for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

INVERTER FR-A800 Plus

The optimum functions for cranes are added.

A800 Plus

for CRANES

GOOD DESIGN AWARD 2014

- Reduction in tact time
- Load slippage prevention
- Dedicated monitoring functions
- Applicability in a wide range of industries
- Easier maintenance
- Approach to the leading drive performance

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximising the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems
A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliances
Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems
Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems
Maximising productivity and efficiency with cutting-edge automation technology.

Features	5	1
Standard specifications	11	2
Outline dimensions	15	3
Crane function parameters	17	4
Warranty	23	5
Support	24	6

Pursuing optimum functions to

A new lineup of dedicated inverters for specialized fields are born!

Plus! The optimum functions for each dedicated field are added to the already high

meet our customers' needs

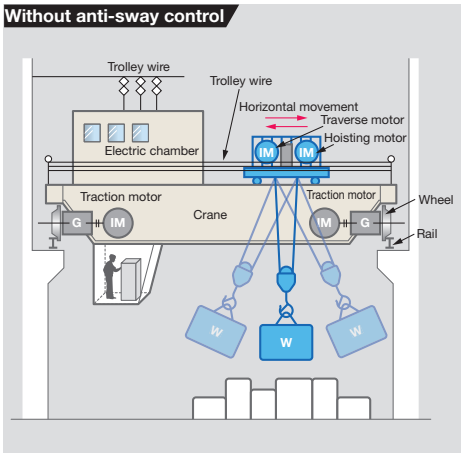
performance and high functionality FR-A800 series inverter.

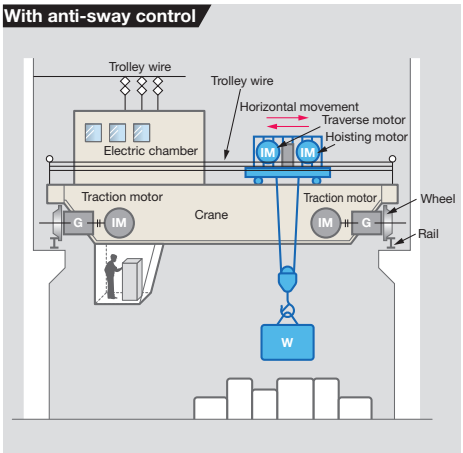
Suited for various cranes to achieve fast, robust, and smooth operations

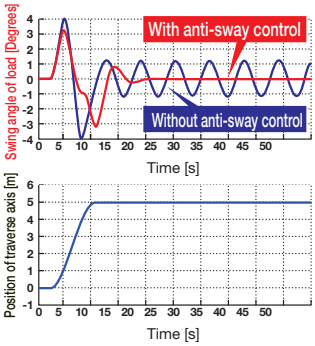
Plus! Reduction in tact time

Anti-sway control

By using the Mitsubishi's original anti-sway control technology, the swinging of an object moved by a crane is suppressed at the time of stopping, even without operator's input adjustment.
This control cuts down the tact time and facilitates efficient operation.







Load torque high-speed frequency control (mode 2)

When there is a light-load (when light loads are moved up or down by a crane), the speed will automatically be increased. This reduces the tact time and facilitates efficient operation.
The possible operation speed is set automatically according to the load. After starting the inverter, the inverter runs at high speed with a light load.

Shortest-time torque startup function

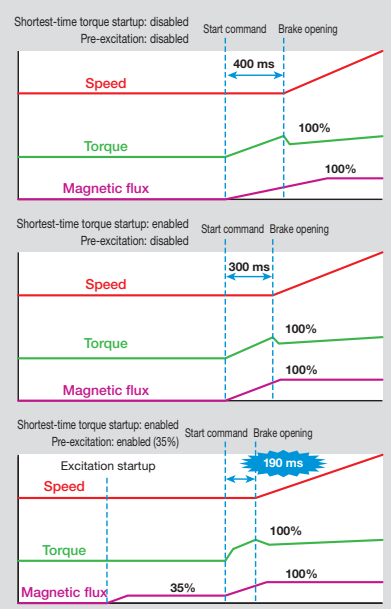
The time from the start command to when the brake opens is shortened. This will contributes to reduction in tact time.

- **Shortest-time torque startup function**

  The optimum distribution of the excitation current and torque current enables rapid startup of the torque.

- **Magnetic flux command during pre-excitation**

  Decreasing the pre-excitation current during a motor stop reduces power consumption during standby, and enables rapid startup of the torque.



Example of FR-A820-90K-1-60CRN and SF-THY (90 kW)

Plus! Load slippage prevention

Brake sequence function

The highly scalable brake sequence function enables the output of a brake opening signal for the optimum brake operation calculated from the load torque or the speed.
The function enables setting of the brake opening level individually for forward rotation and reverse rotation.

Low-speed range speed control P gain

When an inverter is connected to a lift, the inverter has a load immediately after the lift brake is released. Adjusting the speed control P gain in the low-speed range improves the response at low speed, and shortens the time from startup to brake opening.

Falling detection

Slippage during the start of a lift can be checked.
When the commanded direction differs from the actual motor rotation direction, the falling detection signal is output.

Plus! Dedicated monitoring functions

Overload detection function

By outputting an overload detection signal when too much load (overload) is applied to a crane, this information can be transmitted to the superordinate controller.
During constant speed operation, when the motor torque is equal to or higher than the torque setting for the time setting or longer, the overload detection signal is turned ON.

Start count monitor

The inverter starting times can be counted.
Confirming the starting times can be used to determinate the timing of the maintenance, or can be used as a reference for system inspection or parts replacement.

Start count monitor

Wide range applications

Compliance with ship classification standards

Using the recommended noise filter in combination with the inverter supports compliance with various countries ship classifications, such as NK, LR, DNV, ABS, BV, CCS, and KR.
The FR-A800-CRN can be used for electric deck cranes on ship.

Easier maintenance

Longer service life
[Long life components]

The service life of the cooling fans*1 and the capacitors*1*2 is now 10 years. The service life can be further extended by ON/OFF control of the cooling fan.

*1 Surrounding air temperature: Annual average of 40℃ (free from corrosive gas, flammable gas, oil mist, dust and dirt). The design life is a calculated value from the LD rating. The value is not a guaranteed product life.

*2 Output current: 80% of the inverter LD rating.

Plus! Enhanced vibration resistance
[Protection against vibration]

A strong vibration may occur in some operating conditions, for example, during the crane traveling. Inverters with the components fixed on the circuit board with an adhesive, or the cables tied (fixed) together, are available for enhanced vibration resistance. (to be released soon)

Improved environmental resistance
[Measures against dust, dirt, and corrosion]

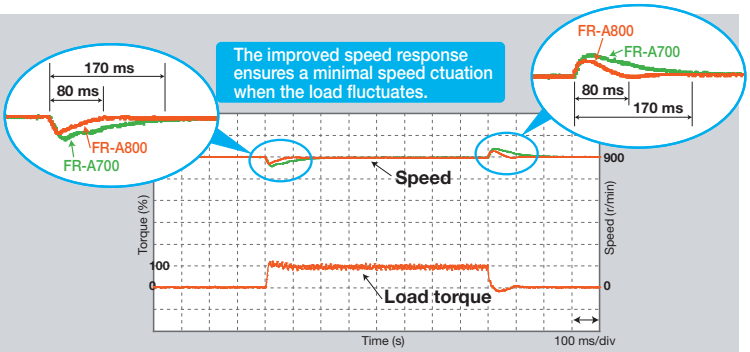
Using the inverter in the dusty environment may cause fault such as a short circuit. The inverter with circuit board coating (conforming to IEC60721-3-3 3C2/3S2) ensures reliability even in poor environments. Furthermore, the inverter with plated conductor is also available.

Approach to the leading drive performance

High response

The improved speed response ensures a minimal speed fluctuation to maintain a constant speed when the load fluctuates.

- Speed response
  Real sensorless vector control
  50 Hz*1 (A700: 20 Hz)
  Vector control*2
  130 Hz*3 (A700: 50 Hz)

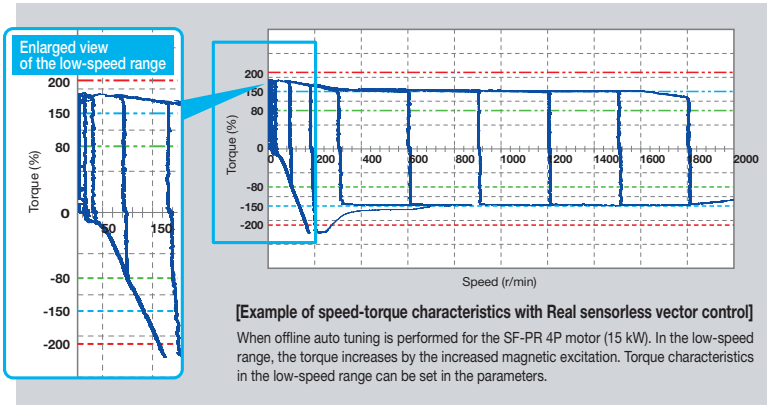


[Example of the speed change when an impact load is applied]
(When the SF-PR 4P motor (3.7 kW) is used under Real sensorless vector control)

High torque at low speed

Our new inverter realizes smooth cargo handling work at low speed and high torque for the slow and stable movements required for heavy objects.

- Starting torque (at 0.3 Hz)
  Real sensorless vector control
  200% (ND rating)
  Vector control*2
  200% (ND rating)
  (150% of initial setting for 5.5K or higher)



[Example of speed-torque characteristics with Real sensorless vector control]
When offline auto tuning is performed for the SF-PR 4P motor (15 kW). In the low-speed range, the torque increases by the increased magnetic excitation. Torque characteristics in the low-speed range can be set in the parameters.

*1 At 3.7 kW with no load Differs depending on the load conditions and motor capacity.
*2 The vector control is available when a vector control compatible option is installed.
*3 When the option (FR-A8AP or FR-A8TP) is installed.

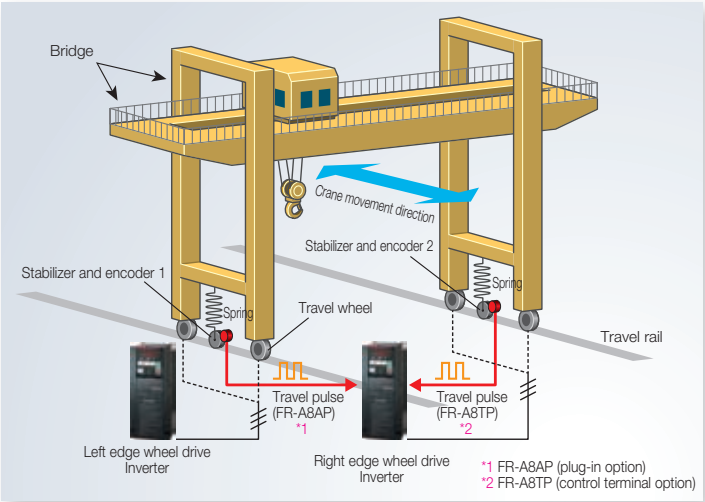
Control the machines as you desire - PLC function

Inverter operation sequence customized for the machine

Inverter control such as inverter operations triggered by input signals, signal output based on inverter operation status, and monitor output can be freely customized based on the machine specifications. Control programs can be created in sequence ladders using the inverter setup software (FR Configurator2) (to be supported soon).

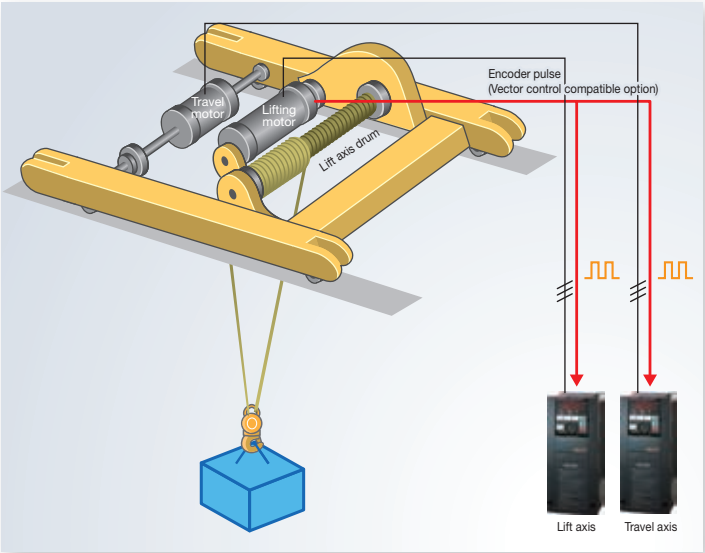
Application example 1: Position error correction

The traveled distance (total number of travel pulses) of each wheel is directly read from the encoder installed at the wheel. The pulses from the two wheels are then compared, and their speed is adjusted to synchronize the wheel positions. There is no need to use an external controller to offset speed, allowing high accuracy control.



Application example 2: Wire rope length measurement

The travel axis reads the amount of lifting/lowering movement (encoder pulse) of the lift axis to calculate the wire rope length.
The wire rope length according to the operating condition can be applied to the anti-sway control.
The lifting/lowering speed can be slowed down when the rope length reaches a predetermined value to prevent the object from colliding into the lift axis drum, etc.



Delivering a comfortable inverter operating environment —FR Configurator2 (to be supported soon)

Easy USB cable connection

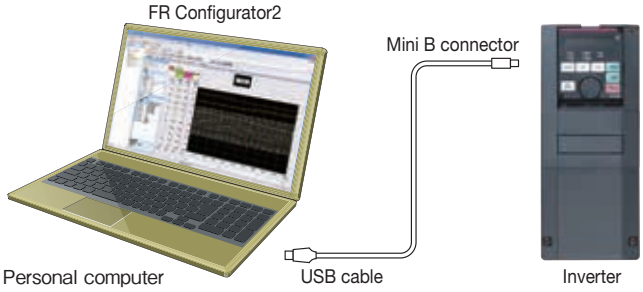
A USB connector (mini B connector) is provided as standard. The connection with a personal computer can be established easily without using a converter.

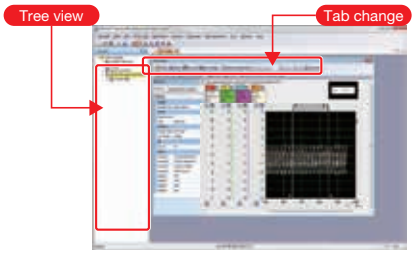
Remote operation

Importing trace data or parameter settings that have been copied in a USB memory device to FR Configurator2 enables analysis or adjustment at a remote place.

Intuitive user interface

Connected inverters are displayed in a tree view. Windows of each function can be switched using tabs, facilitating operations.

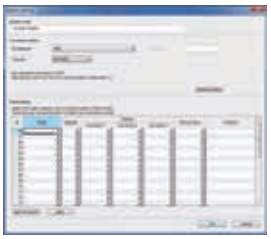




Efficient startup settings

• System setting

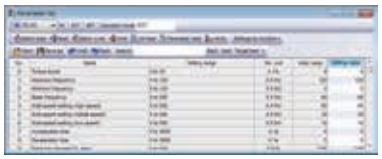
Automatic recognition of connected inverters can also be set. The station number, model, capacity, and any plug-in options of the connected inverters can also be set manually.



Easy pre-operation adjustment and operation check

• Parameter list

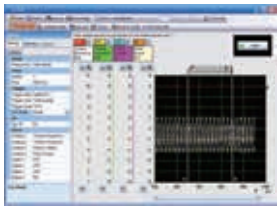
Parameters for selected station numbers can be displayed and changed. I/O signals can be assigned using settings by function.



Easy-to-follow platform facilitates easy maintenance

• Graph function

Inverter data can be sampled and displayed in a graphical format. Trace data can also be read and displayed in a graph.



Lineup

• Standard model

F R - A 8 [2] [0] - [0.4K] [-1] - [60] [CRN]

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure/function
0	Standard model

Capacity*1	Description
00023 to 06830	Inverter SLD rated current (A)
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type
-1	FM
-2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06*3	With	With

Symbol	Dedicated function
CRN	Dedicated to crane

Three-phase 200 V class FR-A820-[] *4	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400 V class FR-A840-[] *4	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	03250	03610	04320	04810	05470	06100	06830										
	110K	132K	160K	185K	220K	250K	280K										
	●	●	●	●	●	●	●										

• Separated converter type

F R - A 8 [4] [2] - [315K] [-1] - [60] [CRN]

Symbol	Voltage class
4	400 V class

Symbol	Structure/function
2	Separated converter type

Capacity*1	Description
07700 to 12120	Inverter SLD rated current (A)
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type
-1	FM
-2	CA *2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Symbol	Dedicated function
CRN	Dedicated to crane

Three-phase 400 V class FR-A842-□	07700	08660	09620	10940	12120
	315K	355K	400K	450K	500K
	●	●	●	●	●

*1 Models can be alternatively indicated with the inverter rated current(SLD rating).
*2 Specification differs by the type as follows.

Symbol	Type	Motor output	Built-in EMC filter	Initial setting		
				Control logic	Rated frequency	Base frequency voltage (Pr.19)
-1	FM	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to 10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
-2	CA	Terminal CA (analog current output (0 to 20 mA)) Terminal AM (analog voltage output (0 to 10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

*3 Available for the 5.5K or higher.
*4 For the 75K or higher inverter, or whenever a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option.

Inverter by rating

• 200 V class

Inverter model FR-A820-[ ]		SLD (superlight duty)		LD (light duty)		ND (normal duty, initial value)		HD (heavy duty)	
		Motor capacity (kW)*5	Rated current (A)	Motor capacity (kW)*5	Rated current (A)	Motor capacity (kW)*5	Rated current (A)	Motor capacity (kW)*5	Rated current (A)
00046	0.4K	0.75	4.6	0.75	4.2	0.4	3	0.2	1.5
00077	0.75K	1.5	7.7	1.5	7	0.75	5	0.4	3
00105	1.5K	2.2	10.5	2.2	9.6	1.5	8	0.75	5
00167	2.2K	3.7	16.7	3.7	15.2	2.2	11	1.5	8
00250	3.7K	5.5	25	5.5	23	3.7	17.5	2.2	11
00340	5.5K	7.5	34	7.5	31	5.5	24	3.7	17.5
00490	7.5K	11	49	11	45	7.5	33	5.5	24
00630	11K	15	63	15	58	11	46	7.5	33
00770	15K	18.5	77	18.5	70.5	15	61	11	46
00930	18.5K	22	93	22	85	18.5	76	15	61
01250	22K	30	125	30	114	22	90	18.5	76
01540	30K	37	154	37	140	30	115	22	90
01870	37K	45	187	45	170	37	145	30	115
02330	45K	55	233	55	212	45	175	37	145
03160	55K	75	316	75	288	55	215	45	175
03800	75K	90/110	380	90	346	75	288	55	215
04750	90K	132	475	110	432	90	346	75	288

• Overload current rating

SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40℃
LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50℃
ND	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50℃
HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50℃

*5 Indicates the maximum capacity applicable with the Mitsubishi 4-pole standard motor.

• 400 V class

Inverter model FR-A84[]-[]		SLD (superlight duty)		LD (light duty)		ND (normal duty, initial value)		HD (heavy duty)	
		Motor capacity (kW)*5	Rated current (A)	Motor capacity (kW)*5	Rated current (A)	Motor capacity (kW)*5	Rated current (A)	Motor capacity (kW)*5	Rated current (A)
00023	0.4K	0.75	2.3	0.75	2.1	0.4	1.5	0.2	0.8
00038	0.75K	1.5	3.8	1.5	3.5	0.75	2.5	0.4	1.5
00052	1.5K	2.2	5.2	2.2	4.8	1.5	4	0.75	2.5
00083	2.2K	3.7	8.3	3.7	7.6	2.2	6	1.5	4
00126	3.7K	5.5	12.6	5.5	11.5	3.7	9	2.2	6
00170	5.5K	7.5	17	7.5	16	5.5	12	3.7	9
00250	7.5K	11	25	11	23	7.5	17	5.5	12
00310	11K	15	31	15	29	11	23	7.5	17
00380	15K	18.5	38	18.5	35	15	31	11	23
00470	18.5K	22	47	22	43	18.5	38	15	31
00620	22K	30	62	30	57	22	44	18.5	38
00770	30K	37	77	37	70	30	57	22	44
00930	37K	45	93	45	85	37	71	30	57
01160	45K	55	116	55	106	45	86	37	71
01800	55K	75/90	180	75	144	55	110	45	86
02160	75K	110	216	90	180	75	144	55	110
02600	90K	132	260	110	216	90	180	75	144
03250	110K	160	325	132	260	110	216	90	180
03610	132K	185	361	160	325	132	260	110	216
04320	160K	220	432	185	361	160	325	132	260
04810	185K	250	481	220	432	185	361	160	325
05470	220K	280	547	250	481	220	432	185	361
06100	250K	315	610	280	547	250	481	220	432
06830	280K	355	683	315	610	280	547	250	481
07700	315K	400	770	355	683	315	610	280	547
08660	355K	450	866	400	770	355	683	315	610
09620	400K	500	962	450	866	400	770	355	683
10940	450K	560	1094	500	962	450	866	400	770
12120	500K	630	1212	560	1094	500	962	450	866

Standard specifications

● Rating (Standard model)

◆ 200 V class

Model FR-A820-[] CRN			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW) *1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA) *3	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage *5		Three-phase 200 to 240 V																
	Regenerative braking	Built-in brake transistor	Built-in											FR-BU2 (option)					
		Maximum brake torque *7	150% torque/3%ED *6			100% torque/3%ED *6		100% torque/2%ED *6		20% torque/continuous								10% torque/continuous	
		FR-ABR (when the option is used)	150% torque/10%ED		100% torque/10%ED					100% torque/6%ED				—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V, 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V, 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A) *8	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA) *9	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529) *10			Enclosed type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 0.2 kW motors can be used only under V/F control.
*3 The rated output capacity indicated assumes that the output voltage is 220 V.
*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 maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 With the built-in brake resistor
*7 ND rating reference value
*8 The rated input current is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the power supply capacity.
*10 FR-DU08: IP40 (except for the PU connector)

◆ 400 V class

Model FR-A840-[] CRN			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW) *1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output	Rated capacity (kVA) *3	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
		LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
		HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
	Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
		LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
		HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	Rated voltage *5		Three-phase 380 to 500 V																							
	Regenerative braking	Built-in brake transistor	Built-in															FR-BU2 (option)								
		Maximum brake torque *7	100% torque/2%ED *6							20% torque/continuous								10% torque/continuous								
		FR-ABR (when the option is used)	100% torque/10%ED							100% torque/6%ED				—*12				—	—	—	—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500 V, 50 Hz/60 Hz *11																							
	Permissible AC voltage fluctuation		323 to 550 V, 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current (A) *8	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
		LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
		HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
	Power supply capacity (kVA) *9	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
		LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
		HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529) *10			Enclosed type (IP20)											Open type (IP00)												
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass (kg)			2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 0.2 kW motors can be used only under V/F control.
*3 The rated output capacity indicated assumes that the output voltage is 440 V.
*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 maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 With the built-in brake resistor
*7 ND rating reference value
*8 The rated input current is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the power supply capacity.
*10 FR-DU08: IP40 (except for the PU connector)
*11 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.
*12 A commercial brake resistor can be used to improve the braking capability of the inverter built-in brake. Please contact your sales representative for details.

Rating (Separated converter type)

◆ 400 V class

• Inverter

Model FR-A842-[] CRN			07700	08660	09620	10940	12120
			315K	355K	400K	450K	500K
Applicable motor capacity (kW) *1		SLD	400	450	500	560	630
		LD	355	400	450	500	560
		ND (initial setting)	315	355	400	450	500
		HD	280	315	355	400	450
Output	Rated capacity (kVA) *2	SLD	587	660	733	834	924
		LD	521	587	660	733	834
		ND (initial setting)	465	521	587	660	733
		HD	417	465	521	587	660
	Rated current (A)	SLD	770	866	962	1094	1212
		LD	683	770	866	962	1094
		ND (initial setting)	610	683	770	866	962
		HD	547	610	683	770	866
	Overload current rating *3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	Rated voltage *4		Three-phase 380 to 500 V				
	Regenerative braking torque*5 (when the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous				
Input power	Power supply voltage		430 to 780 VDC				
	Control power supply auxiliary input		Single-phase 380 to 500 V, 50 Hz/60 Hz *7				
	Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529) *6			Open type (IP00)				
Cooling system			Forced air cooling				
Approx. mass (kg)			163	163	243	243	243

*1 The applicable 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 440 V.
*3 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.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5 ND rating reference value
*6 FR-DU08: IP40 (except for the PU connector)
*7 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

• Converter unit (FR-CC2)

Model FR-CC2-H[]		315K	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		315	355	400	450	500	560	630
Output	Overload current rating *1	200% 60 s, 250% 3 s				150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
	Rated voltage *2	430 to 780 VDC *4						
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 500 V, 50 Hz/60 Hz						
	Permissible AC voltage fluctuation	Three-phase 323 to 550 V, 50 Hz/60 Hz						
	Permissible frequency fluctuation	±5%						
	Rated input current (A)	610	683	770	866	962	1094	1212
	Power supply capacity (kVA) *3	465	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)						
Cooling system		Forced air cooling						
DC reactor		Built-in						
Approx. mass (kg)		210	213	282	285	288	293	294

*1 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 converter unit and the inverter to return to or below the temperatures under 100% load.
*2 The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
*3 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*4 The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

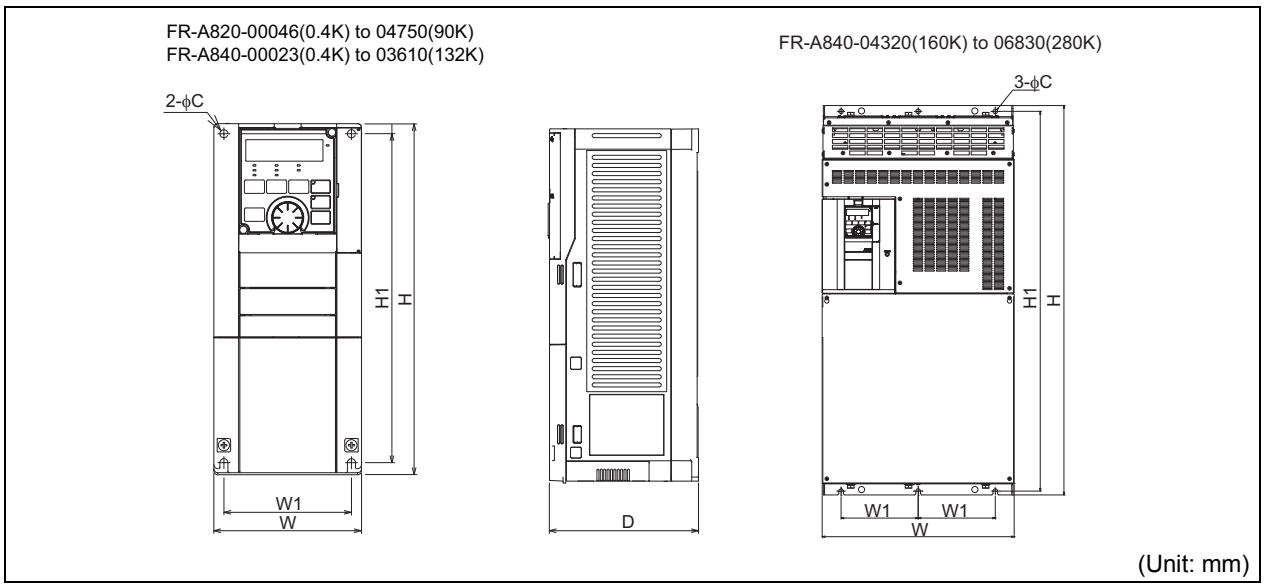
Common specifications

Control specifications	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control), Optimum excitation control, vector control*1, and PM sensorless vector control
	Output frequency range		0.2 to 590 Hz (The upper frequency limit is 400 Hz under Advanced magnetic flux vector control, Real sensorless vector control, vector control*1, PM sensorless vector control.)
	Frequency setting resolution	Analog Input	0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01 Hz
	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 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque		SLD rating: 120% 0.3 Hz, LD rating: 150% 0.3 Hz, ND rating: 200%*2 0.3 Hz, HD rating: 250%*2 0.3 Hz (under Real sensorless vector control or vector control*1)
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected (V/F control, Advanced magnetic flux vector control).
	Torque limit level		Torque limit value can be set (0 to 400% variable). (Real sensorless vector control / vector control*1 / PM sensorless vector control)
Operation specifications	Frequency setting signal	Analog Input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to +5 V are available.
		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-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		The following signals can be assigned to **Pr.178 to Pr.189 (input terminal function selection)**: Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command,Inverter reset
		Pulse train input	100 kpps
	Operational functions		Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding*3, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, automatic acceleration/deceleration, intelligent mode, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, load torque high-speed frequency control, speed smoothing control, traverse, auto tuning, applied motor selection, gain tuning, RS-485 communication, PID control, PID pre-charge function, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power failure time deceleration-to-stop function, stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, orientation control*1, speed control, torque control, position control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function, anti-sway control, low-speed range speed control P gain, shortest-time torque startup, inching time adjustment function, brake sequence function
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, Up to frequency, Instantaneous power failure/undervoltage*3, Overload warning, Output frequency detection, Fault The output signal can be changed using **Pr.190 to Pr.196 (output terminal function selection)**. Fault codes of the inverter can be output (4 bits) from the open collector.
		Pulse train output (FM type)	50 kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Current output (CA type)	Max. 20 mADC: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Voltage output	Max. 10 VDC: one terminal (output frequency) The monitored item can be changed using **Pr.158 AM terminal function selection**.
	Operation panel (FR-DU08)	Operating status	Output frequency, Output current, Output voltage,Frequency setting value The monitored item can be changed using **Pr.52 Operation panel main monitor selection**.
		Fault record	Fault record is displayed when a protective function is activated. Past 8 fault records and output voltage/current/frequency/ cumulative energization time / year/month/date/time immediately before the protective function is activated are stored.
Protective/ warning function		Protective function	Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip, Motor overload trip, Heatsink overheat, Instantaneous power failure*3, Undervoltage*3, Input phase loss*3*4, Stall prevention stop, Loss of synchronism detection*4, Brake transistor alarm detection, Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation*4, PTC thermistor operation*4, Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess*4, Parameter storage device fault, CPU fault, Operation panel power supply short circuit/RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection*4, Inrush current limit circuit fault*3, Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence*4, Speed deviation excess detection*1*4, Signal loss detection*1*4, Excessive position fault*1*4, Brake sequence fault*4, Encoder phase fault*1*4, 4 mA input fault*4, Pre-charge fault*4, PID signal fault*4, Option fault, Opposite rotation deceleration fault*4, Internal circuit fault, Magnetic pole position unknown*1
		Warning function	Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm*3*4, Electronic thermal relay function pre-alarm, PU stop, Speed limit indication*4, Parameter copy, Safety stop, Maintenance signal output*4, USB host error, Home position return setting error*4, Home position return uncompleted*4, Home position return parameter setting error*4, Operation panel lock*4, Password locked*4, Parameter write error, Copy operation error, 24 V external power supply operation
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing) (LD, ND, and HD ratings) -10°C to +40°C (non-freezing) (SLD rating)
	Surrounding air humidity		95% RH or less (non-condensing) (With circuit board coating (IEC60721-3-3 3C2/3S2 compatible)) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature*5		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000 m above sea level*6, 5.9 m/s^2 or less*7 at 10 to 55 Hz (directions of X, Y, Z axes)

*1 The vector control is available only when a vector control compatible option is installed.
*2 In the initial setting for the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, the starting torque is limited to 150% by the torque limit level.
*3 Available only for the standard model.
*4 This protective function is not available in the initial status.
*5 Temperature applicable for a short time, e.g. in transit.
*6 For the installation in an altitude above 1000 m (up to 2500 m), derate the rated current 3% per 500 m.
*7 2.9 m/s^2 or less for the FR-A840-160K(04320) or higher.

Outline dimensions

Standard model



◆ 200 V class

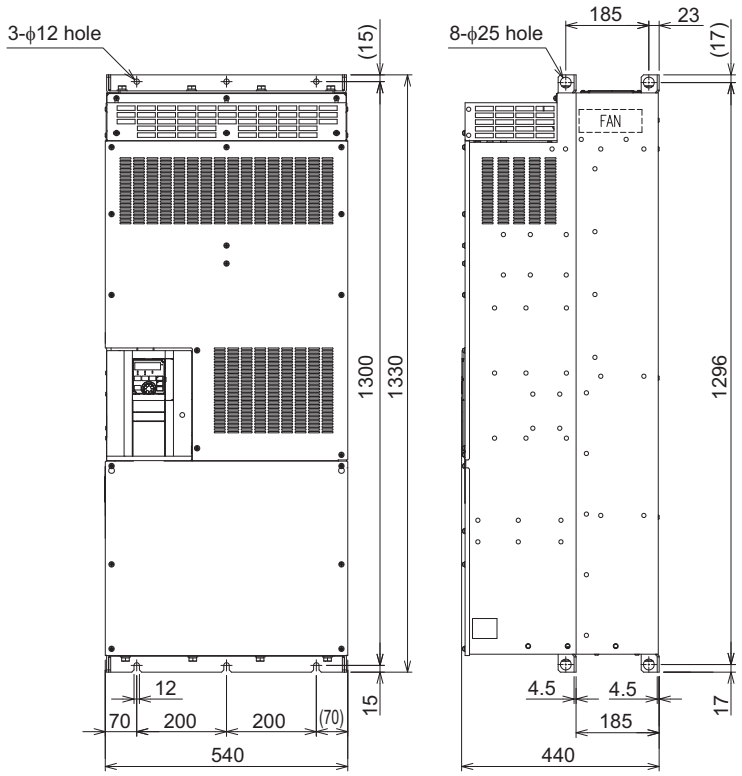
Inverter model	W	W1	H	H1	D	C
FR-A820-00046(0.4K)	110	95	260	245	110	6
FR-A820-00077(0.75K)					125	
FR-A820-00105(1.5K)	150	125			140	
FR-A820-00167(2.2K)						
FR-A820-00250(3.7K)						
FR-A820-00340(5.5K)	220	195			170	
FR-A820-00490(7.5K)						
FR-A820-00630(11K)			300	285	190	
FR-A820-00770(15K)	250	230	400	380		10
FR-A820-00930(18.5K)						
FR-A820-01250(22K)						
FR-A820-01540(30K)	325	270	550	530	195	
FR-A820-01870(37K)	435	380		525	250	12
FR-A820-02330(45K)						
FR-A820-03160(55K)	465	410	700	675		
FR-A820-03800(75K)		400	740	715	360	
FR-A820-04750(90K)						

◆ 400 V class

Inverter model	W	W1	H	H1	D	C
FR-A840-00023(0.4K)	150	125	260	245	140	6
FR-A840-00038(0.75K)						
FR-A840-00052(1.5K)						
FR-A840-00083(2.2K)						
FR-A840-00126(3.7K)						
FR-A840-00170(5.5K)	220	195			170	
FR-A840-00250(7.5K)						
FR-A840-00310(11K)			300	285	190	
FR-A840-00380(15K)						
FR-A840-00470(18.5K)	250	230	400	380		10
FR-A840-00620(22K)						
FR-A840-00770(30K)	325	270	550	530	195	
FR-A840-00930(37K)	435	380		525	250	12
FR-A840-01160(45K)						
FR-A840-01800(55K)						
FR-A840-02160(75K)	465	400	620	595	300	
FR-A840-02600(90K)						
FR-A840-03250(110K)			740	715	360	
FR-A840-03610(132K)						
FR-A840-04320(160K)	498	200	1010	985	380	
FR-A840-04810(185K)						
FR-A840-05470(220K)	680	300		984		
FR-A840-06100(250K)						
FR-A840-06830(280K)						

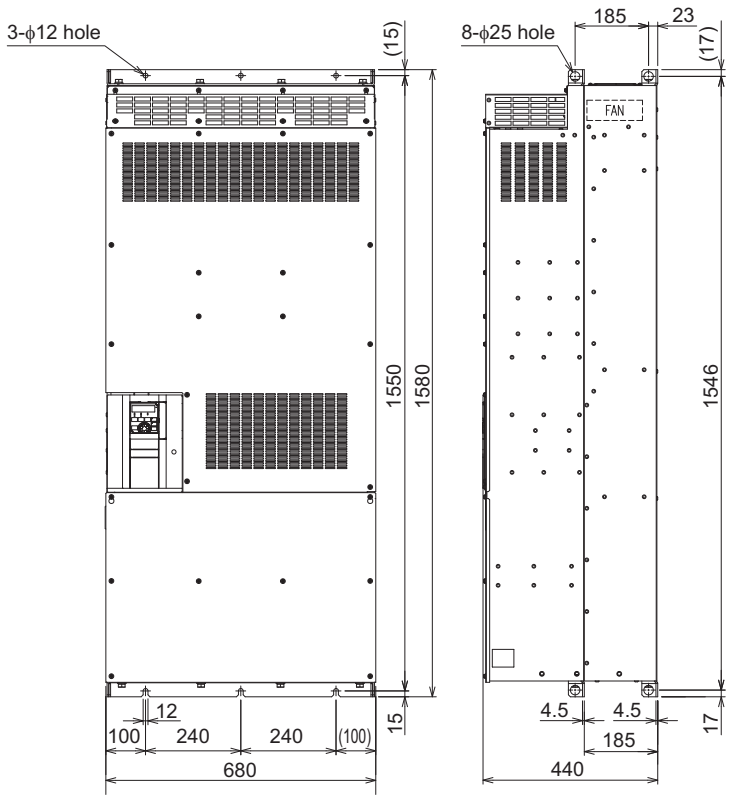
Separated converter type

FR-A842-07700(315K), 08660(355K)



(Unit: mm)

FR-A842-09620(400K), 10940(450K), 12120(500K)



(Unit: mm)

Crane function parameters

The following marks are used to show the applicable control method: V/F for V/F control, Magnetic flux for Advanced magnetic flux vector control, Sensorless for Real sensorless vector control, Vector for vector control, and PM for PM sensorless vector control. (Parameters without any mark are valid for all controls.)
Pr. denotes parameter numbers, GROUP denotes group parameter numbers.

Parameter list

The following parameters are dedicated to the FR-A800-CRN. Set the parameters according to applications.

Pr.	GROUP	Name	Setting range	Minimum setting increment	Initial value	Refer to page	Customer setting
178 to 189	T700 to T711	Input terminal function selection	54*1	1	*2	21	
190 to 196	M400 to M406	Output terminal function selection	221 to 223, 321 to 323*1	1	*2	20, 21	
270	A200	Stop-on contact/load torque high-speed frequency control selection	0 to 3, 4, 5, 11, 13, 15	1	0	19	
1400	A160	Low-speed range speed control P gain 1	0 to 1000%, 9999	1%	9999	18	
1401	A161	Low-speed range speed control P gain 2	0 to 1000%, 9999	1%	9999	18	
1402	A162	Low-speed range gain corner frequency 1	0 to 60 Hz	0.01 Hz	3 Hz	18	
1403	A163	Low-speed range gain corner frequency 2	0 to 60 Hz	0.01 Hz	5 Hz	18	
1404	A164	Shortest-time torque startup selection	0, 1	1	0	18	
1405	A165	Overload detection time	0 to 10 s	0.1 s	1 s	20	
1406	A166	Inching prevention time	0 to 5 s	0.01 s	0 s	19	
1407	A167	Magnetic flux command during pre-excitation	0 to 100%	1%	9999	19	
1408	A168	Brake opening current for reverse rotation	0 to 400%	0.1 %	9999	22	
1409	A169	Second brake opening current for reverse rotation	0 to 400%	0.1 %	9999	22	
1410	A170	Starting times lower 4 digits	0 to 9999	1	0	22	
1411	A171	Starting times upper 4 digits	0 to 9999	1	0	22	

*1 For other settings, refer to the Instruction Manual (Detailed) of the FR-A800 inverter.
*2 For the initial setting of each parameter, refer to the Instruction Manual (Detailed) of the FR-A800 inverter.

Parameter details

Low-speed range speed control P gain Sensorless Vector PM

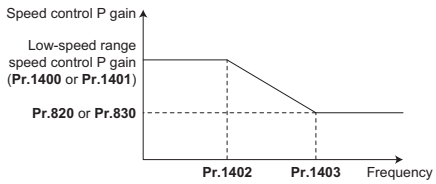
Pr.	GROUP	Name	Pr.	GROUP	Name
1400	A160	Low-speed range speed control P gain 1	1401	A161	Low-speed range speed control P gain 2
1402	A162	Low-speed range gain corner frequency 1	1403	A163	Low-speed range gain corner frequency 2

- The P gain for speed control in the low-speed range can be adjusted.
- When an inverter is connected to a lift, the inverter has a load immediately after the lift brake is released. For lift applications, slow response may cause a delay in the brake opening. Adjusting the speed control P gain in the low-speed range improves the response at low speed, and shortens the time from startup to brake opening. This will contributes to a reduction in tact time.

Pr.	Setting range	Description
1400	0 to 1000%	Set the proportional gain during speed control in the low-speed range. (Setting this parameter higher improves the trackability for speed command changes. It also reduces the speed fluctuation caused by external disturbance.)
	9999 (Initial value)	Low-speed range speed control P gain 1 disabled
1401	0 to 1000%	Second function of **Pr.1400** (enabled when RT signal ON)
	9999 (Initial value)	Low-speed range speed control P gain 2 disabled
1402	0 to 60 Hz	Set the P gain operation during speed control in the low-speed range.
1403	0 to 60 Hz	

◆ Low-speed range speed control P gain operation

- The P gain operation during speed control in the low-speed range is determined by the **Pr.1402** and **Pr.1403** settings.



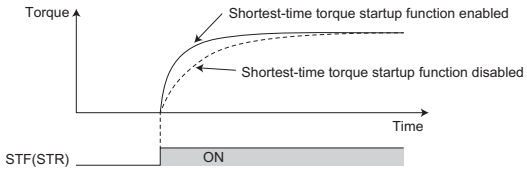
Shortest-time torque startup Sensorless Vector

Pr.	GROUP	Name
1404	A164	Shortest-time torque startup selection

- The torque is started up in the shortest time.
- When an inverter is connected to a lift, the inverter has a load immediately after the lift brake is released. For lift applications, slow torque startup may cause a delay in the brake opening. Using the shortest-time torque startup function shortens the time from startup to brake opening. This will contributes to a reduction in tact time.

Pr.	Setting range	Description
1404	0 (Initial value)	Shortest-time torque startup disabled
	1	Shortest-time torque startup enabled

- When **Pr.1404**="1" and the inverter is not in stop status, the torque is generated by the shortest-time torque startup function.



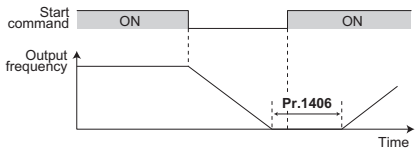
Inching time adjustment function

Pr.	GROUP	Name
1406	A166	Inching prevention time

- By setting a waiting time after the inverter is stopped until the inverter is restarted, inching in the setting time can be prevented.
- When the inverter is repeatedly started and stopped for a short time, the overcurrent may occur due to the effect of the motor residual magnetic flux. Adjust the waiting time after the inverter is stopped until the inverter is restarted to suppress current.

Pr.	Setting range	Description
1406	0 to 5 s	Set the time after the inverter output is stopped until the inverter output can be restarted.

- After the inverter output is stopped by turning OFF the start command, the inverter output cannot be restarted for the time set in **Pr.1406**.



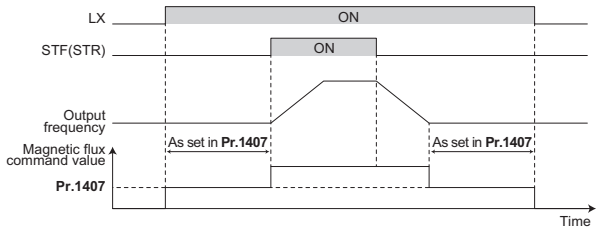
Magnetic flux command during pre-excitation Sensorless Vector

Pr.	GROUP	Name
1407	A167	Magnetic flux command during pre-excitation

- Adjusting the magnetic flux command during pre-excitation reduces the excitation ratio and power consumption during standby.

Pr.	Setting range	Description
1407	0 to 100%	Set the magnetic flux command value during pre-excitation.
	9999 (Initial value)	Magnetic flux command during pre-excitation disabled

- When the pre-excitation signal (LX) is turned ON while the start command (STF/STR) is OFF, the inverter operates in the magnetic flux command value set in **Pr.1407**.
- During deceleration after the start command is OFF or during DC injection brake operation, the inverter operates in normal magnetic flux command value.



Load torque high-speed frequency control (mode 2)

Pr.	GROUP	Name	Pr.	GROUP	Name
270	A200	Stop-on contact/ load torque high-speed frequency control selection	271	A201	High-speed setting maximum current
272	A202	Middle-speed setting minimum current	273	A203	Current averaging range
274	A204	Current averaging filter time constant	286	G400	Droop gain
287	G401	Droop filter time constant	288	G402	Droop function activation selection
4	D301	Multi-speed setting (high speed)	5	D302	Multi-speed setting (middle speed)

- Load torque high-speed frequency control is a function that automatically sets the operable frequency according to the load.
- After starting the inverter, the inverter runs at high frequency with a light load, or at low frequency with a heavy load, depending on the value of the current. When light loads are moved up or down by a crane, the speed will accelerate automatically, which contributes to reduction in tact time.

Pr.	Setting range	Description
4	0 to 590 Hz	Set the target frequency during forward rotation.
5	0 to 590 Hz	Set the target frequency during reverse rotation.
270	0 (Initial value)	Normal operation
	1	Stop-on-contact control*1
	2	Load torque high-speed frequency control (mode 1)*1
	3	Stop-on contact + load torque high- speed frequency control (mode 1)*1
	4	Load torque high-speed frequency control (mode 2)
	5	Stop-on contact + load torque high- speed frequency control (mode 2)
	11	Stop-on-contact control*1 — E.OLT invalid under stop-on-contact control
	13	Stop-on contact + load torque high- speed frequency control (mode 1)*1 — E.OLT invalid under stop-on-contact control
	15	Stop-on contact + load torque high- speed frequency control (mode 2) — E.OLT invalid under stop-on-contact control
271	0 to 400%	Set the reference torque current value during forward rotation.
272	0 to 400%	Set the reference torque current value during reverse rotation.
273	0 to 590 Hz	Set the frequency at which load torque high-speed frequency control (mode 2) is started.
	9999 (initial value)	Load torque high-speed frequency control (mode 2) starts at 50% of the rated motor frequency.
274	1 to 4000	Set the time constant of the primary delay filter relative to the output current. (The time constant [ms] is 0.5 × **Pr.274**, and the initial value is 8 ms.) A larger setting results in a stable operation with poorer response.
286	0 (Initial value)	Without output frequency compensation
	0.1 to 1000%*2	Compensate the output frequency to suppress the torque rise after stopping acceleration.
287	0 to 1 s	Set the filter time constant to apply to the current for torque.

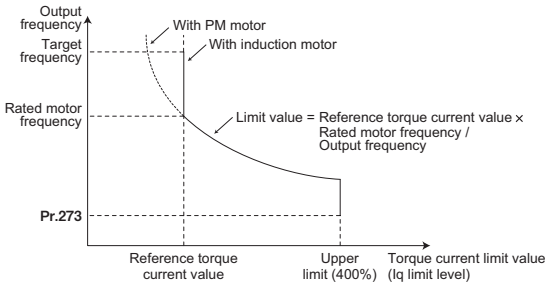
Pr.	Setting range	Description	
288	0 (Initial value)	Without droop control 2 during acceleration/deceleration (With 0 limit)	Rated motor frequency is the droop compensation reference.
	1	Countermeasure against winding expansion Constant droop control 2 during operation (With 0 limit)	
	2	Constant droop control 2 during operation (Without 0 limit)	
	10	Without droop control 2 during acceleration/deceleration (With 0 limit)	Motor speed is the droop compensation reference.
	11	Constant droop control 2 during operation (With 0 limit)	

*1 For the load torque high speed frequency control (mode 1) and the stop-on-contact control, refer to the Instruction Manual (Detailed) of the FR-A800 inverter.

*2 When "load torque high-speed frequency control (mode 2)" is not selected, the droop gain is internally restricted to 100% even if a value exceeding 100% is set.

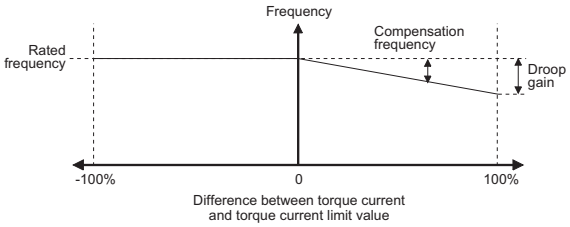
◆ Operation of load torque high-speed frequency control (mode 2)

- The maximum frequency (**Pr.4** or **Pr.5**) is used as the target frequency for acceleration.
- When the output current (Iq) reaches or exceeds the torque current limit value (Iq limit level), acceleration is interrupted.
- When the output current (Iq) decreases by the interruption, acceleration starts again.
- By switching between acceleration and stopping, acceleration is controlled so that the torque current matches the torque current limit value.



◆ Countermeasure against winding expansion (droop control 2)

- When a wire rope is wound, the motor torque increases along with enlargement in the winding diameter (winding expansion). Set the droop control 2 to compensate the output frequency corresponding to the motor torque increase.
- As a countermeasure against winding expansion, set **Pr.288 Droop function activation selection** = Droop gain.



Overload detection

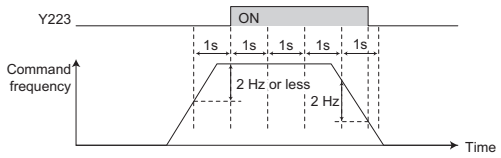
Pr.	GROUP	Name	Pr.	GROUP	Name
864	M470	Torque detection	1405	A165	Overload detection time

- The constant speed signal (Y223) can be output when the range of speed fluctuations is small. By the output of the constant speed signal output, the load torque without the acceleration/deceleration torque can be confirmed. When this function is used together with the PLC function, the superordinate controller, etc., the control according to the load is enabled.
- The overload can be detected during constant speed operation. When too much load is applied (overload) to a crane, the overload detection signal (TU2) output transmits the information to the superordinate controller.

Pr.	Setting range	Description
864	0 to 400%	Set the torque value where the TU2 signal turns ON.
1405	0 to 10 s	Set the time from when the motor torque reaches or exceeds the **Pr.864** setting until the overload detection signal (TU2) is output.

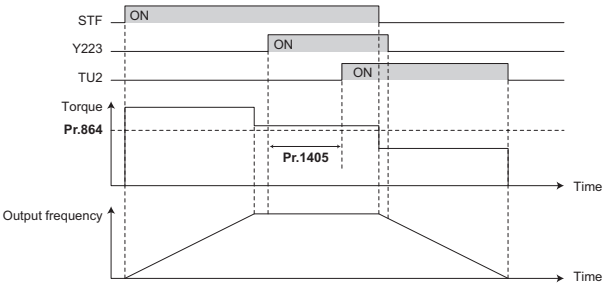
◆ Constant speed signal (Y223 signal)

- When the range of the command frequency fluctuations is 2 Hz/s or less while the inverter is running, the constant speed signal (Y223) is turned ON. When the inverter stops, or when the range of the command frequency fluctuations is more than 2 Hz/s, the constant speed signal (Y223) is turned OFF.
- For the Y223 signal, set "223 (positive logic) or 323 (negative logic)" in one of **Pr.190 to Pr.196 (output terminal function selection)** to assign the function to the output terminal.



◆ Overload detection (Pr.864, Pr.1405, TU2 signal)

- During constant speed operation (the Y223 signal ON), when the motor torque is equal to or higher than the value set in **Pr.864 Torque detection** for a continuous time equal to or longer than the value set in **Pr.1405 Overload detection time**, the overload detection signal (TU2) is turned ON. When the TU2 signal is ON, the TU2 signal stays ON until the inverter output stops.
- For the TU2 signal, set "221 (positive logic) or 321 (negative logic)" in one of **Pr.190 to Pr.196 (output terminal function selection)** to assign the function to the output terminal.



Anti-sway control

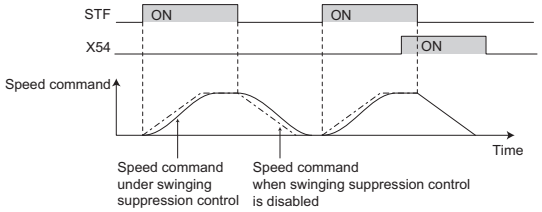
Pr.	GROUP	Name	Pr.	GROUP	Name
1072	A310	DC brake judgment time for anti-sway control operation	1073	A311	Anti-sway control operation selection
1074	A312	Anti-sway control frequency	1075	A313	Anti-sway control depth
1076	A314	Anti-sway control width	1077	A315	Rope length
1078	A316	Trolley weight	1079	A317	Load weight

- When an object is moved by a crane, swinging is suppressed on the crane's traveling axis.
- Anti-sway control can be disabled by the anti-sway control disabled signal (X54).

Pr.	Setting range	Description
1072	0 to 10 s	Set the time from when the output frequency becomes the **Pr.10 DC injection brake operation frequency** or less to when the DC injection brake (zero speed control or the servo lock) operation starts.
1073	0 (Initial value)	Anti-sway control disabled
	1	Anti-sway control enabled
1074	0.05 to 3 Hz	Set a swinging frequency of the object.
	9999	Anti-sway control is performed using a swinging frequency estimated by the inverter according to the settings of **Pr.1077 to Pr.1079**.
1075	0 to 3	0 (Deep) → 3 (Shallow)
1076	0 to 3	0 (Narrow) → 3 (Wide)
1077	0.1 to 50 m	Set the crane rope length.
1078	1 to 50000 kg	Set the trolley weight.
1079	1 to 50000 kg	Set the weight of the object.

◆ Anti-sway control disabled signal (X54 signal)

- When anti-sway control is enabled, the travel distance between the positions where the crane starts deceleration and where the crane stops becomes longer. For an emergency stop by a system using a position confirmation sensor, disable anti-sway control to shorten the stopping distance.
- When anti-sway control is enabled (**Pr.1073Anti-sway control operation selection**="1") , turning ON the anti-sway control disabled signal (X54) disables anti-sway control.
- For the X54 signal, set "54" in any of **Pr.178 to Pr.189 (input terminal function selection)** to assign the function to the input terminal.



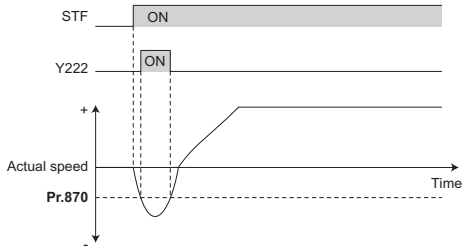
Falling detection V/F Magnetic flux Vector

Pr.	GROUP	Name
870	M400	Speed detection hysteresis

- When the commanded direction differs from the actual motor rotation direction, the falling detection signal (Y222) can be output.
- Slippage during the start of a lift can be checked. (A speed detector such as an encoder is required.)

Pr.	Setting range	Description
870	0 to 5 Hz	Set the hysteresis width for the detected frequency.

- When the commanded direction differs from the actual motor rotation direction, and the actual motor speed is higher than the value set in **Pr.870 Speed detection hysteresis**, the falling detection signal (Y222) is turned ON.
- For the Y222 signal, set "222 (positive logic) or 322 (negative logic)" in any of **Pr.190 to Pr.196 (output terminal function selection)** to assign the function to the output terminal.



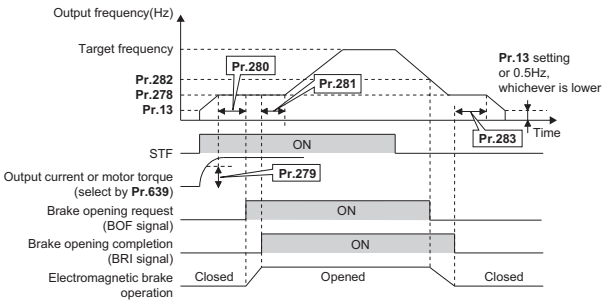
Brake opening current level setting for reverse rotation (Brake sequence function)

Pr.	GROUP	Name	Pr.	GROUP	Name
278	A100	Brake opening frequency	279	A101	Brake opening current
280	A102	Brake opening current detection time	281	A103	Brake operation time at start
282	A104	Brake operation frequency	283	A105	Brake operation time at stop
284	A106	Deceleration detection function selection	285	A107	Overspeed detection frequency
292	F500	Automatic acceleration/ deceleration	639	A108	Brake opening current selection
640	A109	Brake operation frequency selection	641	A130	Second brake sequence operation selection
642	A120	Second brake opening frequency	643	A121	Second brake opening current
644	A122	Second brake opening current detection time	645	A123	Second brake operation time at start
646	A124	Second brake operation frequency	647	A125	Second brake operation time at stop
648	A128	Second deceleration detection function selection	650	A128	Second brake opening current selection
651	A129	Second brake operation frequency selection	1408	A168	Brake opening current for reverse rotation
1409	A169	Second brake opening current for reverse rotation			

- The brake sequence function enables setting of the brake opening level individually for forward rotation and reverse rotation.

Pr.	Setting range	Description
1408	0 to 400%	Set the brake opening current during reverse rotation. Set between 50 and 90% because load slippage is more likely to occur at a start setting is too low.
	9999 (Initial value)	During reverse rotation, the **Pr.279** setting is applied.
1409	0 to 400%	Set the brake opening current during reverse rotation in the second brake sequence function.
	9999 (Initial value)	During reverse rotation, the **Pr.643** setting is applied.

- When the start signal is input to the inverter, the inverter starts running, and when the output frequency reaches the frequency set in **Pr.278 Brake opening frequency** and the output current is equal to or greater than the Brake opening current setting, the brake opening request signal (BOF) is output after the time set in **Pr.280 Brake opening current detection time**.
- The output current level or the motor torque level to output the BOF signal can be set individually for forward rotation and reverse rotation. Set the output current or the motor torque during reverse rotation in **Pr.1408 Brake opening current for reverse rotation**. (When **Pr.1408** = "9999", the Pr.279 setting is applied also during reverse rotation.)



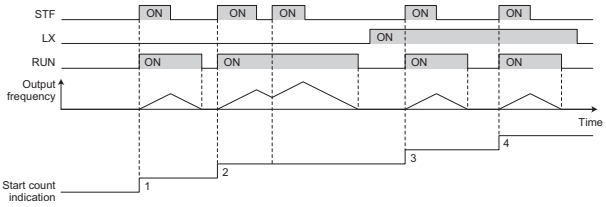
Start count monitor

Pr.	GROUP	Name	Pr.	GROUP	Name
1410	A170	Starting times lower 4 digits	1411	A171	Starting times upper 4 digits

- The inverter starting times can be counted.
- Confirming the starting times can be used to determinate the timing of the maintenance, or can be used as a reference for system inspection or parts replacement.

Pr.	Setting range	Description
1410	0 to 9999	Displays the lower four digits of the number of the inverter starting times.
1411	0 to 9999	Displays the upper four digits of the number of the inverter starting times.

- Every start signal input (the RUN signal ON) while the inverter output is stopped is counted as the inverter starting time. (Starting during pre-excitation is also counted.)



Warranty

When using this product, make sure to understand the warranty described below.

1. Warranty period and coverage

We will repair any failure or defect (hereinafter referred to as "failure") in our FA equipment (hereinafter referred to as the "Product") arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

[Term]

The term of warranty for Product is twelve months after your purchase or delivery of the Product to a place designated by you or eighteen months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[Limitations]

(1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged.
However, it will not be charged if we are responsible for the cause of the failure.

(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
1) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
2) a failure caused by any alteration, etc. to the Product made on your side without our approval
3) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
4) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
5) any replacement of consumable parts (condenser, cooling fan, etc.)
6) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
7) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
8) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas

Our regional FA Center in overseas countries will accept the repair work of the Product; however, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

4. Exclusion of responsibility for compensation against loss of opportunity, secondary loss, etc.

Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

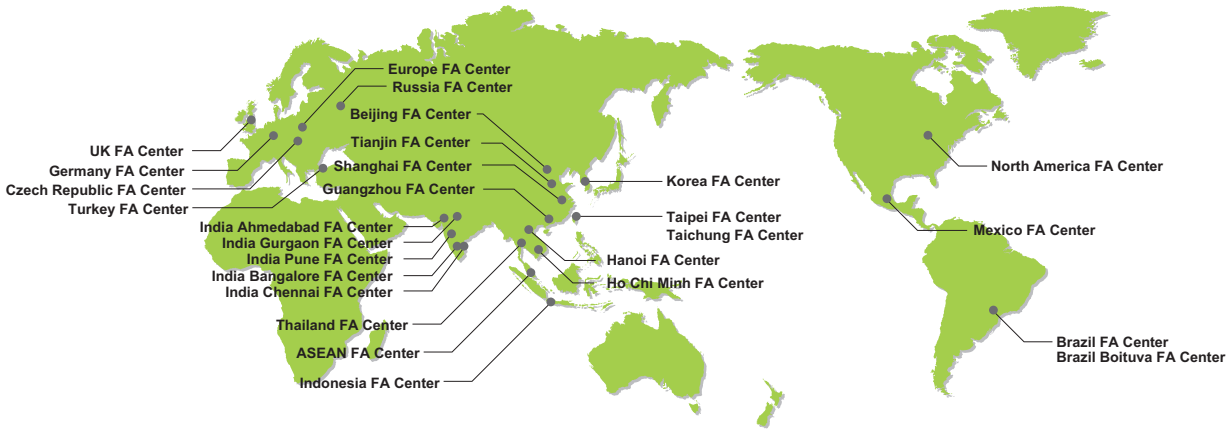
6. Application and use of the Product

(1) For the use of our product, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in product, and a backup or fail-safe function should operate on an external system to product when any failure or malfunction occurs.

(2) Our product is designed and manufactured as a general purpose product for use at general industries.
Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

Support

Global FA Center



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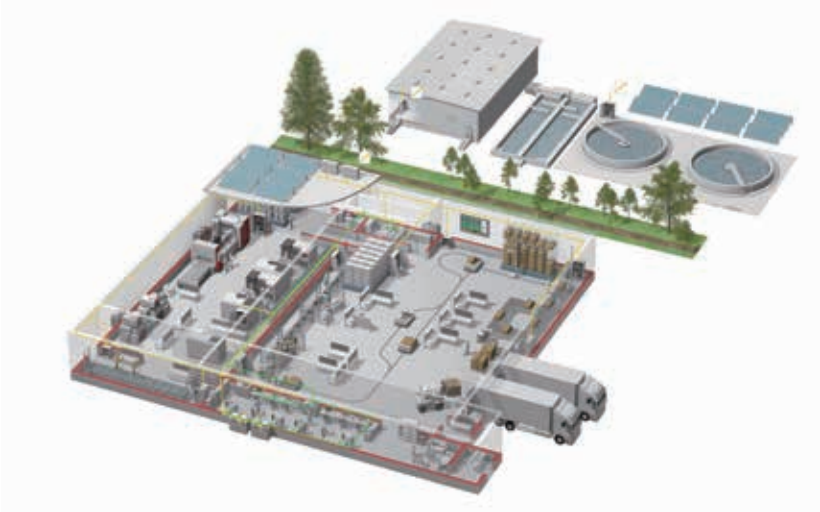

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