

A700 Series

Variable Frequency Drives



A700



UNSURPASSED POWER AND CONTROL

1/2-700 HP



Discover the Many Facets of Mitsubishi Electric.
The Power in Automation Solutions.

The amazing new A700

A700

Mitsubishi Electric's RSV technology gives you class-leading power, control and flexibility.





What makes RSV (Real Sensorless Vector) special?

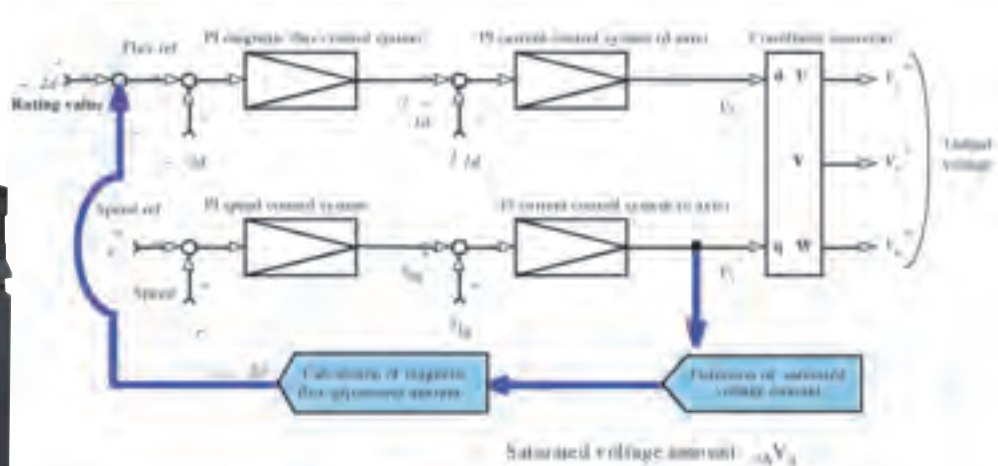
A700 stores a 'map' with the key motor characteristics in its memory and calculates the voltage needed to produce the necessary shaft torque and an output frequency which will keep the magnetizing flux and torque producing flux at right angles to each other – this is crucial to emulating DC drive/ motor performance.



RSV's secret lies in new 'Magnetic Flux Observer' firmware that calculates the magnetic saturation level of the motor and further 'trims' the output voltage to compensate for it; by avoiding motor 'over-fluxing', a wider speed range and smoother low speed operation of the motor than ever before is ensured.

-  Speed Control with or without torque limit – 200:1 range, driving or overhauling*
-  Open Loop Torque Control – including torque at zero speed

* Regenerative or dynamic braking accessory may be needed depending on drive type and application



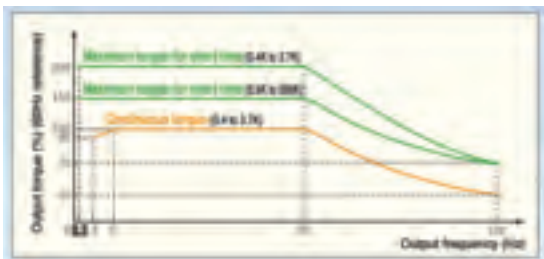
A revolution in dynamic performance.



Wide Speed Range



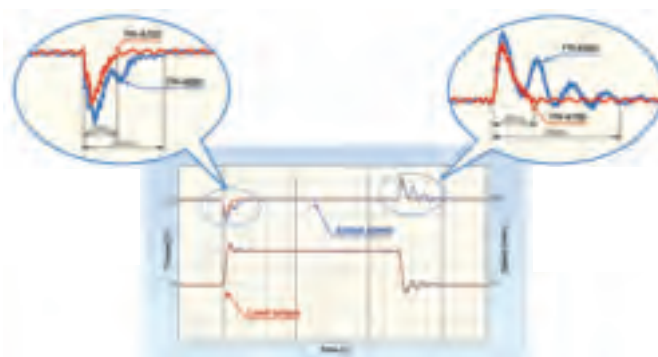
Mitsubishi Electric's new RSV algorithm gives 200:1 speed range open loop.



Fast Response



300 rads/sec response time means lightning-fast response to sudden load changes

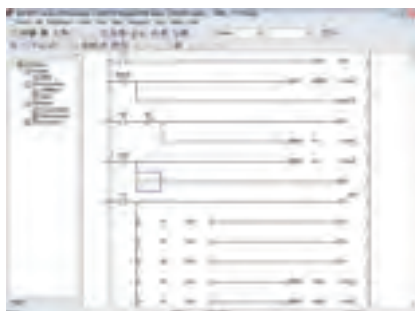


Actual Speed Variation When an Impact Load is Connected

PLC Feature



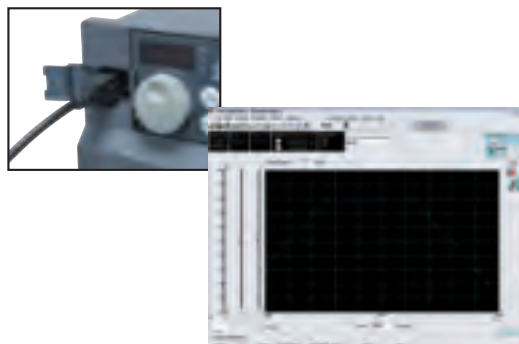
A700 programmability provides true intelligence inside the drive – a simple solution for complex applications



USB Port



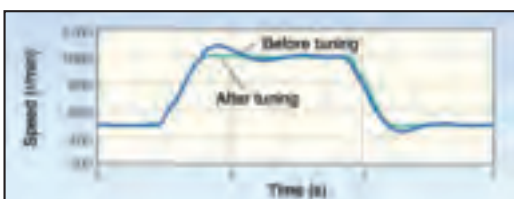
Allows simple connection to new FR-Configurator software for quick and easy commissioning



Easy Gain Tuning



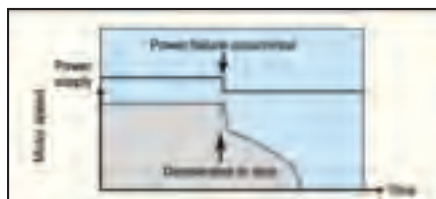
A700 uses servo-drive technology to compensate automatically for changes in load inertia

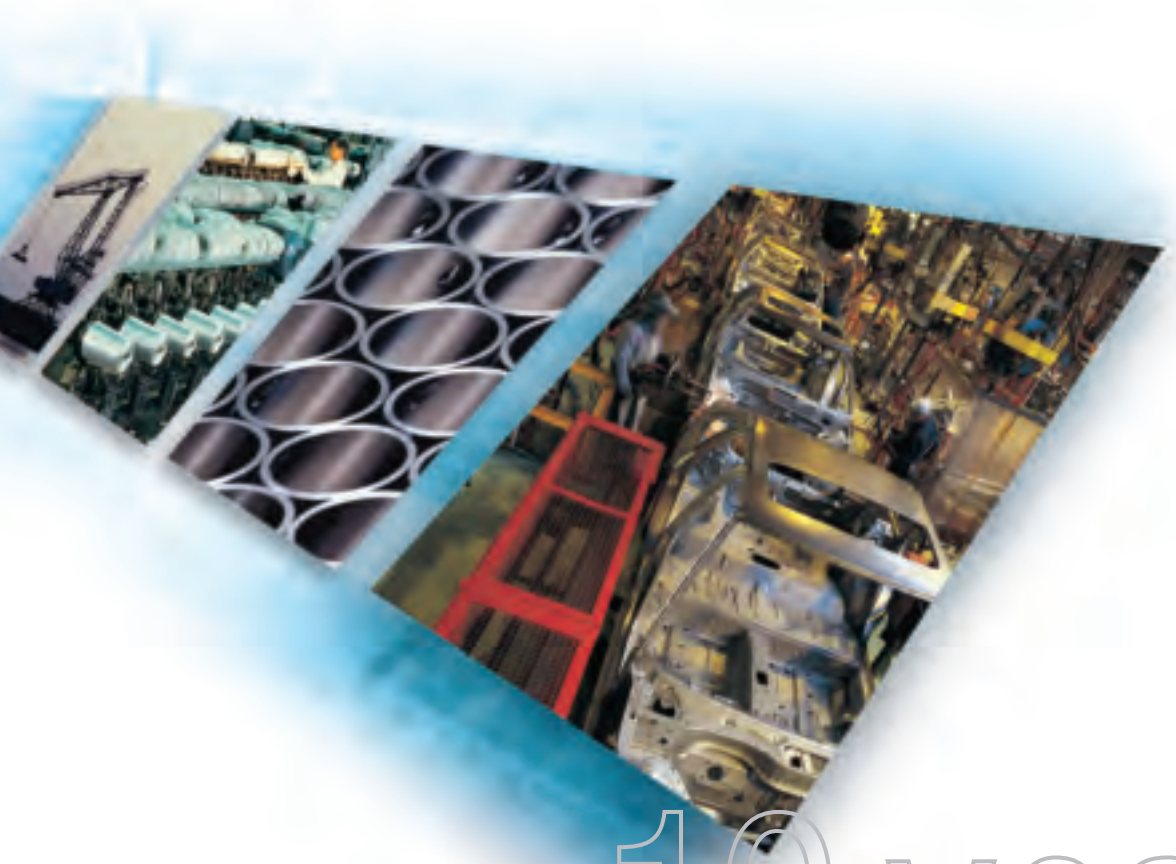


Power-Down Braking



Keeps the motor under control even if supply power is lost





10 year **Design Life**

10 Year Design Life

A700's Diagnostic Check system will pre-empt component failure

- Capacitors
- Inrush circuit
- Cooling Fans

COMPONENT	A700 LIFE DESIGN	JEMA LIFE GUIDELINE
Cooling Fan	10 years	2 to 3 years
Main Circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

Remote I / O Capability

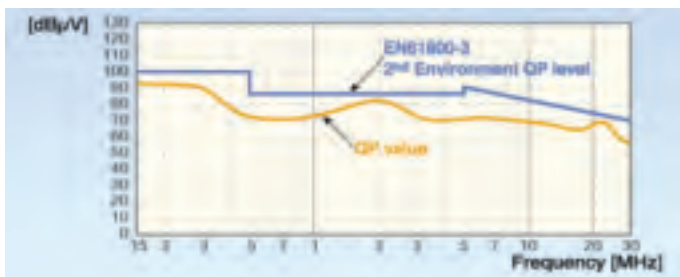
- Status of all I/O can be read over network, including analogs
- Drive outputs can be 'forced' over network
Including 2 hard relays
- Drive outputs can be operated independently via PLC function

Bigger Braking Circuit

- Eliminate the need for external brake units on drives up to 30 HP

Integral Radio Filter

- Limits Radio Noise to meet EC Directive 89/336 – all drive sizes.





Flexible Communications

- Profibus-DP
- LonWorks
- DeviceNet™
- CC-Link
- EtherNet/IP™
- Modbus TCP/IP
- Mitsubishi RS485
- Modbus RTU
- SSCNetIII
- Metasys N2

Advanced Keypad Option (PU07)

- 10 button keypad
- Alphanumeric Display (LCD)
- Upload / Download Parameter sets
- Store up to 3 sets of drive data
- Battery option allows data transfer without powering up the drive



Additional Features

- On-line auto-tune feature compensates for motor temperature changes
- Pulse train input for accurate speed control
- Sink/Source logic selectable
- Removable Control Terminal Block for easy maintenance



A700

Peripheral Equipment

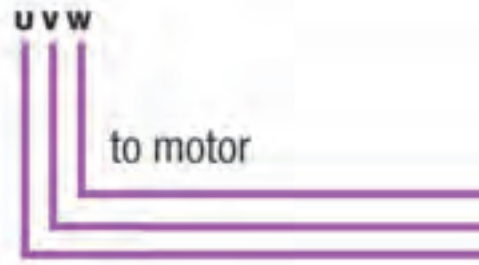
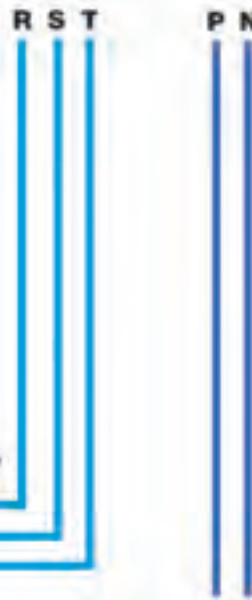
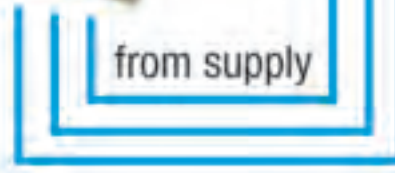
DC Link Choke Option
M_RB (standard on frame size J and above)



Three Phase Supply

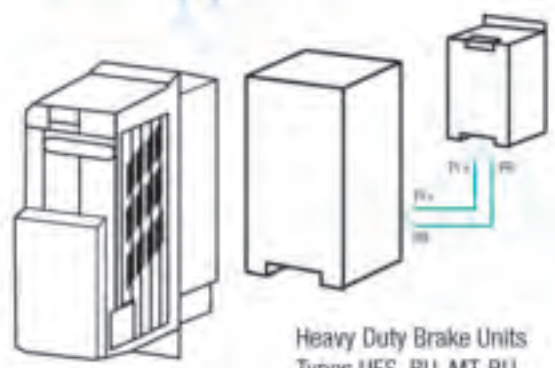


MRL Series Line Reactors



Brake unit (FR-BU¹, MT-BUX²)

CV Regeneration unit Energy recovery device Allows 100% braking torque continuously.



¹ 75 HP, 55K or less. ² 100 HP, 75K or more. ³ 30 HP, 22K or less



USB Connection allows commissioning of drive from PC with FR-Configurator software



High-duty brake resistor (FR-ABR[®])

ABR brake resistors
For use up to frame size F

Drives up to frame size D have a regular duty brake resistor as standard.



BLF Ferrite Core – use as needed to control radiated RFI from drive Output.



Standard Specifications Ratings 240 V Class

Model	FR-A720-□□□□□-NA	00030	00050	00080	00110	00175	00240	00330	00460	00610	00760	00900	01150	01450	01750	02150
Motor capacity (HP) (ND Rating)		0.75	1	2	3	5	7.5	10	15	20	25	30	37	50	60	75
Rating current (A)	SLD	4.6	7.1	10.5	16.7	24	34	49	63	77	93	125 <small>(note 4)</small>	154	187	233	316 <small>(note 3)</small>
	LD	4.2	6.5	9.6	15.2	23	31	45	58	70	85	114 <small>(note 4)</small>	140	170	212	288 <small>(note 3)</small>
	ND	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215
	HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175
Overload Rating <small>(note 1)</small>	SLD	110% 60s, 120% 3s ambient temperature 40°C														
	LD	120% 60s, 150% 3s ambient temperature 50°C														
	ND	150% 60s, 200% 3s ambient temperature 50°C														
	HD	200% 60s, 250% 3s ambient temperature 50°C														
Voltage <small>(note 2)</small>		3 phase 200 - 220V 50Hz, 200-240V 60Hz														
Regenerative braking torque	Maximum value / permissible duty	150% torque / 3%ED			100% torque / 3%ED		100% torque / 2%ED		20% torque / continuous (Brake transistor is included)				20% torque / continuous			
Rated input AC voltage, frequency		3 phase 200 - 220V 50Hz, 200-240V 60Hz														
Permissible AC voltage fluctuation		170 - 242V 50Hz, 170-264V 60Hz														
Permissible frequency fluctuation		±5%														
Protective structure		NEMA 1 Open Type						Enclosed type-(UL1)						NEMA 1 Open type		
Cooling system		Self-cooling			Forced air cooling											
Frame Size		A	B	C			D	E	F		G	H	JA			
Approximate Weight lbs (kg)		4.2 (1.9)	5 (2.3)	8.4 (3.8)			15.6 (7.1)	16.5 (7.5)	28.6 (13)		30.8 (14)	50.6 (23)	77 (35)		128 (58)	

Ratings 480 V Class

Model	FR-A740-□□□□□-NA	00015	00025	00040	00060	00090	00120	00170	00230	00310	00380	00430	00570	00710	00860	01100
Motor capacity (HP) (ND Rating)		0.75	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75
Rating current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	24	31	38	47	62	77	93	116	180 <small>(note 3)</small>
	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144 <small>(note 3)</small>
	ND	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110
	HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86
Overload Rating <small>(note 1)</small>	SLD	110% 60s, 120% 3s ambient temperature 40°C														
	LD	120% 60s, 150% 3s ambient temperature 50°C														
	ND	150% 60s, 200% 3s ambient temperature 50°C														
	HD	200% 60s, 250% 3s ambient temperature 50°C														
Voltage <small>(note 2)</small>		3 phase 380 - 480V 50/60Hz														
Regenerative braking torque	Maximum value / permissible duty	100% torque / 2%ED						20% torque / continuous (Brake transistor is included)				20% torque / continuous				
Rated input AC voltage, frequency		3 phase 380 - 480V 50/60Hz														
Permissible AC voltage fluctuation		323-528V 50/60Hz														
Permissible frequency fluctuation		±5%														
Protective structure		NEMA 1 Open Type						Enclosed Type-(UL 1)						NEMA 1 Open type		
Cooling system		Self-cooling			Forced air cooling											
Frame Size		C					D	E	F	GA	H					
Approximate Weight lbs (kg)		7.7 (3.5)					14.3 (6.5)	16.5 (7.5)	28.6 (13)		50.6 (23)	77 (35)		81.4 (37)		

(note)

*1. The overload capacity indicated in % is the ration of the overload current to the inverter's rated current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

*2. The maximum output voltage cannot exceed the power supply voltage. The maximum output voltage may be set as desired below the power supply voltage.

*3. DC Link Choke (FR-HEL-90K for 240V, FR-HEL-H90K for 480V) is needed.

*4. For use when mounting inside an enclosure only.

Ratings - 480 Volt Class (Continued)

Model	FR-A740-□□□□□-NA	01440	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830	07700	08660	09620
Motor capacity (HP) (ND Rating)		100	150	175	200	250	300	350	400	450	500	550	600	650	700
Rating current (A)	SLD	216	260	325	361	432	481	547	610	683	770	866	962	1094	1212
	LD	180	216	260	325	361	432	481	547	610	683	770	866	962	1094
	ND	144	180	216	260	325	361	432	481	547	610	683	770	866	962
	HD	110	144	180	216	260	325	361	432	481	547	610	683	770	820
Overload Rating (note 1)	SLD	110% 60s, 120% 3s ambient temperature 40°C													
	LD	120% 60s, 150% 3s ambient temperature 50°C													
	ND	150% 60s, 200% 3s ambient temperature 50°C													
	HD	200% 60s, 250% 3s ambient temperature 50°C													
Voltage (note 2)		3 phase 380 - 480V 50/60Hz													
Regenerative braking torque	Maximum value / permissible duty	10% torque / continuous													
Rated input AC voltage, frequency		3 phase 380 - 480V 50/60Hz													
Permissible AC voltage fluctuation		323 - 528V 50/60Hz													
Permissible frequency fluctuation		±5%													
Protective structure		NEMA 1 Open Type													
Cooling system		Forced air cooling													
Frame Size		J		K		L		M		N		P			
Approximate Weight lbs (kg)		110 (50)		125 (57)		158 (72)		242 (110)		385 (175)		572 (260)		814 (370)	

Dimensions - 240V and 480V drives

Frame Size	Dimensions in inches (mm)		
	Height	Width	Depth
A	10.2 (260)	4.3 (110)	4.3 (110)
B	10.2 (260)	4.3 (110)	4.9 (125)
C	10.2 (260)	5.9 (150)	5.5 (140)
D	10.2 (260)	8.7 (220)	6.7 (170)
E	11.8 (300)	8.7 (220)	7.5 (190)
F	15.8 (400)	9.8 (250)	7.5 (190)
GA	21.7 (550)	12.8 (325)	7.7 (195)
H	21.7 (550)	17.1 (435)	9.8 (250)
JA	27.6 (700)	18.3 (465)	9.8 (250)
J	24.4 (620)	18.3 (465)	11.8 (300)
K	29.1 (740)	18.3 (465)	14.2 (360)
L	39.8 (1010)	19.6 (498)	15 (380)
M	39.8 (1010)	26.8 (680)	15 (380)
N	52.4 (1330)	31.1 (790)	17.3 (440)
P	62.2 (1580)	39.2 (995)	17.3 (440)

Details of Factory Supplied DC Link Chokes

FR-A740-□□□□□-NA	Height	Width	Depth	Approx Weight lbs (kg)
01440	12.6 (320)	5.5 (140)	7.3 (185)	35 (16)
01800	13.4 (340)	5.9 (150)	7.5 (190)	44 (20)
02160	13.4 (340)	5.9 (150)	7.7 (195)	48 (22)
02600	15.9 (405)	6.9 (175)	7.9 (200)	57 (26)
03250	15.9 (405)	6.9 (175)	8 (205)	62 (28)
03610	15.9 (405)	6.9 (175)	9.4 (240)	64 (29)
04320	15.9 (405)	6.9 (175)	9.4 (240)	66 (30)
04810	17.3 (440)	7.5 (190)	9.8 (250)	77 (35)
05470	17.3 (440)	7.5 (190)	10 (255)	84 (38)
06100	19.5 (495)	8.3 (210)	9.8 (250)	92 (42)
06830	19.5 (495)	8.3 (210)	9.8 (250)	101 (46)
07700	19.7 (500)	8.7 (220)	9.8 (250)	110 (50)
08660	19.7 (500)	8.7 (220)	10.6 (270)	125 (57)
09620	17.9 (455)	8.5 (215)	13.6 (345)	147 (67)

General Specification

Control Specifications	Control method		Soft-PWM control/high carrier frequency PWM control (selectable from among V/F control, advanced magnetic flux vector control and real sensorless vector control) / vector control (when used with option FR-A7AP)	
	Output frequency range		0.2 to 400Hz	
	Frequency setting 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/about 11bit, terminal 1: 0 to ±10V/12bit) 0.06Hz/0 to 60Hz (terminal 1: 0 to ±5V/11bit)	
		Digital input	0.01Hz	
	Frequency accuracy	Analog Input	Within ±0.2% of the max. output frequency (25°C±10°C)	
		Digital Input	Within 0.01% of the set output frequency	
	Voltage/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	
	Starting torque		200% 0.3Hz (up to frame size C), 150% 0.3Hz (Frame Size D and above) (under real sensorless vector control or vector control)	
	Torque boost		Manual torque boost	
	Acceleration/deceleration time setting		0 to 3600s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected.	
DC injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) variable		
Stall prevention operation level		Operation current level can be set (0 to 220% adjustable), whether to use the function or not can be selected		
Torque limit level		Torque limit value can be set (0 to 400% variable)		
Operation Specifications	Frequency setting 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	Input using the setting dial of the operation panel or parameter unit Four-digit BCD or 16 bit binary (when used with option FR-A7AX)	
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.	
	Input signal		Select any twelve signals using Pr. 178 to Pr. 189 (input terminal function selection) from among multi speed selection, remote setting, stop-on-contact, second function selection, third function selection, terminal 4 input selection, JOG operation selection, selection of automatic restart after instantaneous power failure, flying start, external thermal relay input, inverter operation enable signal (FR-HC/FR-CV connection), FR-HC connection (instantaneous power failure detection), PU operation/external inter lock signal, external DC injection brake operation start, PID control enable terminal, brake opening completion signal, PU operation/external operation switchover, load pattern selection forward rotation reverse rotation boost, V/F switching, load torque high-speed frequency, S-pattern acceleration/deceleration C switchover, pre-excitation, output stop, start self-holding selection, control mode changing, torque limit selection, start-time tuning start external input, torque bias selection 1, 2 ¹ , P/PI control switchover, forward rotation command, reverse rotation command, inverter reset, PTC thermistor input, PID forward reverse operation switchover, PU-NET operation switchover, NET-external operation switchover, and command source switchover.	
		Pulse train input	100kpps	
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, polarity reversible operation, automatic restart after instantaneous power failure operation, commercial power supply-inverter switchover operation, forward/reverse rotation prevention, remote setting, brake sequence, second function, third function, multi-speed operation, original operation continuation at instantaneous power failure, stop-on-contact control, load torque high speed frequency control, droop control, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, online auto tuning function, PID control, computer link operation (RS-485), motor end orientation ¹ , machine end orientation ¹ , pre-excitation, notch filter, machine analyzer ¹ , easy gain tuning, speed feed forward, and torque bias ¹	
	PLC control		Maximum/minimum Integral PLC Feature : I/O including analog : 128 points, sequence instructions : 23, basic instructions : 32, application instructions : 18, input terminals : 12 points, output terminal : 7 points, FR-A7AX input terminal : 16 points, FR-A7AY : 7 points, FR-A7AR : 3 points. Watchdog timer : 10 - 2000 msec, memory capacity : 6 kB as sequence and parameter, program capacity : 1K steps, internal relay : 64 points, timer : 16 points, counter : 16 points, data registers : 120, special relays : 256, special registers : 256. Programming package: GX-Developer	
	Output Signals	Operating status		Select any signals using Pr. 190 to Pr. 196 (output terminal function selection) from among inverter running, up-to-fre-quency, instantaneous power failure/undervoltage, overload warning, output frequency (speed) detection, second output frequency (speed) detection, third output frequency (speed) detection, regenerative brake prealarm, 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, orientation completion ¹ , brake opening request, fan fault output, heatsink overheat pre-alarm, inverter running/start command on, deceleration at an instantaneous power failure, PID control activated, during retry, PID output interruption, life alarm, alarm output 1, 2, 3 (power-off signal), power savings average value update timing, current average monitor, maintenance timer alarm, remote output forward rotation output ¹ , reverse rotation output ¹ , low speed output, torque detection, regenerative status output ¹ , start-time tuning completion, in-position completion ¹ , minor failure output and alarm output. Open collector output (5 points), relay output (2 points) and alarm code of the inverter can be output (4 bit) from the open collector.
			When used with the FR-A7AY, FR-A7AR (optional)	In addition to the above, select any 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. (only positive logic can be set for extension terminals of the FR-A7AR)
		Pulse train input	500kpps	
	Pulse/analog output	Select any signals using Pr. 54 FM terminal function selection (pulse train output) and Pr. 158 AM terminal function selection (analog output) from among output frequency, motor current (steady or peak value), output voltage, frequency setting, operation speed, motor torque, converter output voltage (steady or peak value), electronic thermal relay function load factor, input power, output power, load meter, motor excitation current, reference voltage output, motor load factor, power saving effect, regenerative brake duty, PID set point, PID measured value, motor output, torque command, torque current command, and torque monitor.		
Indication	PU (FR-DU07 / FR-PU07 / FR-PU04)	Operating status	Output frequency, motor current (steady or peak value), output voltage, frequency setting, running speed, motor torque, overload, converter output voltage (steady or peak value), electronic thermal relay function load factor, input power, output power, load meter, motor excitation current, cumulative energization time, actual operation time, motor load factor, cumulative power, energy saving effect, cumulative saving power, regenerative brake duty, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, input terminal option monitor ² , output terminal option monitor ² , option fitting status ³ , terminal assignment status ³ , torquecommand, torque current command, feed back pulse ¹ , motor output	
		Alarm definition	Alarm definition is displayed during the protective function is activated, the output voltage/current/frequency/cumulative energization time right before the protection function was activated and past 8 alarm definitions are stored.	
		Interactive guidance	Operation guide/trouble shooting with a help function ³	
Protective/warning function		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 short circuit, main circuit element overheat, output phase failure, external thermal relay operation, PTC thermistor operation, option alarm, parameter error, PU disconnection, retry count excess, CPU alarm, operation panel power supply short circuit, 24VDC power output short circuit, output current detection value excess, inrush current limit circuit alarm, communication alarm (inverter), USB error, opposite rotation deceleration error, analog input error, fan fault, overcurrent stall prevention, overvoltage stall prevention, regenerative brake prealarm, electronic thermal relay function prealarm, PU stop, maintenance timer alarm ² , brake transistor alarm, parameter write error, copy operation error, operation panel lock, parameter copy alarm, speed limit indication, encoder no-signal ¹ , speed deviation large ¹ , overspeed ¹ , position error large ¹ , encoder phase error ¹		
Environment	Ambient temperature		-10°C to +50°C (non-freezing)	
	Ambient humidity		90%RH maximum (non-condensing)	
	Storage temperature ⁴		-20°C to +65°C	
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)	
	Altitude/vibration		Maximum 1000m above sea level, 0.6 G or less ⁵ (conforms to JIS C 60068-2-6)	

¹ Only when A7AP option is installed
² Can be displayed only on the DU07 operation panel
³ Can be displayed only on the PU07 or PU04 parameter unit
⁴ Temperature applicable for a short time only e.g. in transit
⁵ 2.9 m/s² for frame size K and above





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Servo Systems • Motion Control • Variable Frequency Drives • Computerized Numerical Controls • PC Based Control • Robots