters	5		—	—
PID set point	0.1%		2	52	100%
PID measured value	0.1%		3	53	100%
PID deviation value	0.1%	5	4	—	—

- Selected by the parameter unit(FR-PU04)
- *2 The cumulative energization time and actual operation time are accumulated from 0 to 65535 hours, then cleared, and accumulated again from 0. When the operation panel (FR-DU07) is used, up to 65.53 (65530h) is
- displayed as 1h=0.001 and then accumulated from 0. *3
- The actual operation time is not added up if the cumulative operation time before power supply-off is less than 1h. *1
- When using the parameter unit (FR-PU04), "kW" is displayed.
- *5 Setting can be made for the 75K or more. *6
- The setting depends on the inverter capacity.(55K or less/75K or more)- $\cdot\,$ The cumulative power monitor value digit can be shifted to the right by the number set in Pr. 891.
- By setting "0" in Pr. 170, the cumulative power monitor can be cleared.
- You can check the numbers of cumulative energization time monitor exceeded 65535h with Pr. 563 and the numbers of actual operation time monitor exceeded 65535h with Pr. 564.
- Writing "0" in Pr. 171 clears the actual operation time monitor.

Pr. 268 Setting	Description
9999 (initial value)	No function
0	When 1 or 2 decimal places (0.1 increments or 0.01 increments) are monitored, the decimal places are dropped and the monitor displays an integer value (1 increments). The monitor value of 0.99 or less is displayed as 0.
1	When 2 decimal places (0.01 increments) are monitored, the 0.01 decimal place is dropped and the monitor displays the first decimal place (0.1 increments). When the monitor display digit is originally in 1 increments, it is displayed unchanged in 1 increments.

When Pr. 52 is set to "100", the set frequency monitor is displayed during a stop and the output frequency monitor is displayed during operation. (LED of Hz flickers during stop and is lit during operation.)

\setminus		Pr.52		
	0	100		
	During operation/stop	During stop	During running	
Output frequency	Output frequency	Set frequency	Output frequency	
Output current	Output current			
Output voltage	Output voltage			
Alarm display	Alarm display			

Using Pr. 867, the output voltage response of the terminal AM can be adjusted within the range 0 to 5s.



Change of the monitor output from terminal FM and AM

Pr.55 Frequency monitoring reference Pr.56 Current monitoring reference Set the full-scale value to output the output frequency monitor value to terminal FM and AM.

Set the full-scale value to output the output current monitor value to terminal FM and AM in Pr. 56.



FRANKIL F'700 SERIES

Pr. 57, 58, 162 to 165, 299, 611

Restart operation after instantaneous power failure / Flying start

Pr.58 Restart cushion time

Pr.57 Restart coasting time

Pr.162 Automatic restart after instantaneous power failure selection

Pr.163 First cushion time for restart

 Pr.164 First cushion voltage for restart
 Pr.165 Stall prevention operation level for restart

 Pr.299 Rotation direction detection selection at restarting
 Pr.299 Rotation direction detection selection at restarting

Pr.611 Acceleration time at a restart

You can restart the inverter without stopping the motor in the following cases.

- when commercial power supply operation is switched to inverter operation
- · when power comes back on after an instantaneous power failure
- · when motor is coasting at start

Pr. Number	Setting Range	Description
		1.5K or less0.5s,
		2.2K to 7.5K1s,
	0	11K or more3.0s
57		75K or more5.0s
57		The above times are coasting time.
	0.1 to 5s/	Set the waiting time for inverter-triggered
	0.1 to 30s*	restart after an instantaneous power failure.
	9999 (initial value)	No restart
58	0 to 60s	Set a voltage starting time at restart.
	0 (initial value)	With frequency search
	1	Without frequency search (reduced
162		voltage system)
	10	Frequency search at every start
	11	Reduced voltage system at every start
163	0 to 20s	Set a voltage starting time at restart.
164	0 to 1000/	Consider using these parameters according to the load (inertia moment,
164	0 to 100%	torque) magnitude.
		Consider the rated inverter current as
165	0 to 150%	100% and set the stall prevention
		operation level during restart operation.
	0	Without rotation direction detection
	1	With rotation direction detection
299		When $Pr. 78 = 0$, the rotation direction is
200	9999	detected.
		When $Pr. 78 = 1,2$, the rotation direction is
		not detected.
	0 to 3600s	Set the acceleration time to reach the set
611		frequency at restart. Acceleration time for restart is the normal
	9999	acceleration time for restart is the normal acceleration time (e.g. <i>Pr.</i> 7).
		acceleration time (e.g. FI. /).

The setting range varies according to the inverter capacity. (55K or less/ 75K or more)

<Connection diagram>

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- When "0 (initial value) or 10" is set in *Pr. 162*, the inverter smoothly starts after detecting the motor speed upon power restoration.
- Even when the motor is rotating in the opposite direction, the inverter can be restarted smoothly as the direction of rotation is detected. (You can select whether to make rotation direction detection or not with *Pr. 299 Rotation direction detection selection at restarting*.)

When Pr. 162 = 0, 10 (with frequency search)



• When *Pr. 162* = "1" or "11", automatic restart operation is performed in a reduced voltage system, where the voltage is gradually risen with the output frequency unchanged from prior to an instantaneous power failure independently of the coasting speed of the motor.





Pr.59 Remote function selection

- •Even if the operation panel is located away from the enclosure, you can use contact signals to perform continuous variable-speed operation, without using analog signals.
- By merely setting this parameter, you can use the acceleration, deceleration and setting clear functions of the motorized speed setter (FR-FK).

	Descri	otion
Pr.59 Setting	RH, RM, RL signal function	Frequency setting storage function
0 (initial value)	Multi-speed setting	—
1	Remote setting	Yes
2	Remote setting	No
3	Remote setting	No (Turning STF/STR off clears remotely-set frequency.)



External runnning frequency (other than multi-speed operation) or PU running frequency



Control Selection Control Selection

7 Pr.60 Energy saving control

Without a fine parameter setting, the inverter automatically performs energy saving operation.

This inverter is optimum for fan and pump applications.

Pr. 60 Setting	Description
0 (initial value)	Normal operation mode
4	Energy saving operation mode In the energy saving operation mode, the inverter automatically controls the output voltage to minimize the inverter output voltage during a constant operation.
9	Optimum excitation control mode The optimum excitation control mode is a control system which controls excitation current to improve the motor efficiency to maximum and determines output voltage as an energy saving system.



Retry function at alarm occurrence

Pr.65 Retry selection Pr.68 Retry waiting time Pr.67 Number of retries at alarm occurrence Pr.69 Retry count display erase

If an alarm occurs, the inverter resets itself automatically to restart. You can also select the alarm description for a retry. When selection of automatic restart after instantaneous power failure is selected (Pr. 57 Restart coasting time, restart operation is performed at retry operation as at an instantaneous power failure.)

- Use Pr. 65 to select the alarm to be activated for retries.
 - indicates the alarms selected for retry.

Alarm Indication			Pr.65 S	Setting		
for Retry	0	1	2	3	4	5
E.OC1	•	•		•	•	•
E.OC2	•	•		•	•	
E.OC3	•	•		•	•	•
E.OV1	•		•	•	•	
E.OV2	•		•	•	•	
E.OV3	•		•	•	•	
E.THM	٠					
E.THT	•					
E.IPF	•				٠	
E.UVT	•				٠	
E.BE	•				٠	
E. GF	•				•	
E.OHT	•					
E.OLT	•				•	
E.OPT	•				•	
E.OP1	٠				٠	
E. PE	٠				٠	
E.PTC	•					
E.CDO	•				•	
E.SER	•				•	
E.ILF	•				•	

• Set the number of retries at alarm occurrence in Pr. 67.

Pr. 67 Setting	Description				
0 (initial value)	No retry function	es			
1 to 10	Set the number of retries at alarm occurrence. An alarm output is not provided during retry operation.	Features			
101 to 110	Set the number of retries at alarm occurrence. (The setting value of minus 100 is the number of retries.) An alarm output is provided during retry operation.	Peripheral Devices Why energy savings?			
 Use <i>Pr. 68</i> to set the waiting time from when an inverter alarm occurs until a retry is made in the range 0 to 10s. Reading the <i>Pr. 69</i> value provides the cumulative number of successful restart times made by retry. 					

Refer to the section about Pr. 22 and other (Pr.) 66 relevant parameters.

Refer to the section about Pr. 65 and (Pr.) 67 to 69 other relevant parameters.

▶ Refer to the section about *Pr. 30* and (Pr.) 70 other relevant parameters.

Use the constant torque motor (applied motor)

Pr.71 Applied motor

Setting of the used motor selects the thermal characteristic appropriate for the motor.

Setting is necessary when using a constant-torque motor. Thermal characteristic of the electronic thermal relay function suitable for the motor is set.

	Thermal Characteristic of the	Motor (O: Motor used)		
Pr.71 Setting	Electronic Thermal Relay Function	Standard (SF-JR, etc.)	Constant torque (SF-HRCA, etc.)	
0 (initial value)	Thermal characteristics of a standard motor	0		
1	Thermal characteristics of the Mitsubishi constant-torque motor		0	
2	Thermal characteristics of a standard motor Adjustable 5 points V/F	0		
20	Mitsubishi standard motor SF-JR4P (1.5kW or less)	0		

• For the 5.5K and 7.5K, the Pr. 0 Torque boost and Pr. 12 DC injection brake operation voltage settings are automatically changed according to the Pr. 71 setting as follows.

Pr.71	Standard Motor Setting 0, 2, 20	Constant Torque Motor Setting 1
Pr. 0	3%	2%
Pr. 12	4%	2%

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Carrier frequency and SoftPWM selection

Pr.240 Soft-PWM operation selection Pr.72 PWM frequency selection Pr.260 PWM frequency automatic switchover

You can change the motor sound.

Pr. Number	Setting Range	Description
72	0 to 15/ 0 to 6, 25 *	You can change the PWM carrier frequency. The setting displayed is in [kHz]. Note that 0 indicates 0.7kHz, 15 indicates 14.5kHz and 25 indicates 2.5kHz.
	0	Soft-PWM is invalid
240	1	When "0 to 5" ("0 to 4" for the 75K or more) is set in <i>Pr.</i> 72, Soft-PWM is valid
0 260		PWM carrier frequency is constant independently of load. When the carrier frequency is set to 3 kHz or more (<i>Pr.</i> 72 \ge 3), perform continuous operation at less than 85% of the rated inverter current.
	1	Decreases PWM carrier frequency automatically when load increases.

The setting range varies according to the inverter capacity. (55K or less/75K or more).

(Note)When Pr. 260="1 (initial value)", if continuous operation is performed at 85% or more of the rated inverter current with Pr. 72 value set to "3" (3kHz) or more, the carrier frequency is automatically reduced. This may cause the motor noise to increase

Pr. 73, 242, 243, 252, 253, 267

Analog input selection

Pr.73 Analog input selection

Pr.242 Terminal 1 added compensation amount (terminal 2)

Pr.243 Terminal 1 added compensation amount (terminal 4) Pr.253 Override gain

Pr.252 Override bias

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Pr.267 Terminal 4 input selection

- You can select the function that switches between forward rotation and reverse rotation according to the analog input polarity, the override function and the input signal specifications.
- For the terminals 1, 2, 4 used for analog input, voltage input (0 to 5V, 0 to 10V) or current input (4 to 20mA) can be selected.
- The additional compensation and fixed ratio of analog compensation (override) using terminal 2 as an auxiliary input can be made to multi-speed operation or the speed setting signal (main speed) of the terminal 2 or terminal 4. indicates the main speed setting) (

Pr. 73 Setting	Terminal 2 Input	Terminal 1 Input	Terminal 4 Input	Compensation Input Terminal and Compensation Method	Polarity Reversible
0	0 to 10V	0 to ±10V			
1 (Initial value)	0 to 5V	0 to ±10V		Terminal 1 added compensation	Not function (Indicates that a frequency
2	0 to 10V	0 to ±5V		compensation	command
3	0 to 5V	0 to ±5V			signal of
4	0 to 10V	0 to ±10V		Terminal 2	negative
5	0 to 5V	0 to ±5V	When the AU	override	polarity is not
6	4 to 20mA		signal is off		accepted.)
7	4 to 20mA	0 to ±5V	×	Terminal 1	
10	0 to 10V	0 to ±10V		added	
11	0 to 5V	0 to ±10V		compensation	
12	0 to 10V	0 to ±5V			
13	0 to 5V	0 to ±5V			
14	0 to 10V	0 to ±10V		Terminal 2	Function
15	0 to 5V	0 to ±5V		override	
16	4 to 20mA	0 to ±10V		Terminal 1	
17	4 to 20mA	0 to $\pm 5V$		added compensation	

Pr. 73 Setting	Terminal 2 Input	Terminal 1 Input	Terminal 4 Input	Compensation Input Terminal and Compensation Method	Polarity Reversible
0	0 to 10V	0 to $\pm 10V$			
1 (Initial value)	×	0 to ±10V		Terminal 1 added compensation	Not function (Indicates that a frequency
2		0 to ±5V		compensation	command
3		0 to ±5V			signal of
4	0 to 10V	×	When the AU	Terminal 2	negative
5	0 to 5V	~	signal is on	override	polarity is not
6	×	0 to ±10V			accepted.)
7	^	0 to ±5V	Pr. 267 setting	Terminal 1	
10		0 to ±10V	(Initial value)	added	
11	×	0 to ±10V	1:0 to 5V	compensation	
12	^	0 to ±5V	2:0 to 10V	componication	
13		0 to ±5V			
14	0 to 10V	×		Terminal 2	Function
15	0 to 5V			override	
16		0 to ±10V		Terminal 1	
17	×	0 to $\pm 5V$		added compensation	

(1) Added compensation (Pr.242, Pr.243)

A compensation signal can be added to the main speed setting for synchronous operation, etc.



The terminal 1 (frequency setting auxiliary input) signal is added to the main speed setting signal of the terminal 2 or 4.

(2) Override function (Pr.252, Pr.253)

· When an override is selected, the terminal 1 or 4 is used for the main speed setting and the terminal 2 for the override signal. (When the main speed of the terminal 1 or terminal 4 is not input, compensation by the terminal 2 is invalid.)



- When an override is selected, the terminal 1 or 4 is used for the main speed setting and the terminal 2 for the override signal (50% to 150% at 0 to 5V or 0 to 10V). (When the main speed of the terminal 1 or 4 is not input, compensation by the terminal 2 is invalid.)
- When Pr. 22 Stall prevention operation level = "9999", the value of the terminal 1 is as set to the stall prevention operation level.

Features



Noise elimination at the analog input

Pr.74 Input filter time constant

The time constant of the primary delay filter relative to external frequency command (analog input (terminal 1, 2, 4) signal) can be set.

- Valid for eliminating noise of the frequency setting circuit.
- Increase the filter time constant if steady operation cannot be performed due to noise.

A larger setting results in slower response. (The time constant can be set between approximately 10ms to 1s with the setting of 0 to 8.)

Pr. 75 Reset selection, disconnected PU detection

Pr.75 Reset selection/disconnected PU detection/PU stop selection

You can select the reset input acceptance, disconnected PU (FR-DU07) connector detection function and PU stop function.

Pr.75 Setting	Reset Selection Disconnected PU Detection		PU Stop Selection	
0	Reset input normally enabled.	If the PU is disconnected,		
1	Reset input enabled only when the protective function is activated.	operation will be continued as-is.	Pressing RESET	
2	Reset input normally enabled.	When the PU is disconnected,	motor to a stop only in the PU operation mode.	
3	Reset input enabled only when the protective function is activated.	the inverter output is shut off.		
14 (initial value)	Reset input normally enabled.	If the PU is disconnected,	Pressing (1997) decelerates the motor to a stop in	
15	Reset input enabled only when the protective function is activated.	operation will be continued as-is.		
16	Reset input normally enabled.	When the PU is disconnected,	any of the PU, external and communication	
17	Reset input enabled only when the protective function is activated.	the inverter output is shut off.	operation modes.	

Reset selection

- You can select the operation timing of reset function (RES signal, reset command through communication) input
- Disconnected PU detection
 - This function detects that the PU (FR-DU07/FR-PU04) has been disconnected from the inverter for longer than 1s and causes the inverter to provide an alarm output (E.PUE) and come to an alarm stop.
- PU stop selection

In any of the PU operation, external operation and network operation modes, the motor can be stopped by pressing (see of the PU.



.)₇₆ Output function of alarm code

Pr.76 Alarm code output selection

At alarm occurrence, its description can be output as a 4-bit digital signal from the open collector output terminals.

The alarm code can be read by a programmable controller, etc., and its corrective action can be shown on a display, etc.

Pr.76 Setting	Description	
0 (initial value)	Without alarm code output	
1	With alarm code output (Refer to the following table)	
2	Alarm code output at alarm occurrence only (Refer to the following table)	

• The following table indicates alarm codes to be output. (0: output transistor off, 1: output transistor on)

Operation Panel	Outp	utput of Output Terminals				
Indication (FR-DU07)	SU	IPF	OL	FU	Alarm Code	
Normal *	0	0	0	0	0	
E.OC1	0	0	0	1	1	
E.OC2	0	0	1	0	2	
E.OC3	0	0	1	1	3	
E.OV1 to E.OV3	0	1	0	0	4	
E.THM	0	1	0	1	5	
E.THT	0	1	1	0	6	
E.IPF	0	1	1	1	7	
E.UVT	1	0	0	0	8	
E.FIN	1	0	0	1	9	
E.BE	1	0	1	0	А	
E. GF	1	0	1	1	В	
E.OHT	1	1	0	0	С	
E.OLT	1	1	0	1	D	
E.OPT	1	1	1	0	E	
E.OP1	1	1	1	0	E	
Other than the above	1	1	1	1	F	

When Pr. 76 = "2", the output terminals output the signals assigned to Pr. 190 to Pr. 196.

Pr.₇₇ Prevention of parameter rewrite

Pr.77 Parameter write selection

You can select whether write to various parameters can be performed or not. Use this function to prevent parameter values from being rewritten by misoperation.

Pr. 77 Setting	Description
0 (initial value)	Write is enabled only during a stop
1	Parameter write is not enabled.
2	Parameter write is enabled in any operation mode regardless of operation status.

(Pr.)₇₈

Prevention of reverse rotation of the motor

Pr.78 Reverse rotation prevention selection

This function can prevent reverse rotation fault resulting from the incorrect input of the start signal.

Pr.78 Setting	Description	
0 (initial value)	Both forward and reverse rotations allowed	
1	Reverse rotation disabled	
2	Forward rotation disallowed	

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Pr. 79 (Pr.) 340 Operation mode selection

7 Pr.79 Operation mode selection <u>Pr.340 Communication startup mode selection</u>

•Used to select the operation mode of the inverter.

You can freely change between operation by external signal (external operation), operation by PU (FR-DU07) (PU operation), operation by combination of PU operation and external operation (external/PU combined operation) and network operation (when RS-485 terminals or a communication option is used).

Pr.79		LED Indication	
Setting	Desci	📼 :Off	
		⊡:On	
0	External/PU switchor	External operation mode	
(initial	(PU EXT) to switch betw	een the PU and	EXT
value)	external operation m External operation m		PU operation mode
1	Fixed to PU operatio	n mode	PU EXT NET
2	Fixed to external ope Operation can be pe between the externa mode.	External operation mode NET operation mode	
	External/PU combin	ed operation mode 1	
	Running frequency	Start signal	
3	PU (FR-DU07 / FR-PU04) setting or external signal input (multi-speed setting, across terminals 4-5 (valid when AU signal turns on))		PU EXT NET
	External/PU combine	ed operation mode 2	
	Running frequency		
4	External signal input (terminal 2, 4, 1, Jog, multi-speed setting, etc)	Input from the PU (FR-DU07 / FR- PU04) ((FWD), (REV))	
6	Switch-over mode Switch among PU op operation, and NET keeping the same op	PU operation mode External operation mode NET operation mode	
7	External operation m interlock) X12 signal ON Operation mode c PU operation mode c Output stop durin X12 signal OFF Operation mode c the PU operation	PU operation mode External operation mode	

- Specify operation mode at power on (Pr.340)
 - When power is switched on or when power comes back on after instantaneous power failure, the inverter can be started up in the network operation mode.

After the inverter has started up in the network operation mode, parameter write and operation can be performed from a program. Set this mode for communication operation using the inverter RS-485 terminals or communication option.

You can set the operation mode at power on (reset) according to the Pr. 79 and Pr. 340 settings.

Pr. 340 Setting	Pr.79 Setting	Operation mode at Power On, Power Restoration, Reset	Operation Mode Switchover									
0 (initial value)	As set in Pr. 79.											
	0	NET operation mode	Can be switched to external, PU or NET operation mode *2									
	1	PU operation mode	Fixed to PU operation mode									
	2	NET operation mode	Can be switched to external or NET operation mode Switching to PU operation mode disabled									
1, 2 *1	3, 4	External/PU combined operation mode	Operation mode switching disabled									
	6	NET operation mode	Can be switched to external, PU or NET operation mode with operation continued									
	7	X12 (MRS) signal ON NET operation mode	Can be switched to external, PU or NET operation mode *2									
		7	7	7	7	7	7	7	7	7	7	X12(MRS)signal OFF External operation mode
	0	NET operation mode	Can be switched to PU or NET operation mode *3									
	1	PU operation mode	Fixed to PU operation mode									
	2	NEToperation mode	Fixed to NET operation mode									
10, 12 *1	3, 4	External/PU combined operation mode	Operation mode switching is disallowed									
	6	NET operation mode	Can be switched to PU or NET operation mode with operation continued *3									
7		External operation mode	Fixed to external operation mode (Forcibly switched to external operation mode.)									

The Pr. 340 setting "2" or "12" is mainly used for communication operation using the inverter RS-485 terminals.

When a value other than "9999" (selection of automatic restart after instantaneous power failure) is set in Pr. 57 Restart coasting time, the inverter will resume the same operation state which was in before after power has been restored from an instantaneous power failure.

- *2 The operation mode cannot be switched directly between the PU operation mode and network operation mode
- *3 Operation mode can be changed between the PU operation mode and network operation mode with $\left(\frac{PU}{EXT}\right)$ key of the operation panel (FR-DU07) and X65 signal.

Pr. 80, 90

Simple magnetic flux vector control

Pr.80 Motor capacity (simple magnetic flux vector control) Pr.90 Motor constant (R1)

Providing optimum excitation to the motor can also produce high torque in a low-speed region. (simple magnetic flux vector control)

- Set the used motor capacity (equal to or one rank higher than the inveter capacity) in Pr. 80.
- The number of motor poles should be any of 2, 4 and 6 poles. .
- Single-motor operation (one motor for one inverter) Wiring length from inverter to motor should be within 30m.
- When simple magnetic flux vector control is not used, set "9999" (initial value) in Pr. 80.
- For Pr. 90 Motor constant (R1), normally setting is not necessary. When you need more torque under simple magnetic flux vector control for other manufacturer's motor, set the motor primary resistance value (R1) for ⊥ connection in Pr. 90
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Adjustable 5 points V/F

Pr.100 V/F1 (first frequency) Pr.102 V/F2 (second frequency) Pr.104 V/F3 (third frequency) Pr.106 V/F4 (fourth frequency) Pr.108 V/F5 (fifth frequency)

Pr.101 V/F1 (first frequency voltage) Pr.103 V/F2 (second frequency voltage) Pr.105 V/F3 (third frequency voltage) Pr.107 V/F4 (fourth frequency voltage) Pr.109 V/F5 (fifth frequency voltage)

A dedicated V/F pattern can be made by freely setting the V/F characteristic between a startup and the base frequency and base voltage under V/F control (frequency voltage/frequency). Possible to set the torque pattern that is optimum for the machine's characteristic



- Adjustable 5 points V/F will not function under simple magnetic . flux vector control.
- When Pr. 19 Base frequency voltage = "8888" or "9999", Pr. 71 cannot be set to "2". To set Pr. 71 to "2", set the rated voltage value to Pr. 19
- When the frequency values of the points are the same, a write inhibit error $(F_{r} \mid)$ occurs.
- Set the points (frequencies, voltages) of Pr. 100 to Pr. 109 within the ranges of Pr. 3 Base frequency and Pr. 19 Base frequency voltage.
- When "2" is set in Pr. 71, Pr. 47 Second V/F (base frequency) will not function.
- When "2" is set in Pr. 71, thermal characteristic of the electronic thermal relay function changes to thermal characteristics of a standard motor.

117 to 124, 331 to 337, 341 to 343, 549

Communication initial setting

Pr.117 PU communication station	Pr.118 PU communication speed
Pr.119 PU communication stop bit length.	Pr.120 PU communication parity check
Pr.121 Number of PU communication retries	Pr.122 PU communication check time interval
Pr.123 PU communication waiting time	setting
Pr.124 PU communication CR/LF preser	nce/absence selection
Pr.331 RS-485 communication station	Pr.332 RS-485 communication speed
Pr.333 RS-485 communication stop bit length	
Pr.334 RS-485 communication parity ch	eck selection
Pr.335 RS-485 communication number of retries	Pr.336 RS-485 communication check time interval
Pr.337 RS-485 communication waiting ta	ime setting
Pr.341 RS-485 communication CR/LF selection	Pr.342 Communication EEPROM write selection
Pr.343 Communication error count	Pr.549 Protocol selection
(1) Initial settings and speci	ifications of RS-485

Initial settings (1) communication (Pr.117 to Pr.124, Pr.331 to Pr.337, Pr.341) Used to perform required settings for RS-485 communication between the inverter and personal computer.

- •There are two different communications: communication using the PU connector of the inverter and communication using the RS-485 terminals.
- •You can perform parameter setting, monitor, etc. using the Mitsubishi inverter protocol or Modbus-RTU protocol.
- To make communication between the personal computer and inverter, initialization of the communication specifications must be made to the inverter.

Data communication cannot be made if the initial settings are not made or there is any setting error.

Pr. Number	Setting Range	Description	
117 331	0 to 31 (0 to 247) *1	Specify the inverter station number. Set the inverter station numbers when two or more inverters are connected to one personal computer.	
118 332	48, 96, 192, 384 (3, 6, 12, 24) *2	Set the communication sp The setting value × 100 ec communication speed. For example, the communic 19200bps when the setting	quals the cation speed is
		Stop bit length	Data length
	0	1bit	
119 333	1 (initial value)	2bit	8bit
000	10	1bit	
	11	2bit	7bit
	0	Without parity check	
120 334	1	With odd parity check	
004	2 (initial value)	With even parity check	
121 335	0 to 10	Set the permissible number of retries at occurrence of a data receive error. If the number of consecutive errors exceeds the permissible value, the inverter will come to an alarm stop.	
	9999	If a communication error occurs, the inverter will not come to an alarm stop.	
	0	No PU connector communication Communication with RS-485 terminal can be made, but the inverter will come to an alarm stop in the NET operation mode.	
122 336	0.1 to 999.8s	Set the interval of communication check time. If a no-communication state persists for longer than the permissible time, the inverter will come to an alarm stop.	
	9999 (initial value)	No communication check	
123 337	0 to 150ms	Set the waiting time between data transmission to the inverter and response.	
557	9999 (initial value)	Set with communication data.	
104	0	Without CR/LF	
124 341	1 (initial value)	With CR	
0.1	2	With CR/LF	
485 te	making communication rminals, the setting ra	With CR/LF on through Modbus-RTU pro ange of <i>Pr. 331</i> within paren are added to the setting rang	thesis is applied.

(2) Communication EEPROM write selection (Pr.342)

Parameters written via the inverter's PU connector or RS-485 terminals or from the communication option can be written to the RAM. When performing parameter change frequently, set "1" in Pr. 342.

(3) Modbus-RTU communication specifications (Pr.343, Pr.549)

The Modbus-RTU protocol is valid for only communication from the RS-485 terminals.

Pr. Number	Setting Range	Description
343		Display the number of communication errors during Modbus-RTU communication. Reading only
549	0 (initial value)	Mitsubishi inverter (computer link) protocol
549	1	Modbus-RTU protocol

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Analog input frequency change and voltage, current input and frequency adjustment (calibration)

7 Pr.125 Terminal 2 frequency setting gain frequency

7 Pr.126 Terminal 4 frequency setting gain frequency

Pr. 241 Analog input display unit switchover

C2(Pr.902) Terminal 2 frequency setting bias frequency

C3(Pr.902) Terminal 2 frequency setting bias C4(Pr.903) Terminal 2 frequency setting gain C5(Pr.904) Terminal 4 frequency setting bias frequency

C6(Pr.904) Terminal 4 frequency setting bias C7(Pr.905) Terminal 4 frequency setting gain

 You can set the magnitude (slope) of the output frequency as desired in relation to the frequency setting signal (0 to 5VDC, 0 to 10V or 4 to 20mA).

(1) Change the frequency at maximum analog input. (*Pr.125, Pr.126*)

Set a value in *Pr.* 125 (*Pr.* 126) when changing only the frequency setting (gain) of the maximum analog input power (current). (*C2* (*Pr.* 902) to *C7* (*Pr.* 905) setting need not be changed)



(2) Analog input bias/gain calibration (C2(Pr.902) to C7(Pr.905))

- The "bias" and "gain" functions are used to adjust the relationship between the input signal entered from outside the inverter to set the output frequency, e.g. 0 to 5V, 0 to 10V or 4 to 20mADC, and the output frequency.
- Set the bias frequency of terminal 2 input using *C2(Pr. 902)*. (Factory-set to the frequency at 0V)
- Using *Pr. 125*, set the output frequency relative to the frequency command voltage (current) set in *Pr. 73 Analog input selection.*
- Set the bias frequency of the terminal 4 input using C5(Pr. 904).
- (Factory-set to the frequency at 4mA)
- Using *Pr. 126*, set the output frequency relative to 20mA of the frequency command current (4 to 20mA).

(3) Analog input display unit changing (Pr. 241)

 You can change the analog input display unit (%/V/mA) for analog input bias/gain calibration.

Pr. 127 to 134, 575 to 577 PID control

Pr.127 PID control automatic switchover frequency

 Pr.128 PID action selection
 Pr.129 PID proportional band

 Pr.130 PID integral time
 Pr.131 PID upper limit

 Pr.132 PID lower limit
 Pr.133 PID action set point

 Pr.134 PID differential time
 Pr.575 Output interruption detection time

 Pr.576 Output interruption detection level
 Pr.577 Output interruption release level

The inverter can be used to exercise process control, e.g. flow rate. air volume or pressure.

The terminal 2 input signal or parameter setting is used as a set point and the terminal 4 input signal used as a feedback value to constitute a feedback system for PID control.

· Pr.128 ="10, 11" (Deviation value signal input)



Pr. 135 to 139, 159 Switch between the inverter operation and commercial power-supply operation to use

 Pr.135 Commercial power-supply switchover sequence output terminal selection

 Pr.136 MC switchover interlock time
 Pr.137 Waiting time at a start

 Pr.138 Commercial power-supply operation switchover selection at an alarm

 Pr.139 Automatic switchover frequency between inverter and commercial power-supply operation

 Pr.159 Automatic switchover ON range between commercial power-supply and inverter operation

 The complicated sequence circuit for commercial power supply-inverter switchover is built in the inverter. Hence, merely

inputting the start, stop or automatic switchover selection signal facilitates the interlock operation of the switchover magnetic contactor.

Pr135 Setting	Description	
0 (initial value)	Without commercial power-supply switchover sequence	
1	With commercial power-supply switchover sequence	

Sink logic type, *Pr.185* = "7", *Pr.192* = "17", *Pr.193* = "18", *Pr.194* = "19"



Commercial power-supply switchover sequence connection diagram

- *1 Take caution for the capacity of the sequence output terminal.
- *2 When connecting a DC power supply, insert a protective diode.
 *3 The used terminal changes depending on the setting of *Pr. 180 to Pr. 189*
- (input terminal function selection). Pr. 140 to 143 Pr. 140 to 143 Pr. 140 to 143 Pr. 29 and other relevant parameters.

Refer to the section about *Pr. 37* and other
 relevant parameters.

(Pr.)

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Parameter unit display language selection

Pr.145 PU display language selection

You can switch the display language of the parameter unit (FR-PU04) to another.

Pr.145 Setting	Description
0 (initial value)	Japanese
1	English
2	German
3	French
4	Spanish
5	Italian
6	Swedish
7	Finnish

(**Pr.**) 148, 149

→ Refer to the section about Pr. 22 and other relevant parameters.

150 to 153, 166, 167

Detection of output current (Y12 signal) detection of zero current (Y13 signal)

Pr.150 Output current detection level Pr.151 Output current detection signal delay time Pr.152 Zero current detection level Pr.153 Zero current detection time Pr.166 Output current detection signal retention time

Pr.167 Output current detection operation selection

The output current during inverter running can be detected and output to the output terminal.

(1) Output current detection

(Y12 signal, Pr. 150, Pr. 151, Pr. 166, Pr. 167)

- · The output current detection function can be used for excessive torque detection, etc.
- If the output current remains higher than the Pr. 150 setting during inverter operation for longer than the time set in Pr. 151, the output current detection signal (Y12) is output from the inverter's open collector or relay output terminal.



(2) Zero current detection (Y13 signal, Pr. 152, Pr. 153)

If the output current remains lower than the Pr. 152 setting during inverter operation for longer than the time set in Pr. 153, the zero current detection (Y13) signal is output from the inverter's open collector or relay output terminal.







Selection of action conditions of 155 the second function signal (RT)

Pr.155 RT signal reflection time selection

You can select the second function using the external terminal (RT signal).

You can also set the RT signal operation condition (reflection time).

Pr.155 Setting	Description
0 (initial value)	This function is immediately made valid with on of the RT signal.
10	This function is valid only during the RT signal is on and constant speed operation. (invalid during acceleration/deceleration)

Functions that can be set as second functions

Function	First Function Parameter Number	Second Function Parameter Number	
Torque boost	Pr.0	Pr.46	
Base frequency	Pr.3	Pr.47	
Acceleration time	Pr.7	Pr.44	
Deceleration time	Pr.8	Pr.44, Pr.45	
Electronic thermal O/L relay	Pr.9	Pr.51	
Stall prevention	Pr.22	Pr.48, Pr.49	

Refer to the section about Pr. 22 and (Pr.) 156, 157

158

other relevant parameters.

Refer to the section about Pr. 54 and other relevant parameters.

Refer to the section about Pr. 135 and other

159 relevant parameters.

(**Pr.**) 172 to 174 160

Display of applied parameters and user group function

7 Pr.160 User group read selection

Pr.172 User group registered display/batch clear

Pr.173 User group registration Pr.174 User group clear

• Parameter which can be read from the operation panel and parameter unit can be restricted.

In the initial setting, only the simple mode parameters are displayed.

Pr. 160 Setting	Description	
9999 (initial value)	Only the simple mode parameters can be displayed.	
0	Simple mode+extended parameters can be displayed.	
1	Only parameters registered to the user group can be displayed.	

- (1) Display of simple mode parameters and extended parameters (Pr.160)
 - · When Pr. 160 = "9999" (initial value), only the simple mode parameters can be displayed on the operation panel (FR-DU07) and parameter unit (FR-PU04).
 - · When "0" is set in Pr. 160, simple mode parameters and extended parameters can be displayed.

(2) User group function (Pr.160, Pr.172 to Pr.174)

- The user group function is designed to display only the parameters necessary for setting.
- From among all parameters, a maximum of 16 parameters can be registered to a user group. When Pr. 160 is set in "1", only the parameters registered to the user group can be accessed. (The parameters not registered to the user group cannot be read.)
- To register a parameter to the user group, set its parameter number to Pr. 173.
- To delete a parameter from the user group, set its parameter number to Pr. 174. To batch-delete the registered parameters, set Pr. 172 in "9999".

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Operation selection of the operation panel

Pr.161 Frequency setting/key lock operation selection

You can use the setting dial of the operation panel (FR-DU07) like a potentiometer to perform operation.

The key operation of the operation papel can be disabled

The key operation of the operation panel can be disabled.			
Pr.161 Setting	Pr.161 Setting Description		
0 (initial value)	Setting dial frequency setting mode	Key lock mode invalid	
1	Setting dial potentiometer mode		
10	Setting dial frequency setting mode	Key lock mode	
11	Setting dial potentiometer mode	valid	
Pr. 162 to 165 Refer to the section about <i>Pr. 57</i> and other relevant parameters.			
Pr. 166, 167 Refer to the section about <i>Pr. 150</i> and other relevant parameters.			
Pr. 168, 169 Pa	arameter for manufacturer setting	j. Do not set.	
Pr. 170, 171	Refer to the section about	ut Pr. 52 and	

Refer to the section about Pr. 160 and (Pr.) 172 to 174 other relevant parameters.

Function assignment of 178 to 189 input terminal

Pr.178 STF terminal function selection Pr.180 RL terminal function selection Pr.182 RH terminal function selection Pr.184 AU terminal function selection Pr.186 CS terminal function selection

Pr.

Pr.179 STR terminal function selection Pr.181 RM terminal function selection Pr.183 RT terminal function selection Pr.185 JOG terminal function selection Pr.187 MRS terminal function selection Pr.188 STOP terminal function selection Pr.189 RES terminal function selection

Use these parameters to select/change the input terminal functions.

Pr.178 to Pr.189 Setting	Signal Name	Function	
0	RL	Pr:59 =0 (initial value) Low speed operation command	
		Pr.59 =1, 2 *1 Remote setting (setting clear)	
1	RM	Pr.59 =0 Middle speed operation (initial value) command	
		Pr.59 =1, 2 *1 Remote setting (deceleration)	
2	RH	Pr:59 =0 (initial value) High speed operation command	
		Pr.59 =1, 2 *1 Remote setting (acceleration)	
3	RT	Second function selection	
4	AU	Terminal 4 input selection	
5	JOG	Jog operation selection	
6	CS	Selection of automatic restart after instantaneous power failure, flying start	
7	OH	External thermal relay input *2	
8	REX	15 speed selection (combination with three speeds RL, RM, RH)	
10	X10	Inverter operation enable signal (FR-HC, FR-CV connection)	
11	X11	FR-HC connection, instantaneous power failure detection	
12	X12	PU operation external interlock	
14	X14	PID control valid terminal	
16	X16	PU-external operation switchover	
24	MRS	Output stop	
25	STOP	Start self-holding selection	
60	STF	Forward rotation command (assigned to STF terminal (Pr. 178) only)	
61	STR	Reverse rotation command (assigned to STR terminal (<i>Pr. 179</i>) only)	
62	RES	Inverter reset	
63	PTC	PTC thermistor input (assigned to AU terminal (<i>Pr. 184</i>) only)	
64	X64	PID forward/reverse action switchover	
65	X65	NET/PU operation switchover	
66	X66	External/NET operation switchover	
67	X67	Command source switchover	
9999		No function	

When Pr. 59 Remote function selection = "1" or "2", the functions of the RL, *1 RM and RH signals are changed as given in the table. The OH signal turns on when the relay contact "opens".

*2



Terminal assignment of 190 to 196 output terminal

Pr.190 RUN terminal function selection Pr.191 SU terminal function selection Pr.192 IPF terminal function selection Pr.193 OL terminal function selection Pr.194 FU terminal function selection Pr.196 ABC2 terminal function selection

Pr.195 ABC1 terminal function selection

You can change the functions of the open collector output terminal and relay output terminal.

Pr.190 to Pr.196 Setting		Signal	
Positive logic	Negative logic	Name	Function
0	100	RUN	Inverter running
1	101	SU	Up to frequency
2	102	IPF	Instantaneous power failure/ undervoltage
3	103	OL	Overload alarm
4	104	FU	Output frequency detection
5	105	FU2	Second output frequency detection
5	105	FU2	Second output frequency detection
7	107	RBP	Regenerative brake prealarm *
10	110	PU	PU operation mode
11	111	RY	Inverter operation ready
12	112	Y12	Output current detection
13	113	Y13	Zero current detection
14	114	FDN	PID lower limit
15	115	FUP	PID upper limit
16	116	RL	PID forward/reverse rotation output
17	_	MC1	Commercial power-supply switchover MC1
18		MC2	Commercial power-supply switchover MC2
19		MC3	Commercial power-supply switchover MC3
25	125	FAN	Fan fault output
26	126	FIN	Heatsink overheat pre-alarm
45	145	RUN3	During inverter running and start command is on
46	146	Y46	During deceleration at occurrence of power failure (retained until release)
47	147	PID	During PID control activated
64	164	Y64	During retry
70	170	SLEEP	During PID output suspension
90	190	Y90	Life alarm
91	191	Y91	Alarm output 3 (power-off signal)
92	192	Y92	Energy saving average value updated timing
93	193	Y93	Current average monitor signal
94	194	ALM2	Alarm output 2
95	195	Y95	Maintenance timer signal
96	196	REM	Remote output
98	198	LF	Minor fault output
99	199	ALM	Alarm output
99	99	—	No function
* Setting can be made for the 75K or more			

* Setting can be made for the 75K or more.

(Pr.) 232 to 239 \rightarrow Refer to the section about *Pr.4 to Pr.6*

Refer to the section about Pr. 72 and other (Pr.) 240 relevant parameters.

(Pr.) 241 Pr. 125, Pr. 126

Refer to the section about Pr. 73 and (Pr.) 242, 243 other relevant parameters.

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Increase cooling fan life

Pr.244 Cooling fan operation selection

You can control the operation of the cooling fan (200V class 2.2K or more, 400V class 3.7K or more) built in the inverter.

Pr. 244 Setting	Description
0	The cooling fan operates at power on. Cooling fan on/off control invalid (The cooling fan is always on at power on)
1 (initial value)	Cooling fan on/off control valid The fan is normally on during inverter operation. The fan switches on/off according to the temperature during a stop of the inverter whose status is monitored.

245 to 247 Slip compensation

Pr.245 Rated slip Pr.246 Slip compensation time constant Pr.247 Constant-output region slip compensation selection

The inverter output current may be used to assume motor slip to keep the motor speed constant.

Selection of motor stopping 250 method and start signal

Pr.250 Stop selection

Pr.

Used to select the stopping method (deceleration to a stop or coasting) when the start signal turns off.

Used to stop the motor with a mechanical brake, etc. together with switching off of the start signal.

You can also select the operations of the start signals (STF/STR).

Pr.250	Description		
Setting	Start signal (STF/STR)	Stop operation	
0 to 100s	STF signal: Foward rotation start STR signal: Reverse rotation start	The motor is coasted to a stop when the preset time elapses after the start signal is turned off. The motor is coasted to a stop (<i>Pr. 250</i> - 1000)s after the start signal is turned off.	
1000s to 1100s	STF signal: Start signal STR signal: Forward/ reverse rotation signal		
9999	STF signal: Foward rotation start STR signal: Reverse rotation start	When the start signal is turned off, the motor decelerates to stop.	
8888	STF signal: Start signal STR signal: Forward/ reverse rotation signal		

When Pr. 250 is set to "9999" (initial value) or "8888".



When Pr. 250 is set to values other than "9999" (initial value) or "8888".



251, 872

Input/output phase failure protection selection

Pr.251 Output phase failure protection selection Pr.872 Input phase failure protection selection You can disable the output phase failure protection function that stops the inverter output if one of the inverter output side (load side) three phases (U, V, W) opens.

The input phase failure protection selection of the inverter input side (R/L1, S/L2, T/L3) can be made valid.

Pr. Number	Setting Range	Description	
251	0	Without output phase failure protection	
201	1 (initial value)	With output phase failure protection	
872	0 (initial value)	Without input phase failure protection	
072	1	With input phase failure protection	

(Pr.) 252, 253

Refer to the section about Pr. 73 and other relevant parameters.

Display of the life of the 255 to 259 inverter parts

Pr.256 Inrush current limit circuit life display Pr.255 Life alarm status display Pr.257 Control circuit capacitor life display Pr.258 Main circuit capacitor life display Pr.259 Main circuit capacitor life measuring

Degrees of deterioration of main circuit capacitor, control circuit capacitor or inrush current limit circuit and cooling fan can be diagnosed by monitor.

When any part has approached the end of its life, an alarm can be output by self diagnosis to prevent a fault.

(Use the life check of this function as a guideline since the life except the main circuit capacitor is calculated theoretically.)

Pr. Number	Setting Range	Description	Explanations of
255	(0 to 15)	Display whether the control circuit capacitor, main circuit capacitor, cooling fan, and each parts of the inrush current limit circuit has reached the life alarm output level or not. Reading only	
256	(0 to 100%)	Display the deterioration degree of the inrush current limit circuit. Reading only	Protective
257	(0 to 100%)	Display the deterioration degree of the control circuit capacitor. Reading only	
258	(0 to 100%)	Display the deterioration degree of the main circuit capacitor. Reading only The value measured by <i>Pr. 259</i> is displayed.	Options
259	0, 1 (2, 3, 8, 9)	Setting "1" and turning off the power starts the measurement of the main circuit capacitor life. When the $Pr. 259$ value is "3" after powering on again, the measuring is completed. Read the deterioration degree in $Pr. 258$.	nstructions

(Pr.) 260 \rightarrow Refer to the section about Pr. 72.

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REAL F700 SERIES



Operation at instantaneous 261 to 266 power failure

Pr.261 Power failure stop selection

Pr.262 Subtracted frequency at deceleration start

Pr.266 Power failure deceleration time switchover frequency

When a power failure or undervoltage occurs, the inverter can be decelerated to a stop or can be decelerated and reaccelerated to the set frequency.

Pr. Number	Setting Range	Description
	0 (initial value)	Coasting to stop When undervoltage or power failure occurs, the inverter output is shut off.
261	1	When undervoltage or a power failure occurs, the inverter can be decelerated to a stop.
	2	When undervoltage or a power failure occurs, the inverter can be decelerated to a stop. If power is restored during a power failure, the inverter accelerates again.
262	0 to 20Hz	Normally operation can be performed with the initial value unchanged. But adjust the frequency according to the magnitude of the load specifications (moment of inertia, torque).
263	0 to 120Hz	When output frequency $\ge Pr. 263$ 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 <i>Pr. 262</i> .
264	0 to 3600/ 360s *	Set a deceleration slope down to the frequency set in <i>Pr. 266</i> .
265	0 to 3600/ 360s *	Set a deceleration slope below the frequency set in <i>Pr. 266</i> .
	9999	Same slope as in Pr. 264
266	0 to 400Hz <i>Pr. 264</i> setting to the <i>Pr. 265</i>	

When the setting of *Pr. 21 Acceleration/deceleration time increments* is "0" (initial value), the setting range is "0 to 3600s" and the setting increments are "0.1s", and when the setting is "1", the setting range is "0 to 360s" and the setting increments are "0.01s"



(1) Power failure stop mode (Pr.261 = "1")

 If power is restored during power failure deceleration, deceleration to a stop is continued and the inverter remains stopped.To restart, turn off the start signal once, then turn it on again.



(2) Instantaneous power failure-time operation continuation function (Pr.261 = "2")

- When power is restored during deceleration after an instantaneous power failure, acceleration is made again up to the set frequency.
- When this function is used in combination with the automatic restart after instantaneous power failure operation, deceleration can be made at a power failure and acceleration can be made again after power restoration.
 When power is restored after a stop by deceleration at an instantaneous power failure, automatic restart operation is performed if automatic restart after instantaneous power failure has been selected (*Pr.* 57 ≠ "9999")



FRANKOL F700 SERIES

(**Pr.**)_{338, 339, 550, 551}

Operation command source and speed command source during communication operation

Pr.338 Communication operation command source

Pr.339 Communication speed command source Pr.550 NET mode operation command source selection

Pr.551 PU mode operation command source selection

When the RS-485 terminals or communication option is used, the external operation command and speed command can be made valid. Also, the control command source in the PU operation mode can be selected.

Pr. Number	Setting Range	Description	
338	0 (initial value)	Operation command source communication	
	1	Operation command source external	
	0 (initial value)	Speed command source communication	
339	1	Speed command source external (Frequency setting from communication is invalid, terminal 2 and 1 setting from external is valid)	
	2	Speed command source external (Frequency setting from communication is valid, terminal 2 and 1 setting from external is invalid)	
	0	Communication option valid	
	1	Inverter RS-485 terminal valid	
(initial the second sec		Automatic communication option recognition Normally, the RS-485 terminals are valid. When the communication option is fitted, the communication option is valid.	
	1	Select the RS-485 terminals as the PU operation mode control source.	
551 *	2 (initial value)	Select the PU connector as the PU operation mode control source.	

Pr. 550 and Pr. 551 are always write-enabled.

(Pr.) 340 Pr. 79.

(Pr.) 341 to 343

Refer to the section about Pr. 117 and other relevant parameters.



Pr.496 Remote output data 1

Pr.495 Remote output selection Pr.497 Remote output data 2

You can utilize the on/off of the inverter's output signals instead of the remote output terminal of the programmable logic controller.



To determine the ^{503 to 504} maintenance time of parts.

Pr.504 Maintenance timer alarm output set time

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Pr.503 Maintenance timer When the cumulative energization time of the inverter reaches the parameter set time, the maintenance timer output signal (Y95) is output. (MT) is displayed on the operation panel (FR-DU07)

This can be used as a guideline for the maintenance time of peripheral devices.



• The cumulative energization time of the inverter is stored into the EEPROM every hour and indicated in Pr. 503 Maintenance timer in 100h increments. Pr. 503 is clamped at 9998 (999800h).

(Pr.) 549 \rightarrow Refer to the section about *Pr.117 to Pr. 124*.

(Pr.) 550 to 551 **Pr. 338**, Pr.339.

Current average value Pr.)555 to 557 monitor signal

Pr.556 Data output mask time Pr.555 Current average time

Pr.557 Current average value monitor signal output reference current The average value of the output current during constant speed operation and the maintenance timer value are output as a pulse to the current average value monitor signal (Y93).

The pulse width output to the I/O module of the PLC or the like can be used as a guideline due to abrasion of machines and elongation of belt and for aged deterioration of devices to know the maintenance time.

The current average value monitor signal (Y93) is output as pulse for 20s as 1 cycle and repeatedly output during constant speed operation.



Pr. 571	→ Refer to the section about <i>Pr. 13</i> and other relevant parameters.
Pr. 575 f	→ Refer to the section about <i>Pr. 127</i> and other relevant parameters.
Pr. 611	➡ Refer to the section about <i>Pr. 57</i> and other relevant parameters.
Pr. 872	→ Refer to the section about <i>Pr. 251</i> and other relevant parameters.

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Pr.882 Regeneration avoidance operation selection

Pr.883 Regeneration avoidance operation level

- Pr.884 Regeneration avoidance at deceleration detection sensitivity
- Pr.885 Regeneration avoidance compensation frequency limit value

Pr.886 Regeneration avoidance voltage gain

This function detects a regeneration status and increases the frequency to avoid the regeneration status.

 Possible to avoid regeneration by automatically increasing the frequency and continue operation if the fan happens to rotate faster than the set speed due to the effect of another fan in the same duct.

Pr. Number	Setting Range	Description	
882	0 (initial value)	Regeneration avoidance function invalid	
	1	Regeneration avoidance function valid	
883	300 to 800∨	Set the bus voltage level at which regeneration avoidance operates. When the bus voltage level is set to low, overvoltage error will be less apt to occur. However, the actual deceleration time increases. The set value must be higher than the power supply valtage $\times \sqrt{2}$.	
	0 (initial value)	Regeneration avoidance by bus voltage change ratio is invalid	
884	1 to 5	Set sensitivity to detect the bus voltage change Setting 1 5 Detection sensitivity low	
885	0 to 10Hz	Set the limit value of frequency which rises at activation of regeneration avoidance function.	
	9999 Frequency limit invalid		
886 0 to 200% improve responsiveness to the bus voltage		regeneration avoidance. A larger setting will improve responsiveness to the bus voltage change. However, the output frequency could	



Free parameter

Pr.888 Free parameter 1

Pr.889 Free parameter 2

Parameters you can use for your own purposes. You can input any number within the setting range 0 to 9999. For example, the number can be used:

- As a unit number when multiple units are used.
- As a pattern number for each operation application when multiple units are used.
- · As the year and month of introduction or inspection.



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Refer to the section about Pr. 52 and other relevant parameters.



Pr.892 Load factor

 Pr.893 Energy saving monitor reference (motor capacity)

 Pr.894 Control selection during commercial power-supply operation

 Pr.895 Power saving rate reference value

 Pr.896 Power unit cost

 Pr.897 Power saving monitor average time

 Pr.898 Power saving cumulative monitor clear

Pr.899 Operation time rate (estimated value)

From the power consumption estimated value during commercial power supply operation, the energy saving effect by use of the inverter can be monitored/output.

• The following provides the items that can be monitored by the power saving monitor (*Pr. 52, Pr. 54, Pr. 158* = "50").

(Only power saving and power saving average value can be output to *Pr. 54* (terminal FM) *and Pr. 158* (terminal AM))

Energy Saving Monitor Item	Description and Formula	Increments
Power saving	Difference between the estimated value of power necessary for commercial power supply operation and the input power calculated by the inverter Power during commercial power supply operation - input power monitor	0.01kW/ 0.1kW*
Power saving rate	Ratio of power saving on the assumption that power during commercial power supply operation is 100%Power savingPower savingPower during commercial power supply operation × 100Ratio of power saving on the assumption that $Pr. 893$ is 100%Power saving $Pr.893$ ×100	0.1%
Power saving average value	Average value of power saving amount per hour during predetermined time ($Pr. 897$) Σ (Power saving $\times \Delta t$) $Pr.897$	0.01kWh/ 0.1kWh*
Power saving rate reference value	Ratio of power saving average value on the assumption that the value during commercial power supply operation is 100% Σ (Power saving × Δt) $Yr.897$ ×100Ratio of power saving average value on the assumption that $Pr. 893$ is 100%Power saving average value $Pr.893$ ×100	0.1%
Power saving charge average value	Power saving average value represented in terms of charge Power saving average value × Pr. 896	0.01/0.1*

Features

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The following gives the items which can be monitored by the cumulative saving power monitor (*Pr.* 52 = "51"). (The cumulative power monitor data digit can be shifted to the

right by the number set in Pr. 891 Cumulative power monitor digit shifted times.)

Energy Saving Monitor Item	Description and Formula	Increments
Power saving amount	Power saving is added up per hour. Σ (Power saving × Δt)	0.01kWh/ 0.1kWh*
Power saving amount charge	Power saving amount represented in terms of charge Power saving amount × <i>Pr. 896</i>	0.01/0.1*
Annual power saving amount	Estimated value of annual power saving amount Power saving amount Operation time during power saving totalization Pr.899 100 100	0.01kWh/ 0.1kWh*
Annual power saving amount charge	Annual power saving amount represented in terms of charge Annual power saving amount × Pr. 896	0.01/0.1*

The increments vary according to the inverter capacity. (55K or less/75K or more)

C0(900), C1(901) and AM (calibration)

Adjustment of terminal FM

C0(Pr.900) FM terminal calibration C1(Pr.901) AM terminal calibration The operation panel and parameter unit can be used to calibrate the full scales of the terminals FM and AM.

(1) FM terminal calibration (C0(Pr.900))

- · The terminal FM is preset to output pulses. By setting the Calibraton parameter C0 (Pr. 900), the meter connected to the inverter can be calibrated by parameter setting without use of a calibration resistor.
- Using the pulse train output of the terminal FM, a digital display can be provided by a digital counter. The monitor value is 1440 pulses/s output at the full-scale value of Pr. 54 FM terminal function selection.



Not needed when the operation panel (FR-DU07) or parameter unit (FR-*1 PU04) is used for calibration.

Used when calibration must be made near the frequency meter for such a reason as a remote frequency meter.

However, the frequency meter needle may not deflect to full-scale if the calibration resistor is connected. In this case, use this resistor and operation panel or parameter unit together.

(2) AM terminal calibration (*C1(Pr.901)*)

· The AM terminal is factory-set to output 10VDC in the fullscale state of each monitor item. By setting the calibration parameter C1 (Pr. 901), the ratio (gain) of the output voltage can be adjusted to the meter scale. Note that the maximum output voltage is 10VDC.

(Pr.) 989 Parameter for manufacturer setting. Do not set.



Buzzer control of the operation panel 990

Pr.990 PU buzzer control

You can make the buzzer "beep" when you press key of the operation panel (FR-DU07) and parameter unit (FR-PU04).

Pr.990 Setting	Description	Devic
0	Without buzzer	Perinheral
1(initial value)	With buzzer	Peri

PU contrast adjustment 991

Pr.991 PU contrast adjustment

Contrast adjustment of the LCD of the parameter unit (FR-PU04) can be performed.

Decreasing the setting value makes contrast light.

Pr.991 Setting	Description	
0 to 63	0 : Light ↓ 63 : Dark	Terminal Connec

989, CL, ALLC, Er.CL, PCPY

Parameter clear, parameter copy

Pr.989 Parameter copy alarm release

Pr.CL Parameter clear ALLC All parameter clear

- PCPY Parameter copy Er.CL Alarm history clear • Set "1" in *Pr.CL Parameter clear* to initialize all parameters.
- (Calibration parameters are not cleared.)*
- Set "1" in ALLC All parameter clear to initialize all parameters. *
- Set "1" in Er.CL Alarm history clear to clear alarm history. *
- Parameter settings can be copied to multiple inverters by using PCPY.

When parameters are copied to the 75K or more inverter from the 55K or less inverter or vice versa, an $\int P$ alarm appears on the operation panel.

For the parameters whose setting range differ, set Pr.989 as below after reset.

		55K or less	75K or more
Pr.989 s	etting	tting 10 100	
PCPY Setting		Description	
0	Cancel	Cancel	
1	Copy the source parameters in the operation panel.		
2		Vrite the parameters copied to the operation panel to the lestination inverter.	
3	Verify p	Verify parameters in the inverter and operation panel.	

* Parameters are not cleared when "1" is set in Pr.77 Parameter write selection.

Protective Functions

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Protective Functions

When an alarm occurs in the inverter, the protective function is activated bringing the inverter to an alarm stop and the PU display automatically changes to any of the following error (alarm) indications.

F700 Series

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	Function Name	Description	Indication					
2	Operation panel lock	Appears when operation is tried during operation panel lock.	KOLJ					
Error message *2	Parameter write error	Appears when an error occurs at parameter writing.	Er I to Er Y					
or mes	Copy operation error	Appears when an error occurs at parameter copying.	ר 3 ¦ to ר 3 ץ					
Е Ш	Error	Appears when the RES signal is on or the PU and inverter can not make normal communication.	Err.					
	Stall Prevention (overcurrent)	Appears during overcurrent stall prevention.	OL					
	Stall prevention (overvoltage)	Appears during overvoltage stall prevention Appears while the regeneration avoidance function is activated.	οί					
warnings *3	Regenerative brake prealarm	Appears if the regenerative brake duty reaches or exceeds 85% of the <i>Pr.</i> 70 "special regenerative brake duty" value. If the regenerative brake duty reaches 100%, a regenerative overvoltage (E. OV_) occurs. (displayed only for the 75K or more)	rb					
Warni	Electronic thermal relay function prealarm	Appears when the electronic thermal O/L relay has reached 85% of the specified value.	ſH					
	PU Stop	Appears when employed and the operation panel was pressed during external operation.	PS					
	Maintenance signal output	Appears when the cumulative energization time has exceeded the maintenance output timer set value.	nr					
	Parameter copy	Appears when parameters are copied between models with capacities of 55K or less and 75K or more.	C P					
fault *4	Fan fault	Appears when the cooling fan remains stopped when operation is required or when the speed has decreased.	۶n					
	Overcurrent shut-off during acceleration	Appears when an overcurrent occurred during acceleration.						
	Overcurrent shut-off during constant speed	Appears when an overcurrent occurred during constant speed operation.	5003					
	Overcurrent shut-off during deceleration or stop	Appears when an overcurrent occurred during deceleration and at a stop.	E.OC 3					
	Regenerative overvoltage shutoff during acceleration	Appears when an overvoltage occurred during acceleration.	8.0u I					
	Regenerative overvoltage shut-off during constant speed	Appears when an overvoltage occurred during constant speed operation.	£.0u2					
	Regenerative overvoltage shut- off during deceleration or stop	Appears when an overvoltage occurred during deceleration and at a stop.	£.0 J 3					
	Inverter overload shut-off (electronic thermal relay function)*1	Appears when the electronic thermal relay function for inverter element protection was activated.	<i>Ε.Γ.ΗΓ</i>					
ڻ ۲	Motor overload shut-off (electronic thermal relay function)*1	Appears when the electronic thermal relay function for motor protection was activated.	<i>ЕГ</i> НП					
	Fin overheat	Appears when the heatsink overheated.	6.F.L n					
Major Tallures	Instantaneous power failure protection	Appears when an instantaneous power failure occurred at an input power supply.	EJ PF					
a C	Undervoltage protection	Appears when the main circuit DC voltage became low.	6.UuF					
≥	Input phase failure	Appears if one of the three phases on the inverter input side opened.	EJ LF					
	Stall prevention	Appears when the output frequency drops to 0.5Hz as a result of deceleration due to the excess motor load.	6.0L F					
	Output side earth (ground) fault overcurrent protection	Appears when an earth (ground) fault occurred on the inverter's output side.	E. GF					
	Output phase failure protection	Appears if one of the three phases on the inverter output side opened.	E. L.F					
	External thermal relay operation *6	Appears when the external thermal relay connected to the terminal OH operated.	6.0нГ					
	PTC thermistor operation	Appears when the motor overheat status is detected for 10s or more by the externa PTC thermistor input connected to the terminal AU.						
	Option alarm	Appears when an alarm occurred in the option card or an AC power supply is connected to the R/L1, S/L2, T/L3 when the high power factor converter connection is set.	6.0PF					
	Option slot alarm	Appears when a communication error occurred in the communication option.	E.0P I					
	Option alarm	Appears when a functional error occurred in the plug-in option.	ε. ι					
	Parameter storage devide	Appears when operation of the element where parameters are stored became	E. PE					

	Function Name	Description	Indication	
	PU disconnection	Appears when a communication error between the PU and inverter occurred, the communication interval exceeded the permissible time during the RS-485 communication with the PU connecter, or communication errors exceeded the number of retries during the RS-485 communication.	<i>Ε.Ρ</i> .υΕ	Features
	Retry count excess	Appears when the operation was not restarted within the set number of retries.	E.r. 8 F	Ч
	Parameter storage devide alarm	Appears when operation of the element where parameters stored became abnormal. (main circuit board)	6.962	vices
	CPU error	Appears during the CPU and peripheral circuit errors.	E. 67 E. 97 E.C.PU	Peripheral Devices Why energy savings?
Major failures *5	Operation panel power supply short circuit RS-485 terminals power supply short circuit	Appears when the RS-485 terminal power supply or operation panel power supply was shorted.	есте	Standard Specifications
lajor f	24VDC power output short circuit	Appears when terminals PC-SD were shorted.	<i>Е.Р.2</i> Ч	
Σ	Output current detection value exceeded	Appears when output current exceeded the output current detection level set by the parameter.	06 J.3	Outline Dimension Drawings
	Inrush resistor overheat	Appears when the resistor of the inrush current limit circuit overheated.	EJ OH	0-
	Communication error (inverter)	Appears when a communication error occurred during the RS-485 communication with the RS-485 terminals.	8.58 r	onnection ram ecification lation
	Analog input error	Appears when 30mA or more is input or a voltage (7.5V or more) is input with the terminal 2/4 set to current input.	E.RT E	Terminal Connection Diagram Terminal Specification Explanation
	Internal circuit error	Appears when an internal circuit error occurred.	E. 13	
	Brake transistor alarm detection	This function stops the inverter output if an alarm occurs in the brake circuit, e.g. damaged brake transistors. In this case, the inverter must be powered off immediately. (Internal circuit error for the model 55K or less)	Е. ЬЕ	Operation Panel

*1 *2 *3 *4 *5 *6 Resetting the inverter initializes the internal thermal integrated data of the electronic thermal relay function.

The error message shows an operational error. The inverter output is not shut off. Warnings are messages given before major failures occur. The inverter output is not shut off.

Minor faults warn the operator of failures with output signals. The inverter output is not shut off.

When major failures occur, the protective functions are activated to shut off the inverter output and output the alarms.

The external thermal operates only when the OH signal is set in Pr. 178 to Pr. 189 (input terminal function selection).

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Option and Peripheral Devices

REAL F700 Series

Options

By fitting the following options to the inverter, the inverter is provided with more functions. One plug-in option can be fitted.

		Name	Туре	Applications, Specifications, etc.	Applicable Inverter	
	16-b	it digital input	FR-A7AX	 This input interface sets the high frequency accuracy of the inverter using an external BCD or binary digital signal. BCD code 3 digits (maximum 999) BCD code 4 digits (maximum 9999) Binary 12 bits (maximum FFFH) Binary 16 bits (maximum FFFH) 		
Plug-in Type		al output nsion analog output	FR-A7AY	 This option provides the inverter with open collector outputs selected from among the standard output signals. This option adds two different signals that can be monitored at the terminals FM and AM, such as the output frequency, output voltage and output current. 20mADC or 5VDC (10V) meter can be connected. 	Shared among all models	
Ē	Rela	y output	FR-A7AR	· Output any three output signals available with the inverter as standard from the relay contact terminals		
	Communication	CC-LINK	FR-A7NC	• This option allows the inverter to be operated or monitored or the parameter setting to be changed from a computer or		
	Commu	LonWorks	FR-A7NL	PLC. * For the FR-A7NC (CC-Link), the above operations can be done from the PLC only.		
	Para	meter unit (Eightlanguages)	FR-PU04	Interactive parameter unit with LCD display		
	Para	meter unit connection cable	FR-CB20□	Cable for connection of operation panel or parameter unit indicates a cable length. (1m, 3m, 5m)	Shared among all models	
		ration panel connection ector	FR-ADP	Connector to connect the operation panel (FR-DU07) and connection cable		
	Intore	oomotikilitu ottookmont	FR-AAT	Attachment for replacing with the F700 series using the installation holes of the FR-F500.	According to	
	Intert	compatibility attachment	FR-A5AT	Attachment for replacing with the F700 series using the installation holes of the FR-A100 <excellent> and FR-A200<excellent></excellent></excellent>	capacities	
	AC re	eactor	FR-HAL	For harmonic current reduction and inverter input power factor improvement (total power factor approx. 88%)	For 200V class 55K or less, 400V class 75K or less	
8	DC r	eactor	FR-HEL	For harmonic current reduction and inverter input power factor improvement (total power factor approx. 93%)	For the 55K or less	
Shared	Line	noise filter	FR- BSF01 FR- BLF	For line noise reduction	Shared among all models	
ne	BU ty	ype brake unit	BU	For increasing the braking capability of the inverter (for high- inertia load or negative load)	For the 55K or less	
Stand-alo	Brak	e unit	FR-BU MT-BU5	For increasing the braking capability of the inverter (for high- inertia load or negative load)	According to	
Sta		stor unit	FR-BR MT-BR5	Brake unit and resistor unit are used in combination	capacities	
	conv		FR-CV	Unit which can return motor-generated braking energy back to the power supply in common converter system	For the 55K or	
		cated stand-alone reactor ne FR-CV	FR-CVL		less	
	Powe	er regeneration converter	MT-RC	Energy saving type high performance brake unit which can regenerate the braking energy generated by the motor to the power supply.	For the 75K or more	
	High	power factor converter	FR-HC MT-HC	The high power factor converter switches the converter section on/off to reshape an input current waveform into a sine wave, greatly suppressing harmonics. (Used in combination with the standard accessory.)	According to capacities	
	Surg	e voltage suppression filter	FR-ASF	Filter for suppressing surge voltage on motor	For 400V class 55K or less	
	Sine wave filter	Reactor	MT-BSL	Reduce the motor noise during inverter driving	For the 75K or	
	Sine	Capacitor	MT-BSC	Use in combination with a reactor and a capacitor	more	

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	Name	Туре	Applications, Specifications, etc.	Applicable Inverter	
oller	Manual controller	FR-AX	For independent operation. With frequency meter, frequency setting potentiometer and start switch.		ures
ontro	DC tach. follower	FR-AL	For synchronous operation (1.5VA) by external signal (0 to 5V, 0 to 10V DC) *		Features
ed C	Three speed selector	FR-AT	For three speed switching, among high, middle and low speed operation (1.5VA) *		svices 3y
Controller/Speed Controller	Motorized speed setter	FR-FK	For remote operation. Allows operation to be controlled from several places (5VA) *		Peripheral Devices Why energy savings?
roller	Ratio setter	FR-FH	For ratio operation. Allows ratios to be set to five inverters. (3VA) *		
Conti	PG follower	FR-FP	For tracking operation by a pilot generator (PG) signal (3VA)		Standard Specifications
ual (Master controller	FR-FG	Master controller (5VA) for parallel operation of multiple (maximum 35) inverters. *	Shared among all	Sta Spec
Man	Soft starter	FR-FC	For soft start and stop. Enables acceleration/deceleration in parallel operation (3VA) *	models	ine nsion vings
Series Manual	Deviation detector	FR-FD	For continuous speed control operation. Used in combination with a deviation sensor or synchro (5VA) *		Outline Dimension Drawings
FR S	Preamplifier	FR-FA	Used as an A/V converter or arithmetic amplifier (3VA) *		Terminal Connection Diagram Terminal Specification Explanation
	Pilot generator	QVAH-10	For tracking operation. 70V/35VAC 500Hz (at 2500r/min)		inal Cor Diagra nal Spe
	Deviation sensor	YVGC-500W-NS	For continuous speed control operation (mechanical deviation detection). Output 90VAC/90°		Term
s	Frequency setting potentiometer	WA2W 1kΩ	For frequency setting. Wirewound 2W 1k Ω B characteristic		io –
Others	Frequency meter	YM206NRI 1mA	Dedicated frequency meter (graduated to 120Hz). Moving- coil type DC ammeter		Operation Panel
0	Calibration resistor	RV24YN 10kΩ	For frequency meter calibration. Carbon film type B characteristic		
	Inverter setup software (FR Configrator)	FR-SW1-SETUP- WE	Supports an inverter startup to maintenance.	Shared among all models	Parameter List
* R	ated power consumption. The pow	er supply specificatio	ns of the FR series manual controllers and speed controllers are	200\/AC 50Hz 220\//	

Rated power consumption. The power supply specifications of the FR series manual controllers and speed controllers are 200VAC 50Hz, 220V/ 220VAC 60Hz, and 115VAC 60Hz.

Motor

Stand-alone option

Name (type)							S	pecificat	ions,	Stru	cture	, etc.	
	Th ful Sii	for replacing	eries inv the con lation siz	erter car ventiona ze of the	n be inst Il model 400V c	alled us with the lass 0.7	tach ing ir FR- 5K to	nment Istallation hol F700 series. 3.7K, 7.5K, 2	es of the 22K, 37ł	conver C to 55K	itional Fl	R-F500	series with this attachment. This attachment is use- an intercompatibility attachment is not necessary
		The deput inc					vente			10 030		ad Inve	artor.
	F	R-AAT	In	verter					/pe AT22			ed Inve 740-5.	
Intercompatibility					<u>-</u>	7			AT24		FR-F74		
attachment		Ĺ	<u></u>		<u> </u>	-		FR-A	AT27		FR-	F740-30)K
FR-AAT□□ FR-A5AT□□	FR-A100E and FR-A200E series installation intercompatibility attachment The FR-F700 series inverter can be installed using installation holes of the conventional FR-A100E and FR-A200E series with this attachment is useful for replacing the conventional model with the FR-F700 series. * The depth increases after installation of the inverter when the attachment is used												
								-	/pe			ed Inve	
	F	R-A5AT		nverter		Ŧ			5AT02 5AT03		R-F740 FR-F74		
					=	12			5AT04		FR-F74		
		L				1		FR-A	5AT05		FR-F7	40-45K,	55K
	• 0	outline dim	ensior	า							(Un	it: mm)	
		Туре	w	D	н	Mass (kg)		Туре	w	D	н	Mass (kg)	Less than D
		0.4K	104	72	99	0.6	6 8 1 5 2 3 2 4 2 0 0 V V 7	H0.4K	135	59.6	115	1.5	
		0.75K 1.5K	104 104	74 77	99 99	0.8		H0.75K H1.5K	135 135	59.6 59.6	115 115	1.5 1.5	
	2 0 0 V	2.2K	115	77	115	1.5		H2.2K	135	59.6	115	1.5	
		3.7K 5.5K	115	83	115	2.2		H3.7K	135	70.6	115	2.5	Н
AC reactor		5.5K 7.5K	115 130	83 100	115 135	2.3 4.2		H5.5K H7.5K	160 160	72 91	142 142	3.5 5.0	
(for power coordination) FR-HAL-(H)□□K		11K	160	111	164	5.2		H11K	160	91	146	6.0	W
~ /		15K 18.5K	160 160	126 175	167 128	7.0 7.1		H15K H18.5K	220 220	105 170	195 215	9.0 9.0	(Note) 1. Make selection according to the applied
		22K	185	158	150	9.0		H22K	220	170	215	9.5	motor capacity. (When the inverter
		30K	185	168	150	9.7		H30K	220	170	215	11	capacity is larger than the motor capacity, make selection according to the
		37K 45K	210 210	174 191	175 175	12.9 16.4		H37K H45K	220 280	170 165	214 245	12.5 15	motor capacity) 2. Power factor improving reactor (FR-BAL)
		55K	210	201	175	17.4		H55K	280	170	245	18	can be used. Power factor improving effect
								H75K	205	208	170	20	FR-BAL : approx. 90% FR-HAL : approx. 88%
	•0	utline dime	ension								(Un	it: mm))
		Туре	w	D	н	Mass		Туре	w	D	Н	Mass	Less than D
		0.4K	70	61	71	(к д) 0.4		H0.4K	90	60	78	(kg) 0.6	
		0.75K	85	61	81	0.5		H0.75K	66	70	100	0.8	
		1.5K 2.2K	85 85	70 70	81 81	0.8 0.9		H1.5K H2.2K	66 76	80 80	100 110	1 1.3	
		3.7K	77	82	92	1.5		H3.7K	86	95	120	2.3	HW
	2	5.5K 7.5K	77 86	92 98	92 113	1.9 2.5	4	H5.5K H7.5K	96 96	100 105	128 128	3 3.5	
	0 0	11K	105	112	133	3.3	0 0	H11K	105	110	137	4.5	<i>ν</i> У
DC reactor	v	15K	105	115	133	4.1	v	H15K	105	125	152	5	(Note) 1.Be sure to remove the jumper across terminals P/+ - P1 of the inverter. (A
(for power coordination) FR-HEL-(H)□□K		18.5K 22K	105 105	165 175	93 93	4.7 5.6		H18.5K H22K	114 133	120 120	162 178	5 6	failure to do so will produce no power
		30K	114	200	100	7.8		H30K	133	120	178	6.5	factor improving effect) 2. The wiring length between the reactor and
		37K 45K	133 133	195 205	117 117	10 11		H37K H45K	133 133	155 170	187 187	8.5 10	inverter should be within 5m. 3. The size of the cables used should be equal
		45K 55K	153	203	132	12.6		H55K	152	170	206	11.5	to or larger than that of the power supply cables (R/L1, S/L2, T/L3). 4. Make selection according to the motor
													 Wake Selection according to the indici- capacity. (When the inverter capacity is larger than the motor capacity, make selection according to the motor capacity) Power factor improving reactor (FR-BEL) can be used. Power factor improving effect FR-BEL : approx. 95% FR-HEL : approx. 93%

REARD F700 SERIES



Name (type)	Specifications, Structure, etc.										
	 The brake unit and resistor unit are options that will fully exhibit the regenerative braking capability of the inverter and are always used as a set. There are six different brake units as in the following table, from which make selection according to the necessary braking torque and deceleration time. The brake unit is equipped with a seven-segment LED that displays the duty (%ED) and alarm. Brake unit selection table 										
	KED at short-time rating when braking torque is 100%										
	Motor Capacity 5.5kW 7.5kW 11kW 15kW 18.5kW 22kW 30kW 37kW 45kW 55kW										
	200V 5.5K 7.5K 11K 15K 18.5K 22K 30K 37K 45KK 55K										
	Inverter 400V 5.5K 7.5K 11K 15K 18.5K 22K 30K 37K 45KK 55K										
	2 FR-BU-15K 80 40 15 10										
	₩ 0 FR-BU-30K %ED 65 30 25 15 10										
	$\begin{bmatrix} U & 0 \\ 5 & V \end{bmatrix} \begin{bmatrix} RR-BU-30K \\ V \end{bmatrix} \begin{bmatrix} -1 & -1 & -55 \\ -1 & -1 & -1 \end{bmatrix} \begin{bmatrix} -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 \end{bmatrix} \begin{bmatrix} -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 \end{bmatrix} \begin{bmatrix} -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 \end{bmatrix}$										
	4 FR-BU-H15K 80 40 15 10 -										
	m 0 0 FR-BU-H30K %ED − − 65 30 25 15 10 − − −										
	Braking torque (%) at short-time rating when 10%ED is 15s										
	Motor Capacity 5.5kW 7.5kW 11kW 15kW 18.5kW 22kW 30kW 37kW 45kW 55kW										
	200V 5.5K 7.5K 11K 15K 18.5K 22K 30K 37K 45KK 55K										
	Inverter 400V 5.5K 7.5K 11K 15K 18.5K 22K 30K 37K 45KK 55K										
	2 FR-BU-15K Braking 280 200 120 100 80 70										
	Image: book for the strength of the str										
	⁸ / ₂ ⁴ / ₄ FR-BU-H15K Braking 280 200 120 100 80 70 − − − −										
	m 0 FR-BU-H30K Torque − − 260 180 160 130 100 80 70 −										
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
Brake unit FR-BU-(H)□□K	Brake unit and resistor unit combinations and used cables Brake Unit Type Resistor Unit Type Cable (P/+-P/+, N/ N/-, P/+-P, PR-PR) (Note) 1. The temperature rise of the resistor unit is about a maximum of 100°C. Therefore, use heat-resistant wires (such as glass wires).										
Resistor unit FR-BR-(H)□□K	2 FR-BU-15K FR-BR-15K 3.5mm² 0 FR-BU-30K FR-BR-30K 5.5mm² V FR-BU-55K FR-BR-55K 14mm²										
	4 FR-BU-H15K FR-BR-H15K 3.5mm ² 0 FR-BU-H30K FR-BR-H30K 3.5mm ² V FR-BU-H55K FR-BR-H55K 5.5mm ²										
	Use the wires of the above recommended size or larger. Connection example										
	T+2 MCCB MC MC MC MC MC MC MC MC MC MC										
	Three-phase AC power supply X J J J J J J J J J J J J J J J J J J										
	N-										
	*3. Minimize the cable length between the inverter and brake unit and the resistor unit and brake unit. Use a twisted cable when the write a write a write a write and the verse is so.										
	*3. Minimize the cable length between the inverter and brake unit and the resistor unit and brake unit. Use a twisted cable when the wiring length exceeds 5m. (If twisted wires are used, the distance should be within 10m.) Use										
	 *1. Connect the inverter terminals (P/+, N/-) and brake unit (FR-BU (H)) terminals so that their *3. Minimize the cable length between the inverter and brake unit and the resistor unit and brake unit. Use a twisted cable when the wiring length exceeds 5m. (If twisted wires are used, the distance should be within 10m.) Use the wires of the above recommended size or larger. 										
	*3. Minimize the cable length between the inverter and brake unit and the resistor unit and brake unit. Use a twisted cable when the wiring length exceeds 5m. (If twisted wires are used, the distance should be within 10m.) Use										

Name (type)						Spec	ificat	ions	s, St	ruct	ture, etc).]
	The brake unit and resistor unit are options that will fully exhibit the regenerative braking capability of the inverter. Use them as a set. There are six different brake units as in the following table, from which make selection according to the deceleration time. When the brake unit duty (%ED) excess and an alarm occur, errors appear in the inverter. Brake unit selection table								atures						
	%ED at short-time Motor Capac	-	nen bra 75 kW	90 1	10 1	s 100% 132 16 kW kW		220 kW	280 kW	375 kW		S Unit Type	Resistor unit	Cable	Ъ
	Inverter	200V 400V	75K	90K 1	10K	 32K 160	· -	-			200V	MT-BU5-55K	type MT-BR5-55K	14mm ²	evices gy
	2 MT-BU5-55K	400 V	5	-	_		· _	-	-	-	2001	MT-BU5-110K MT-BU5-H75K	2×MT-BR5-55K MT-BR5-H75K	2×14mm ² 14mm ²	Peripheral Devices Why energy savings?
		%ED		45	40							MT-BU5- H150K	2×MT-BR5-H75K	2×14mm ²	
	Image: Window Stress MT-BU5-110K Image: Window Stress MT-BU5-H75K Image: Window Stress MT-BU5-H150K		20 10	_	10		-	-	-	-	400V	MT-BU5- H220K MT-BU5-	3×MT-BR5-H75K	3×14mm ²	ication
	MT-BU5-H150K	%ED	40 80	25	20	10 5 25 15	5	 10		-		H280K MT-BU5-	4×MT-BR5-H75K	4×14mm ²	Standard Specifications
	V MT-BU5-H280K MT-BU5-H375K		-		65	40 30 80 50	20	15 20	10 15	5 10	(Caution 1)	H375K	5×MT-BR5-H75K	5×14mm ²	
	Braking torque (% Motor Capac	ity	75 kW	90 1 kW k	w I	132 16 kW kW		220 kW	280 kW	375 kW	(Caution 2)	installing the re heat is not wel	stor unit. Ventilation esistor in a place, e. I diffused. re rise of the discha	g. enclosure, where	
	Inverter 2 MT-BU5-55K	200V 400V	75K 75K 70	90K 1	10K - 10K 1 50 -	 32K 160	 K 185K	 220K	 280K	 375K	(Caution 2)	300deg. There the resistor. In heat resistance	fore, wire the cable addition, separate t and the resistor by	so as not to touch he parts with low	nnection am cification ation
	0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	braking torque (%)	150		100 -			_	_		(Caution 3)	increases if the	re of the resistor un brake unit is opera Since the resistor u	ated exceeding the	Terminal Connection Diagram Terminal Specification Explanation
		braking torque (%)	100 150 150 150	150 1 150 1 150 1	35 1 50 1 50 1	55 45 110 90 150 13 150 15 150 15	80 5 115 0 150	35 70 100 125 150	25 50 80 100 130	20 40 55 70 100	overheat normal o	overheat if the unchanged, sw stor unit is provi protection. If th peration, it is as	temperature of the vitch off the inverter ded with a thermost is protective device sumed that the dec	brake unit is left at (a contact) as is activated under eleration time is too	
Brake unit	 To obtain a large b that meets the bra Check the torque Outline dimens 	king torqu characteri	rque, th ue. stic of	he moto	r has						the inver		crease the deceler:	auon ume setung of	Parameter List
MT-BU5-(H)□□K Resistor unit MT-BR5-(H)□□K			+ + ₽	A AA AB			P, PF 2×M	terminal Sscrew×t			<u>↓</u> ♦	NP + 000			Explanations of Parameters
	407	B BA	₽		Ð							H12 M4 RTH1 E 1 RTH1 E 1	• • • • • • • • • • • • • • • • • • •		Protective Functions
		nting hole			N X-Y		c		+			Mounting hole	<u>7.5, , 450 .</u>		Options
	Brake Unit Type 200V MT-BU5-55K class MT-BU5-110K MT-BU5-H75K MT-BU5-H150K	A AA 118 102 188 172 118 102 188 172	2 90 2 160 2 90	200 10	00 25 00 25 00 25	C Lc 6.5 550 6.5 550 6.5 550 6.5 550	1740 2000 1740	LN 1740 2000 1740 2000	N /	Approx mass 1.5 3.0 1.5 3.0		2 t 8 200V 8 class l	ype va MT-BR5-55K 2 MT-BR5- 6	stance aluemass.0Ω50kg.5Ω70kg	Instructions
	400V class MT-BU5-H220K MT-BU5-H280K MT-BU5-H375K • External conne		2 300 2 370	200 10 200 10 200 10	00 25	i6.5 550 i6.5 550 i6.5 550	2330	2000 2330 2330	3 4 5	4.5 6.0 7.5	38 12 60 12 60 12	8 10 10			Motor
			maximum and 5m m not twiste	g length shoul 1 when wires a naximum when d. TH1 P PR PR	re twisted		(Cautio	a u n c n	n acce nit. Co ninals uit cab	essory onnect P/+ ar ole to t cuts i	cable supp the main ci d N/- and co he connecto	hit and inverter, lied with the bra rcuit cable to the onnect the contro or (CN8) inside to bush at the top	ke Brak e ter- ↓ rol cir by	e unit	Compatibility
	Cable provided with a brake u	P PR Brake ur MT-BUS		PR PR Resis	tor unit BR5		(Cautio	on 2) T u re	he bra nits ha esistor	ake un as tern units.	ninals equal	s multiple resist to the number on the resistor unit to	or of	nverter	Warranty
															Inquiry

Name (type)	Specifications, Structure, etc.								
Power regeneration common converter FR-CV-(H)□□K	 enables 100%-torque continuous regeneration to support continuous regenerative operation for line control, etc. Eliminates the need to use a brake unit with each inverter, reducing total space and total cost. Saves energy since regeneration energy is used for the other inverters and excess energy is returned to the power supply. Connection example								
High power factor converter FR-HC- (H)□□K	 Substantially suppresses power harmonics to realize the equivalent capacity conversion coefficient K5=0 in the "Harmonic suppression guideline for specific consumers". Specifications Applied inverter capacity (*1) 37K to 75K 75K 15K 30K 115 215 17 13 15 16 15 10 240 230 160 155 100 240 230 160 190 320 165 170 180 180 190 201 165 190 201 160 150 100 240 230 160 190 160 160<!--</th-->								

THORD F700 SERIES



Peripheral devices list

	Motor Output			Case Circuit Breaker (MC Leakage Circuit Breaker			e Magnetic actor*3		nded Cable nm ²)*4
Voltage	(kW)	Applicable Inverter Type	Reactor c	onnection	Commercial-power	Reactor c	onnection		
	*1		without	with	supply operation available	without	with	R, S, T	U, V, W
	0.75	FR-F720-0.75K	30AF 10A	30AF 10A	30AF 10A	S-N10	S-N10	2	2
	1.5	FR-F720-1.5K	30AF 15A	30AF 15A	30AF 15A	S-N10	S-N10	2	2
	2.2	FR-F720-2.2K	30AF 20A	30AF 15A	30AF 20A	S-N10	S-N10	2	2
	3.7	FR-F720-3.7K	30AF 30A	30AF 30A	30AF 30A	S-N20, N21	S-N10	3.5	3.5
	5.5	FR-F720-5.5K	50AF 50A	50AF 40A	50AF 50A	S-N25	S-N20, N21	5.5	5.5
	7.5	FR-F720-7.5K	100AF 60A	50AF 50A	100AF 60A	S-N25	S-N25	14	8
	11	FR-F720-11K	100AF 75A	100AF 75A	100AF 75A	S-N35	S-N35	14	14
	15	FR-F720-15K	225AF 125A	100AF 100A	225AF 125A	S-N50	S-N50	22	22
200V class	18.5	FR-F720-18.5K	225AF 150A	225AF 125A	225AF 150A	S-N65	S-N50	38	38
	22	FR-F720-22K	225AF 175A	225AF 150A	225AF 175A	S-N80	S-N65	38	38
	30	FR-F720-30K	225AF 225A	225AF 175A	225AF 225A	S-N95	S-N80	60	60
	37	FR-F720-37K	400AF 250A	225AF 225A	400AF 250A	S-N150	S-N125	80	80
	45	FR-F720-45K	400AF 300A	400AF 300A	400AF 350A	S-N180	S-N150	100	100
	55	FR-F720-55K	400AF 400A	400AF 350A	600AF 500A	S-N220	S-N180	100	100
	75	FR-F720-75K	_	400AF 400A	400AF 400A	_	S-N300	125	125
	90	FR-F720-90K	_	400AF 400A	600AF 500A		S-N300	150	150
	110	FR-F720-110K	_	600AF 500A	600AF 600A		S-N400	2 × 100	2 × 10
	0.75	FR-F740-0.75K	30AF 5A	30AF 5A	30AF 5A	S-N10	S-N10	2	2
	1.5	FR-F740-1.5K	30AF 10A	30AF 10A	30AF 10A	S-N10	S-N10	2	2
	2.2	FR-F740-2.2K	30AF 10A	30AF 10A	30AF 15A	S-N10	S-N10	2	2
	3.7	FR-F740-3.7K	30AF 20A	30AF 15A	30AF 20A	S-N10	S-N10	2	2
	5.5	FR-F740-5.5K	30AF 30A	30AF 20A	30AF 30A	S-N20	S-N11, N12	2	2
	7.5	FR-F740-7.5K	30AF 30A	30AF 30A	30AF 30A	S-N20	S-N20	3.5	3.5
	11	FR-F740-11K	50AF 50A	50AF 40A	50AF 50A	S-N20	S-N20	5.5	5.5
	15	FR-F740-15K	100AF 60A	50AF 50A	100AF 60A	S-N25	S-N20	8	8
	18.5	FR-F740-18.5K	100AF 75A	100AF 60A	100AF 75A	S-N25	S-N25	14	8
	22	FR-F740-22K	100AF 100A	100AF 75A	100AF 100A	S-N35	S-N25	14	14
	30	FR-F740-30K	225AF 125A	225AF 100A	225AF 125A	S-N50	S-N50	22	22
	37	FR-F740-37K	225AF 150A	225AF 125A	225AF 150A	S-N65	S-N50	22	22
	45	FR-F740-45K	225AF 175A	225AF 150A	225AF 175A	S-N80	S-N65	38	38
	55	FR-F740-55K	225AF 200A	225AF 175A	225AF 200A	S-N80	S-N80	60	60
	75	FR-F740-75K		225AF 225A	225AF 200A 225AF 225A	_	S-N95	60	60
	90	FR-F740-90K		225AF 225A	400AF 300A		S-N150	60	60
400V class	90 110	FR-F740-90K		225AF 225A 225AF 225A	400AF 300A 400AF 350A		S-N180	80	80
	132	FR-F740-110K	_	400AF 400A	400AF 350A 400AF 400A	-	S-N180 S-N220	100	125
	160	FR-F740-132K	_	400AF 400A 400AF 400A	400AF 400A 600AF 500A	-	S-N220 S-N300	100	125
	185	FR-F740-160K		400AF 400A 400AF 400A	600AF 500A		S-N300 S-N300	125	125
						_	S-N400	2 × 100	2 × 10
	220	FR-F740-220K	_	600AF 500A	600AF 600A				
	250	FR-F740-250K	—	600AF 600A	600AF 600A	_	S-N600	2 × 100	2 × 10
	280	FR-F740-280K	—	600AF 600A	800AF 800A		S-N600	2 × 125	2 × 12
	315	FR-F740-315K	—	800AF 700A	800AF 800A	_	S-N600	2 × 150	2 × 15
	355	FR-F740-355K	—	800AF 800A	800AF 800A	-	S-N600	2 × 200	2 × 20
	400 450	FR-F740-400K FR-F740-450K	_	1000AF 900A 1000AF 1000A	1000AF 1000A 1000AF 1000A		S-N800 1000A rated product	2 × 200 2 × 250	2 × 20 2 × 25
	500	FR-F740-500K	_	1200AF 1200A	1200AF 1200A	_	1000A rated product	2 × 250	2 × 25
	560	FR-F740-560K	_	1600AF 1500A	1600AF 1600A	_	1200A rated product	3 × 200	3 × 20

*1 Selections for use of the Mitsubishi 4-pole standard motor with power supply voltage 200VAC (200V class)/400VAC (400V class) 50Hz.

*2 Install one MCCB per inverter.

For installations in the United States or Canada, use the fuse certified by the UL and cUL. (*Refer to the Instruction Manual (basics).*)

*3 The electrical durability of magnetic contactor is 500,000 times. When the magnetic contactor is used for emergency stop during motor driving, the electrical durability is 25 times. When using the MC for emergency stop during motor driving or using on the motor side during commercial-power supply operation, select the MC with class AC-3 rated

When using the MC for emergency stop during motor driving or using on the motor side during commercial-power supply operation, select the MC with class AC-3 rated current for the motor rated current. *4 Cable

For the 55K or less, the recommended cable size is that of the cable (HIV cable (600V class 2 vinyl-insulated cable) etc.) with continuous maximum permissible temperature of 75°C. Assumes that the ambient temperature is 50°C or less and the wiring distance is 20m or less.

For the 75K or more, the recommended cable size is that of the cable (LMFC (heat resistant flexible cross-linked polyethylene insulated cable) etc.) with continuous maximum permissible temperature of 90°C or more. Assumes that the ambient temperature is 50°C or less and wiring is performed in an enclosure.

REDROL F700 SERIES

Selection of rated sensitivity current of earth (ground) leakage breaker

When using the earth leakage circuit breaker with the inverter circuit, select its rated sensitivity current as follows, independently of the PWM carrier frequency:

- Breaker designed for harmonic and surge suppression Rated sensitivity currentl $\Delta n \ge 10 \times (Ig1 + Ign + Igi + Ig2 + Igm)$
- Standard breaker Rated sensitivity currentl $\Delta n \ge 10 \times \{Ig1 + Ign + Igi + 3 \times (Ig2 + Igm)\}$
- Ig1, Ig2 : Leakage currents in wire path during commercial power supply
- operation Leakage current of inverter input side noise filter lgn
- lgm Igi Leakage current of motor during commercial power supply operation : Inverter unit leakage current

Example of leakage current per 1km during the commercial power supply operation when the CV cable is routed in metal conduit

Leakage current example of Three-phase induction motor during the commercial power supply operation



For " 1/2" connection, the amount of leakage current is 1/3

example

(mA)

currents

eakage



- (Note)1. Install the earth leakage breaker (ELB) on the input side of the inverter.
 - 2. In the \downarrow connection earthed-neutral system, the sensitivity current is purified against an earth (ground) fault in the inverter output side. Earthing (Grounding) must conform to the requirements of national and local safety regulations and electrical codes. (JIS, NEC section 250, IEC 536 class 1 and other applicable standards)
- Selection example (in the case of the left figure)

	Breaker Designed for Harmonic and Surge Suppression	Standard Breaker				
Leakage current Ig1 (mA)	$\frac{1}{3} \times 66 \times \frac{5n}{1000}$	<u> </u>				
Leakage current Ign (mA)	0 (without nois	e filter)				
Leakage current Igi (mA)	1 (Without EMC filter) Refer to the following table for the leakage current of the inverter					
Leakage current Ig2(mA)	$\frac{1}{3} \times 66 \times \frac{600}{1000}$	<u> </u>				
Motor leakage current Igm (mA)	0.36					
Total leakage current (mA)	2.79	6.15				
Rated sensitivity current (mA)(≥ Ig × 10)	30	100				

 Inverter leakage current (with and without EMC filter) Input power conditions

(200V class : 220V/60Hz, 400V class : 440V/60Hz, power supply unbalance within 3%)

	Voltage	EMC	Filter
	(V)	ON (mA)	OFF (mA)
Phase grounding	200	22(1) *	1
	400	30	1
Earthed-neutral system	400	1	1

For the 200V class 0.75K and 1.5K, the EMC filter is always valid. The leakage current is 1mA

Warrantv

REARDE F700 SERIES

Precautions for use of the inverter

A Safety Precautions

- To operate the inverter correctly and safely, be sure to read the "instruction manual" before starting operation.
- This product has not been designed or manufactured for use with any equipment or system operated under life-threatening conditions.
- Please contact our sales office when you are considering using this product in special applications such as passenger mobile, medical, aerospace, nuclear, power or undersea relay equipment or system.
- Although this product is manufactured under strict quality control, safety devices should be installed when a serious accident or loss is expected by a failure of this product.
- The load used should be a three-phase induction motor only.

Operation

- A magnetic contactor (MC) provided on the primary side should not be used to make frequent starts and stops. It could cause the inverter to fail.
- However, at this time, the motor cannot be brought to a sudden stop. Hence, provide a mechanical stopping/ holding mechanism for the machine/equipment which requires an emergency stop.
- It will take time for the capacitor to discharge after shutoff of the inverter power supply. When accessing the inverter for inspection, wait for at least 10 minutes after the power supply has been switched off, and check to make sure that there are no residual voltage using a tester or the like.

Wiring

- Application of power to the output terminals (U, V, W) of the inverter will damage the inverter. Therefore, fully check the wiring and sequence to ensure that wiring is correct, etc. before powering on.
- The terminals P/+, P1, N/- are provided for connection of a dedicated option. Connect only a dedicated option. Do not short the frequency setting power supply terminal 10 and common terminal 5 or the terminal PC and terminal SD.
- Do not wire the maker-dedicated terminal PR/PX.

Installation

- Avoid hostile environment where oil mist, fluff, dust particles, etc. are suspended in the air, and install the inverter in a clean place or put it in an ingress-protected "enclosed" panel. When placing the inverter in a panel, determine the cooling system and panel dimensions so that the ambient temperature of the inverter is within the permissble value. (refer to page 8 for the specified value)
- Do not install the inverter on wood or other combustible material as it will be hot locally.
- Install the inverter in the vertical orientation.

Setting

- The inverter can be operated as fast as a maximum of 400Hz by parameter setting. Therefore, incorrect setting can cause a danger. Set the upper limit using the maximum frequency limit setting function.
- A setting higher than the initial value of DC injection brake operation voltage or operation time can cause motor overheat (electronic thermal relay trip).

Precautions for selection

Inverter capacity selection

When operating a special motor or more than one motor in parallel with a single inverter, select the inverter capacity so that 1.1 times the total rated motor current is less than the rated output current of the inverter.

Starting torque of the motor

The start and acceleration characteristics of the motor driven by the inverter are restricted by the overload current rating of that inverter. Generally the torque characteristic is less than when the motor is started by a commercial power supply. When torque boost adjustment or simple magnetic flux vector cannot provide enough starting torque, select the inverter of one rank higher capacity or increase the capacities of both the motor and inverter.

Acceleration and deceleration times

- The acceleration/deceleration time of the motor depends on the motor-generated torque, load torque and moment of inertia of the load (GD²).
- When the current limit function or stall prevention function is activated during acceleration/deceleration, increase the acceleration/deceleration time as the actual time may become longer.
- To decrease the acceleration/deceleration time, increase the torque boost value (setting of a too large value may activate the stall prevention function at a start, longer the acceleration time), use the simple magnetic flux vector control, or increase the inverter and motor capacities. To decrease the deceleration time, it is necessary to add the brake unit (FR-BU, MT-BU5), power regeneration common converter (FR-CV), power regeneration unit (MT-RC) or a similar device to absorb braking energy.

Power transfer mechanism (gear, belt, chain, etc.)

When an oil-lubricated gear box, speed change gear or similar device is used in the power transfer system, note that continuous operation at low decelerated speed only may deteriorate oil lubrication, causing seizure. When performing fast operation at higher than 60Hz, fully note that such operation will cause strength shortage due to the noise, life or centrifugal force of the power transfer mechanism.

Instructions for overload operation

When performing operation of frequent start/stop of the inverter, rise/fall in the temperature of the transistor element of the inverter will repeat due to a continuous flow of large current, shortening the life from thermal fatigue. Since thermal fatigue is related to the amount of current, the life can be increased by reducing bound current, starting current, etc. Decreasing current may increase the life. However, decreasing current will result in insufficient torque and the inverter may not start. Therefore, increase the inverter capacity to have enough allowance for current.

Installation and selection of moulded case circuit breaker

Install a moulded case circuit breaker (MCCB) on the power receiving side to protect the wiring of the inverter primary side. For MCCB selection, refer to *page 57* since it depends on the inverter power supply side power factor (which changes depending on the power supply voltage, output frequency and load). Note that the operation characteristics of the completely electromagnetic MCCB changes according to the higher harmonic current, so a larger capacity must be selected. (Check it in the data of the corresponding breaker.) As an earth (ground) leakage breaker designed for harmonics and surges. (*Refer to page 58.*)

When installing a moulded case circuit breaker on the secondary side of the inverter, contact each manufacturer for selection of the moulded case circuit breaker.

Handling of primary side magnetic contactor

For operation via external terminal (terminal STF or STR used), provide a primary side MC to prevent an accident caused by a natural restart at power recovery after a power failure, such as an instantaneous power failure, and to ensure safety for maintenance work. Do not use this magnetic contactor to make frequent starts and stops. (The switching life of the inverter input circuit is about 1,000,000 times.) For parameter unit operation, an automatic restart after power failure is not made and the MC cannot be used to make a start. Note that the primary side MC can stop the operation, but the regenerative brake specific to the inverter does not operate and the motor coasts to stop.

Handling of secondary side magnetic contactor

Switch the magnetic contactor between the inverter and motor only when both the inverter and motor are at a stop. When the magnetic contactor is turned on while the inverter is operating, overcurrent protection of the inverter and such will activate. When an MC is provided to switch to a commercial power supply, for example, it is recommended to use commercial power supply-inverter switchover operation *Pr. 135 to 139*.

Thermal relay installation

The inverter has an electronic thermal relay function to protect the motor from overheating. However, when running multiple motors with one inverter or operating a multi-pole motor, provide a thermal relay (OCR) between the inverter and motor. In this case, set the electronic thermal relay function of the inverter to OA. And for the setting of the thermal relay, add the line-to-line leakage current (*refer to page 61*) to the current value on the motor rating plate.

For low-speed operation where the cooling capability of the motor reduces, it is recommended to use a thermal protector or thermistor-incorporated motor.

Secondary side measuring instrument

When the wiring length between the inverter and motor is long, select the device that has enough current rating. Otherwise the measuring instrument or CT which is used especially for the 400V class small-capacity inverter may generate heat due to the influence of line leakage current. To measure and display the output voltage and output current of the inverter, it is recommended to use the terminal AM-5 output function of the inverter.

Disuse of power factor improving capacitor (power capacitor)

The power factor improving capacitor and surge suppressor on the inverter output side may be overheated or damaged by the harmonic components of the inverter output. Also, since an excessive current flows in the inverter to activate overcurrent protection, do not install a capacitor or surge suppressor. For power factor improvement, use the power factor improving DC reactor (see *page 51*).

Wire thickness and wiring distance

When the wiring length between the inverter and motor is long, use thick wires so that the voltage drop of the main circuit cable is 2% or less especially at low frequency output. (A selection example for the wiring distance of 20m is shown on *page 57*)

Especially at a long wiring distance, the maximum wiring length should be within 500m since the overcurrent protection function may be misactivated by the influence of a charging current due to the stray capacitances of the wiring. (The overall wiring length for connection of multiple motors should be within the value in the table below.)

Pr. 72 PWM frequency selection setting (carrier frequency)	0.75K	1.5K	2.2K or more	
2	300m	500m	500m	
3 to 15	200m	300m	500m	

Use the recommended connection cable when installing the operation panel away from the inverter unit or when connecting the parameter unit.

For remote operation via analog signal, wire the control cable between the operation box or operation signal and inverter within 30m and away from the power circuits (main circuit and relay sequence circuit) to prevent induction from other devices.

When using the external potentiometer instead of the parameter unit to set the frequency, use a shielded or twisted cable, and do not earth (ground) the shield, but connect it to terminal 5 as shown below.



Earth (Ground)

When the inverter is run in the low acoustic noise mode, more leakage currents occur than in the non-low acoustic noise mode due to high-speed switching operation. Be sure to use the inverter and motor after grounding (earthing) them. In addition, always use the earth (ground) terminal of the inverter to earth (ground) the inverter. (Do not use the case and chassis)

Inquiry

Noise

When performing low-noise operation at higher carrier frequency, electromagnetic noise tends to increase. Therefore, refer to the following measure example and consider taking the measures. Depending on the installation condition, the inverter may be affected by noise in a non-low noise (initial) status.

- The noise level can be reduced by decreasing the carrier frequency (*Pr.* 72).
- As measures against AM radio broadcasting noise and sensor malfunction, turning on the built-in noise reduction filter produces an effect. (For the switching method, refer to the instruction manual.)
- As measures against induction noise from the power cable of the inverter, an effect is produced by putting a distance of 30cm (at least 10cm) or more and using a twisted pair shielded cable as a signal cable. Do not earth (ground) shield but connect it to signal common cable.

Noise reduction examples



Leakage currents

Capacitances exist between the inverter I/O cables, other cables and earth and in the motor, through which a leakage current flows. Since its value depends on the capacitances, carrier frequency, etc., low acoustic noise operation at the increased carrier frequency of the inverter will increase the leakage current. Therefore, take the following measures. Select the earth leakage breaker according to its rated sensitivity current, independently of the carrier frequency setting.

To-earth (ground) leakage currents

Туре	Influence and Measures
Influence and measures	 Leakage currents may flow not only into the inverter's own line but also into the other lines through the earth (ground) cable, etc. These leakage currents may operate earth (ground) leakage circuit breakers and earth leakage relays unnecessarily. Countermeasures If the carrier frequency setting is high, decrease the <i>Pr. 72 PWM frequency selection</i> setting. Note that motor noise increases. Select <i>Pr. 240 Soft-PWM operation selection</i> to make the sound inoffensive. By using earth leakage circuit breakers designed for harmonic and surge suppression in the inverter's own line and other line, operation can be performed with the carrier frequency kept high (with low noise).
Undesirable current path	Power supply

Line leakage current

Туре	Influence and Measures
Influence and measures	 This leakage current flows via a static capacitance between the inverter output cables. The external thermal relay may be operated unnecessarily by the harmonics of the leakage current. When the wiring length is long (50m or more) for the 400V class small-capacity model (7.5kW or less), the external thermal relay is likely to operate unnecessarily because the ratio of the leakage current to the rated motor current increases. Countermeasures Use <i>Pr. 9 Electronic thermal O/L relay</i>. If the carrier frequency setting is high, decrease the <i>Pr. 72 PWM frequency selection</i> setting. Note that motor noise increases. Select <i>Pr. 240 Soft-PWM operation selection</i> to make the sound inoffensive. To ensure that the motor is protected against line-to-line leakage currents, it is recommended to use a temperature sensor to directly detect motor temperature.
Undesirable current path	Power Supply CB MC Inverter Inverter Interval relay Motor Inverter Interval relay

Features

rameter List

• Harmonic suppression guideline

Harmonic currents flow from the inverter to a power receiving point via a power transformer. The harmonic suppression guidelines were established to protect other consumers from these outgoing harmonic currents.

The three-phase 200V input specifications 3.7kW or less are previously covered by "Harmonic suppression guideline for household appliances and general-purpose products" and other models are covered by "Harmonic suppression guideline for consumers who receive high voltage or special high voltage". However, the generalpurpose inverter has been excluded from the target products covered by "Harmonic suppression guideline for household appliances and general-purpose products" in January 2004 and all capacities of all models are now target products of "Harmonic suppression guideline for consumers who receive high voltage or special high voltage".

Harmonic suppression guideline for consumers who receive high voltage or special high voltage

This guideline sets forth the maximum values of harmonic currents outgoing from a high-voltage or especially high-voltage consumer who will install, add or renew harmonic generating equipment. If any of the maximum values is exceeded, this guideline requires that consumer to take certain suppression measures.

Users who use models other than the target models are not covered by the guideline. However, we ask to connect an AC reactor and a DC reactor as before.

For compliance to the "Harmonic suppression guideline for consumers who receive high voltage or special high voltage"

Input Power Supply	Target Capacity	Measures					
Three- phase 200V		Make a judgment based on "Harmonic suppression guideline for consumers who receive					
Three- phase 400V	All capacities	high voltage or special high voltage" issued by the Japanese Ministry of Economy, Trade and Industry (formerly Ministry of International Trade and Industry) in September 1994 and take measures if necessary. For calculation method of power supply harmonics, refer to materials below. Reference materials • "Harmonic suppression measures of the general-purpose inverter" Jan., 2004 Japan Electrical Manufacturer's Association • "Calculation method of harmonic current of the general-purpose inverter used by specific consumers" JEM-TR201 (Revised in December 2003) : Japan Electrical Manufacturer's Association					

For compliance to "Harmonic suppression guideline of the general-purpose inverter (input current of 20A or less) for consumers other than specific consumers" published by JEMA

Input Power Supply	Target Capacity	Measures
Three- phase 200V	3.7kW or less	Connect the AC reactor or DC reactor recommended in a catalog or an instruction manual. Reference materials • "Harmonic suppression guideline of the general- purpose inverter (input current of 20A or less)" JEM-TR226 (Revised in December 2003) : Japan Electrical Manufacturer's Association

Calculation of outgoing harmonic current

Outgoing harmonic current = fundamental wave current (value converterd from received power voltage) \times operation ratio \times harmonic content

 Operation ratio: Operation ratio = actual load factor × operation time ratio during 30 minutes

· Harmonic content: Found in Table.

Table 1: Harmonic content (Values of the fundamental current is 100%)

Reactor	5th	7th	11th	13th	17th	19th	23rd	25th
Not used	65	41	8.5	7.7	4.3	3.1	2.6	1.8
Used (AC side)	38	14.5	7.4	3.4	3.2	1.9	1.7	1.3
Used (DC side)	30	13	8.4	5.0	4.7	3.2	3.0	2.2
Used (AC, DC sides)	28	9.1	7.2	4.1	3.2	2.4	1.6	1.4

Table 2: Rated capacities and outgoing harmonic currents of inverter-driven motors

Applied Motor	Rated Current [A]		Fundamen tal Wave Current	Rated Capacity	Fund		ntal W	6.6	δkV		erted ratio)	from
kW	200V	400V	Converted from6.6kV (mA)	(kVA)	5th	7th	11th	13th	17th	19th	23rd	25th
0.75	2.74	1.37	83	0.97	53.95	34.03	7.055	6.391	3.569	2.573	2.158	1.494
1.5	5.50	2.75	167	1.95	108.6	68.47	14.20	12.86	7.181	5.177	4.342	3.006
2.2	7.93	3.96	240	2.81	156.0	98.40	20.40	18.48	10.32	7.440	6.240	4.320
3.7	13.0	6.50	394	4.61	256.1	161.5	33.49	30.34	16.94	12.21	10.24	7.092
5.5	19.1	9.55	579	6.77	376.4	237.4	49.22	44.58	24.90	17.95	15.05	10.42
7.5	25.6	12.8	776	9.07	504.4	318.2	65.96	59.75	33.37	24.06	20.18	13.97
11	36.9	18.5	1121	13.1	728.7	459.6	95.29	86.32	48.20	34.75	29.15	20.18
15	49.8	24.9	1509	17.6	980.9	618.7	128.3	116.2	64.89	46.78	39.24	27.16
18.5	61.4	30.7	1860	21.8	1209	762.6	158.1	143.2	79.98	57.66	48.36	33.48
22	73.1	36.6	2220	25.9	1443	910.2	188.7	170.9	95.46	68.82	57.72	39.96
30	98.0	49.0	2970	34.7	1931	1218	252.5	228.7	127.7	92.07	77.22	53.46
37	121	60.4	3660	42.8	2379	1501	311.1	281.8	157.4	113.5	95.16	65.88
45	147	73.5	4450	52.1	2893	1825	378.3	342.7	191.4	138.0	115.7	80.10
55	180	89.9	5450	63.7	3543	2235	463.3	419.7	234.4	169.0	141.7	98.10

Applied Motor	Rated Current [A]		Fundamen tal Wave Current	Rated Capacity				6.6	kV		erted t	
kW	200V	400V	from 6.6kV (mA)	(kVA)	5th	7th	11th	13th	17th	19th	23rd	25th
75	245	123	8200	87.2	2237	969	626	373	350	239	224	164
90	293	147	9800	104	2673	1158	748	445	419	285	267	196
110	357	179	11933	127	3254	1410	911	542	510	347	325	239
132	—	216	14400	153	3927	1702	1100	655	615	419	393	288
160	—	258	17200	183	4691	2033	1313	782	735	500	469	344
220	—	355	23667	252	6455	2797	1807	1076	1011	688	645	473
250	—	403	26867	286	7327	3175	2052	1221	1148	782	733	537
280	—	450	27273	319	8182	3545	2291	1364	1282	873	818	600
315	—	506	30667	359	9200	3987	2576	1533	1441	981	920	675
355	—	571	34606	405	10382	4499	2907	1730	1627	1107	1038	761
400	—	643	38970	456	11691	5066	3274	1949	1832	1247	1169	857
450	—	723	43818	512	13146	5696	3681	2191	2060	1402	1315	964
500	—	804	48727	570	14618	6335	4093	2436	2290	1559	1462	1072
560	_	900	54545	638	16364	7091	4582	2727	2564	1746	1636	1200

Inquiry

Application to Motor

REAL F700 SERIES

Application to standard motor

When the Mitsubishi standard squirrel-cage motor (SF-JR, 4-pole) and inverter of the same capacity are used, the torque characteristics are as shown below.



50Hz torque reference



- *1 The 60Hz torque reference indicates that the rated torque of the motor running at 60Hz is 100%, and the 50Hz torque reference indicates that the rated torque of the motor running at 50Hz is 100%
- *2 Torque boost minimum (0%)
- *3 Torque boost standard (initial value)
- *4 Torque boost large (0.75K... 10%, 1.5K to 3.7K... 7%, 5.5K, 7.5K... 6%, 11K or more... 4%)
 *5 Enabled for torque boost adjustment (3.7kW or less) or simple magnetic flux vector control (slip compensation setting)
- 6 A general-purpose, squirrel-cage motor must be used at lower continuous operating torque in rated operation as shown in the chart since the cooling capability of the fan installed on the rotor reduces at a lower speed. (Instantaneous torque occurs)
- *7 200/220V 60Hz or 200V 50Hz in the chart indicates a motor torque standard (base frequency set in Pr. 3 of the inverter) and is not the frequency of the power supply. You can also set 60Hz in a 50Hz power supply area.
- You can also set 60Hz in a 50Hz power supply area. *8 As shown in the chart, the 60Hz torque reference setting allows you to use the motor more efficiently as it can bring out the 100% torque of the motor continuously.
- *9 This chart shows the characteristic available when a constant-torque load is selected for load pattern selection (Pr. 14).

Motor loss and temperature rise

The motor operated by the inverter has a limit on the continuous operating torque since it is slightly higher in temperature rise than the one operated by a commercial power supply. At a low speed, reduce the output torque of the motor since the cooling effect decreases. When 100% torque is needed continuously at low speed, consider using a constant-torque motor.

Torque characteristic

The motor operated by the inverter may be less in motor torque (especially starting torque) than the one driven by the commercial power supply. It is necessary to fully check the load torque characteristic of the machine.

Vibration

The machine-installed motor operated by the inverter may be slightly greater in vibration than the one driven by the commercial power supply. The possible causes of vibration are as follows.

- 1.Vibration due to imbalance of the rotator itself including the machine
- 2.Resonance due to the natural oscillation of the mechanical system. Caution is required especially when the machine used at constant speed is operated at variable speed. The frequency jump function allows

resonance points to be avoided during operation. (During acceleration/deceleration, the frequency within the setting range is passed through.) An effect is also produced if the PWM carrier frequency in Pr. 72 is changed. When a two-pole motor is operated at higher than 60Hz, caution should be taken since such operation may cause abnormal vibration.

Inverter-driven 400V class motor

When driving a 400V class motor by the inverter, surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor. In such a case, consider taking the following measures.

- (1) Rectifying the motor insulation
 - 1. Use a "400V class inverter driven insulationenhanced motor".
 - Note: The four poles of the Mitsubishi standard motor (SF-JR, SB-JR) have the 400V class inverter driving insulation-enhanced feature.
 - 2. For the dedicated motor such as the constant-torque motor and low-vibration motor, use the "inverter-driven, dedicated motor".
- (2) Suppressing the surge voltage on the inverter side Connect a filter on the secondary side of the inverter to suppress a surge voltage so that the terminal voltage of the motor is 850V or less. When driving by the Mitsubishi inverter, connect an optional surge voltage suppression filter (FR-ASF-H) for the 55K or less and an optional sine wave filter (MT-BSL, BSC) for the 75K or more on the inverter output side.

Application to constant-torque motor

Since a constant-torque motor is greater in current than the standard motor, the inverter capacity may be one rank higher. For a constant-torque motor, decrease the torque boost setting. Recommended value 0.75kW... 6%, 1.5 to 3.7kW... 4%,

5.5 to 7.5kW...3%, 11 to 37kW...2%,

45 to 55kW...1.5%, 75k or more...1%

When two or more motors are operated synchronously, torque imbalance is likely to occur as motor slip is smaller than that of the standard motor.

Application to special motors

Pole changing motor

As this motor differs in rated current from the standard motor, confirm the maximum current of the motor and select the inverter. Be sure to change the number of poles after the motor has stopped. If the number of poles is changed during rotation, the regenerative overvoltage protecion circuit may be activated to cause an inverter alarm, coasting the motor to a stop.

Geared motor

The continuous operating rotation range of this motor changes depending on the lubrication system and maker. Especially in the case of oil lubrication, continuous operation in the low speed range only can cause gear seizure. For fast operation at higher than 60Hz, please consult the maker.

Synchronous motor

This motor is not suitable for applications of large load variation or impact, where out-of-sync is likely to occur. Please contact us when using this motor because its starting current and rated current are greater than those of the standard motor and will not rotate stably at low speed.

Main Differences and Compatibilities with the FR-F500(L) Series

Item	FR-F500 (L)	FR-F700				
	Simple mode parameters 61	Simple mode parameters 15				
	<i>Pr. 0 Torque boost</i> initial value 11K to 55K: 2%	<i>Pr. 0 Torque boost</i> initial value 11K to 37K: 2%, 45K, 55K: 1.5% (When the torque boost value of the FR-F500 series used was the initial value, it is not necessary to change the torque boost value from the initial value when replacing with the FR-F700 series.)	Peripheral Devices Why energy Features savinus?			
	User group 1 (16), user group 2 (16) (Pr. 160, Pr. 173 to Pr. 175)	User group (16) only Setting methods were partially changed (Pr. 160, Pr. 172 to Pr. 173) "User initial value setting" (Pr. 199) was cleared Substitutable with the copy function of the operation panel (FR-DU07)				
Changed/cleared functions	User initial value setting (Pr. 199)					
	DC injection brake function with terminal (X13 signal) (Pr. 11 setting value 8888, Pr. 180 to Pr. 186 setting value 13)	DC injection brake function with terminal was cleared Start in reverse rotation is possible with flying start function (frequency search of automatic restart after instantaneous power failure function)				
	Long wiring mode (Pr. 240 setting 10, 11)	Setting is not necessary (Pr. 240 settings "10" and "11" were cleared)				
	Intelligent optimum acceleration/deceleration (Pr. 60 setting "3" and Pr. 61 to Pr. 63)	Function was cleared For deceleration time, overvoltage alarm can be avoided with regeneration avoidance function (Pr. 882 to Pr. 885)				
	Automatic torque boost (Pr. 38, Pr. 39)	Automatic torque boost was cleared because of addition of "Simple magnetic flux vector" (Pr. 80)				
Terminal block	Removable terminal block	Removable terminal block Priority compatibility (Terminal block of the F500 can be mounted)	eter Operation			
PU	FR-PU04, DU04	FR-DU07 FR-DU04 unavailable (Partly restricted when the FR- PU04 is used.)	Parameter List			
	Dedicated plug-in	option (not compatible)	tions			
Plug-in option	Computer link, relay output option FR-A5NR	Built into the inverter (RS-485 terminals, relay output 2 points)	Explanations of Darameters			
	Three boards can be mounted	One board can be mounted	Protective Functions			
Installation size	FR-F720-0.75K, 2.2K, 3.7K, 7.5K, 18.5K, 22K, 37K, 45K, FR-F740-0.75K to 3.7K, 7.5K, 22K, 37K to 55K are compatible in mounting dimensions For other capacities, an optional intercompatibility attachment (FR-AAT) is necessary.					

Warranty

Warranty

F700 SERIES

1. Gratis warranty period and coverage

[Gratis warranty period]

Note that an installation period of less than one year after installation in your company or your customer's premises or a period of less than18 months (counted from the date of production) after shipment from our company, whichever is shorter, is selected.

[Coverage]

(1) Diagnosis of failure

As a general rule, diagnosis of failure is done on site by the customer.

However, Mitsubishi or Mitsubishi service network can perform this service for an agreed upon fee upon the customer's request.

There will be no charges if the cause of the breakdown is found to be the fault of Mitsubishi.

(2) Breakdown repairs

There will be a charge for breakdown repairs, exchange replacements and on site visits for the following four conditions, otherwise there will be a charge.

- 1) Breakdowns due to improper storage, handling, careless accident, software or hardware design by the customer.
- 2) Breakdowns due to modifications of the product without the consent of the manufacturer.
- 3) Breakdowns resulting from using the product outside the specified specifications of the product.
- 4) Breakdowns that are outside the terms of warranty.

Since the above services are limited to Japan, diagnosis of failures, etc. are not performed abroad. If you desire the after service abroad, please register with Mitsubishi. For details, consult us in advance.

2. Exclusion of chance loss from warranty liability

Regardless of the gratis warranty term, compensation to chance losses incurred to your company or your customers by failures of Mitsubishi products and compensation for damages to products other than Mitsubishi products and other services are not covered under warranty.

Repair period after production is discontinued Mitsubishi shall accept product repairs for seven years after production of the product is discontinued.

4. Terms of delivery

In regard to the standard product, Mitsubishi shall deliver the standard product without application settings or adjustments to the customer and Mitsubishi is not liable for on site adjustment or test run of the product.

FRANKOL F700 SERIES



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Parameter List

Explanations of Parameters

Protective Functions

Options

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Instru

Motor

▲ Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

