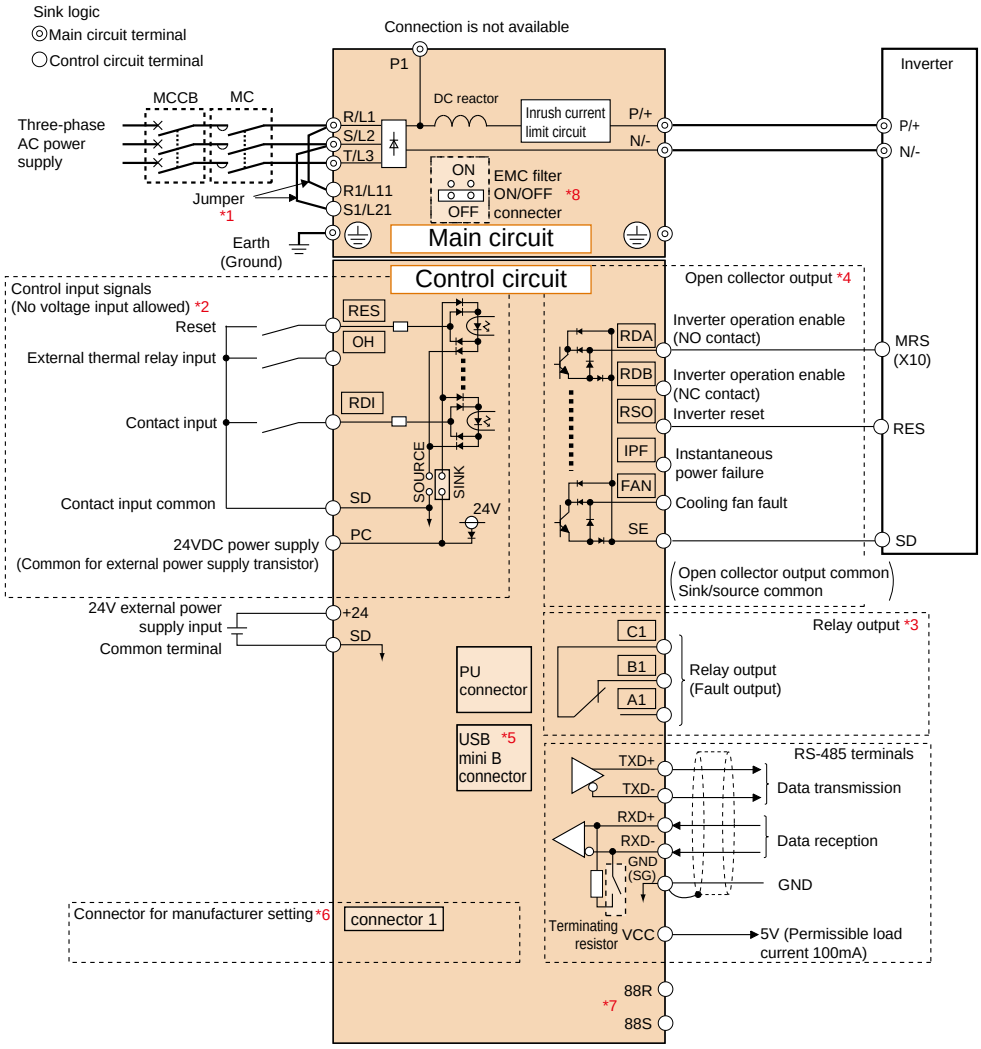
■Converter unit (FR-CC2)

●When the sink logic is selected



*1: When using separate power supply for the control circuit, remove the jumpers from R1/L11 and S1/L21.
*2: The function of these terminals can be changed with the input terminal assignment **(Pr.178, Pr.187, Pr.189)**.
*3: The function of these terminals can be changed with the output terminal assignment **(Pr.195)**.
*4: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*5: The connector is for manufacturer setting. Do not use.
*6: Plug-in options cannot be used.
*7: For manufacturer setting. Do not use.
*8: For the FR-CC2-H400K to H630K, two EMC filter ON/OFF connectors are provided.

Standard models, and separated converter type

Type		Terminal Symbol	Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3*1	AC power input	Connect to the commercial power supply.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or PM motor.	
		R1/L11, S1/L21	Power supply for control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain alarm display and alarm output, apply external power to this terminal.	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV), power regeneration converter (MT-RC), high power factor converter (FR-HC2), or DC power supply (under DC feeding mode). Do not connect the DC power supply between terminals P3 and N/-. Use terminals P/+ and N/- for DC feeding. Connect the separated converter type to the terminals P/+ and N/- of the converter unit.	
		P3, N/-*1*2			
		P/+, P1*1	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. For the FR-F820-03160 (75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor, which is available as an option.	
		PR, PX*1	Do not use terminals PX and PR. The terminal PX is equipped in the FR-F820-00490(11K) or lower and the FR-F840-00250(11K) or lower. The terminal PR is equipped in the FR-F820-01250(30K) or lower and the FR-F840-01800(75K) or lower.		
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal	Contact input	STF	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	When the STF and STR signals are turned ON simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.	
		STP (STOP)	Start self-holding selection	Turn ON the STOP signal to self-hold the start signal.	
		RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
		JOG	Jog mode selection	Turn ON the JOG signal to select Jog operation (initial setting) and turn ON the start signal (STF or STR) to start Jog operation.	
			Pulse train input	JOG terminal can be used as pulse train input terminal. To use as pulse train input terminal, the **Pr.291** setting needs to be changed. (maximum input pulse: 100k pulses/s)	
		RT	Second function selection	Turn ON the RT signal to select second function selection When the second function such as "Second torque boost" and "Second V/F (base frequency)" are set, turning ON the RT signal selects these functions.	
		MRS	Output stop	Turn ON the MRS signal (2 ms or more) to stop the inverter output. Use to shut OFF the inverter output when stopping the motor by electromagnetic brake.	
		MRS (X10)*7	Output stop (Inverter operation enable)	Connect to the terminal RDA of the converter unit (FR-CC2). When the RDA signal is turned OFF, the inverter output is shut off. The X10 signal (NC contact) is assigned to the terminal MRS in the initial setting. Use **Pr.599** to change the specification to NO contact.	
		RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn ON the RES signal for more than 0.1 s, then turn it OFF. Recover about 1 s after reset is cancelled.	
		AU	Terminal 4 input selection	Terminal 4 is made valid only when the AU signal is turned ON. Turning the AU signal ON makes terminal 2 invalid	
		CS	No function	Use **Pr.186 CS terminal function selection** for function assignment.	
		SD	Contact input common (sink)*3	Common terminal for the contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)*4	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			24 VDC power supply common	Common output terminal for the 24 VDC 0.1 A power supply (terminal PC). Isolated from terminals 5 and SE.	
		PC	External transistor common (sink)*3	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable currents.	
			Contact input common (source)*4	Common terminal for contact input terminal (source logic).	
			24 VDC power supply	Can be used as a 24 VDC 0.1 A power supply.	
	Frequency setting	10E	Frequency setting power supply	When connecting a frequency setting potentiometer at an initial status, connect it to terminal 10. Change the input specifications of terminal 2 when connecting it to terminal 10E.	10 VDC, permissible load current 10mA
		10			5 VDC, permissible load current 10mA
		2	Frequency setting (voltage)	Inputting 0 to 5 VDC (or 0 to 10 V, 4 to 20 mA) provides the maximum output frequency at 5 V (10 V, 20 mA) and makes input and output proportional. Use **Pr.73** to switch from among input 0 to 5 VDC (initial setting), 0 to 10 VDC, and 4 to 20 mA. Set the voltage/current input switch in the ON position to select current input (0 to 20 mA).	Voltage input: Input resistance 10 kΩ ± 1 kΩ Maximum permissible voltage 20 VDC Current input: Input resistance 245 Ω ± 5 Ω Maximum permissible current 30 mA
		4	Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). Use **Pr.267** to switch from among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the OFF position to select voltage input (0 to 5 V/0 to 10 V). Use **Pr.858** to switch terminal functions.	
		1	Frequency setting auxiliary	Inputting 0 to ±5 VDC or 0 to ±10 VDC adds this signal to terminal 2 or 4 frequency setting signal. Use **Pr.73** to switch between input 0 to ±5 VDC and 0 to ±10 VDC (initial setting) input.	Input resistance 10 kΩ ±1 kΩ Maximum permissible voltage ±20 VDC
		5	Frequency setting common	Common terminal for frequency setting signal (terminal 2, 1 or 4) and analog output terminal AM, CA. Do not earth (ground).	
	Thermistor	10 2	PTC thermistor input	For receiving PTC thermistor outputs. When PTC thermistor is valid (**Pr.561** ≠ "9999"), the terminal 2 is not available for frequency setting.	Applicable PTC thermistor specification Overheat detection resistance:500 Ω to 30 kΩ (Set by **Pr.561**)
	External power supply input	+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.	Input voltage 23 to 25.5 VDC Input current 1.4 A or less

□ indicates that terminal functions can be selected from **Pr.178 to Pr.196 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

Type		Terminal Symbol	Terminal Name	Description		
Control circuit/output signal	Relay	A1, B1, C1	Relay output 1 (alarm output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Alarm: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C)		Contact capacity 230 VAC 0.3 A (power factor =0.4) 30 VDC 0.3 A
		A2, B2, C2	Relay output 2	1 changeover contact output		
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched high during stop or DC injection brake operation.		Permissible load 24 VDC (maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).
		SU	Up to frequency	Switched low when the output frequency reaches within the range of ±10% (initial value) of the set frequency. Switched high during acceleration/deceleration and at a stop.	Alarm code (4 bits) output	
		OL	Overload alarm	Switched low when stall prevention is activated by the stall prevention function. Switched high when stall prevention is cancelled.		
		IPF	Instantaneous power failure	Switched low when an instantaneous power failure and under voltage protections are activated.		
		IPF*7	Open collector output	No function is assigned in the initial setting. The function can be assigned setting **Pr.192**.		
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.		
		SE	Open collector output common	Common terminal for terminals RUN, SU, OL, IPF, FU		
	Pulse	FM*5	For meter	Select one e.g. output frequency from monitor items. (The signal is not output during an inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item. The output signal is proportional to the magnitude of the corresponding monitoring item.Use **Pr.55**, **Pr.56**, and **Pr.866** to set full scales for the monitored output frequency, output current, and torque.	Output item: output frequency (initial setting), permissible load current 2 mA, For full scale1440 pulses/s	
			NPN open collector output		Signals can be output from the open collector terminals by setting **Pr.291**. (maximum output pulse: 50kpulses/s)	
	Analog	AM	Analog voltage output		Output item: output frequency (initial setting), output signal 0 to ±10 VDC, permissible load current 1 mA (load impedance 10 kΩ or more), resolution 8 bit	
		CA*6	Analog current output		Output item: output frequency (initial setting), Load impedance 200 Ω to 450 Ω Output signal 0 to 20 mADC	
Communication		–	PU connector	With the PU connector, communication can be made through RS-485. (1:1 connection only) • Conforming standard: EIA-485(RS-485) • Communication speed: 4800 to 115200 bps • Transmission format: Multi-drop link • Wiring length: 500 m		
	RS-485 terminals	TXD+, TXD-	Inverter transmission terminal	With the RS-485 terminals, communication can be made through RS-485. • Conforming standard: EIA-485(RS-485) • Communication speed: 300 to 115200 bps • Transmission format: Multi-drop link • Overall extension: 500 m		
		RXD+, RXD-	Inverter reception terminal			
		GND (SG)	Earth (Ground)			
	–		USB A connector	A connector (receptacle). A USB memory device enables parameter copies and the trace function.		Interface: Conforms to USB1.1 (USB2.0 full-speed compatible). Transmission speed: 12 Mbps
			USB B connector	Mini B connector (receptacle). Connected to a personal computer via USB to enable setting, monitoring, test operations of the inverter by FR Configurator2.		
Safety stop signal		S1	Safety stop input (Channel 1)	The terminals S1 and S2 are used for the safety stop input signal for the safety relay module. The terminals S1 and S2 are used at the same time (dual channel). Inverter output is shutoff by shortening/opening between terminals S1 and SIC, or between S2 and SIC. In the initial status, terminals S1 and S2 are shorted with the terminal PC by shorting wires. The terminal SIC is shorted with the terminal SD. Remove the shorting wires and connect the safety relay module when using the safety stop function.		Input resistance 4.7 kΩ Input current 4 to 6 mADC (with 24 VDC input)
		S2	Safety stop input (Channel 2)			
		SIC	Safety stop input terminal common	Common terminal for terminals S1 and S2.		–
		SO	Safety monitor output (open collector output)	Indicates the safety stop input signal status. Switched to LOW when the status is other than the internal safety circuit failure. Switched to HIGH during the internal safety circuit failure status. (LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).) Refer to the Safety stop function instruction manual (BCN-A23228-001) when the signal is switched to HIGH while both terminals S1 and S2 are open.		Permissible load 24 VDC (27 VDC at maximum), 0.1 A (A voltage drop is 3.4 V at maximum while the signal is ON.) (A voltage drop is 3.4 V at maximum while the signal is ON.)
		SOC	Safety stop input terminal common	Common terminal for terminal SO.		–

*1: Terminals R/L1, S/L2, T/L3, PR, P3, P1, and PX are not provided in the separated converter type.
*2: The terminal P3 is equipped in the FR-F820-00770(18.5K) to 01250(30K) and the FR-F840-00470(22K) to 01800(75K).
*3: Sink logic is initially set for the FM-type inverter.
*4: Source logic is initially set for the CA-type inverter.
*5: Terminal FM is provided in the FM-type inverter.
*6: Terminal CA is provided in the CA-type inverter.
*7: Function and name of the separated converter type.

Converter unit (FR-CC2)

Type		Terminal Symbol		Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3		AC power input	Connect these terminals to the commercial power supply.	
		R1/L11, S1/L21		Power supply for the control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain the fault display and fault output, remove the jumpers across terminals R/L1 and R1/L11 and across S/L2 and S1/L21 and supply external power to these terminals.	
		P/+, N/-		Inverter connection	Connect to terminals P/+ and N/- of the inverter.	
		⏚		Earth (ground)	For earthing (grounding) the converter unit chassis. This must be earthed (grounded).	
Control circuit/input signal	Contact input	RES		Reset	Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 s or longer, then turn it OFF. In the initial setting, reset is always enabled. By setting **Pr.75**, reset can be set enabled only at fault occurrence of the converter unit. The inverter recovers about 1 s after the reset is released.	
		OH		External thermal relay input	The external thermal relay input (OH) signal is used when using an external thermal relay or a thermal protector built into the motor to protect the motor from overheating. When the thermal relay is activated, the inverter trips by the external thermal relay operation (E.OHT).	
		RDI		Contact input	The function can be assigned by setting **Pr.178**.	
		SD		Contact input common (sink) (Initial setting)	Common terminal for contact input terminal (sink logic).	
				External transistor common (source)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
				24 VDC power supply common	Common terminal for the 24 VDC power supply (terminal PC, terminal +24) Isolated from terminal SE.	
		PC		External transistor common (sink) (Initial setting)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
				Contact input common (source)	Common terminal for contact input terminal (source logic).	
				24 VDC power supply common	Can be used as a 24 VDC 0.1 A power supply.	
	External power supply input	+24		24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.	Input voltage 23 to 25.5 VDC Input current 1.4 A or less
Control circuit/output signal	Relay	A1, B1, C1		Relay output 1 (fault output)	1 changeover contact output that indicates that the protective function of the converter unit has been activated and the outputs are stopped. Fault: discontinuity across B and C (continuity across A and C), Normal: continuity across Band C (discontinuity across A and C)	Contact capacity 230 VAC 0.3 A (power factor = 0.4) 30 VDC 0.3 A
		88R, 88S		For manufacturer setting. Do not use.		
	Open collector	RDA		Inverter operation enable (NO contact)	Switched to LOW when the converter unit operation is ready. Assign the signal to the terminal MRS (X10) of the inverter. The inverter can be started when the RDA status is LOW.	Permissible load 24 VDC (maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).
		RDB		Inverter operation enable (NC contact)	Switched to LOW when a converter unit fault occurs or the converter is reset. The inverter can be started when the RDB status is HIGH.	
		RSO		Inverter reset	Switched to LOW when the converter is reset (RES-ON). Assign the signal to the terminal RES of the inverter. The inverter is reset when it is connected with the RSO status LOW.	
		IPF		Instantaneous power failure	Switched to LOW when an instantaneous power failure is detected.	
		FAN		Cooling fan fault	Switched to LOW when a cooling fan fault occurs.	
		SE		Open collector output common	Common terminal for terminals RDA, RDB, RSO, IPF, FAN	
Communication		—		PU connector	With the PU connector, communication can be made through RS-485. (For connection on a 1:1 basis only) • Conforming standard: EIA-485 (RS-485) • Transmission format: Multidrop link • Communication speed: 4800 to 115200 bps • Wiring length: 500 m	
		RS-485 terminals	TXD+	Converter unit transmission terminal	The RS-485 terminals enable the communication by RS-485. • Conforming standard: EIA-485 (RS-485) • Transmission format: Multidrop link • Communication speed: 300 to 115200 bps • Overall length: 500 m	
			TXD-			
			RXD+	Converter unit reception terminal		
			RXD-			
			GND (SG)	Earthing (grounding)		

□ indicates that terminal functions can be selected from **Pr.178, Pr.187, Pr.189 to Pr.195 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

MEMO

Inverter FREQROL-E700 Series

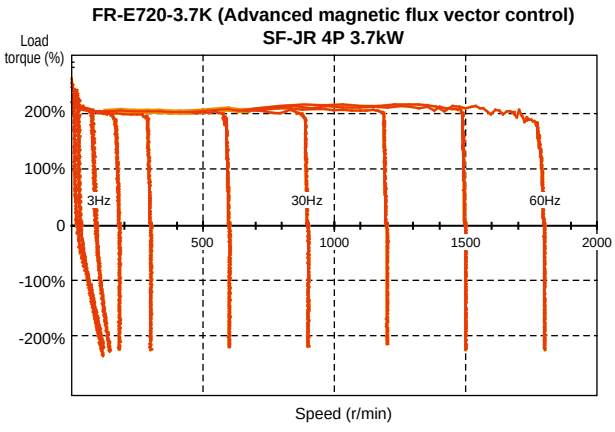
Compact body with easy use and High-class drive performance

Top Level of Driving Performance in Compact Body

High Torque 200%/0.5Hz is Realized by Advanced Magnetic Flux Vector Control (3.7K or less)

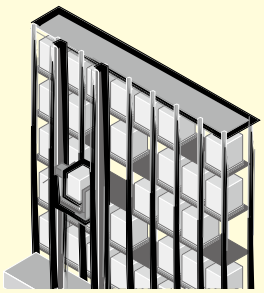
By the advancement of General-purpose magnetic flux vector control to Advanced magnetic flux vector control, top level of driving performance becomes possible.
Since V/F control and General-purpose magnetic flux vector control operations are available, operation after replacement of the conventional model (FR-E500 series) is ensured.
For the 5.5K to 15K, 150%/0.5Hz torque is realized.

■Speed/torque characteristics example



Advanced auto tuning

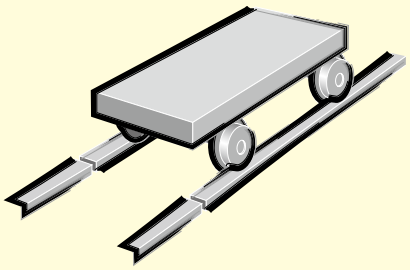
Many kinds of three phase induction motors can be optimally controlled with Mitsubishi's original "non-rotation" auto tuning function. High precision tuning is enabled even when a test operation of a machine cannot be performed at parameter adjustment.



Advanced magnetic flux vector control is ideal for a lift in an automated-storage system which requires high torque at low speed.

Short Time Overload Capacity is Increased (200% 3s)

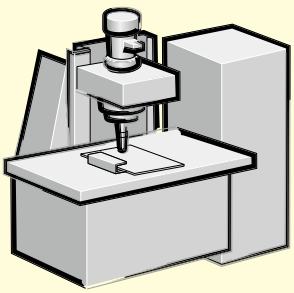
Short time overload capacity is increased to 200% 3s (200% 0.5s for the conventional model). Overcurrent trip is less likely to occur.



When a bogie runs over a bump, the impact can be beared by this function.

Torque Limit/Current Limit Function

Improved torque limit/current limit function provides a machine protection, load limit, and stop-on-contact operation.



Using the torque limit function, machine breakage from overload can be avoided.
For example, edge chipping of a tool can be avoided.

Improved Regeneration Capability

A brake transistor is built-in to the 0.4K to 15K.
Connecting an optional brake resistor increases regeneration capability.

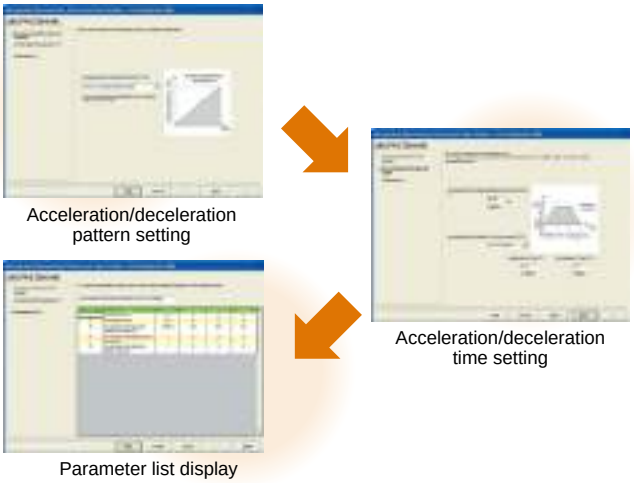
Enhanced Operability

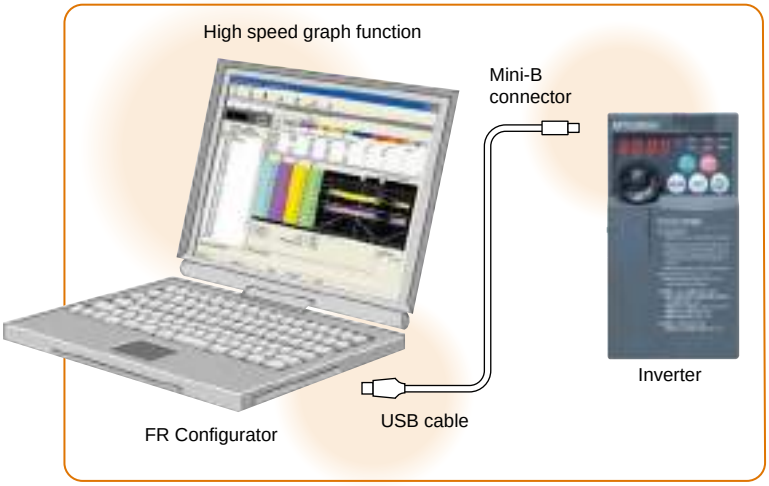
Usability was thoroughly pursued.

With a Provided USB Connector, Setting is Easily Done from a Personal Computer Using FR Configurator

An USB connector (mini-B connector) is provided as standard. The inverter can be easily connected without a USB-RS-485 converter.
Wizard (interactive) function of FR Configurator (inverter setup software) provides setting support.
In addition, a high-speed graph function with USB enables high speed sampling display.

Setting wizard function (example: acceleration/deceleration time setting)





Expanded advanced operability with USB and FR Configurator

Enclosure Surface Operation Panel FR-PA07 (Option)

Optional enclosure surface operation panel (FR-PA07) can be connected.
In addition, an operation panel for conventional model (FR-E500 series) can be connected.

The operation panel of the inverter cannot be removed.
A parameter unit connection cable (FR-CB20□) is separately required.

Parameter Unit FR-PU07/FR-PU07BB(-L) (Option)

The FR-PU07/FR-PU07BB(-L), an optional parameter unit, can be connected as well.

A parameter unit connection cable (FR-CB20□) is separately required.
(Parameter unit connection cable FR-CB203 (3m) is enclosed with FR-PU07BB(-L).)

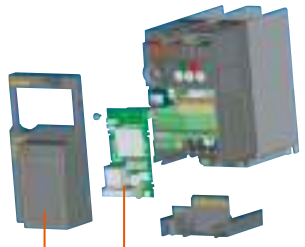
- Setting such as direct input method with a numeric keypad, operation status indication, and help function are useful.
  The display language can be selected from 8 languages.
- Parameter settings of maximum of three inverters can be stored.
- A battery pack type (FR-PU07BB(-L)) allows parameter setting and parameter copy without powering on the inverter.
  To use a parameter unit with battery pack (FR-PU07BB) outside of Japan, order a "FR-PU07BB-L" (parameter unit type indicated on the package has L at the end).

Enhanced Expandability

Mitsubishi inverters offer the expandability that answers to every need

A Variety of Plug-in Options are Mountable

Plug-in options supporting digital input, analog output extension, and a variety of communications provide extended functions which is almost equivalent to the FR-A700 series. (One type of plug-in option can be mounted.)
[For the FR-E700 series, use the "FR-A7 □□ E kit" which is a set of optional board and dedicated front cover.]



These plug-in options are supported by the standard control circuit terminal model.

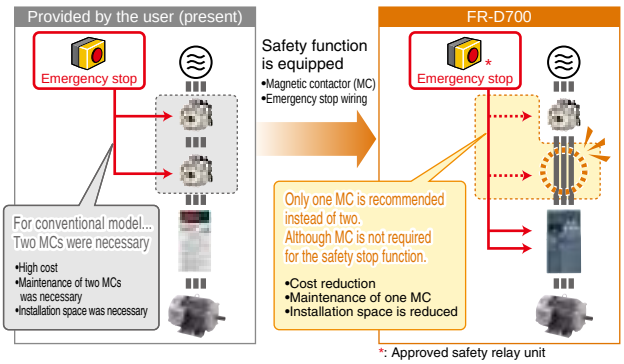
Compatible Plug-in Options

- FR-A7AX E kit ...16-bit digital input
- FR-A7AY E kit ...Digital output
  Extension analog output
- FFR-A7AR E kit ...Relay output
- FR-A7NC E kit ...CC-Link
- FR-A7ND E kit ...DeviceNet
- FR-A7NP E kit ...PROFIBUS-DP
- FR-A7NL E kit ...LonWorks

Safety Stop Function (FR-E700-SC)

- Spring clamp terminals are adopted as control circuit terminals. Spring clamp terminals are highly reliable and can be easily wired.
- The FR-E700-SC series is compliant to the EU Machinery Directive without the addition of previously required external devices.
  Operation of an external emergency stop device results in a highly reliable immediate shutoff of the D700's output to the motor.
  This safety stop function conforms to the following standards.

EN ISO 13849-1 Category 3 / PLd
EN62061 / IEC61508 SIL2



*: Approved safety relay unit

Control Terminals are Selectable According to Applications

Terminal cards other than standard terminal such as analog, plus train (available soon), two port RS-485 terminal are available as options.
A crimp ring terminal type is also available (to be released).
A terminal card is removable and can be easily replaced from a standard terminal card.

Various Kinds of Networks are Supported

- EIA-485 (RS-485), ModbusRTU (equipped as standard), CC-Link, PROFIBUS-DP, DeviceNet®, LonWorks® (option)

LonWorks® is a registered trademark of Echelon Corporation, DeviceNet® is of ODVA, and PROFIBUS is of PROFIBUS User Organization.
Other company and product names herein are the trademarks of their respective owners.

Compact and Space Saving

Compact design expands flexibility of enclosure design.

Compact Body with High Performance Function

Installation size is the same as the conventional model (FR-E500 series) in consideration of intercompatibility. (7.5K or less)

FR-E720-0.2K (SC) FR-E520-0.2K

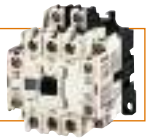
Side by Side Installation Saves Space

Space can be saved by side by side no clearance installation*.

*: Use the inverter at the surrounding air temperature of 40°C or less.

Peripheral device — Mitsubishi magnetic contactors

- Offer a selection of small frames
- Offer a line-up of safety contactors
- Support with low-level load (auxiliary contact)
- Support many international regulations as a standard model



Ensured Maintenance

700 series are the pioneer of long life and high reliability.

Long-life Design

- The design life of the cooling fan has been extended to 10 years*1. The life of the fan can be further extended utilizing the it's ON/OFF control.
- The design life of the capacitors has been extended to 10 years by adopting a capacitor that endures 5000 hours at 105°C surrounding air temperature*1, *2.

*1: Surrounding air temperature : annual average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value.
*2: Output current : 80% of the inverter rated current

- Life indication of life components

Components	Guideline of the FR-E700 Life	Guideline of JEMA*3
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

*3: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacturer's Association)

Leading Life Check Function

- Degrees of deterioration of main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be monitored.
- Trouble can be avoided with the self-diagnostic alarm*4 that is output when the life span is near.

*4: Any one of main circuit capacitor, control circuit capacitor, inrush current limit circuit or cooling fan reaches the output level, an alarm is output.
Capacity of the main circuit capacitor can be measured by setting parameter at a stop and turning the power from off to on. Measuring the capacity enables an alarm to be output.

Easy Replacement of Cooling Fan

- A cooling fan is provided on top of the inverter for all capacities requiring a cooling fan*. A cooling fan can be easily replaced without disconnecting main circuit wires.

*: Cooling fans are equipped with FR-E720-1.5K or more, FR-E740-1.5K or more, and FR-E720S-0.75K or more.

Combed Shaped Wiring Cover

Since a wiring cover can be installed after wiring, wiring work is easily done.

Removable Control Terminal Block

Wiring of the control circuit when replacing the same series inverter can be done by changing the terminal block.

Environment-Friendly

Human and environment-friendly inverter

Compliance with the EU Restriction of Hazardous Substances (RoHS)

- The inverter is human and environment-friendly by being compliance with the RoHS Directive.

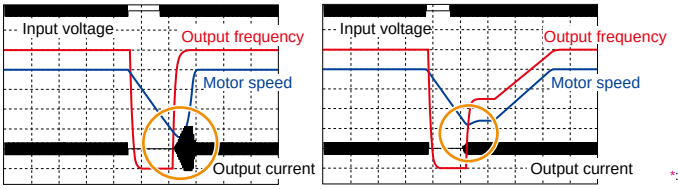
Filter Options

- The inverter with filterpack FR-BFP2 (a package of power factor improving DC reactor, common mode choke and capacitive filter) conforms to the Japanese harmonic suppression guideline.
- Noise filter option which is compatible with EMC Directive (EN61800-3 2nd Environment Category C3) is available.

Full of Useful Functions

Enhanced functions for all sorts of applications

- Automatic restart after instantaneous power failure function with frequency search



FR-E500 series FR-E700 series

Detection of coasting speed (frequency search function) prevents the motor speed from decreasing at a restart, starting the motor smoothly with less output current.

- Power-failure deceleration stop function/operation continuation at instantaneous power failure function
  The motor can be decelerated to a stop when a power failure or undervoltage occurs to prevent the motor from coasting.
  This function is useful to stop a motor at power failure as a fail safe of machine tool, etc.
  With the new operation continuation function at instantaneous power failure, the motor continues running without coasting even if an instantaneous power failure occurs during operation.

*: The inverter may trip and the motor may coast depending on the load condition.

- Brake sequence mode ····· is useful for mechanical brake control of a lift.
- Regeneration avoidance function ····· prevents regenerative overvoltage in a pressing machine.
- Optimum excitation control ····· can save more energy with the maximum motor efficiency control.
- Main circuit power supply DC input ····· can be connected to DC power supply.
- Enhanced I/O terminal function ····· supports switchover of analog input (voltage / current).
- Password function ····· is effective for parameter setting protection.

and so on

Energy saving design for fan/pump use

- Applicable load selection (Pr.14)
  Selecting the best output characteristics (V/F characteristics) according to use and load characteristics is possible.
- Optimum excitation control (Pr.60)
  Save more energy with control that maximizes motor efficiency.

Lineup

FR-E720 -0.1K -

Symbol	Voltage
1	100V class
2	200V class
4	400V class

Symbol	Number of Power Phases
None	Three-phase input
S	Single-phase input
W	Single-phase input (double voltage output)

Symbol	Inverter Capacity
0.1K to 15K	Represents the inverter capacity "kW".

Symbol	Control circuit terminal specification
None	Standard control circuit terminal model (screw type)
SC	Safety stop function model
NF	FL remote communication compatible model
NC	CC-Link communication compatible model

Symbol	Protective Structure
None	Enclosed-type structure IP20
C	Totally enclosed structure IP40

Inverter Model \ Inverter capacity		0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K
Three-phase 200V FR-E720-□□	Enclosed-type structure (IP20)	●	●	●	●	●	●	●	●	●	●	●
	Totally enclosed structure (IP40)	○	○	○	○	○	○	○	○	○	○	○
Three-phase 400V FR-E740-□□	Enclosed-type structure (IP20)	—	—	●	●	●	●	●	●	●	●	●
	Totally enclosed structure (IP40)	—	—	○	○	○	○	○	○	○	○	○
Single-phase 200V FR-E720S-□□*	Enclosed-type structure (IP20)	●	●	●	●	●	●	—	—	—	—	—
Single-phase 100V FR-E710W-□□*	Enclosed-type structure (IP20)	●	●	●	●	—	—	—	—	—	—	—

*:Output of the single-phase 200V and single-phase 100V input specifications is three-phase 200V.

●:Available models ○:Models to be released — :Not available

Inverter type \ Inverter Capacity		0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K
3-phase 200V class	FR-E720-□□NF/NC	●	●	●	●	●	●	●	●	●	●	●
3-phase 400V class	FR-E740-□□NF/NC	—	—	●	●	●	●	●	●	●	●	●

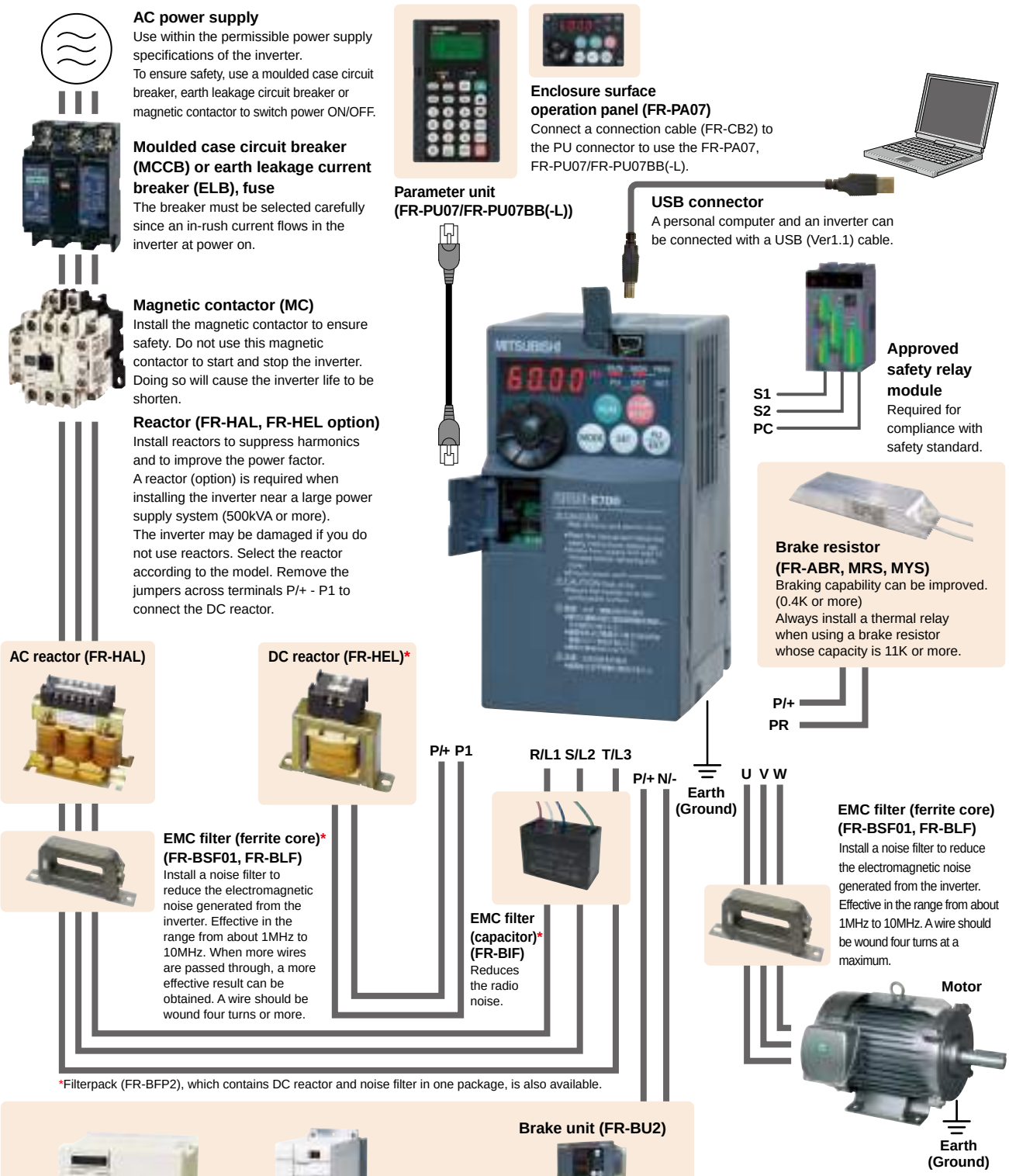
●:Available models — :Not available

Complies with UL, cUL, EC Directives (CE marking) as a standard model

Single-phase 100V power input specification models are not in compliance with the EMC Directive.

Our inverters comply with RoHS Directive and are eco friendly to people and the environment.

Installation Example



Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the output side of the inverter. When installing a moulded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the moulded case circuit breaker.

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

: Install these options as required.

*2 Can be used only with standard control circuit terminal specification models and safety-stop function models.

■Standard specifications

●Rating

Three-phase 200V power supply

Model FR-E720-□K*9(-C)*10		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.3	0.6	1.2	2.0	3.2	4.4	7.0	9.5	13.1	18.7	23.9
	Rated current (A)*7	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11 (10)	17.5 (16.5)	24 (23)	33 (31)	47 (44)	60 (57)
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)										
	Voltage*4	Three-phase 200 to 240V										
	Regenerative braking torque*5	150%		100%		50%	20%					
Power supply	Rated input AC (DC) voltage/frequency	Three-phase 200 to 240V 50Hz/60Hz (283 to 339VDC*8)										
	Permissible AC (DC) voltage fluctuation	170 to 264V 50Hz/60Hz (240 to 373VDC*8)										
	Permissible frequency fluctuation	±5%										
	Power supply capacity (kVA)*6	0.4	0.8	1.5	2.5	4.5	5.5	9	12	17	20	28
Protective structure (JEM1030)		Enclosed type (IP20). IP40 for totally enclosed structure series.										
Cooling system		Self-cooling				Forced air cooling						
Approximate mass (kg)		0.5	0.5	0.7	1.0	1.4	1.4	1.7	4.3	4.3	6.5	6.5

Three-phase 400V power supply

Model FR-E740-□K*9(-C)*10		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	1.2	2.0	3.0	4.6	7.2	9.1	13.0	17.5	23.0
	Rated current (A)*7	1.6 (1.4)	2.6 (2.2)	4.0 (3.8)	6.0 (5.4)	9.5 (8.7)	12	17	23	30
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)								
	Voltage*4	Three-phase 380 to 480V								
	Regenerative braking torque*5	100%		50%	20%					
Power supply	Rated input voltage/frequency	Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation	325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation	±5%								
	Power supply capacity (kVA)*6	1.5	2.5	4.5	5.5	9.5	12	17	20	28
Protective structure (JEM1030)		Enclosed type (IP20). IP40 for totally enclosed structure series.								
Cooling system		Self-cooling		Forced air cooling						
Approximate mass (kg)		1.4	1.4	1.9	1.9	1.9	3.2	3.2	6.0	6.0

*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 230V for three-phase 200V class and 440V for three-phase 400V class.
*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 pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used. (Option brake resisitor cannot be used for 0.1K and 0.2K.)
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 Setting 2kHz or more in **Pr. 72 PWM frequency selection** to perform low acoustic noise operation in the surrounding air temperature exceeding 40°C (totallyenclosed structure is 30°C), the rated output current is the value in parenthesis.
*8 • Connect DC power supply to terminal P/+ and N/-. Connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-.
• Since the voltage between P/+ and N/- may increase due to the regeneration energy from the motor and exceeds 415V temporarily, select the DC power supply which can withstand the voltage/energy during regeneration. If using the power supply which can not withstand voltage/energy during regeneration, insert diodes in series for reverse current prevention.
• Although the FR-E700 series has the built-in inrush current limit circuit, select the DC power supply considering the inrush current at powering ON as the inrush current four times of the rated inverter flows at powering ON.
• Since the power supply capacity depends on the output impedance of the power, select the power supply capacity which has enough allowance according to the AC power supply system capacity.
*9 The safety stop function model is indicated with SC.
*10 FL remote communication compatible models are indicated with “NF”.
*11 CC-Link communication compatible models are indicated with “NC”.

Single-phase 200V power supply

Model FR-E720S-□K(SC)*10		0.1	0.2	0.4	0.75	1.5	2.2
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2	0.3	0.6	1.2	2.0	3.2	4.4
	Rated current (A)*7	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11.0 (10.0)
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)					
	Rated output voltage*4	Three-phase 200 to 240V					
	Regenerative braking torque*5	150%		100%		50%	20%
Power supply	Rated input AC voltage/frequency	Single-phase 200 to 240V 50Hz/60Hz					
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz					
	Permissible frequency fluctuation	Within ±5%					
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.5	4.0	5.2
Protective structure (JEM1030)		Enclosed type (IP20)					
Cooling system		Self-cooling			Forced air cooling		
Approximate mass (kg)		0.6	0.6	0.9	1.4	1.5	2.0

Single-phase 100V power supply

Model FR-E710W-□K		0.1	0.2	0.4	0.75
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)*2	0.3	0.6	1.2	2.0
	Rated current (A)*7	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)			
	Rated output voltage*4	Three-phase 200 to 230V*8, *9			
	Regenerative braking torque*5	150%		100%	
Power supply	Rated input AC voltage/frequency	Single-phase 100 to 115V 50Hz/60Hz			
	Permissible AC voltage fluctuation	90 to 132V 50Hz/60Hz			
	Permissible frequency fluctuation	Within ±5%			
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.5
Protective structure (JEM1030)		Enclosed type (IP20)			
Cooling system		Self-cooling			
Approximate mass (kg)		0.6	0.7	0.9	1.5

*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 230V.
*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. If the automatic restart after instantaneous power failure function **(Pr. 57)** or power failure stop function **(Pr. 261)** is set and power supply voltage is low while load becomes bigger, the bus voltage decreases to power failure detection level and load of 100% or more may not be available.
*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 pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used. (Option brake resisitor cannot be used for 0.1K and 0.2K.)
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 Setting 2kHz or more in **Pr. 72 PWM frequency selection** to perform low acoustic noise operation with the surrounding air temperature exceeding 40°C, the rated output current is the value in parenthesis.
*8 For single-phase 100V power input model, the maximum output voltage is twice the amount of the power supply voltage and cannot be exceeded.
*9 In a single-phase 100V power input model, the output voltage may fall down when the load is heavy, and larger output current may flow compared to a threephase input model. Use the motor with less load so that the output current is within the rated motor current range.
*10 The safety stop function model is indicated with SC.

●Common specifications

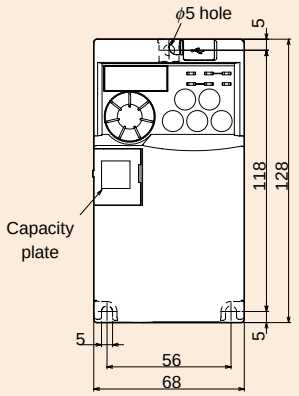
Control specifications	Control method		Soft-PWM control/high carrier frequency PWM control (V/F control, Advanced magnetic flux vector control, General-purpose magnetic flux vector control, Optimum excitation control are available)
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminal2, 4: 0 to 10V/10bit) 0.12Hz/60Hz (terminal2, 4: 0 to 5V/9bit) 0.06Hz/60Hz (terminal4: 0 to 20mA/10bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±0.5% 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 can be selected
	Starting torque		200% or more (at 0.5Hz)...when Advanced magnetic flux vector control is set (3.7K or less)
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.01 to 360s, 0.1 to 3600s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration modes are available.
	DC injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) can be changed.
	Stall prevention operation level		Operation current level can be set (0 to 200% adjustable), whether to use the function or not can be selected
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V, 0 to 5V can be selected Terminal 4: 0 to 10V, 0 to 5V, 4 to 20mA can be selected
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set. 4 digit BCD or 16bit binary data (when the option FR-A7AX E kit is used)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (Standard control circuit terminal model:Seven terminals Safety stop function model: Six terminals)		The following signals can be assigned to **Pr. 178 to Pr.184 (input terminal function selection)**: multi-speed selection, remote setting, stop-on contact selection, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, brake opening completion signal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, brake sequence, second function, multi-speed operation, stop-on contact control, droop control, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485)
	Safety stop function*2		Safety shutoff signal can be input from terminals S1 and S2. (compliant with EN ISO 13849-1 Category 3 / PLd EN62061 / IEC61508 SIL2)
	Output signal Open collector output (Two terminals) Relay output (One terminal)	Operating status	The following signals can be assigned to **Pr.190 to Pr.192 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, brake opening request, fan alarm*1, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, safety monitor output*2, safety monitor output2*2, during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm
		For meter Pulse train output (Max. 2.4kHz: one terminal)	The following signals can be assigned to **Pr.54 FM terminal function selection**: output frequency, motor current (steady), output voltage, frequency setting, motor torque, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power Pulse train output (1440 pulses/s/full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, motor current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, motor torque, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, I/O terminal option monitor, output power, cumulative power, motor thermal load factor, and inverter thermal load factor.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault records (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored
		Interactive guidance	Function (help) for operation guide*3
Protective/warning function		Protective functions	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, input phase failure*5, output side earth ground) fault overcurrent at start*4, output phase failure, external thermal relay operation*4, option fault*4, parameter error, internal board fault, PU disconnection, retry count excess*4, CPU fault, brake transistor alarm, inrush resistance overheat, communication error, analog input error, USB communication error, brake sequence error 4 to 7*4, safety circuit fault*2
		Warning functions	Fan alarm*1, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm*4, electronic thermal relay function prealarm, maintenance output*4, undervoltage, operation panel lock, password locked, inverter reset, safety stop*2
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing) (-10°C to +40°C for totally-enclosed structure feature)*6
	Ambient humidity		90%RH or less (non-condensing)
	Storage temperature*7		-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, 5.9m/s² or less at 10 to 55Hz (directions of X, Y, Z axes)

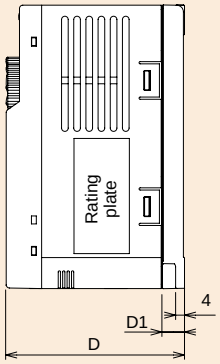
*1 As the FR-E720-0.1K(SC) to 0.75K(SC), FR-E740-0.4K(SC) and 0.75K(SC), FR-E720S-0.1K(SC) to 0.4K(SC), FR-E710W-0.1K to 0.75K are not provided with the cooling fan, this alarm does not function.
*2 This function is only available for the safety stop function model.
*3 This operation guide is only available with option parameter unit (FR-PU07).
*4 This protective function does not function in the initial status.
*5 This protective function is available with the three-phase power input model only.
*6 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
*7 Temperatures applicable for a short time, e.g. in transit.

■Standard Model

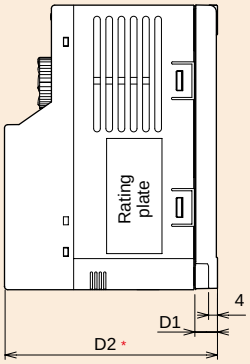
Outline Dimension Drawings

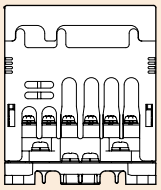
- FR-E720-0.1K(SC) to 0.75K(SC)
- FR-E720S-0.1K(SC) to 0.4K(SC)
- FR-E710W-0.1K to 0.4K





When used with the plug-in option





Inverter Model	D	D1	D2*
FR-E720-0.1K, 0.2K FR-E720S-0.1K, 0.2K FR-E710W-0.1K	80.5	10	95.6
FR-E720-0.1KSC, 0.2KSC FR-E720S-0.1KSC, 0.2KSC	86.5		108.1
FR-E710W-0.2K	110.5	10	125.6
FR-E720-0.4K	112.5	42	127.6
FR-E720-0.4KSC	118.5		140.1
FR-E720-0.75K	132.5	62	147.6
FR-E720-0.75KSC	138.5		160.1
FR-E720S-0.4K FR-E710W-0.4K	142.5	42	157.6
FR-E720S-0.4KSC	148.5		170.1

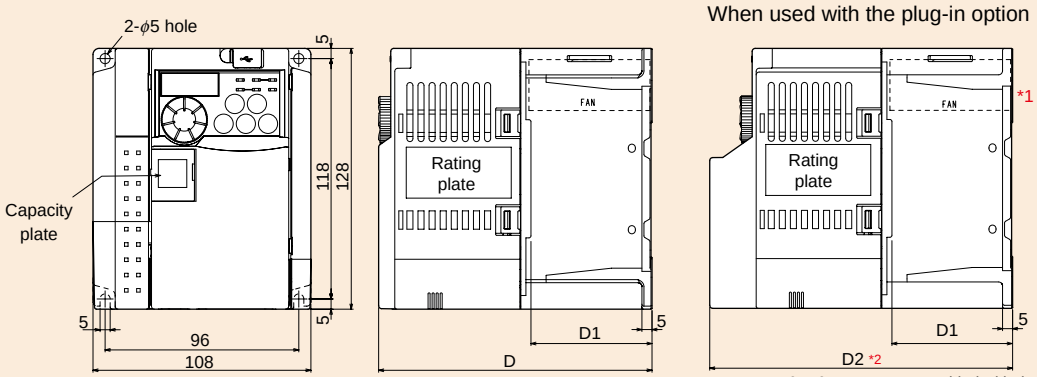
* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

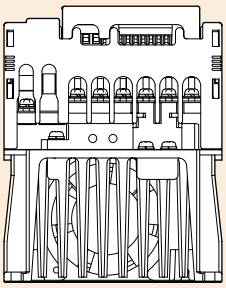
Outline Dimension Drawings

- FR-E720-1.5K(SC), 2.2K(SC)
- FR-E720S-0.75K(SC), 1.5K(SC)
- FR-E710W-0.75K

When used with the plug-in option



*1 FR-E710W-0.75K are not provided with the cooling fan.



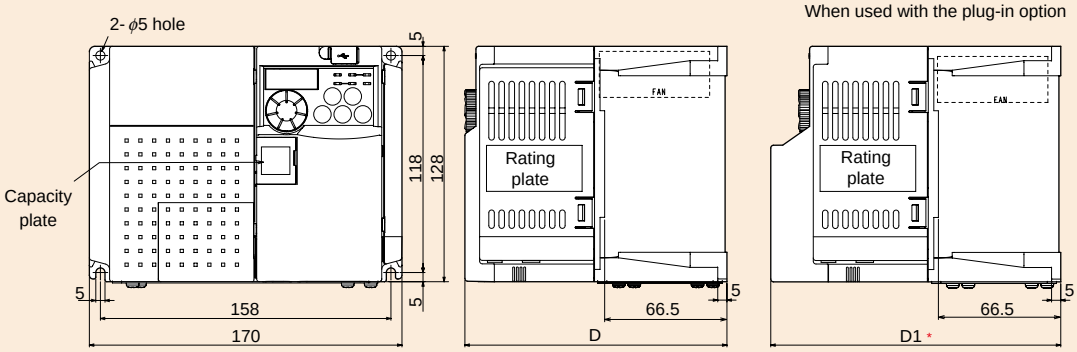
Inverter Model	D	D1	D2*2
FR-E720-1.5K, 2.2K FR-E720S-0.75K	135.5	60	150.6
FR-E720-1.5KSC, 2.2KSC FR-E720S-0.75KSC	141.5		163.1
FR-E720S-1.5K	161		176.1
FR-E720S-1.5KSC	167		188.6
FR-E710W-0.75K	155	54	170.1

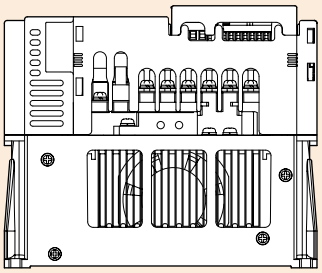
*2 When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

- FR-E720-3.7K(SC)

When used with the plug-in option





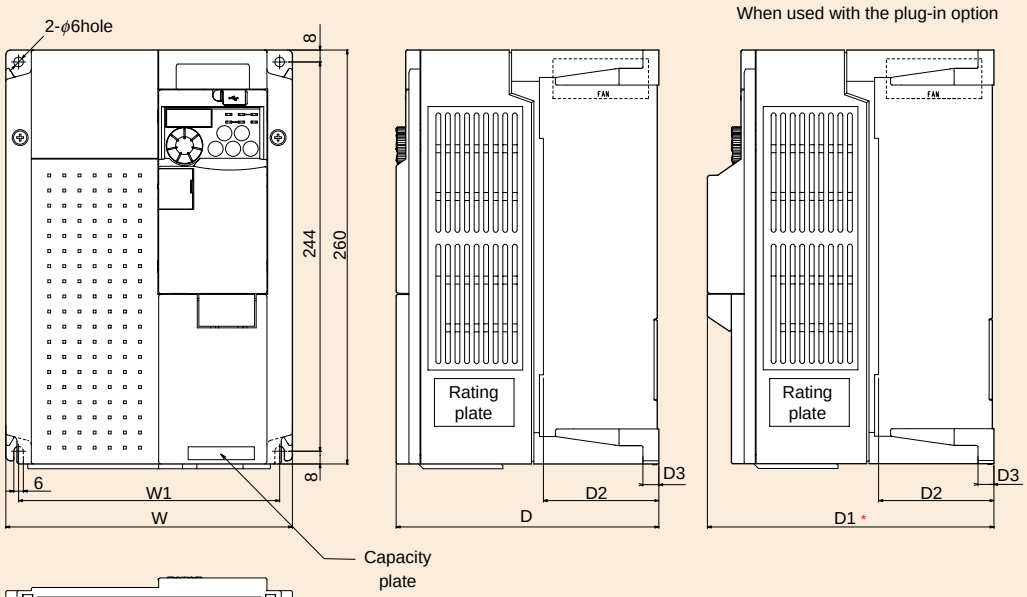
Inverter Model	D	D1*
FR-E720-3.7K	142.5	157.6
FR-E720-3.7KSC	148.5	170.1

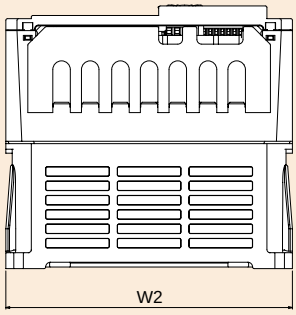
* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Outline Dimension Drawings

●FR-E720-5.5K(SC) to 15K(SC)



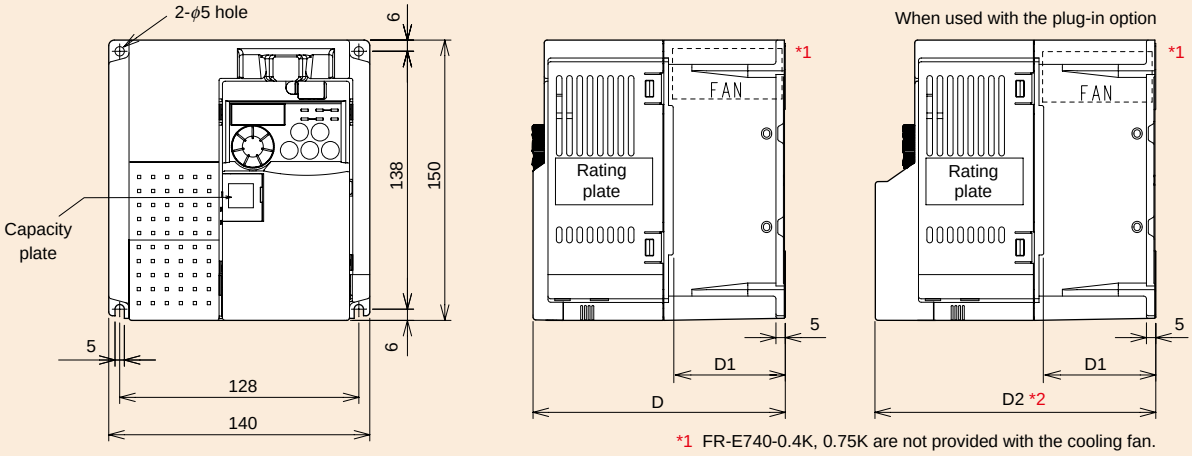


Inverter Model	W	W1	W2	D	D1*	D2	D3
FR-E720-5.5K, 7.5K	180	164	180	165	180.1	71.5	10
FR-E720-5.5KSC, 7.5KSC				171	192.6		
FR-E720-11K, 15K	220	195	211	190	205.1	84.5	10.5
FR-E720-11KSC, 15KSC				196	217.6		

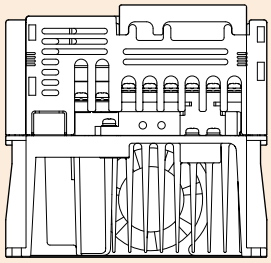
* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

●FR-E740-0.4K(SC) to 3.7K(SC)
●FR-E720S-2.2K(SC)



*1 FR-E740-0.4K, 0.75K are not provided with the cooling fan.



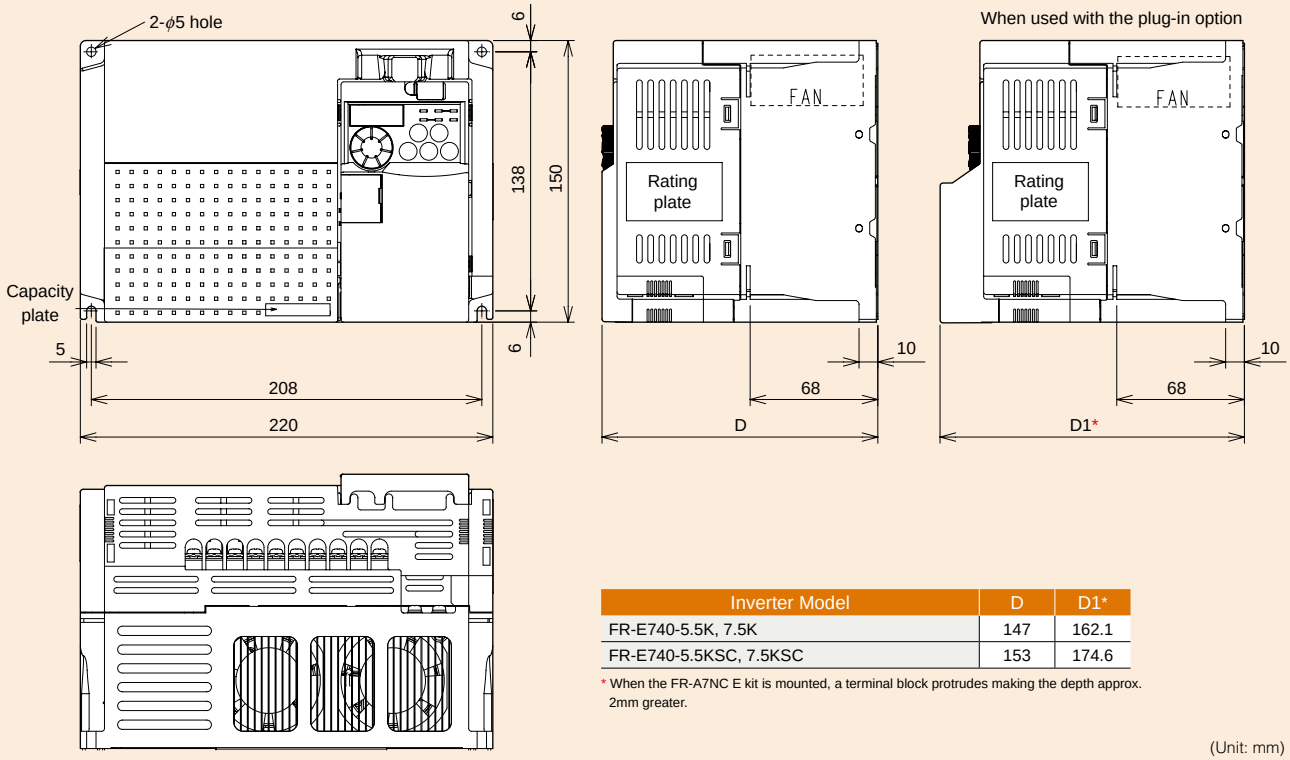
Inverter Model	D	D1	D2*2
FR-E740-0.4K, 0.75K	114	39	129.1
FR-E740-0.4KSC, 0.75KSC	120		141.6
FR-E740-1.5K, 2.2K, 3.7K	135	60	150.1
FR-E740-1.5KSC, 2.2KSC, 3.7KSC	141		162.6
FR-E720S-2.2K	155.5		170.6
FR-E720S-2.2KSC	161.5		183.1

*2 When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Outline Dimension Drawings

●FR-E740-5.5K(SC), 7.5K(SC)

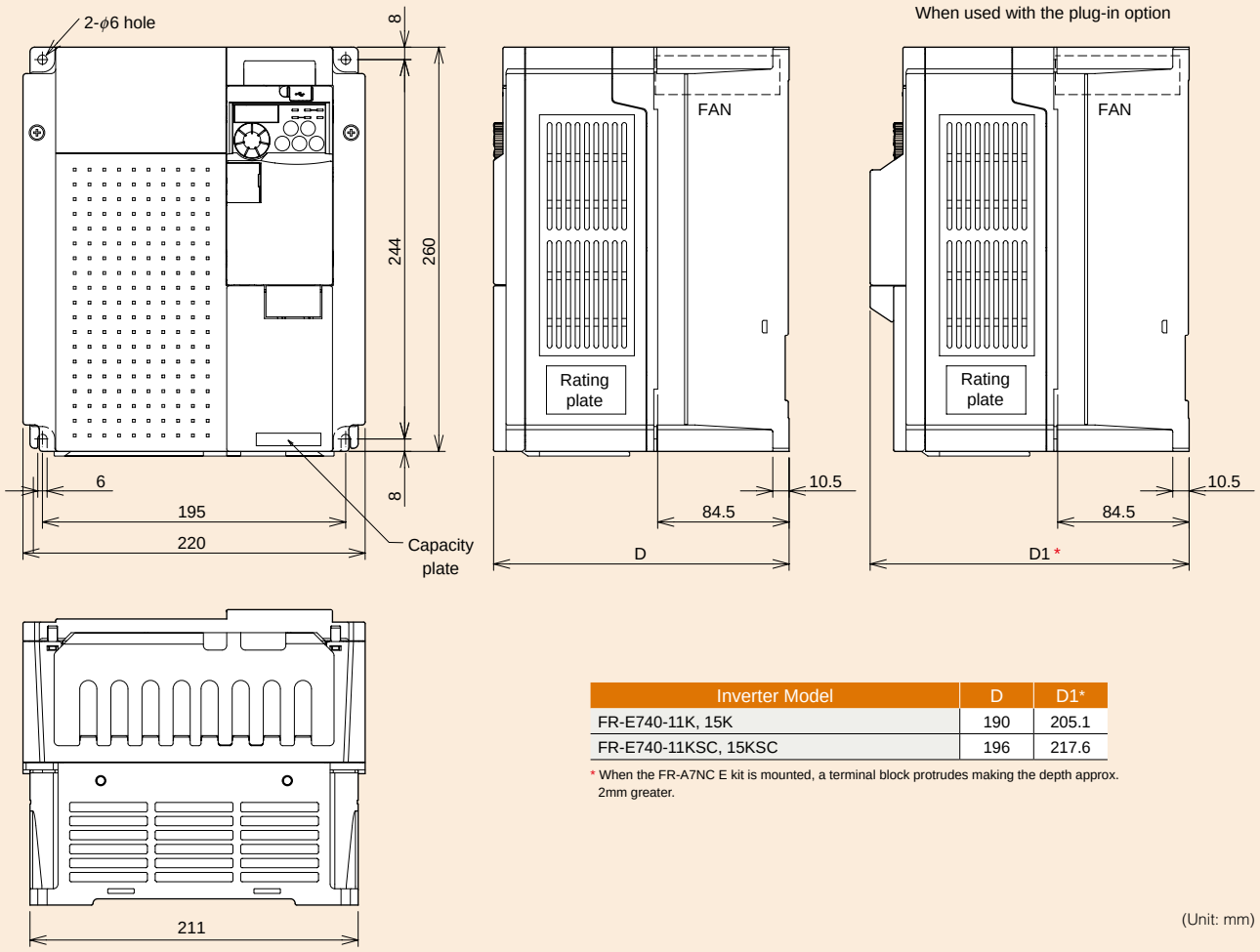


Inverter Model	D	D1*
FR-E740-5.5K, 7.5K	147	162.1
FR-E740-5.5KSC, 7.5KSC	153	174.6

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

●FR-E740-11K(SC), 15K(SC)



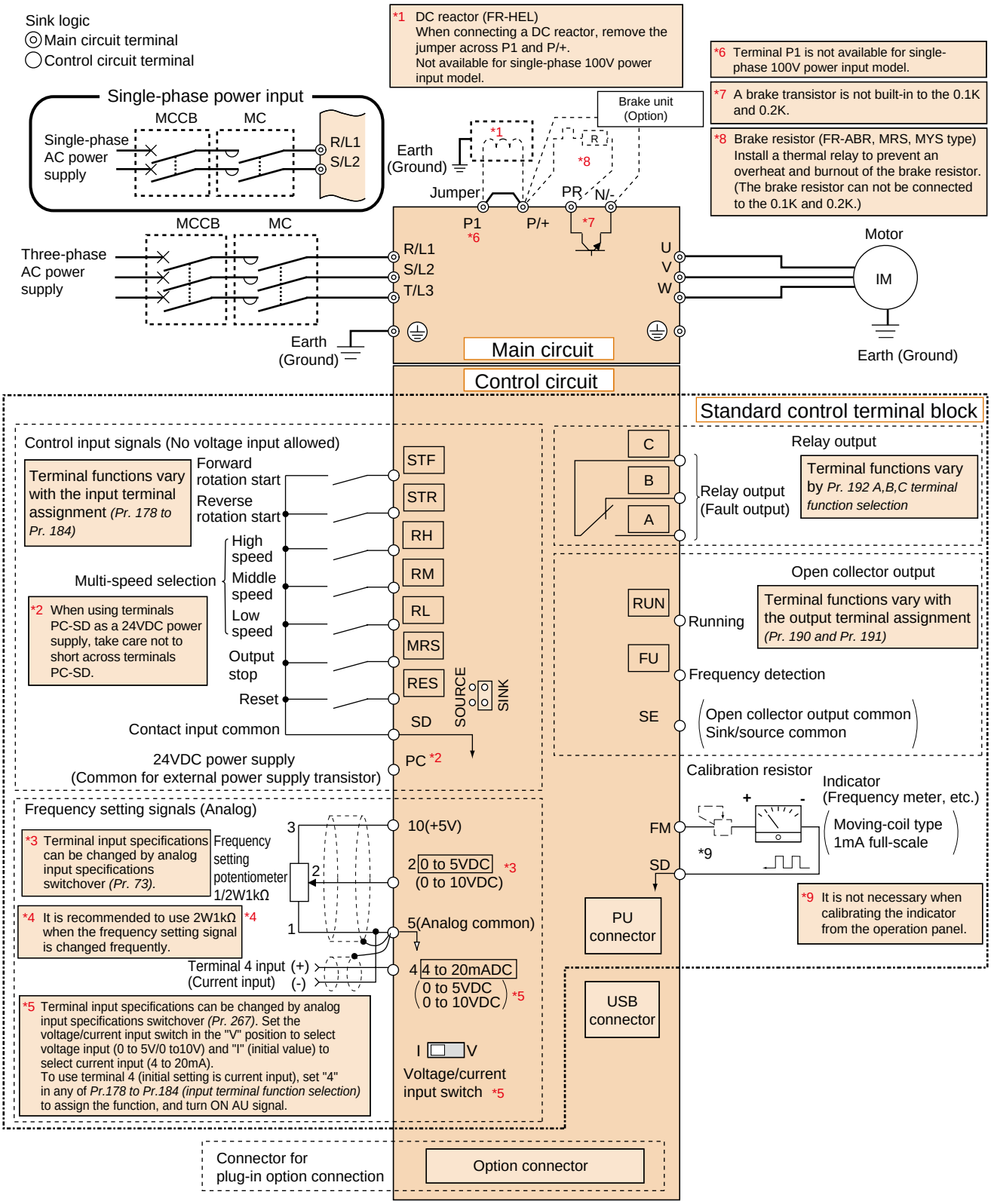
Inverter Model	D	D1*
FR-E740-11K, 15K	190	205.1
FR-E740-11KSC, 15KSC	196	217.6

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

■Terminal Connection Diagram

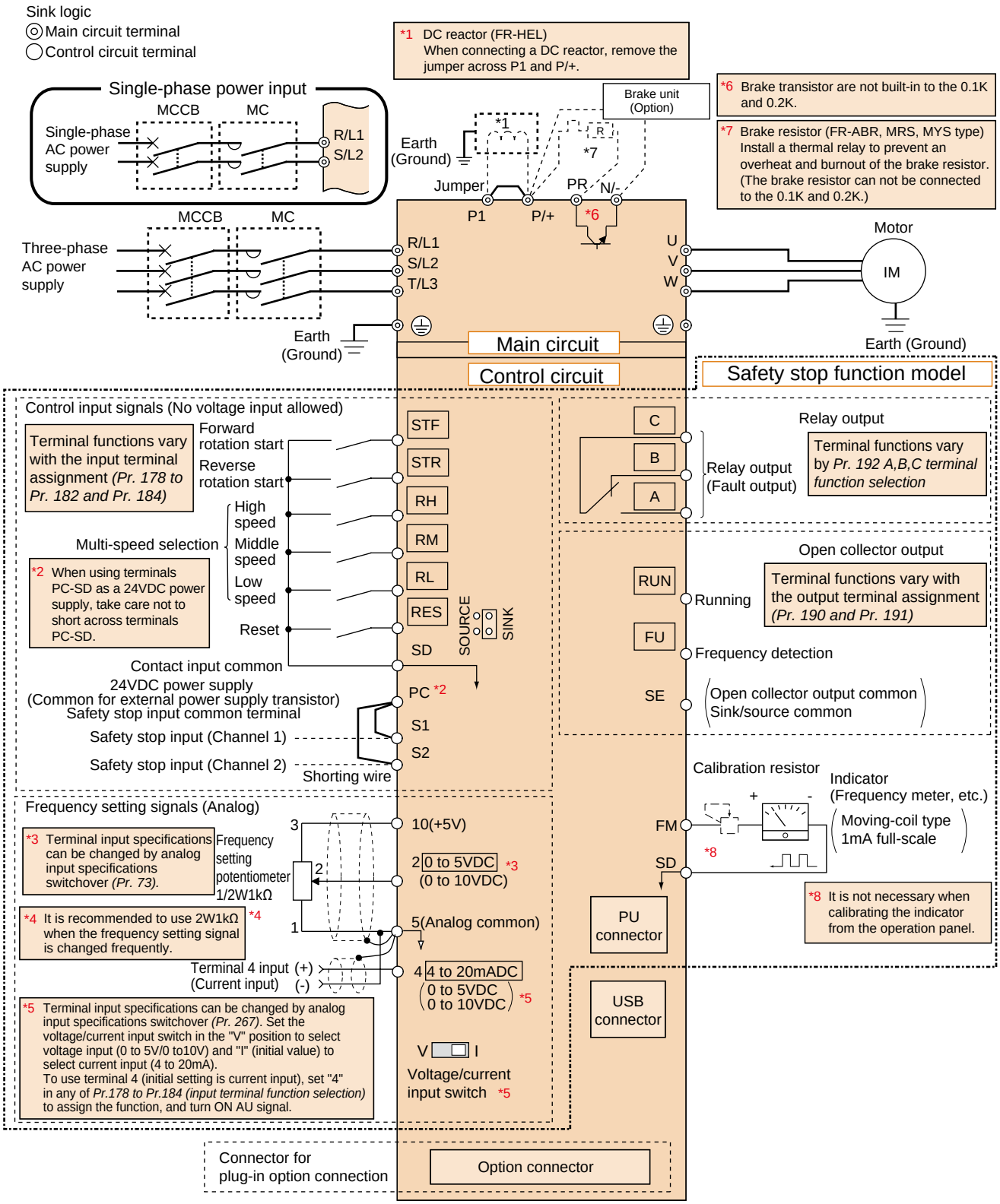
(1) Standard control circuit terminal model



[NOTE]

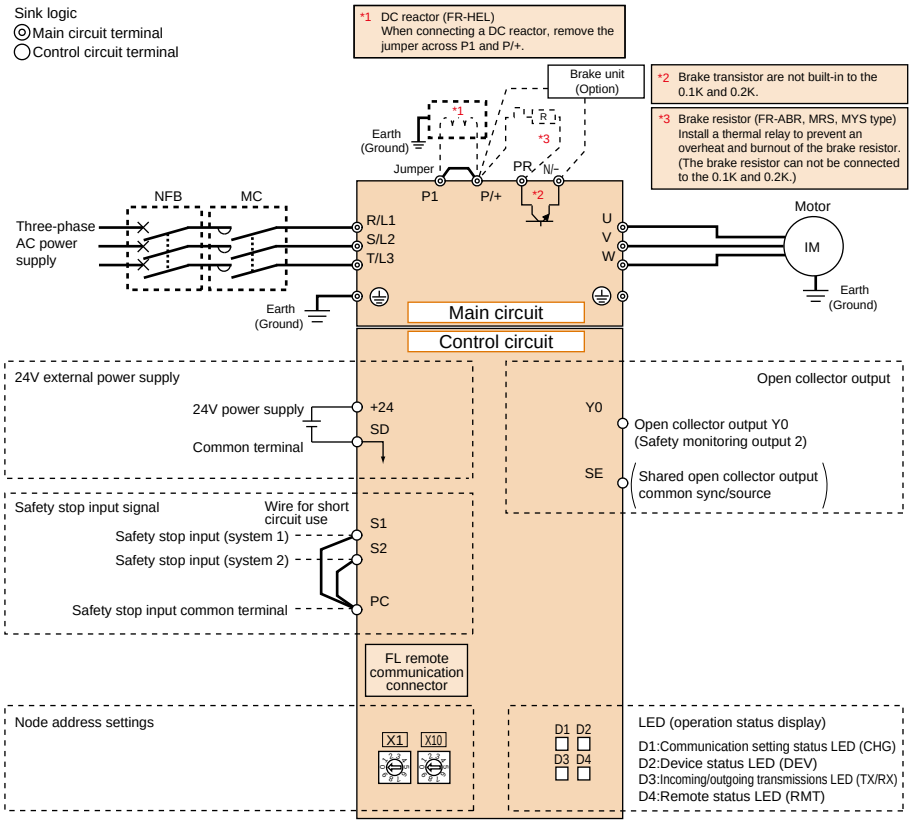
- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
- The output of the single-phase power input model is three-phase 200V.

(2) Safety stop function model



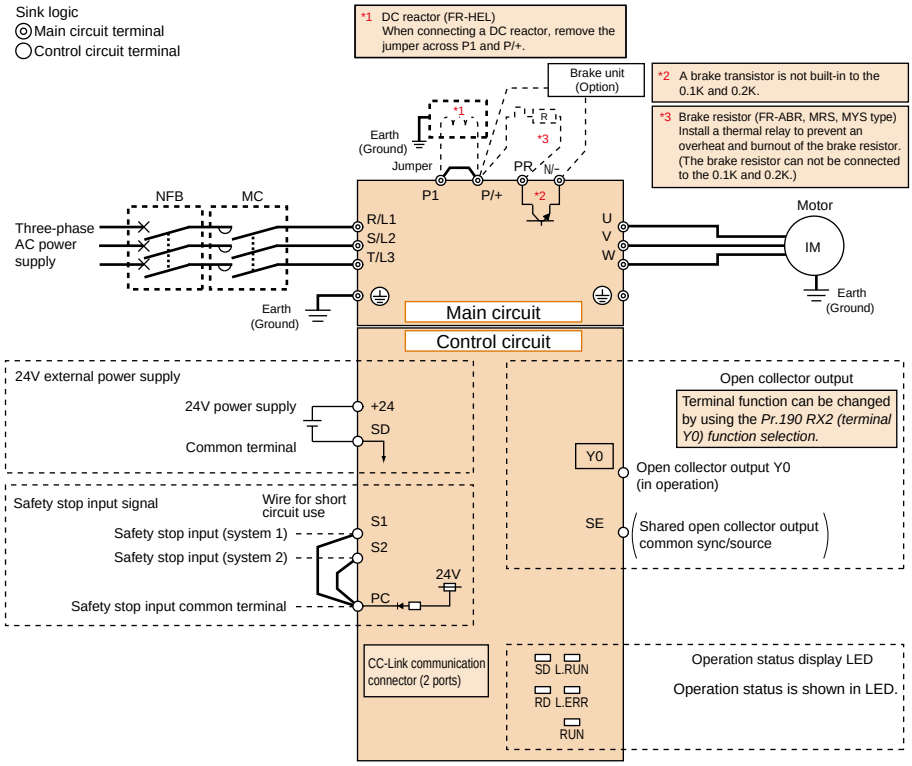
[NOTE]
- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
- The output of the single-phase power input model is three-phase 200V.

(3) FL remote communication compatible model (NF)



[**NOTE**]
- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

(4) CC-Link communication compatible model (NC)



[**NOTE**]
- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

■Terminal Specification Explanation

(1) Standard control circuit terminal specification model and safety-stop model (SC)

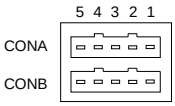
Type		Terminal Symbol	Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3*	AC power input	Connect to the commercial power supply. Keep these terminals open when using the high power factor converter (FR-HC) or power regeneration common converter (FR-CV). *When using single-phase power input, terminals are R/L1 and S/L2.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor.	
		P/+, PR	Brake resistor connection	Connect a brake transistor (MRS type, MYS type, FR-ABR) across terminals P/+-PR. (The brake resistor can not be connected to the 0.1K or 0.2K)	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or high power factor converter (FR-HC).	
			DC power input	Connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-.	
		P/+, P1*	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. Single-phase 100V power input model is not compatible with DC reactor. *Terminal P1 is not available for single-phase 100V power input model.	
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal	Contact input	STF	Forward rotation start	Turn on the STF signal to start forward rotation and turn it off to stop.	When the STF and STR signals are turned on simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn on the STR signal to start reverse rotation and turn it off to stop.	
		RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
		MRS*	Output stop	Turn on the MRS signal (20ms or more) to stop the inverter output. Use to shut off the inverter output when stopping the motor by electromagnetic brake. *Terminal MRS is only available for the standard control circuit terminal model.	
		RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn on the RES signal for more than 0.1s, then turn it off. Initial setting is for reset always. By setting **Pr. 75**, reset can be set to enabled only at fault occurrence. Recover about 1s after reset is cancelled.	
		SD	Contact input common (sink) (initial setting)	Common terminal for contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)	When connecting the transistor output (open collector output), such as a programmable controller, when source logic is selected, connect the external power supply common for transistor output to this terminal to prevent a malfunction caused by undesirable currents.	
			24VDC power supply common	Common output terminal for 24VDC 0.1A power supply (PC terminal). Isolated from terminals 5 and SE.	
		PC	External transistor common (sink) (initial setting)	When connecting the transistor output (open collector output), such as a programmable controller, when sink logic is selected, connect the external power supply common for transistor output to this terminal to prevent a malfunction caused by undesirable currents.	
			Contact input common (source)	Common terminal for contact input terminal (source logic).	
			24VDC power supply	Can be used as 24VDC 0.1A power supply.	
			Safety stop input terminal common*	Common terminal for safety stop input terminals S1 and S2. *Terminal S1 and S2 are only available for the safety stop function model.	
	Frequency setting	10	Frequency setting power supply	Used as power supply when connecting potentiometer for frequency setting (speed setting) from outside of the inverter.	5VDC permissible load current 10mA
		2	Frequency setting (voltage)	Inputting 0 to 5VDC (or 0 to 10V) provides the maximum output frequency at 5V (10V) and makes input and output proportional. Use **Pr. 73** to switch between input 0 to 5VDC (initial setting) and 0 to 10VDC input.	Input resistance 10kΩ ± 1kΩ Permissible maximum voltage 20VDC
		4	Frequency setting (current)	Inputting 0 to 20mADC (or 0 to 5V / 0 to 10V) provides the maximum output frequency at 20mA makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). To use terminal 4 (initial setting is current input), set "4" to any of **Pr.178 to Pr.184 (input terminal function selection)**, and turn AU signal ON. Use Pr. 267 to switch from among input 4 to 20mA (initial setting), 0 to 5VDC and 0 to 10VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to 10V). Standard control circuit terminal model: Current input (initial status) / Voltage input  Safety stop function model: Current input (initial status) / Voltage input 	Voltage input: Input resistance 10kΩ ± 1kΩ Permissible maximum voltage 20VDC Current input: Input resistance 233Ω ± 5Ω Maximum permissible current 30mA.
		5	Frequency setting common	Common terminal for the frequency setting signals (terminals 2 or 4). Do not earth (ground).	
Safety stop		S1	Safe stop input (Channel 1)*	S1/S2 are safe stop signals for use with in conjunction with an approved external safety unit. Both S1/S2 must be used in dual channel form. Inverter output is shutoff depending on shorting/opening between S1 and PC, S2 and PC. In the initial status, terminal S1 and S2 are shorted with terminal PC by shortening wire. Remove the shortening wire and connect the safety relay module when using the safety stop function. *Terminal S1 and S2 are only available for the safety stop function model.	Input resistance 4.7kW Voltage when contacts are open 21 to 26VDC When contacts are shortcircuited 4 to 6mADC
		S2	Safe stop input (Channel 2)*		

Type		Terminal Symbol	Terminal Name	Description	
Control circuit/output signal	Relay	A, B, C	Relay output (fault output)	1 changeover contact output indicates that the inverter fault occurs. Fault: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C) Contact capacity 230VAC 0.3A (power factor = 0.4) 30VDC 0.3A	
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched high during stop or DC injection brake operation.*	Permissible load 24VDC (Maximum 27VDC) 0.1A (a voltage drop is 3.4V maximum when the signal is on) *Low is when the open collector output transistor is on (conducts). High is when the transistor is off (does not conduct).
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.*	
		SE	Open collector output common	Common terminal of terminal RUN and FU.	
	Pulse	FM	For meter	Select one e.g. output frequency from monitor items. (Not output during inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item.	Permissible load current 1mA 1440 pulses/s at 60Hz
Communication		–	PU connector	With the PU connector, RS-485 communication can be made. ・Conforming standard: EIA-485 (RS-485) ・Transmission format: Multi-drop link ・Communication speed: 4800 to 38400bps ・Overall extension: 500m	
		–	USB connector	The FR Configurator can be operated by connecting the inverter to the personal computer through USB. ・Interface: conforms to USB1.1 ・Transmission Speed: 12Mbps ・Connector: USB mini B connector (receptacle mini B type)	

[**Note**]
・Set **Pr. 267** and a voltage/current input switch correctly, then input an analog signal in accordance with the setting. Applying a voltage with voltage/current input switch in "I" position (current input is selected) or a current with switch in "V" position (voltage input is selected) could cause component damage of the inverter or analog circuit of output devices.
・The inverter will be damaged if power is applied to the inverter output terminals (U, V, W). Never perform such wiring.
・ indicates that terminal functions can be selected using **Pr. 178 to Pr. 192 (I/O terminal function selection)**.
・Terminal names and terminal functions are those of the factory set.
・When connecting the DC power supply, be sure to connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-. Opposite polarity will damage the inverter.

(2) Models compatible with FL remote communication (NF) and CC-Link communication (NC)

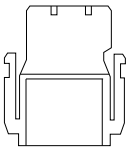
Type		Terminal symbol	Terminal name	Descriptions of terminal functions	
Main circuit		R/L1, S/L2, T/L3	Alternating current power input	Connects with commercial power supply.	
		U, V, W	Inverter output	Connects with 3-phase squirrel-cage motor.	
		P/+, PR	Brake resistor connection	Connects with optional brake resistor (MRS and MYS types, FR-ABR) between terminal P/+-PR. (Cannot be connected with 0.1K and 0.2K.)	
		P/+, N/-	Brake unit connection	Connects with a brake unit (FR-BU2).	
		P/+, P1	DC reactor connection	Remove the short-circuit piece between terminals P/+-P1, and connect the DC reactor.	
		⏚	Ground	For inverter chassis; make earth ground connection.	
Control circuit	24V external power supply	+24	24V external power supply	The 24V power input from an external source enables ongoing communication even when the main circuit power is OFF.	Input voltage 23.5 - 26.5VDC Input current 0.7A or lower
		SD	24V external power supply terminals common	Common terminal for positive terminal 24	
	Safety stop	S1	Safety stop input (system 1)	Terminals S1 and S2 are safety stop input signals and are used for the safety relay unit. Terminals S1 and S2 are used simultaneously (dual-channel). Short circuit release between S1 - PC and S2 - PC will shut off the inverter output. In initial state, terminals S1 and S2 are short-circuited with terminal PC with short-circuit wires. When using the safety stop function, remove the short-circuit wires and connect to the safety relay unit.	Input resistance 4.7kΩ Release voltage 21 - 26VDC Short-circuit DC4 - 6mA
		S2	Safety stop input (system 2)		
		PC	Safety stop input terminal common	Common terminals for safety stop input terminals S1 and S2.	
	Open collector output	Y0	FL remote communication compatible model (NF)		Allowable load 24VDC (Maximum 27VDC) 0.1A (Maximum voltage drop of 3.4V when ON) *L level means the open collector output transistor is ON (conduction state). H level means the open collector output transistor is OFF (non-conduction state).
			Open collector output Y0 (Safety monitoring output 2)	Indicates either the L level when safety stop function prevents occurrence of safety circuit fault (E.SAF), or the H level for other status.*	
			CC-Link communication compatible model (NC)		
			Open collector output Y0 (inverter in operation)	Indicates either the L level when the inverter output frequency is at or higher than the starting frequency level (initial value 0.5Hz), or the H level during stop or in DC braking stage. Terminal function can be selected by using the *Pr.190 RX2 (terminal Y0) function selection.*	
		SE	Open collector output common	Common terminal for terminal Y0.	
Communication	FL remote communication compatible model (NF)				
	FL-net	FL remote communication connector		The FL remote communication connector enables FL remote communication.	
	CC-Link communication compatible model (NC)				
	CC-Link	CONA CONB	CC-Link communication connector (2 ports)	Pin layout	



Pin number	5	4	3	2	1
Signal name	SLD	NC	DG	DB	DA

CC-Link communication one-touch connector

Model	Manufacturer name
A6CON-L5P	Mitsubishi Electric Corporation
35505-6000-B0M GF	Sumitomo 3M Limited



[**Note**]
・The inverter will be damaged if power is applied to the inverter output terminals (U, V, W). Never perform such wiring.
・When connecting the DC power supply, be sure to connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-. Opposite polarity will damage the inverter.

Main Differences and Compatibilities with the FR-E500 series

Item	FR-E500	FR-E700
Control method	V/F control General-purpose magnetic flux vector control	V/F control General-purpose magnetic flux vector control Advanced magnetic flux vector control Optimum excitation control
Changed/cleared functions	Torque boost **(Pr. 0)** initial value FR-E520-1.5K to 7.5K: 6% FR-E540-1.5K to 3.7K: 6% FR-E540-5.5K, 7.5K: 4%	FR-E720-1.5K(SC) to 3.7K(SC): 4% FR-E720-5.5K(SC), 7.5K(SC): 3% FR-E740-1.5K(SC) to 3.7K(SC): 4% FR-E740-5.5K(SC), 7.5K(SC): 3%
	DC injection brake operation voltage **(Pr. 12)** initial value 0.4K to 7.5K: 6%	0.4K to 7.5K: 4%
	Frequency at 5V (10V) input **(Pr. 38)** Frequency at 20mA input frequency **(Pr. 39)** Second electronic thermal O/L relay **(Pr. 48)** Shortest acceleration/deceleration mode **(Pr. 60)**	Parameter number change **(Pr. 125 Terminal 2 frequency setting gain frequency)** **(Pr. 126 Terminal 4 frequency setting gain frequency)** **(Pr. 51 Second electronic thermal O/L relay)** **(Pr. 60 Energy saving control selection)** **(Pr. 292 Automatic acceleration/deceleration)**
	Reverse rotation from the inverter operation panel Press REV .	After setting "1" in **Pr. 40 RUN key rotation direction selection**, press RUN .
	FM terminal function selection **(Pr. 54)** setting 0: Output frequency (initial value), 1: Output current, 2: Output voltage	1: Output frequency (initial value), 2: Output current, 3: Output voltage
	Second applied motor **Pr. 71** = 100 to 123	**Pr. 450 Second applied motor**
	Terminal 2 0 to 5V, 0 to 10V selection **(Pr. 73)** setting 0: 0 to 5V (initial value), 1: 0 to 10V	**Pr. 73 Analog input selection** 0: 0 to 10V 1: 0 to 5V (initial value)
	Operation mode selection **(Pr. 79)** Initial value 1: PU operation mode Setting 8: Operation mode switching by external signal	Initial value 0: External operation mode is selected at power ON Setting 8: deleted (X16 signal is used instead)
	Setting General-purpose magnetic flux vector **Pr. 80** ≠ 9999	**Pr. 80** ≠ 9999, **Pr. 81** ≠ 9999, **Pr. 800** = 30
	User group 1 (16), user group 2 (16) **(Pr. 160, Pr. 173 to Pr. 175)**	User group (16) only, setting methods were partially changed **(Pr. 160, Pr. 172, Pr. 173)**
	Input terminal function selection **(Pr. 180 to Pr. 183)** setting 5: STOP signal (start self-holding selection) 6: MRS signal (output stop)	**Pr. 178 to Pr. 184 Input terminal function selection** setting 5: JOG signal (Jog operation selection) 6: None 24: MRS signal (output stop) 25: STOP signal (start self-holding selection)
	Long wiring mode **(Pr. 240 setting 10, 11)**	Setting is unnecessary (**Pr. 240** setting 0, 11 are deleted)
	Cooling fan operation selection **(Pr. 244)** initial setting 0: Cooling fan operates in power-on status.	11: Cooling fan on/off control valid
	Stop selection **(Pr. 250)** setting increments 1s	0.1s
	RS-485 communication control source from the PU connector PU operation mode	Network operation mode (PU operation mode as FR-E500 when **Pr. 551** = 2)
	Earth (ground) fault detection 400V class: Detects always	400V class: Detects only at a start
Inrush current limit circuit	Provided for the 200V class 2.2K or more and 400V class	Provided for the all capacity
Control terminal block	Fixed terminal block (can not be removed) Screw type terminal block (Phillips screw M2.5) Length of recommended bar terminal is 7mm.	Removable terminal block Standard control circuit terminal model: Screw type terminal block (Flathead screw M2 (M3 for terminal A, B, and C) Length of recommended blade terminal is 5mm (6mm for terminal A, B and C). Safety stop function model: Spring clamp terminal block (Fixes a wire with a pressure of inside spring) Length of recommended blade terminal is 10mm
Operation panel	Removable operation panel (PA02)	Integrated operation panel (can not be removed)
Parameter unit	FR-PU04	FR-PU07 FR-PU04 (some functions, such as parameter copy, are unavailable.)
Plug-in option	Dedicated plug-in option (installation is incompatible)	
	for 400V class only FR-E5NC : CC-Link communication FR-E5ND : DeviceNet communication FR-E5NL : LonWorks communication	FR-A7NC E kit : CC-Link communication FR-A7ND E kit : DeviceNet communication FR-A7NL E kit : LonWorks communication
Installation size	FR-E720-0.1K(SC) to 7.5K(SC), FR-E740-0.4K(SC) to 7.5K(SC), FR-E720S-0.1K(SC) to 0.75K(SC), FR-E710W-0.1K to 0.75K are compatible in mounting dimensions	

INVERTER FREQROL-F700PJ Series

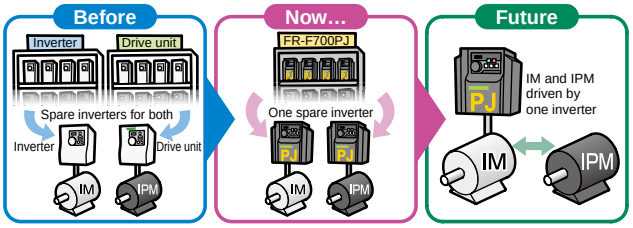
GREAT ENERGY SAVING WITH A COMPACT BODY

Easy and Compact | General-purpose Motor and IPM Motor Control | Energy Saving

Suitable for Both The General-Purpose Motor (Three-Phase Induction Motor) and The IPM Motor

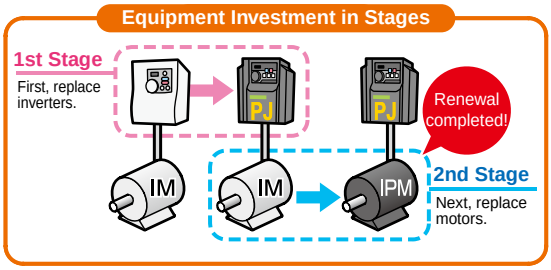
The F700PJ Series for Both a General-Purpose Motor (IM) and an IPM Motor (IPM)

- The IM drive setting can be switched to IPM drive setting by only one setting "12" (MM-EFS) in the parameter 1PM.
  Never drive an IPM motor in the IM drive setting.
- One spare F700PJ inverter is enough for the two types of motors (IM and IPM); the number of required spare inverters is reduced by half.
- A push on the setting dial in the monitor mode brings up the control setting (IM, IPM).



Simple and Reliable Transition from IM to IPM

- There is no need to replace the whole system at once; replace the inverters first, then replace the motors.
  When the budget is limited, equipment investment can be made over several stages.



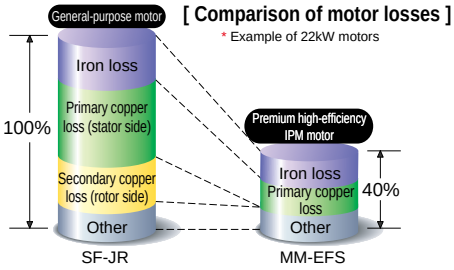
What is an IPM Motor?

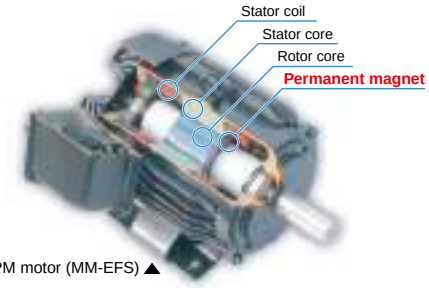
An IPM motor is a synchronous motor with strong permanent magnets embedded in its rotor.

Why is an IPM motor more efficient?

- No current flows to the rotor (secondary side), and no secondary copper loss is generated.
- Magnetic flux is generated with permanent magnets, and less motor current is required.
- Embedded magnets provide reluctance torque*, which can be used for driving.

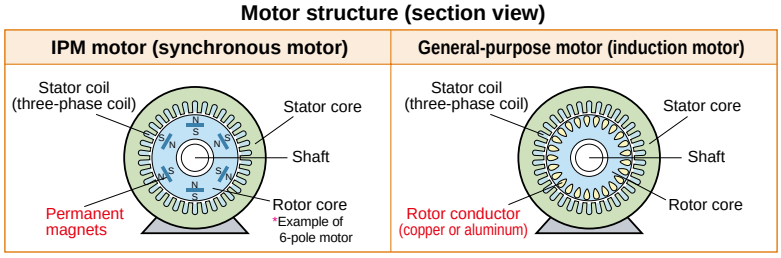
*: Reluctance torque occurs due to magnetic imbalance in the rotor.





IPM motor (MM-EFS) ▲

Motor structure (section view)

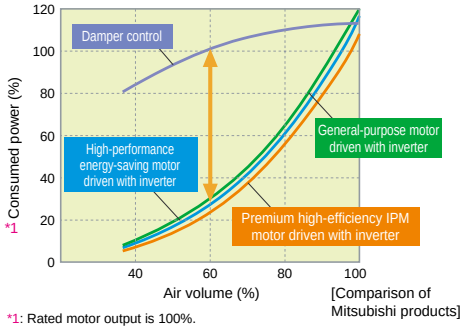


Inverter Control for Energy Saving

Energy Saving with Speed Control

●The consumed power of a variable-torque load, such as fans, pumps, and blowers, is proportional to the cube of its rotation speed.
This means that controlling the rotation speed to adjust the air volume can lead to energy saving.

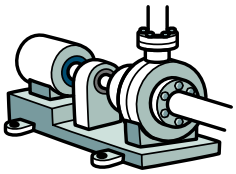
[Example of blower operation characteristic]



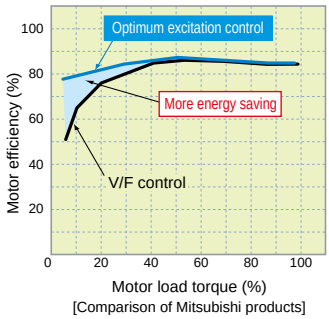
*1: Rated motor output is 100%.

Energy Saving with Optimum Excitation Control (General-Purpose Motors)

●The optimum excitation control achieves the highest motor efficiency. Further energy saving can be achieved for applications such as fans and pumps with variable load torque.



(Example: Pump)

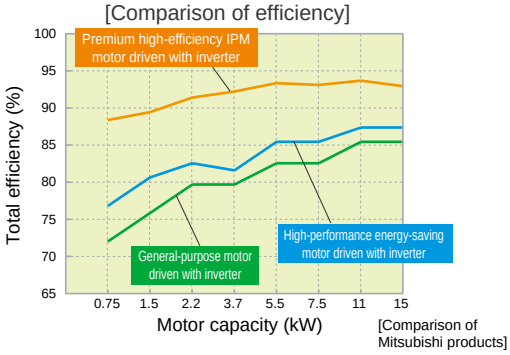


To Save More Energy – the IPM Motor Control (MM-EFS Series) is Now Available

High efficiency achieved with IPM motors

●The IPM motors that have permanent magnets embedded in their rotors are even more efficient than the high-performance energy-saving motors.

[Comparison of efficiency]



IE4-equivalent efficiency level

●The premium high-efficiency IPM motor "MM-EFS series" provides efficiency that is equivalent to IE4 (super premium efficiency), the highest efficiency class*2.

*2: As of October 2012

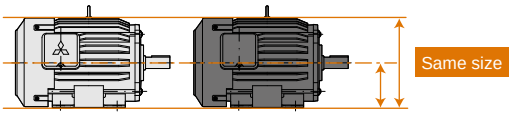
IEC 60034-30 Efficiency class	Efficiency of Mitsubishi motors	
	General-purpose motor	IPM motor
IE4 (super premium efficiency)*3	—	Premium high-efficiency IPM (MM-EFS)
IE3 (premium efficiency)	Super line premium series (SF-PR)	—
IE2 (high efficiency)	Super line eco series (SF-HR)	—
IE1 (standard efficiency)	Super line series (SF-JR)	—
Below the class		—

High ↑ Efficiency ↓ Low

*3: The details of IE4 can be found in IEC 60034-31.

Smooth replacement from a general-purpose motor (with the same installation size)

●The frame number of the MM-EFS is the same (same size) as the Mitsubishi general-purpose motors (4-pole SF-JR/SF-HR series). Replacement is easy as the installation sizes are compatible.



SF-JR 3.7kW MM-EFS371M4

Check the Energy Saving Effect at a Glance

●Energy saving monitor is available. The energy saving effect can be checked using an operation panel, output terminal (terminal FM), or network.

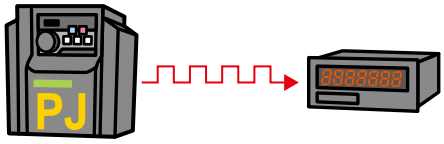
Example of the monitor display for power saving

[List of monitored items for energy saving]

Power saving monitor (kW)	Power saving rate average value (%)
Power saving rate (%)	Power cost saving average value (yen)
Power saving amount (kWh)	Annual power saving amount (kWh)
Power cost saving (yen)	Annual power saving amount (kWh)
Power saving average value (kW)	

●The output power amount measured by the inverter can be output in pulses. The cumulative power amount can be easily checked.*4

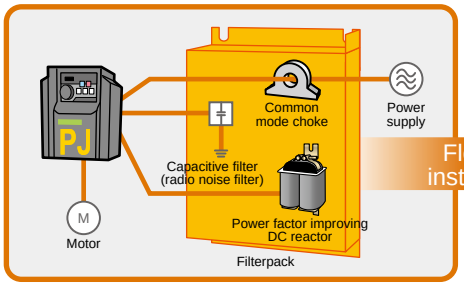
*4: This function cannot be used as a meter to certify billings.



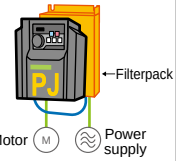
Wire and Space Saving

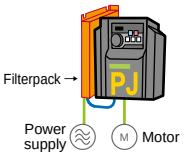
A Lineup of Filterpack Models Available

- The power factor improving DC reactor, common mode choke (line noise filter), and capacitive filter (radio noise filter) are all essential for air conditioning applications, and all of these are included in a Filterpack.
  The Filterpack inverter models (FR-F7□0PJ-□F) are also available.
  The option wiring, which was necessary in the past, is no longer required.
- A Filterpack allows flexible installation and various layouts in the enclosure. Smaller space is required for installation.
- Less wiring and smaller space also enable compliance with the Harmonic Suppression Guidelines, **the Architectural Standard Specifications (Electrical Installation)**, and **the Architectural StandardSpecifications (Machinery Installation) (2013 revisions)** in Japan.



Flexible installation

Back of the panel	Installation area reduced by*1
	Approx. **72%** With FR-F740PJ-3.7KF

Side of the panel	Installation area reduced by*1
	Approx. **84%** With FR-F740PJ-3.7KF 200 mm or less depth at all capacities

*1: The area required for the separate installation of power factor improving DC reactor, common mode choke (line noise filter), and capacitive filter (radio noise filter) with clearance around them.

Space Saving by Side-by-Side Installation

- Side-by-side installation is possible*2 and requires less space. A DIN rail installation attachment (FR-UDA□□) option can be installed.

*2: Keep the surrounding air temperature of the inverter at 40°C maximum. Side-by-side installation is not available for Filterpacks.

Easy Operation and Maintenance

Quick Setting Using the Setting Dial

- The adaptable scroll speed setting dial allows for quick jumps or precise increments based on turning speed.
- The non-slip treatment was applied to the setting dial for easier turning.

Automatic Parameter Setting for Specific Applications

- Simple parameter setting (Pr.79 Operation mode selection)
- Communication setting for Mitsubishi HMI (GOT)
- Rated frequency change (60Hz→50Hz)

Spring Clamp Terminals (Control Circuit Terminals)

- Spring clamp terminals*1 are adopted as control circuit terminals. Spring clamp terminals are highly reliable and can be easily wired.

*1: The control circuit terminals are screw terminals.

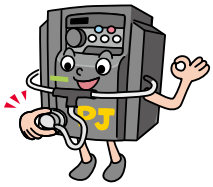
Longer Life Parts

- The service life of the cooling fans is now 10 years*2. The service life can be further extended by ON/OFF control of the cooling fan.
- Capacitors with a design life of 10 years*2*3 are adapted. (Surrounding air temperature of 105°C for 5000 hours). With these capacitors, the service life of the inverter is further extended.

*2: Surrounding air temperature: Annual average of 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt). The design life is a calculated value and is not a guaranteed product life.
*3: Output current: 80% of the inverter rating.

The Leading-Edge Life Diagnosis Function

- The degree of deterioration of the main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be diagnosed on the monitor.
- Using the self-diagnosis function, the part life warning*4 can be output. With these warnings, the self-diagnosis function prevents troubles from occurring.



*4: A warning is output when any of the main circuit capacitor, control circuit capacitor, inrush current limit circuit, and cooling fan reaches its specified output level.

Enhanced Communication Function

- The Mitsubishi inverter protocol and Modbus-RTU are selectable.
- The speed of RS-485 communication has been improved. (Communication at 38.4kbps is available.)

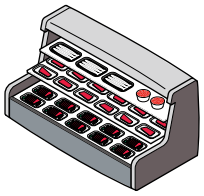
Introducing the Mitsubishi magnetic contactor

- Offers a selection of small frames
- Offers a line-up of safety contactors
- Supports small loads (auxiliary contact)
- Supports many international regulations as standard

Optimum for Fan and Pump Applications

Enhanced PID Control

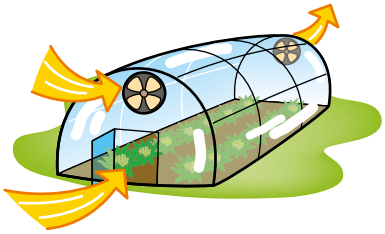
- To save energy in low-speed operation:
  PID output shutoff (sleep) function
- To shorten the start-up time of PID control:
  PID automatic switchover function
- For air conditioning applications: Forward/reverse rotation switching by external signals
- To use various types of detectors: PID set point and measured value outputs in voltage (0 to 5V / 0 to 10V) and current (4 to 20mA)



(Example: Water-cooling pump for a showcase)

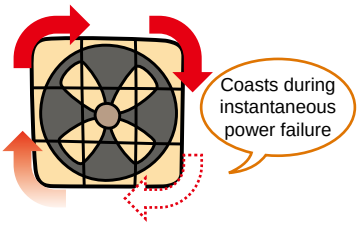
Regeneration Avoidance Function

- The operation frequency is automatically increased to prevent the regenerative overvoltage fault from occurring. This function is useful when a load is forcibly rotated by another fan in the duct.



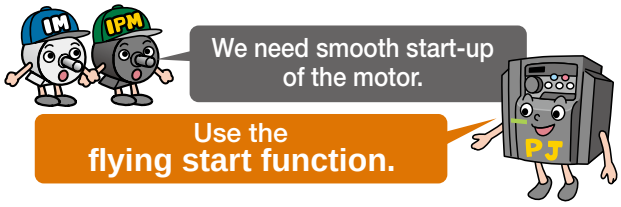
Automatic Restart After Instantaneous Power Failure / Flying Start Function

- After an instantaneous power failure, the operation is re-startable from the coasting motor speed.
  Even if the rotation direction has been forcibly reversed, the operation can be smoothly restarted in the original direction.

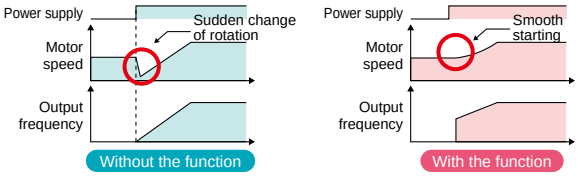


Example

The fan is rotated by the external force.

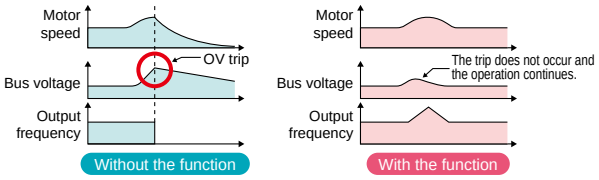


The motor can be started smoothly even after the motor was rotated by the external force (coasting).
This function can be set enabled by changing **Pr.57** setting.



Parameters to adjust the acceleration time at a restart **(Pr.611)**, to detect the fan rotation direction **(Pr.299)**, etc. are also available.

When the external force accelerates rotation of the running motor (regeneration), the motor may trip due to the overvoltage.
The regeneration avoidance function is available to increase the frequency and avoid the regenerative condition.
This function can be set enabled by changing **Pr.822** setting.



Parameters to start the regeneration avoidance operation **(Pr.883)** and to adjust the response level **(Pr.886)** are also available.

Application Example

Great energy saving effect obtained in medium airow

(When the electricity cost is 14 yen/kWh, and the CO_2 emission is [1,000 kWh 0.555 ton - CO_2 emission])

Condition

Operation patterns

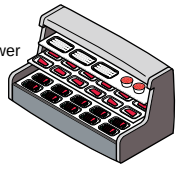
(Annual) energy saving effect produced by replacing to IPM motors driven with inverters

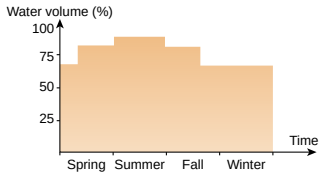
Water-cooling pump for a showcase

Commercial power supply (valve) + General-purpose motor (SF-JR) ▼ Inverter + General-purpose motor (SF-JR)

[Units to drive]

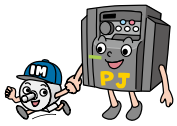
- Water-cooling pump
  3.7 kW × 1 unit
- Fans for the cooling tower
  1.5 kW × 1 unit
- Freezer
  11 kW × 3 unit
  5.5 kW × 2 unit
  3.7 kW × 1 unit
  3.0 kW × 1 unit





8760 hours/year

- **With commercial power supply**
  Approx. 0.15 million kWh
  Approx. 2.17 million yen
- **With inverter**
  Approx. 0.14 million kWh
  Approx. 1.9 million yen



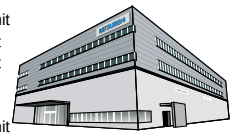
- **Annual energy saving effect**
  (differences in the amount and cost)
  Approx. 0.019 million kWh
  Approx. 0.27 million yen
- **Annual CO_2 emission reduction**
  Approx. 0.019 million kWh
  10.7 tons

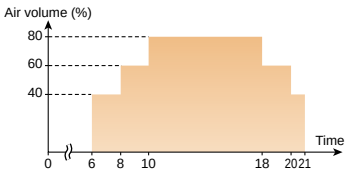
Air conditioning in a Mitsubishi plant

Inverter + General-purpose motor (SF-JR) ▼ Inverter + IPM motor (MM-EFS)

[Units to drive]

- Ventilator
  0.75 kW × 3 unit
  1.5 kW × 1 unit
  2.2 kW × 3 unit
- Air conditioner
  15 kW × 1 unit
  18.5 kW × 1 unit
  30 kW × 2 unit





5475 hours/year

- **With general-purpose motor**
  Approx. 0.25 million kWh
  Approx. 3.44 million yen
- **With IPM motor**
  Approx. 0.22 million kWh
  Approx. 3.02 million yen

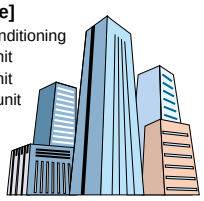
- **Annual energy saving effect**
  Approx. 0.03 million kWh
  Approx. 0.42 million yen
- **Annual CO_2 emission reduction**
  Approx. 0.03 million kWh
  16.7 tons

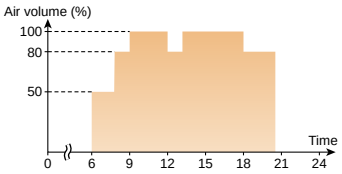
Air conditioning in a building

Inverter + General-purpose motor (SF-JR) ▼ Inverter + IPM motor (MM-EFS)

[Units to drive]

- Fans for air conditioning
  5.5 kW × 10 unit
  7.5 kW × 10 unit
  3.7 kW × 100 unit





4745 hours/year

- **With general-purpose motor**
  Approx. 2.39 million kWh
  Approx. 33.42 million yen
- **With IPM motor**
  Approx. 2.1 million kWh
  Approx. 29.43 million yen

- **Annual energy saving effect**
  Approx. 0.28 million kWh
  Approx. 3.99 million yen
- **Annual CO_2 emission reduction**
  Approx. 0.28 million kWh
  158 tons

Your best assistant — Mitsubishi inverter software

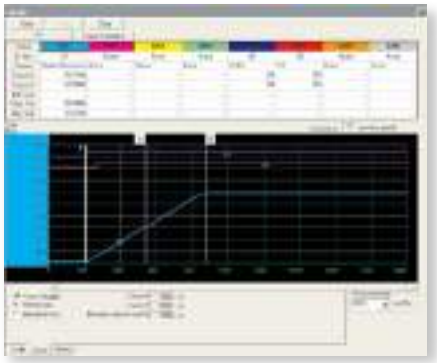
●IPM energy savings simulation file

The IPM energy savings simulation file calculates the energy saving effect and CO_2 reduction rate achieved by replacing commercial power supply (damper/valve control) operation with IPM motor operation by inverter. This file requires inputs of motor capacity, quantity, air volume, operating time, etc.

IPM energy savings simulation file

●FR Configurator (FR-SW3-SETUP-WE) (Option)

Support tool for the inverter operations from start-up to maintenance.



Lineup

●Inverter

F R - F 7 4 0 P J - 3 . 7 K □

Symbol	Inverter capacity
0.4K to 15K	Represents the capacity (kW).

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Filterpack
None	No
F	Yes*

*: The inverter with Filterpack consists of an inverter and a Filterpack. The inverter carries the rating plate, "FR-F7□0PJ-□KF," and the Filterpack carries the rating plate "FR-BFP2-□K".

Power supply specification	Inverter model	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Three-phase 200 V	FR-F720PJ-□K FR-F720PJ-□KF	●	●	●	●	●	●	●	●	●
Three-phase 400 V	FR-F740PJ-□K FR-F740PJ-□KF	●	●	●	●	●	●	●	●	●

●:To be released

■Precautions
- Never drive an IPM motor in the IM drive setting.
- Use the same IPM motor capacity as the inverter capacity.
- For IPM motor, use an MM-EFS or MM-EF series motor. Please contact us regarding a combination with other manufacturer's IPM motor.

Compatible with UL, cUL, EC Directives (CE marking)
- IPM motors and Filterpacks are not compatible with the above regulations and directives.

Being RoHS compliant, the FR-F700PJ series inverters are friendly to people and to the environment.

●Premium high-efficiency IPM motor

M M - E F S 7 1 M 4 □ □

Symbol	Output	Symbol	Output
7	0.75kW	55	5.5kW
15	1.5kW	75	7.5kW
22	2.2kW	11K	11kW
37	3.7kW	15K	15kW

Symbol	Voltage class
None	200V
4	400V

Symbol	Rated speed*1
1M	1500r/min

Symbol	Specification*2
Q	Class B

Symbol	Specification*2
P1	Outdoor-type

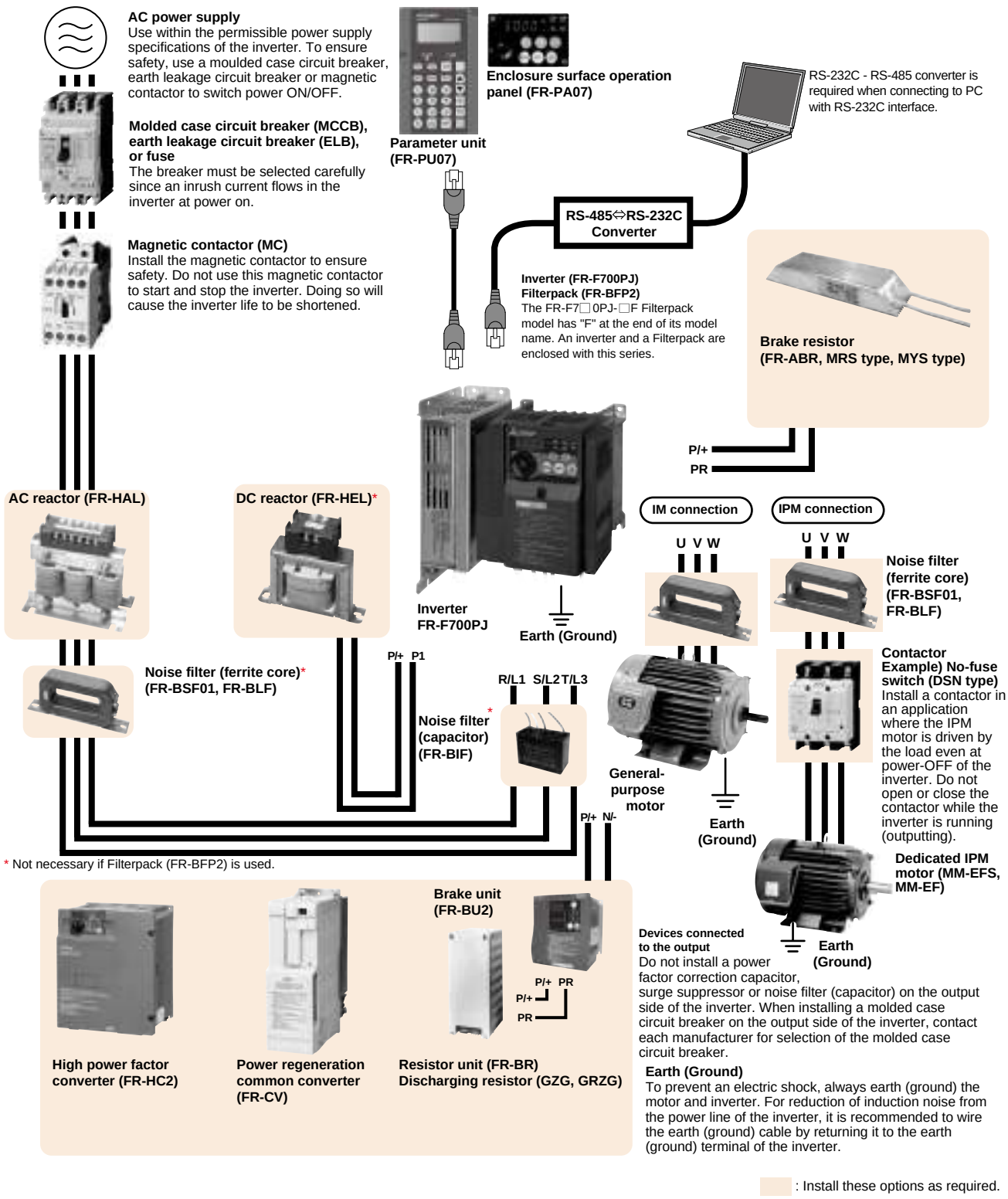
*1: Also applicable to an application with the rated speed of 1800r/min.
*2: The outdoor-type and class B are semi-standard models. Please contact your sales representative for a special specification such as the long-axis type, flange shape, and salt-proof type.

Rated output (kW)		0.75	1.5	2.2	3.7	5.5	7.5	11	15
Motor model		7	15	22	37	55	75	11K	15K
200 V class	MM-EFS□1M	●	●	●	●	●	●	●	●
400 V class	MM-EFS□1M4	●	●	●	●	●	●	●	●

●:To be released

■Precautions
- MM-EFS series IPM motors cannot be driven with commercial power supply
- The total wiring length for an IPM motor should be 100 m or less.
- Only one IPM motor can be connected to an inverter.

Installation Example



[NOTE]

- The life of the inverter is influenced by surrounding air temperature. Use the product within the permissible surrounding air temperature. This must be noted especially when the inverter is installed in an enclosure. (Refer to chapter 1 of the Instruction Manual (Applied))
- Wrong wiring might lead to damage of the inverter. The control signal lines must be kept fully away from the main circuit to protect them from noise.
- Do not install a power factor correction capacitor, surge suppressor or noise filter (capacitor) on the inverter output side. This will cause the inverter to trip or the capacitor and surge suppressor to be damaged. If any of the above devices are connected, immediately remove them.
- Electromagnetic wave interference
  The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter.
  In this case, install the FR-BIF optional EMC filter (capacitor) (for use in the input side only) or FR-BSF01 or FR-BLF noise filter (ferrite core) to minimize interference.
  (Refer to chapter 3 of the Instruction Manual (Applied))
- Refer to the Instruction Manual of each option and peripheral devices for details of peripheral devices.
- An IPM motor cannot be driven by the commercial power supply.
- An IPM motor is a motor with permanent magnets embedded inside. High voltage is generated at the motor terminals while the motor is running. Before closing the contactor at the output side, make sure that the inverter power is ON and the motor is stopped.

■Standard Specifications

●Rating

Three-phase 200V power supply

Inverter										
Model FR-F720PJ-□K			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable general-purpose motor capacity (kW)*1			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2		1.0	1.6	2.7	3.8	6.3	9.1	12.1	17.1	22.1
	Rated current (A)		2.5	4.2	7.0	10.0	16.5	23.8	31.8	45	58
	Overload current rating*3		120% 60s, 150% 0.5s (inverse-time characteristics)								
	Rated voltage*4		Three-phase 200 to 240V								
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240V 50Hz/60Hz								
	Permissible AC voltage fluctuation		170 to 264V 50Hz/60Hz								
	Permissible frequency fluctuation		±5%								
	Power supply capacity (kVA)*5	Without Filterpack	1.2	2.1	4.0	5.0	8.8	12.0	17.0	20.0	27.0
		With Filterpack	0.8	1.2	2.6	3.4	5.5	8.4	11.0	16.0	19.0
Protective structure (JEM 1030)			Enclosed type (IP20)*6								
Cooling system			Self-cooling		Forced air cooling						
Approximate mass (kg)			0.8	1.0	1.4	1.4	1.8	3.6	3.6	6.5	6.5

Filterpack										
Model FR-BFP2-□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Approximate mass (kg)		1.3	1.4	2.0	2.2	2.8	3.8	4.5	6.7	7.0
Power factor improving reactor		Install the DC reactor in the DC side. 93% to 95% of power supply power factor under 100% load (94.4% *7)								
EMC filter	Common mode choke	Install a ferrite core on the input side								
	Capacitive filter	About 4mA of capacitor leakage current*8								
Protective structure (JEM 1030)		Open type (IP00)								

Three-phase 400V power supply

Inverter										
Model FR-F740PJ-□K			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable general-purpose motor capacity (kW)*1			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2		0.9	1.7	2.8	3.8	6.2	9.1	12.4	17.5	22.5
	Rated current (A)		1.2	2.2	3.7	5.0	8.1	12.0	16.3	23.0	29.5
	Overload current rating*3		120%60s, 150% 0.5s (inverse-time characteristics)								
	Rated voltage*4		Three-phase 380 to 480V								
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation		325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation		±5%								
	Power supply capacity (kVA)*5	Without Filterpack	1.1	2.2	4.2	4.8	8.6	12.0	17.0	20.0	28.0
		With Filterpack	0.7	1.3	2.7	3.3	5.4	8.5	11.0	16.0	19.0
Protective structure (JEM 1030)			Enclosed type (IP20)*6								
Cooling system			Self-cooling		Forced air cooling						
Approximate mass (kg)			1.3	1.3	1.4	1.5	1.5	3.3	3.3	6.0	6.0

Filterpack										
Model FR-BFP2-H□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Approximate mass (kg)		1.6	1.7	1.9	2.3	2.6	4.5	5.0	7.0	8.2
Power factor improving reactor		Install the DC reactor in the DC side. 93% to 95% of power supply power factor under 100% load (94.4%*7)								
EMC filter	Common mode choke	Install a ferrite core on the input side								
	Capacitive filter	About 8mA of capacitor leakage current*8								
Protective structure (JEM 1030)		Open type (IP00)								

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor. To use a dedicated IPM motor.
*2 The rated output capacity assumes the following output voltages: 220V for the three-phase 200V and 440V for the three-phase 400V class.
*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 pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*6 Open type (IP00) for Filterpack.
*7 The values in parentheses are calculated with 1 fundamental frequency power factor according to the Year 2013 Standard specification for public constructions (electric installation works), published by the Ministry of Land, Infrastructure, Transport and Tourism in Japan.
*8 The indicated leakage current is equivalent to one-phase of the three-phase three wire 人 connection cable.

●Common Specification

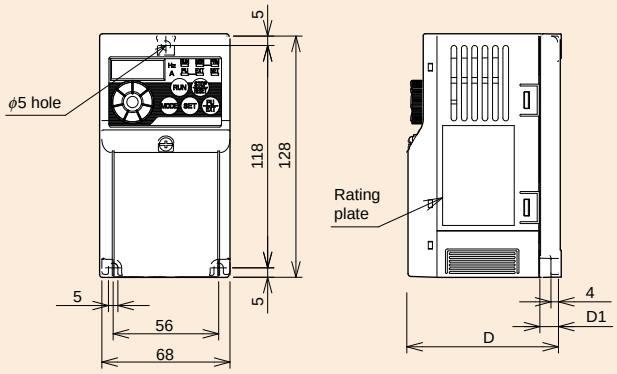
Control specifications	Control method		High carrier frequency PWM control (V/F control)/Optimum excitation control/General-purpose magnetic flux vector control/IPM motor control
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminals 2 and 4: 0 to 10V/10-bit) 0.12Hz/60Hz (terminals 2 and 4: 0 to 5V/9-bit) 0.06Hz/60Hz (terminal 4: 0 to 20mA/10-bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±1% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Speed control range		V/F control 1:10, General-purpose magnetic flux vector control (during power driving) 1:60, IPM motor control 1:10
	Voltage/frequency characteristics		Base frequency can be set from 0 to 400Hz. Constant-torque/variable-torque pattern can be selected.
	Starting torque	General-purpose motor control	General-purpose motor control (General-purpose magnetic flux vector control or slip compensation): 120% (at 1Hz)
		IPM motor control	IPM motor control: 50%
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.1 to 3600s (acceleration and deceleration can be set individually), linear and S-pattern acceleration/deceleration modes are available.
	Regenerative braking torque	General-purpose motor control	General-purpose motor control: 15%*1
		IPM motor control	IPM motor control: 5% (10% for 1.5kW or less)*1
	DC injection brake		General-purpose motor control: Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) can be changed.
	Stall prevention operation level		Operation current level can be set (0 to 150% variable). Whether to use the function or not can be set.
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V and 0 to 5V are available Terminal 4: 0 to 10V, 0 to 5V, and 4 to 20mA are available
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set.
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (five terminals)		The following signals can be assigned to **Pr. 178 to Pr.182 (input terminal function selection)**: multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PID forward/reverse action switchover, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, PU operation external interlock, PID integral value reset.
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485), Optimum excitation control, power failure stop, speed smoothing control, MODBUS RTU
	Output signal Open collector output (one terminal) Relay output (one terminal)	Operating status	The following signals can be assigned to **Pr.190 and Pr.192 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm.*2, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID deviation limit, IPM motor control*3, PID output interruption, pulse train output of output power, during retry, life alarm, average current value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.
		For meter Pulse train output (MAX 2.4kHz: one terminal)	The following signals can be assigned to **Pr. 54 FM terminal function selection**: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, energy saving effect, cumulative energy saving, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor. Pulse train output (1440 pulses/s/full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, output current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, and PTC thermistor resistance.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault definitions (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.
		Interactive guidance	Function (help) for operation guide*4
Protective/warning function		Protective 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, undervoltage *3, input phase loss *5, output side earth (ground) fault overcurrent at start *5, output short circuit, output phase loss, external thermal relay operation *5, PTC thermistor operation *5, parameter error, PU disconnection, retry count excess *5, CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, overspeed occurrence *3 ,PID signal fault *5, stall prevention operation, output current detection value exceeded *5, loss of synchronism detection *3
		Warning function	Fan alarm*2, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm*5, electronic thermal relay function prealarm, maintenance output*5, undervoltage, operation panel lock, password locked, inverter reset
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing)*6
	Ambient humidity		90% RH or less (non-condensing)
	Storage temperature*7		-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, 5.9m/s² or less*8 at 10 to 55Hz (directions of X, Y, Z axes)

*1 The regenerative braking torque indicates the average short-time torque (which varies by the motor loss) that is generated when a motor decelerates in the shortest time by itself from the rated speed. It is not the continuous regenerative torque. When a motor decelerates from a speed higher than the rated speed, the average deceleration torque decreases. When the regenerative power is large, use an option brake unit.
*2 As the 0.75K or lower are not provided with the cooling fan, this alarm does not function.
*3 This function is available only when an IPM motor is connected.
*4 This operation guide is only available with option parameter unit (FR-PU07).
*5 This protective function is not available in the initial status.
*6 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
Side-by-side installation is not available for Filterpacks.
*7 Temperatures applicable for a short time, e.g. in transit.
*8 When installing Filterpack of 11K or 15K on the rear side of an inverter, do not install to a moving object or place where vibrates (exceeding 1.96m/s²).

■Standard Model (Without a Filterpack)

Outline Dimension Drawings

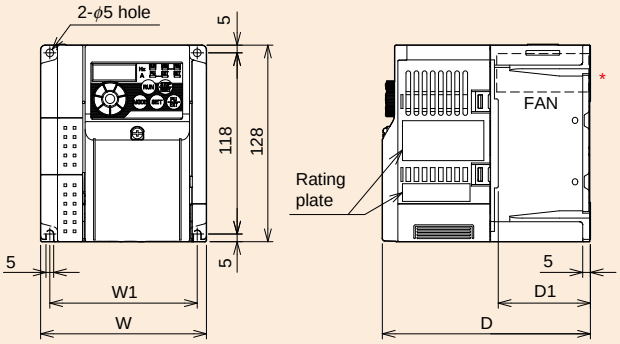
●FR-F720PJ-0.4K, 0.75K



Inverter Model	D	D1
FR-F720PJ-0.4K	112.5	42
FR-F720PJ-0.75K	132.5	62

(Unit: mm)

●FR-F720PJ-1.5K to 3.7K
●FR-F740PJ-0.4K to 3.7K

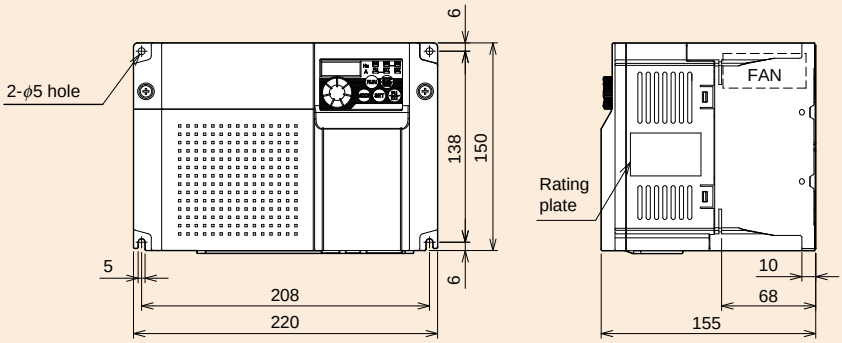


* FR-F740PJ-0.4K and 0.75K are not provided with the cooling fan.

Inverter Model	W	W1	D	D1
FR-F720PJ-1.5K, 2.2K FR-F740PJ-1.5K	108	96	135.5	60
FR-F740PJ-0.4K, 0.75K			129.5	54
FR-F740PJ-2.2K			155.5	60
FR-F740PJ-3.7K			165.5	
FR-F720PJ-3.7K	170	158	142.5	66.5

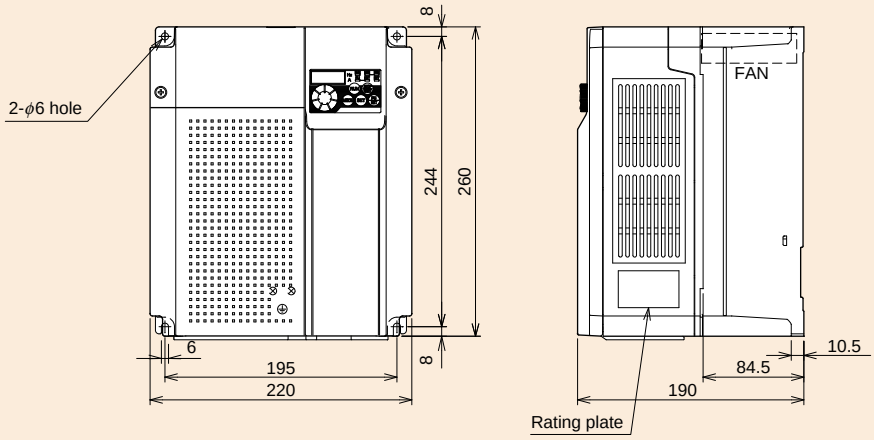
(Unit: mm)

●FR-F720PJ-5.5K, 7.5K
●FR-F740PJ-5.5K, 7.5K



(Unit: mm)

●FR-F720PJ-11K, 15K
●FR-F740PJ-11K, 15K



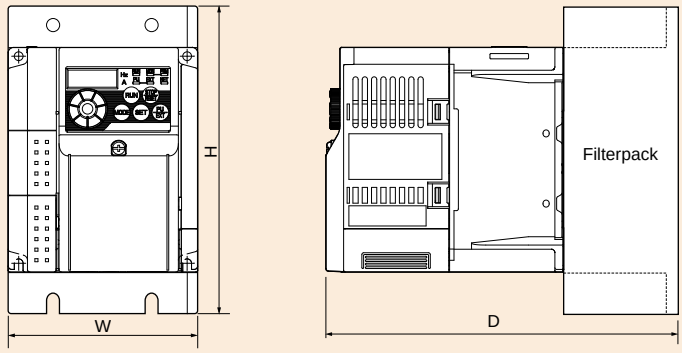
(Unit: mm)

■Standard Model (With a Filterpack)

A Filterpack can be installed on the side or rear panel of the inverter. This is a sample outline dimension drawing. The shape differs by the model.

Outline Dimension Drawings

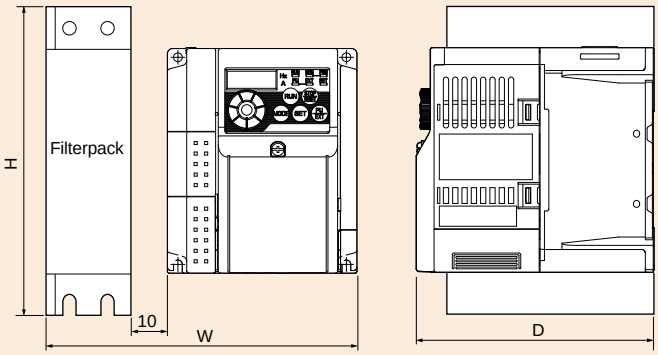
●Filterpack installed on the rear panel



Inverter Model	W	H	D
FR-F720PJ-0.4KF	68	218	172.5
FR-F720PJ-0.75KF	68	218	192.5
FR-F720PJ-1.5KF, 2.2KF	108	188	215.5
FR-F720PJ-3.7KF	170	188	207.5
FR-F720PJ-5.5KF, 7.5KF	220	210	230
FR-F720PJ-11KF, 15KF	220	320	275
FR-F740PJ-0.4KF, 0.75KF	108	188	184.5
FR-F740PJ-1.5KF	108	188	215.5
FR-F740PJ-2.2KF	108	188	235.5
FR-F740PJ-3.7KF	108	188	245.5
FR-F740PJ-5.5KF, 7.5KF	220	210	230
FR-F740PJ-11KF, 15KF	220	320	275

(Unit: mm)

●Filterpack installed on the side panel

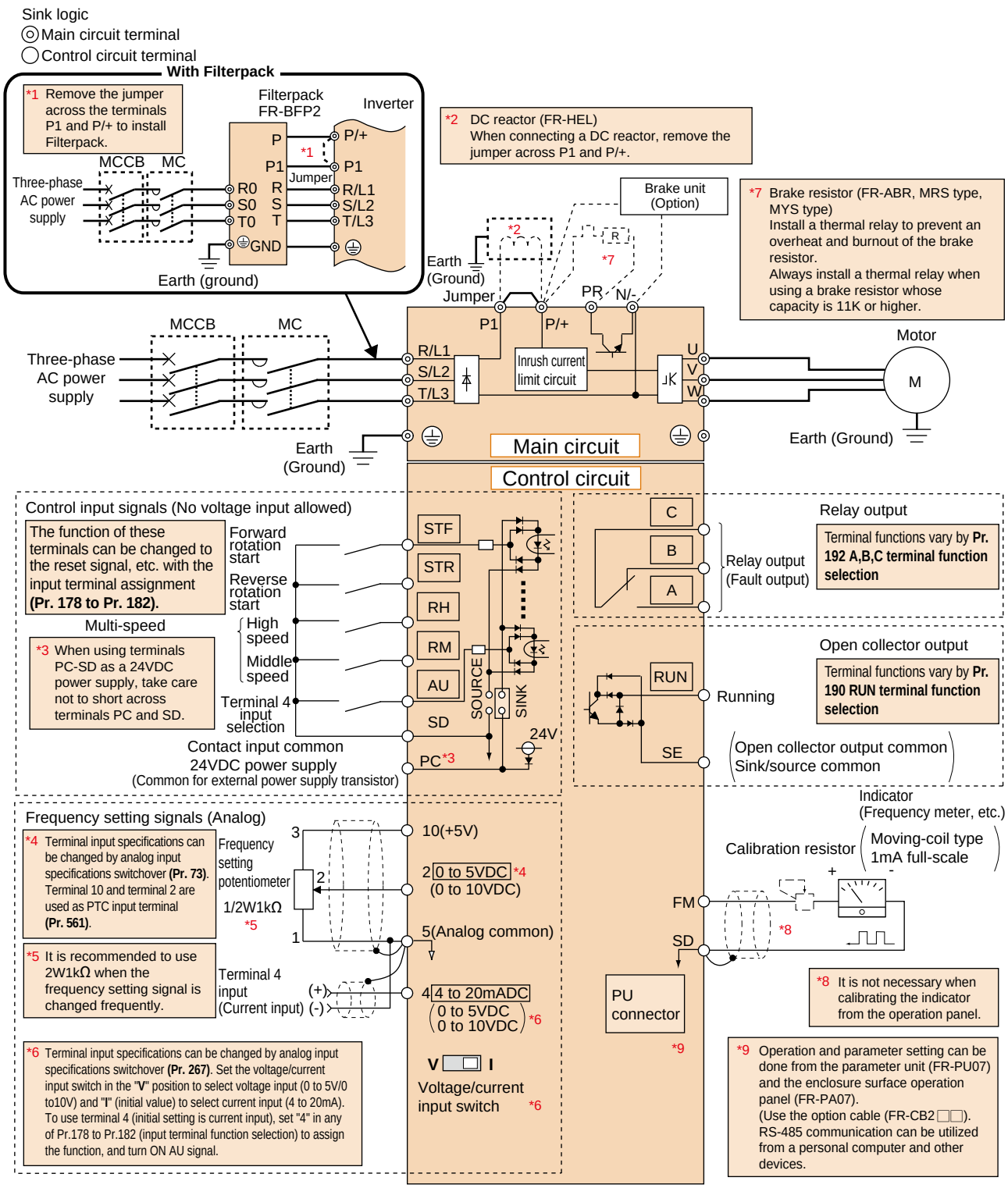


Inverter Model	W*	H	D
FR-F720PJ-0.4KF	138	218	112.5
FR-F720PJ-0.75KF	138	218	132.5
FR-F720PJ-1.5KF, 2.2KF	198	188	135.5
FR-F720PJ-3.7KF	245	188	170
FR-F720PJ-5.5KF, 7.5KF	305	210	195
FR-F720PJ-11KF, 15KF	315	320	195
FR-F740PJ-0.4KF, 0.75KF	173	188	129.5
FR-F740PJ-1.5KF	198	188	135.5
FR-F740PJ-2.2KF	198	188	155.5
FR-F740PJ-3.7KF	198	188	165.5
FR-F740PJ-5.5KF, 7.5KF	305	210	195
FR-F740PJ-11KF, 15KF	315	320	195

* The clearance between the inverter and the filter is 10mm.

(Unit: mm)

■Terminal Connection Diagram



[NOTE]

- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
- The terminals S1, S2, SC, and SO are for manufacturer setting. Do not remove the shortening wires across the terminals S1 and SC and the terminals S2 and SC.

Terminal Specification Explanation

Type		Terminal Symbol	Terminal Name	Terminal Specification	
Main circuit	Inverter	R/L1, S/L2, T/L3	AC power input	Connect to the commercial power supply. Do not connect anything to these terminals when using the high power factor converter (FR-HC2) or power regeneration common converter (FR-CV). To use Filterpack, connect the R, S, and T cables of Filterpack.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or a dedicated IPM motor.	
		P/+, PR	Brake resistor connection	Connect a brake resistor (FR-ABR, MRS type, MYS type) across terminals P/+ and PR.	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or high power factor converter (FR-HC2).	
		P/+, P1	DC reactor (Filterpack) connection	Remove the jumper across terminals P/+ and P1 and connect a DC reactor. To use Filterpack, remove the jumper across the terminals P/+ and P1, then connect the P and P1 cables of Filterpack.	
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded). To use Filterpack, connect the GND cable of Filterpack.	
	Filterpack	R0, S0, T0	Commercial power supply input	Connect to the commercial power supply.	
		⏚	Earth (Ground)	For earthing (grounding) the Filterpack. Must be earthed (grounded).	
		R, S, T	Inverter power supply	Connect to R/L1, S/L2, and T/L3 of the inverter.	
		P, P1	DC reactor terminal	Remove the jumper across terminals P/+ and P1, and connect to the terminals P/+ and P1 of the inverter.	
		GND	Inverter earth (ground) connection	Connect to the earth (ground) terminal of the inverter.	
Control circuit/Input signal	Contact input	STF	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	When the STF and STR signals are turned ON simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.	
		RH, RM	Multi-speed selection	Multi-speed can be selected according to the combination of RH and RM signals.	
		AU	Terminal 4 input selection	The terminal 4 function is available only when the AU signal is ON. (the operation with the frequency setting signal of 4 to 20mA DC is available) Turning ON the AU signal disables the terminal 2 (voltage input) function.	
		SD	Contact input common (sink) (initial setting)	Common terminal for contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			24VDC power supply common	Common output terminal for 24VDC 0.1A power supply (PC terminal). Isolated from terminals 5 and SE.	
		PC	External transistor common (sink) (initial setting)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable current.	
			Contact input common (source)	Common terminal for contact input terminal (source logic).	
			24VDC power supply	Can be used as 24VDC 0.1A power supply.	
	Frequency setting	10	Frequency setting power supply	Used as power supply when connecting potentiometer for frequency setting (speed setting) from outside of the inverter.	5VDC permissible load current 10mA
		2	Frequency setting (voltage)	Inputting 0 to 5VDC (or 0 to 10V) provides the maximum output frequency at 5V (10V) and makes input and output proportional. Use Pr. 73 to switch between input 0 to 5VDC input (initial setting) and 0 to 10VDC.	Input resistance10kΩ ± 1kΩ Permissible maximum voltage 20VDC
		4	Frequency setting (current)	Inputting 4 to 20mADC (or 0 to 5V, 0 to 10V) provides the maximum output frequency at 20mA and makes input and output proportional. The input signal to terminal 4 is valid only when the AU signal is ON (terminal 2 input is invalid). Use **Pr. 267** to switch from among input 4 to 20mA (initial setting), 0 to 5VDC and 0 to 10VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to 10V).	Current input: Input resistance 249Ω ± 5Ω Maximum permissible current 30mA Voltage input: Input resistance10kΩ ± 1kΩ Permissible maximum voltage 20VDC
		5	Frequency setting common	Frequency setting signal (terminal 2 or 4) common terminal. Do not earth (ground).	
	Thermistor	10 2	PTC thermistor input	For connecting PTC thermistor output. When PTC thermistor protection is valid (**Pr. 561** ≠ "9999"), terminal 2 is not available for frequency setting.	Adaptive PTC thermistor specification Heat detection resistance: 500Ω to 30kΩ (Set by **Pr. 561**)

Type		Terminal Symbol	Terminal Name	Terminal Specification	
Control circuit terminal/Output signal	Relay	A, B, C	Relay output (fault output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Fault: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C) Contact capacity:230VAC 0.3A (power factor =0.4) 30VDC 0.3A	
	Open collector	RUN	Inverter running	Switched Low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched High during stop or DC injection brake operation. (Low is when the open collector output transistor is ON (conducts). High is when the transistor is OFF (does not conduct).)	Permissible load 24VDC (maximum 27VDC) 0.1A (a voltage drop is 3.4V maximum when the signal is ON)
		SE	Open collector output common	Common terminal of terminal RUN.	
	Pulse	FM	For meter	Selected one e.g. output frequency from monitored items. (Not output during inverter reset.) The output signal is proportional to the magnitude of the corresponding monitored item.	Permissible load current 1mA 1440 pulses/s at full scale
Communication		–	PU connector	With the PU connector, communication can be established through RS-485. •Conforming standard: EIA-485 (RS-485) •Transmission format: Multidrop link •Communication speed: 4800 to 38400bps •Overall length: 500m	

[NOTE]

- To change the input specification for terminal 4, set **Pr. 267** and the voltage/current input switch correctly, then input the analog signal relevant to the setting. Applying a voltage with voltage/current input switch in "I" position (current input is selected) or a current with switch in "V" position (voltage input is selected) could cause component damage of the inverter or analog circuit of output devices.
- Connecting the power supply to the inverter output terminals (U, V, W) will damage the inverter. Do not perform such wiring.
- ☐ indicates that terminal functions can be selected using **Pr. 178 to Pr. 182, Pr. 190 and Pr. 192 (I/O terminal function selection)**.
- The terminal names and functions shown here are the initial settings.
- The terminals S1, S2, SC, and SO are for manufacturer setting. Do not connect anything to these.
  Doing so may cause an inverter failure. Do not remove the shortening wires across the terminals S1 and SC and the terminals S2 and SC. Removing either shortening wire disables the inverter operation.

INVERTER FREQROL-D700 Series

Simple and compact; the Mitsubishi standard

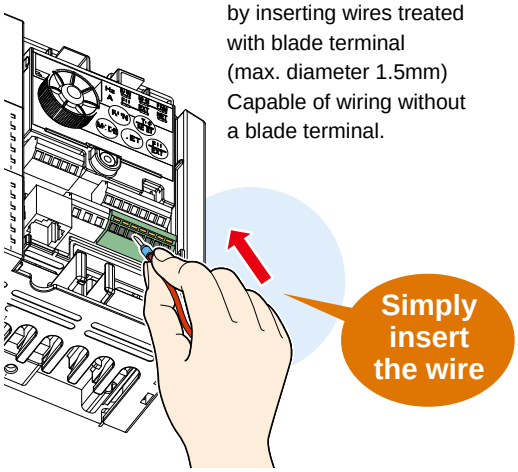
Mitsubishi Inverter Sets a New Standard —— with More Reliability!!

Spring Clamp Terminal (Control Circuit Terminal)

With spring clamp terminals*, the wiring becomes easier and more secure.

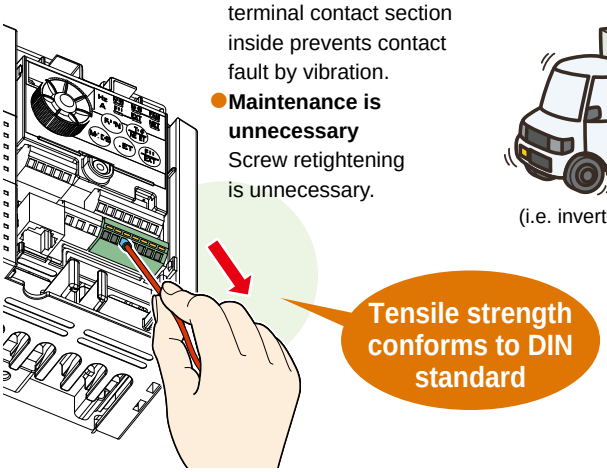
*: Main circuit terminal is screw terminal.

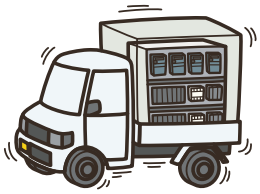
●**Easy wiring**
Wiring is completed only by inserting wires treated with blade terminal (max. diameter 1.5mm)
Capable of wiring without a blade terminal.



●**High reliability**
Spring structure in terminal contact section inside prevents contact fault by vibration.

●**Maintenance is unnecessary**
Screw retightening is unnecessary.



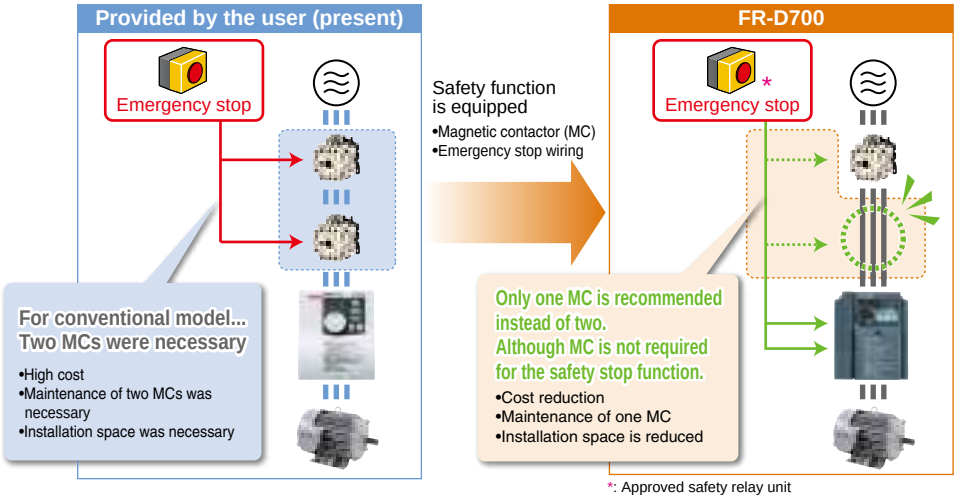


(i.e. inverter transportation)

Safety Stop Function

The FR-D700 series is compliant to the EU Machinery Directive without the addition of previously required external devices.
Operation of an external Emergency Stop device results in a highly reliable immediate shutoff of the D700's output to the motor.
This safety stop function conforms to the following standards.

EN ISO 13849-1 Category 3 / PLd
EN62061 / IEC61508 SIL2



*: Approved safety relay unit

Password Function

Registering 4-digit password can limit parameter read/write.

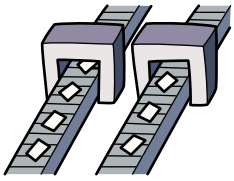
●It is effective for parameter setting protection.

Equipped with High-Class Performance (as of April 2008)

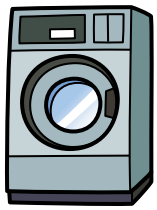
150%/1Hz High Starting Torque by General-Purpose Magnetic Flux Vector Control

General-purpose magnetic flux vector control and auto tuning function are available. It ensures operation that requires high starting torque, such as transfer machine including conveyer, hoist, lift, etc., washing machine, and agitators.

- High torque of 150%/1Hz and 200%/3Hz (3.7K or less) is realized (when the slip compensation function is valid).
- Auto tuning
  Many kinds of motors can be optimally controlled with Mitsubishi original "non-rotation" auto tuning function. (R1 constants tuning)



(example: conveyer)



(example: industrial washing machine)

Simple & Easy Operation

Quick Setup with the Setting Dial

Setting dial is the feature of Mitsubishi inverters.

- Displayed numbers can be jumped by turning the setting dial quickly, and numbers can be changed one by one by turning it slowly, enabling speedy parameter setting.
- The nonslip setting dial is easier to turn.

Easy Setting from a Personal Computer Using the FR Configurator (Option)

Connecting a personal computer and the inverter via RS-485 communication enables setting with wizard (interactive) function of the FR Configurator (inverter setup software).
In addition, a parameter setting can be converted from the FR-S500 series to the FR-D700 series by "Convert" function.
"Graph" function displays monitor data in waveform.

Enclosure Surface Operation Panel FR-PA07 (Option)

Optional enclosure surface operation panel (FR-PA07) can be connected. In addition, an operation panel for the FR-E500 series can be connected.

The operation panel of the inverter can not be removed.
A parameter unit connection cable (FR-CB20□) is separately necessary.

Parameter Unit FR-PU07 (Option)

An optional parameter unit (FR-PU07) can be connected as well.

A parameter unit connection cable (FR-CB20□) is separately necessary.

- Setting such as direct input method with a numeric keypad, operation status indication, and help function are usable. Eight languages can be displayed.
- Parameter setting values of maximum of three inverters can be stored.

Compact and Space Saving

Easily Replaceable Compact Body

Installation size is the same as that of the FR-S500 series which is the smallest model of the Mitsubishi inverter.

FR-D740-0.4K FR-S540E-0.4K

Side by Side Installation Saves Space

Space can be saved by side by side no clearance installation*.

*: Use the inverter at the surrounding air temperature of 40°C or less.

Long-Life and Easy Maitenance

Long-Life Design

- The design life of the cooling fan has been extended to 10 years*1. The life of the fan can be further extended utilizing the it's ON/OFF control.
- The design life of the capacitors has been extended to 10 years by the adoption of a capacitor endures 5000 hours at 105°C surrounding air temperature*1, *2.

*1: Surrounding air temperature : annual average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value.
*2: Output current : 80% of the inverter rated current

- Life indication of critical components

Components	Guideline of the FR-D700 Life	Guideline of JEMA*3
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

*3: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacture's Association)

Leading Life Check Function

- Degrees of deterioration of main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be monitored.
- Trouble can be avoided with the self-diagnostic alarm*4 that is output when the life span is near.

*4: If any one of main circuit capacitor, control circuit capacitor, inrush current restriction circuit or cooling fan reaches the output level, an alarm is output. Capacity of the main circuit capacitor can be measured by setting parameter at a stop and turning the power from off to on. Measuring the capacity enables alarm to be output.
The cooling fan outputs alarm by using fan speed detection.

Easy Replacement of Cooling Fan

A cooling fan is provided on top of the inverter of all capacities requiring a cooling fan (1.5K or more).
A cooling fan can be easily replaced without disconnecting main circuit wires.

Combed Shaped Wiring Cover

Since a cover can be fitted after wiring, wiring work is easily done.

Environment Consciousness in Global Standards

RoHS Directive Compliant

Human and environment-friendly inverter in compliant with RoHS Directive.

RoHS Directive requires member nations to guarantee that new electrical and electronic equipment sold in the market after July 1, 2006 do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.
<G> mark indicating RoHS Directive compliance is printed on the package.

EMC Directive Compliant Noise Filter

Compliance to the EMC Directive of European Norm is easier.

- Noise filter option which is compatible with EMC Directive (EN61800-3 2nd Environment Category C3) is available.

Filterpack FR-BFP2 (Option)

Power factor improving DC reactor, zero phase reactor, and capacitative filter (radio noise filter), are frequently-used units for an air conditioning application. The filterpack combines those three units are available as an option.
Not only it uses less space and wiring, the filterpack is in compliance with the harmonic suppression guidelines, and conforms to the public building construction standard specifications (electrical equipment construction edition) as well as the public building construction standard specifications (machinery and equipment construction edition) (2010 edition) edited by the Ministry of Land, Infrastructure, Transport and Tourism.

Complies with UL, cUL, EC Directives (CE Marking) as a Standard Model

c UL us LISTED

CE

Single-phase 100V power input specification models are not in compliance with the EMC Directive.

Enhanced Functions

Built for Various Applications

Equipped with many useful functions for various applications

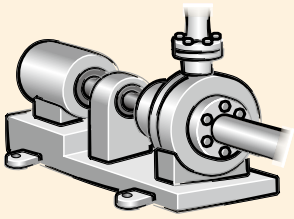
Fan and pump

Energy saving

- **Applicable load selection *(Pr.14)***
  Select the best output features (V/F features) according to use and load characteristics.
- **Optimum excitation control *(Pr.60)***
  This control maximizes motor efficiency, saving more energy especially during use of reduced load torque such as fan and pump applications.

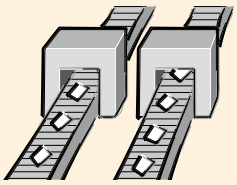
- **Regeneration avoidance function**
  This function automatically increases the frequency level during regeneration, for example, a dragging fan, to restrain tripping.
- **Deceleration and stop function upon power failure/continuous operation function upon instantaneous power failure**
- **PID control**
- **Auto-restart upon instantaneous power failure/drag retraction**

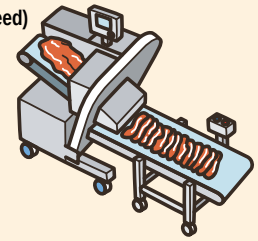

(i.e. A/C fan)


(i.e. pump)

Conveyor and food machineries

- **General-purpose magnetic flux vector control**
- **S-shaped acceleration and deceleration**
- **Multi-speed function (up to 15 speed)**
- **Brake resistor connection**

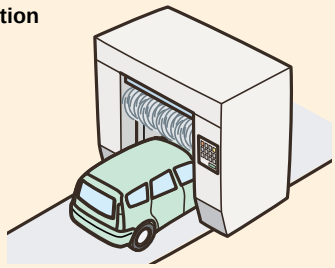

(i.e. conveyor)


(i.e. meat slicer)

Environmental and consumer-related machineries

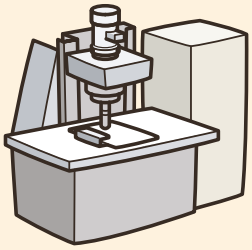
- **General-purpose magnetic flux vector control**
- **Brake resistor connection**


(i.e. Industrial washing machine)


(i.e. Car wash machine)

Machine tools

- **General-purpose magnetic flux vector control**
- **Deceleration and stop function upon power failure**
  In the event of a power failure or an undervoltage, the motor decelerates and stops to prevent a free-run state. This function is useful to prevent risks associated with machine tools, such as when stopping a motor upon power failure.


(i.e. Spindle)

Amusement machine

Packaging machinery

Textile machinery

Printing machinery

etc.

Enhanced Communication Function

- Mitsubishi inverter protocol and Modbus-RTU Faster communication speed with RS-485 models (enables 38.4kbps communication)
  Added the "Multi-Command Mode" to the Mitsubishi inverter protocol (reduces inverter data process time by 1/3 - 1/4)
  Compatible with Modbus-RTU

Brake Resistor Connection Possible

Built-in brake transistor for 0.4K and above.
Regenerative capacity can be increased by connecting the optional brake resistor.
The above function can also be used to reduce deceleration time of fans and other machineries with a large inertia as well as lifts.

Introducing the Mitsubishi magnetic contactor

- Offers a selection of small frames
- Offers a line-up of safety contactors
- Supports small loads (auxiliary contact)
- Supports many international regulations as standard

Lineup

The lineup of three phase 200V/400V class goes to 15K.

●For a use in harsh environment, special unit with board coating is also available. Please contact our sales representative.

●For the FR-D700 series, North American (NA), EU (EC), and Chinese (CHT) specifications also are supported.

*: This catalog explains based on the Japanese specifications.
Consult our sales office for specifications of each country.

F R - D 7 4 0 □ - 0 . 4 K

Symbol	Voltage
1	100V class
2	200V class
4	400V class

Symbol	Number of Power Phases
None	Three-phase input
S	Single-phase input
W	Single-phase input (double voltage output)

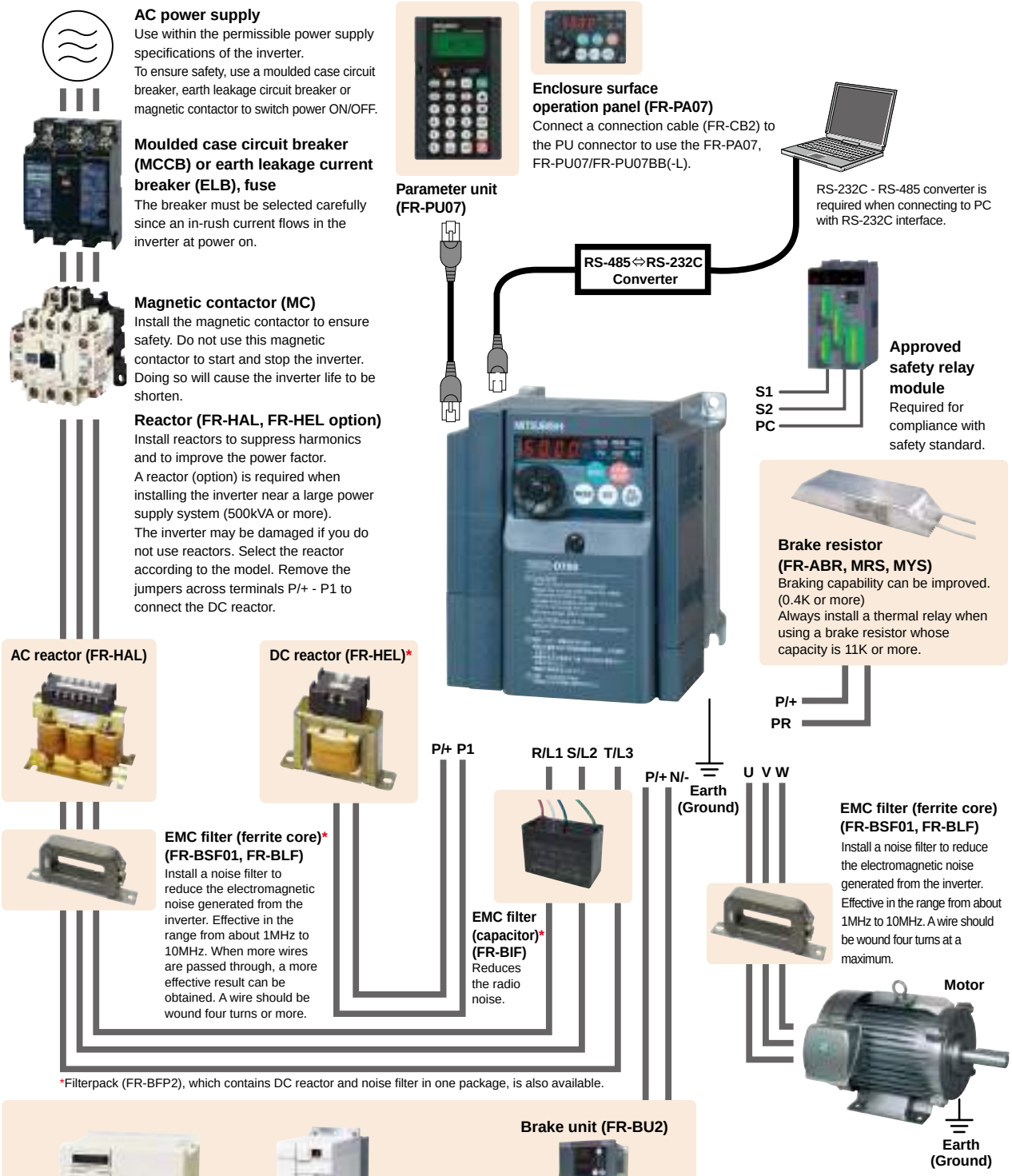
Symbol	Inverter Capacity
0.1K to 15K	Indicate capacity "kW".

Power Supply	Inverter Model	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Three phase 200V	FR-D720-□K	●	●	●	●	●	●	●	●	●	●	●
Three phase 400V	FR-D740-□K	–	–	●	●	●	●	●	●	●	●	●
Single phase 200V*	FR-D720S-□K	●	●	●	●	●	●	–	–	–	–	–
Single phase 100V*	FR-D710W-□K	●	●	●	●	–	–	–	–	–	–	–

*: Output of the single-phase 200V and single-phase 100V input models is three-phase 200V.

●:Available models –:Not available

Installation Example



Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the output side of the inverter. When installing a moulded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the moulded case circuit breaker.

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

: Install these options as required.

*2 Can be used only with standard control circuit terminal specification products and safety stop compatible models.

■Standard Specifications

●Rating

Three-phase 200V power supply

Model FR-D720-□K		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7	2.8	4.0	6.6	9.5	12.7	17.9	23.1
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0	16.5	23.8	31.8	45	58
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)										
	Voltage*4	Three-phase 200 to 240V										
	Regenerative braking torque*5	150%		100%		50%	20%					
Power supply	Rated input AC voltage/frequency	Three-phase 200 to 240V 50Hz/60Hz										
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz										
	Permissible frequency fluctuation	±5%										
	Power supply capacity (kVA)*6	0.4	0.7	1.2	2.1	4.0	5.5	9.0	12.0	17.0	20.0	27.0
Protective structure (JEM1030)		Enclosed type (IP20).										
Cooling system		Self-cooling				Forced air cooling						
Approximate mass (kg)		0.5	0.5	0.8	1.0	1.4	1.4	1.8	3.6	3.6	6.5	6.5

Three-phase 400V power supply

Model FR-D740-□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.9	1.7	2.7	3.8	6.1	9.1	12.2	17.5	22.5
	Rated current (A)	1.2	2.2	3.6	5.0	8.0	12.0	16.0	23.0	29.5
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)								
	Voltage*4	Three-phase 380 to 480V								
	Regenerative braking torque*5	50%		100%	20%					
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation	325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation	±5%								
	Power supply capacity (kVA)*6	1.5	2.5	4.5	5.5	9.5	12.0	17.0	20.0	28.0
Protective structure (JEM1030)		Enclosed type (IP20).								
Cooling system		Self-cooling		Forced air cooling						
Approximate mass (kg)		1.3	1.3	1.4	1.5	1.5	3.3	3.3	6.0	6.0

*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 230V for three-phase 200V class and 440V for three-phase 400V class.
*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 pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque.
When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used.
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

Single-phase 200V power supply

Model FR-D720S-□K		0.1	0.2	0.4	0.75	1.5	2.2
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7	2.8	4.0
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)					
	Voltage*4	Three-phase 200 to 240V					
	Regenerative braking torque*5	150%		100%		50%	20%
Power supply	Rated input AC voltage/frequency	Single-phase 200 to 240V 50Hz/60Hz					
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz					
	Permissible frequency fluctuation	±5%					
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.3	4.0	5.2
Protective structure (JEM1030)		Enclosed type (IP20).					
Cooling system		Self-cooling				Forced air cooling	
Approximate mass (kg)		0.5	0.5	0.9	1.1	1.5	2.0

Single-phase 100V power supply

Model FR-D710W-□K		0.1	0.2	0.4	0.75
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7
	Rated current (A)	0.8	1.4	2.5	4.2
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)			
	Voltage	Three-phase 200 to 230V*7, *8			
	Regenerative braking torque*5	150%		100%	
Power supply	Rated input AC voltage/frequency	Single-phase 100 to 115V 50Hz/60Hz			
	Permissible AC voltage fluctuation	90 to 132V 50Hz/60Hz			
	Permissible frequency fluctuation	±5%			
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.5
Protective structure (JEM1030)		Enclosed type (IP20).			
Cooling system		Self-cooling			
Approximate mass (kg)		0.6	0.7	0.9	1.4

*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 230V.
*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. If the automatic restart after instantaneous power failure function **(Pr. 57)** or power failure stop function **(Pr. 261)** is set and power supply voltage is low while load becomes bigger, the bus voltage decreases to power failure detection level and load of 100% or more may not be available.
*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 pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque.
When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used.
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 For single-phase 100V power input model, the maximum output voltage is twice the amount of the power supply voltage and cannot be exceeded.
*8 In a single-phase 100V power input model, the output voltage may fall down when the load is heavy, and larger output current may flow compared to a three-phase input model.
Use the motor with less load so that the output current is within the rated motor current range.

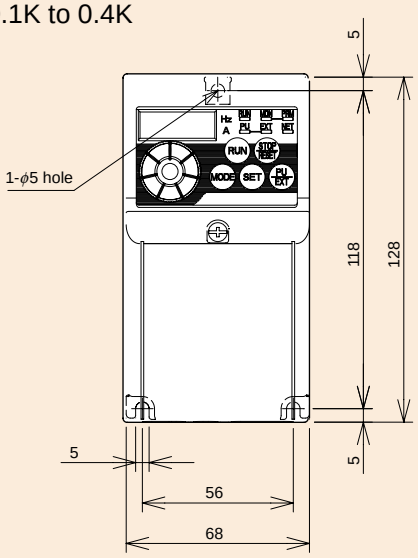
●Common Specifications

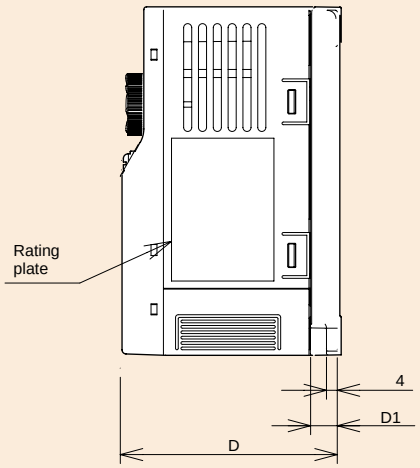
Control specifications	Control method		Soft-PWM control/high carrier frequency PWM control (V/F control, General-purpose magnetic flux vector control, and Optimum excitation control are available)
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminal2, 4: 0 to 10V/10bit) 0.12Hz/60Hz (terminal2, 4: 0 to 5V/9bit) 0.06Hz/60Hz (terminal4: 0 to 20mA/10bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±1% 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 can be selected
	Starting torque		150% or more (at 1Hz)...when General-purpose magnetic flux vector control and slip compensation is set
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.1 to 3600s (acceleration and deceleration can be set individually), Linear and S-pattern acceleration/deceleration modes are available.
	DC injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), and operation voltage (0 to 30%) can be changed
	Stall prevention operation level		Operation current level (0 to 200%), and whether to use the function or not can be selected
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V and 0 to 5V are available Terminal 4: 0 to 10V, 0 to 5V, and 4 to 20mA are available
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set.
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (five terminals)		The following signals can be assigned to **Pr. 178 to Pr.182 (input terminal function selection)**: multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock.
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485), Optimum excitation control, power failure stop, speed smoothing control, Modbus-RTU
	Output signal Open collector output (two terminals) Relay output (one terminal)	Operating status	The following signals can be assigned to **Pr.190, Pr.192 and Pr.197 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm*1, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID output interruption, safety monitor output, safety monitor output 2, during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.
		For meter Pulse train output (MAX 2.4kHz: one terminal)	The following signals can be assigned to **Pr.54 FM terminal function selection**: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor. Pulse train output (1440 pulses/s/full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, output current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, and PTC thermistor resistance.
		Fault record	Fault definition is displayed when a fault occurs. Past 8 fault records (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.
		Interactive guidance	Function (help) for operation guide*2
Protective/warning function		Protective 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, input phase loss*3*4, output side earth (ground) fault overcurrent at start*3, output phase loss, external thermal relay operation*3, PTC thermistor operation*3, parameter error, PU disconnection, retry count excess*3, CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, stall prevention operation, output current detection value exceeded*3, safety circuit fault
		Warning function	Fan alarm*1, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm*3, electronic thermal relay function prealarm, maintenance output*3, undervoltage, operation panel lock, password locked, inverter reset, safety stop
Environment	Surrounding air temperature		-10°C to +50°C maximum (non-freezing)*5
	Ambient humidity		90%RH or less (non-condensing)
	Storage temperature*6		-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, 5.9m/s² or less at 10 to 55Hz (directions of X, Y, Z axes)

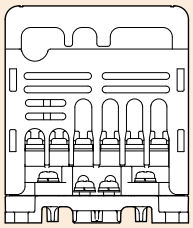
*1 As the 0.75K or less are not provided with the cooling fan, this alarm does not function.
*2 This operation guide is only available with option parameter unit (FR-PU07).
*3 This protective function does not function in the initial status.
*4 This protective function is available with the three-phase power input specification model only.
*5 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
*6 Temperatures applicable for a short time, e.g. in transit.

Outline Dimension Drawings

- FR-D720-0.1K to 0.75K
- FR-D720S-0.1K to 0.75K
- FR-D710W-0.1K to 0.4K



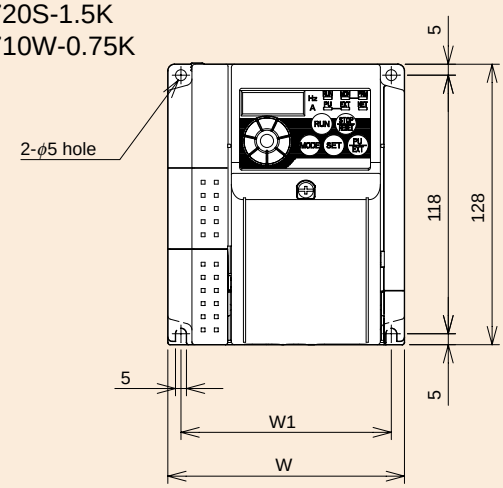


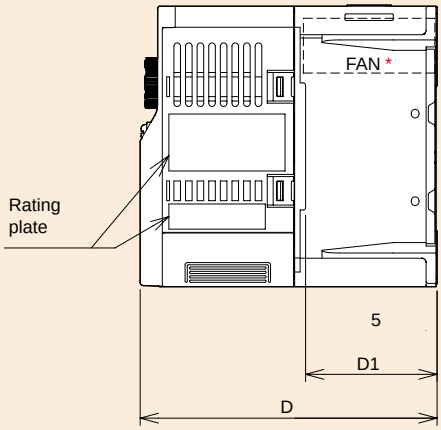


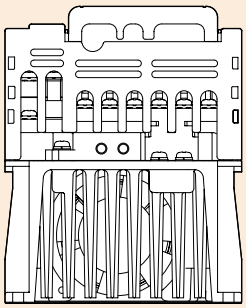
Inverter Model	D	D1
FR-D720-0.1K, 0.2K FR-D720S-0.1K, 0.2K FR-D710W-0.1K	80.5	10
FR-D710W-0.2K	110.5	10
FR-D720-0.4K	112.5	42
FR-D720-0.75K	132.5	62
FR-D720S-0.4K FR-D710W-0.4K	142.5	42
FR-D720S-0.75K	162.5	62

(Unit: mm)

- FR-D720-1.5K to 3.7K
- FR-D740-0.4K to 3.7K
- FR-D720S-1.5K
- FR-D710W-0.75K







* FR-D740-0.4K, 0.75K, FR-D710W-0.75K are not provided with the cooling fan.

Inverter Model	W	W1	D	D1
FR-D720-1.5K, 2.2K FR-D740-1.5K	108	96	135.5	60
FR-D740-0.4K, 0.75K			129.5	54
FR-D740-2.2K FR-D720S-1.5K			155.5	60
FR-D740-3.7K			165.5	
FR-D710W-0.75K			149.5	54
FR-D720-3.7K	170	158	142.5	66.5

(Unit: mm)

GRAPHIC OPERATION TERMINAL / SCADA

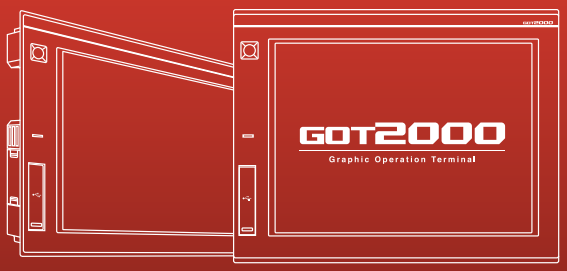
Graphic Operation Terminal

SCADA MC Works64

Graphic Operation Terminal

Craftsmanship mindset goes global

Full lineup to incorporate manufacturing needs.
Connections with FA equipment and advanced operability will reduce design man-hours and bring greater efficiency.



Graphic Operation Terminal

GOT2000 Series

GOT2000 with advanced high-functionality delivers the next-level basic performance.

Features P.570 Specifications P.582

GOT2000 Series Open frame model

The GOT2000 open frame model can be integrated into equipment.

Features P.572 Specifications P.584

GOT1000 Series

Full lineup to provide various site needs.

Specifications P.597

GOT SIMPLE

Simple, high functioning, and user friendly model for a reliable system.

Features P.608 Specifications P.615