MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow

INVERTER FAMILY

700 Series INVERTER Revolutionizing the

700 Series

Superior driving performance backed by the highest quality!

Main features of the 700 series

Environmentally friendly

- The newly developed EMC filter reduces electromagnetic noise generated by the inverter. (Embedded in the FR-A700 and F700P series inverters.)
- AC and DC reactors can be connected to suppress the harmonic current to the power supply and to improve the power factor.
- The inverters are compliant with the restriction of hazardous substances (RoHS) directive of EU and friendly to people and to the environment.

Drive performance

- The inverters provide powerful and consistent driving.

Long-life and easy maintenance

- Long-life cooling fan*1 and long-life capacitor*1*2 are incorporated (design life: 10 years)

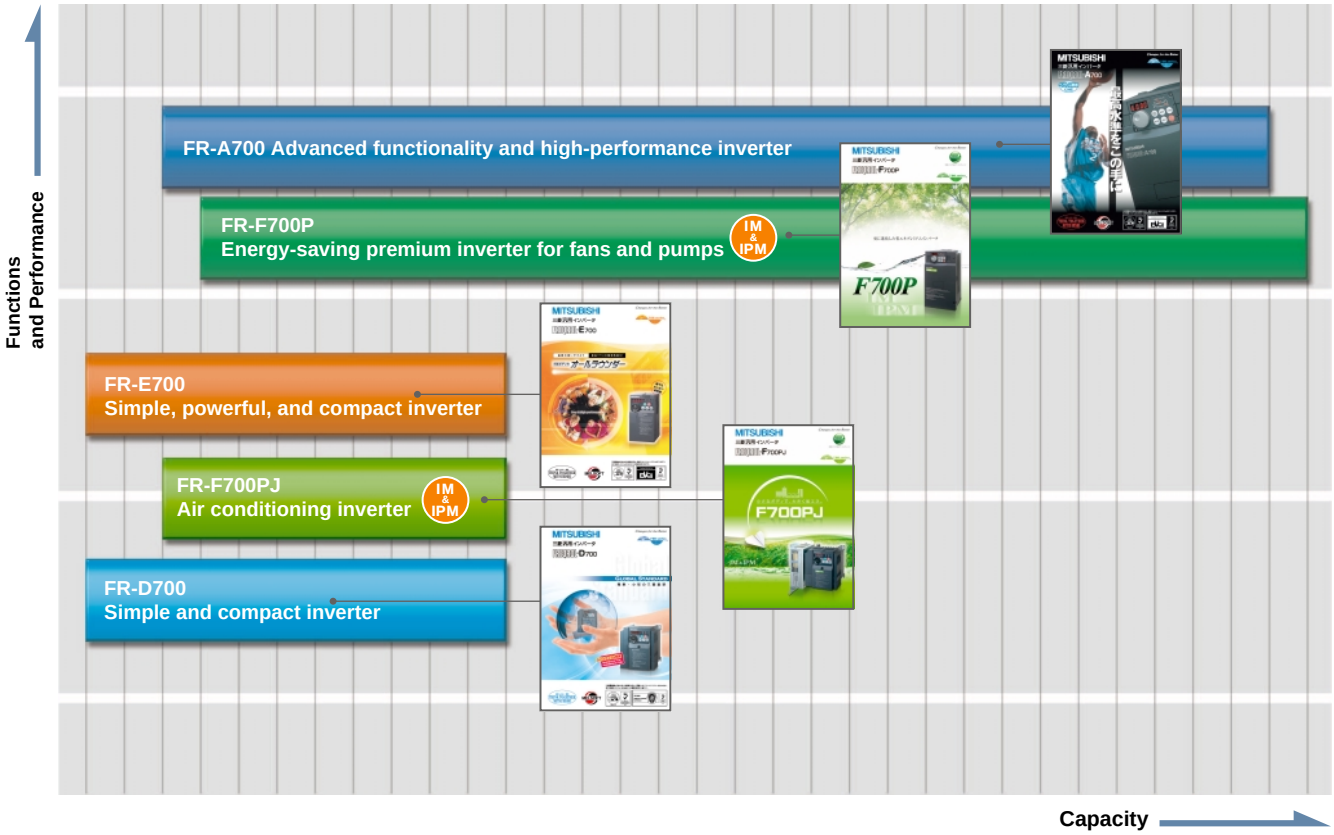
  *1: Surrounding air temperature: 40°C on yearly average (free from corrosive gas, flammable gas, oil mist, dust and dirt). The design life is a calculated value and is not a guaranteed product life.

  *2: Output current: 80% of the rated inverter current.
- Degradation degrees of the main circuit capacitor, control circuit capacitor, and inrush current limit resistor can be monitored. The inverter self diagnoses the degradation degree and outputs a warning, allowing trouble to be prevented.
- The removable control circuit terminal block simplifies renewal work. (FR-A700, F700P, E700 series)
- Cooling fan replacement is performed in simple steps. Maintenance of the inverter is easy.

Easy-to-use

- An operation panel is mounted as standard on all models.
- The Mitsubishi's setting dial is used.

world of inverters



Capacity table

Model	Capacity range (applicable motor capacity {kW})
	0.1 0.2 0.4 0.75 1.5 2.2 3.7 5.5 7.5 11 15 18.5 22 30 37 45 55 75 90 110 132 160 185 220 250 280 315 355 400 450 500 560
FR-A720-☐K	
FR-A740-☐K	
FR-F720P-☐K	
FR-F740P-☐K	
FR-E720-☐K*1*2*3	
FR-E740-☐K*1*2*3	
FR-E720S-☐K*1	
FR-E710W-☐K	
FR-F720PJ-☐K(F)*4	
FR-F740PJ-☐K(F)*4	
FR-D720-☐K	
FR-D740-☐K	
FR-D720S-☐K	
FR-D710W-☐K	

Voltage class
- Three-phase 200V
- Three-phase 400V
- Single-phase 200V (Note)
- Single-phase 100V (Note)

(Note) The output is three-phase 200V.

*1: SC at the end of the model name indicates the safety stop function model.
*2: NF at the end of the model name indicates the FL remote communication model.
*3: NC at the end of the model name indicates the CC-Link communication model.
*4: Filterpack (FR-BFP2) is enclosed for the inverter with Filterpack. ("F" is marked at the end of its model names on the packaging box.)

Mitsubishi's inverter family — meeting the needs of a full range of applications!

Vector inverter

FR-V500(L)	1.5kW to 75kW	(Three-phase 200V)
	1.5kW to 250kW	(Three-phase 400V)

Inverter with power regeneration function

FR-A701	5.5kW to 55kW	(Three-phase 200V/400V)

Speed controller

SC-A	40W to 0.4kW	(Three-phase 200V)
	40W to 100W	(Single-phase 200V/100V)

(Note) The output is three-phase 200V.

Inverter for pressure-resistant explosion-proof motor

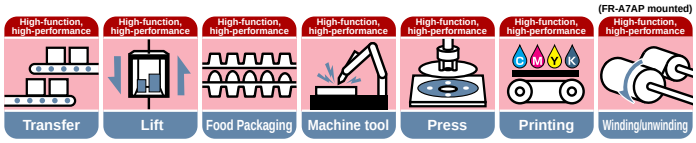
FR-B	750W to 75kW	(Three-phase 200V)
	750W to 110kW	(Three-phase 400V)
FR-B3	400W to 37kW	(Three-phase 200V/400V)

Inverter with built-in PLC function

FR-C500	0.1kW to 3.7kW	(Three-phase 200V)

Advanced functionality and high-performance inverter

FR-A700 Series



Features

■Pursuing the best performance

· High-accuracy, high-response speed control using vector control is possible with a general-purpose motor without encoder. (200% 0.3Hz (3.7K or lower), with Real sensorless vector control)

Torque control and torque limit under speed control is possible.

· Full-scale vector control is possible by using this inverter with a motor with encoder. (When using optional FR-A7AP or A7AL)

In addition to zero-speed control and servo lock, torque control and position control are available with this general-purpose inverter.

The speed command response is improved. (Speed response 300rad/s, speed control range 1:1500 (with model adaptive speed control))

The torque fluctuation caused by changes in the motor temperature is reduced. (With adaptive magnetic flux observer having ±5% repeated torque accuracy)

The speed control gain and position loop gain do not need to be adjusted. (When simple gain tuning is set.)

■Improved reliability and easy maintenance

· The lives of the cooling fan and capacitor have been extended.

· Using the self-diagnosis function, the part life warning can be output and the degree of deterioration can be monitored to prevent malfunction.

· The removable control terminal block and the cooling fan cassette make it easy to replace.

■Environmentally friendly

· The newly developed built-in EMC filter reduces electromagnetic noise generated from the inverter.

■Easy-to-use

· The machine analyzer function of the FR Configurator vibrates the motor to analyze the resonance frequency of the machine. The notch filter function is available to avoid machine resonances.

· Encoder expandability

The power voltage and input circuit can be selected according to the encoder. (Differential line driver/ complementary, separate power supply (5/12/15/24V) required.)

Model

F R - A 7 **2** 0 - **3.7K**

Symbol	Voltage class
2	200V class
4	400V class

Symbol	Applicable motor capacity
0.4K to 500K	Represents the capacity (kW)

Inverter model	Inverter capacity
FR-A720	0.4kW to 90kW
FR-A740	0.4kW to 500kW

Specifications

Control method		Soft-PWM control, high carrier frequency PWM control (V/F control, Advanced magnetic flux vector control or Real sensorless vector control can be selected) Vector control *1
Starting torque		200% 0.3Hz (0.4K to 3.7K) 150% 0.3Hz (5.5K or higher) with Real sensorless vector control or vector control*1
Output frequency range		0.2 to 400Hz (Up to 120Hz with Real sensorless vector control or vector control*1)
Regenerative braking torque	Maximum value/ permissible duty	200V class*2 : 0.4K to 1.5K……150%3%ED 2.2K/3.7K……100%3%ED 5.5K/7.5K…… 100%2%ED 11K to 55K……20% continuous 75K or higher…. 10% continuous 400V class*3 : 0.4K to 7.5K……100%2%ED 11K to 55K……20% continuous 75K or higher…. 10% continuous
Acceleration/deceleration time setting		0 to 3600s (up to three types of accelerations and decelerations can be set individually.)
Multi-speed		15 speeds
Speed command		0 to 5VDC, 0 to 10VDC, 0 to ±5VDC, 0 to ±10VDC, 4 to 20mA, digitally set with pulse train input, operation panel or parameter unit, 4-digit BCD or 16-bit binary (when using optional FR-A7AX)
Alarm output		1 changeover contact (230VAC, 0.3A, 30VDC, 0.3A), open collector output, alarm code (4-bit) output
Output signal		Five types of open collector outputs and two types of contact output (1 changeover contact) can be selected from inverter running, up to frequency, instantaneous power failure (undervoltage), frequency detection, operation ready, overload warning, error output and alarm, etc.
Monitor function		One type can be selected from output frequency, motor current (steady or peak value), output voltage, operation speed, motor torque, converter output voltage, regenerative brake duty, input power, output power and load meter, etc. Pulse train output (1440 pulses/s 2mA) and analog output (0 to 10VDC)
Restart after instantaneous power failure		Available (reduced voltage method (frequency search selectable))
Removable terminal block		Used for control circuit terminals
Communication function		RS-485 supported (Modbus-RTU) as standard, CC-Link, PROFIBUS-DP, DeviceNet™, LonWorks®, SSCNET III, and FL remote options available

*1: Available when an option (FR-A7AP/FR-A7AL) is mounted.
*2: The following performance can be attained when FR-ABR (option) is connected: 150% torque and 10%ED for 0.4K and 0.75K, 100% torque and 10%ED for 1.5K to 7.5K, 100% torque and 6%ED for 11K to 22K.
*3: The following performance can be attained when FR-ABR-H (option) is connected: 100% torque and 10%ED for 0.4K and 0.75K, 100% torque and 6%ED for 11K to 22K.

Inverter for fans and pumps

FR-F700P Series

IM & IPM

High-function, high-performance Fan | High-function, high-performance Pump | High-function, high-performance Air conditioning

Features

■Great CO_2 emission reduction with energy-saving drive

· Optimum excitation control continuously adjusts the excitation current to an optimum level to provide the highest motor efficiency leading to substantial energy savings.

· This series can drive both a general-purpose motor and an IPM motor. Switching between the two motor controls is simple—just a single parameter setting.
(Initially, a general purpose motor could be used, then upgraded to an IPM motor without switching this inverter, leading to lower cost of equipment.)

■Easy-to-use

· The following functions provide the ideal operation for fans and pumps: variable torque acceleration/deceleration patterns, PID control, commercial power supply switching, adjustable 5 points V/F, continuous operation at an instantaneous power failure, regeneration avoidance function, etc.

■Environmentally friendly

· The newly developed built-in EMC filter reduces electromagnetic noise generated from the inverter.

■Improved reliability and easy maintenance

· The lives of the cooling fan and capacitor have been extended.

· Using the self-diagnosis function, the part life warning can be output and the degree of deterioration can be monitored to prevent malfunction.

· The removable control terminal block and the cooling fan cassette make it easy to replace.

Model

F R - F 7 **2** 0 P - **3.7K**

Symbol	Voltage class
2	200V class
4	400V class

Symbol	Applicable motor capacity
0.75K to 560K	Represents the capacity (kW)

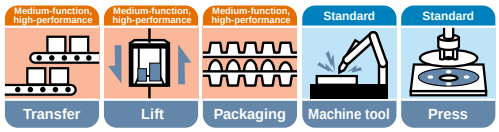
Inverter model	Inverter capacity
FR-F720P	0.75kW to 110kW
FR-F740P	0.75kW to 560kW

Specifications

Control method		Soft-PWM control, high carrier frequency PWM control (V/F control and Optimum excitation control, Simple magnetic flux vector control, and IPM motor control can be selected)
Starting torque	General-purpose motor control	120% 3Hz, with Simple magnetic flux vector control and slip compensation
	IPM motor control	50%
Output frequency range	General-purpose motor control	0.5 to 400Hz
	IPM motor control	MM-EF : 0 to 135Hz (30K or lower) / 0 to 180Hz (37K to 75K) / 0 to 160Hz (90K or higher) MM-EFS*1 : 0 to 112.5Hz (15K or lower) / 0 to 150Hz (18K or higher)
Regenerative braking torque (Maximum value/ permissible duty)	General-purpose motor control	0.75K to 55K····15% continuous, 75K or higher····10% continuous
	IPM motor control	Approximately 5% (1.5K or lower····Approximately 10%)*2
Acceleration/deceleration time setting		0 to 3600s (up to two types of accelerations and decelerations can be set individually.)
Multi-speed		15 speeds
Speed command		0 to 5VDC, 0 to 10VDC, 0 to ±5VDC, 0 to ±10VDC, 4 to 20mA, digitally set with operation panel or parameter unit, 4-digit BCD or 16-bit binary (when using optional FR-A7AX)
Alarm output		1 changeover contact (230VAC, 0.3A, 30VDC, 0.3A), open collector output, alarm code (4-bit) output
Output signal		Five types of open collector outputs and two types of contact outputs (1 changeover contact) can be selected from inverter running, up to frequency, instantaneous power failure (undervoltage), frequency detection, operation ready, overload warning, error output and alarm, etc.
Monitor function		One monitored item can be selected from output frequency, motor current (steady or peak value), output voltage, operation speed, converter output voltage, input power, output power and load meter, etc. Pulse train output (1440 pulses/s 2mA) and analog output (0 to 10VDC)
Restart after instantaneous power failure		Available (reduced voltage method (frequency search selectable))
Removable terminal block		Used for control circuit terminals
Communication function		RS-485 supported (Modbus-RTU) as standard, CC-Link, PROFIBUS-DP, DeviceNet™, LonWorks®, and FL remote options available

*1: FR-F740P-1.5K to 45K manufactured in January 2011 or later are compatible with the premium high-efficiency IPM motor MM-EFS series.
For more release schedules of compatible models, please refer to the inverter page on the "MELFANS Web," the Mitsubishi Electric FA network service on the world wide web (URL: http://www.MitsubishiElectric.co.jp/melfansweb).

*2: Regenerative braking torque is the average short-time torque when a motor decelerates to a stop from the rated speed in the shortest time. (It varies with the motor loss.) It is not a continuous regenerative torque. The average deceleration torque decreases when a motor decelerates from a speed higher than the rated speed.When the regenerative power is large, use a braking option.



Simple, powerful, and compact inverter

FR-E700 Series

Features

■Pursuing the best performance—top level of driving performance in a compact body

- Advanced magnetic flux vector control enables accurate start-ups for general-purpose industrial machines. (200% 0.5Hz (3.7K or lower))
- Improved short-time permissible overload (200% for 3s) provides powerful and consistent driving.
- Torque limit and current limit functions are available.

■Easy-to-use (Outstanding operability and diverse expandability)

- The non-slip, adaptable scroll speed setting dial allows for quick jumps or precise increments based on turning speed.
- The operation mode can be selected in simple steps.
- This series has USB which enables easy setting from a personal computer with FR Configurator.
- Plug-in options are available to add digital inputs/analog outputs and to support different communication networks.
- For the customers who need more than the standard terminals, the option terminal blocks, such as the 2-port RS-485 terminal block, are available.
- The inverters with 0.4K or higher capacity have plug-in regenerative brake transistors, which enable use for lift applications.
- An enclosure surface operation panel can be attached on an enclosure surface and is available as an option.The operation panel of the FR-E500 series can be also connected.

■Compact and space-saving

- The mounting dimensions are the same as the conventional FR-E500 model to keep backwards compatibility.
- Space can be saved with the side-by-side installation.

■Improved reliability and easy maintenance

- Spring clamp terminals provide high reliability and easy wiring. (FR-E700-SC/NF/NC)
- Shutoff circuit (hardware) securely provides emergency output shutoffs. The inverter with the safety stop function can comply with the safety standards without incurring too much cost. (FR-E700-SC/NF/NC)
- The lives of the cooling fan and capacitor have been extended.
- Using the self-diagnosis function, the part life warning can be output and the degree of deterioration can be monitored to prevent malfunction.
- The removable control circuit terminal block simplifies replacement work.

■Environmentally friendly

- Filter options reduce the electromagnetic noise generated at the inverter and enables compliance with the harmonic suppression guidelines of Japan.

Model

F R - E 7 [2] 0 [ ] - [3.7K] [ ]

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

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

Symbol	Applicable motor capacity
0.1K to 15K	Represents the capacity (kW)

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

Inverter model	Inverter capacity
FR-E720(SC)(NF)(NC)	0.1kW to 15kW
FR-E740(SC)(NF)(NC)	0.4kW to 15kW
FR-E720S(SC)*	0.1kW to 2.2kW
FR-E710W*	0.1kW to 0.75kW

* The output of the single-phase 200V and single-phase 100V input models is three-phase 200V.

Specifications

Control method	Soft-PWM control, high carrier frequency PWM control (V/F control, General-purpose magnetic flux vector control, Advanced magnetic flux vector control or Optimum excitation control can be selected)
Starting torque	200%0.5Hz (3.7K or lower) 150% 0.5Hz (5.5K or higher) with Advanced magnetic flux vector control
Output frequency range	0.2 to 400Hz
Regenerative braking torque*1	0.1K/0.2K·····150%, 0.4K/0.75K·····100%, 1.5K·····50%, 2.2K or higher·····20%
Acceleration/deceleration time setting	0 to 3600s (up to two types of accelerations and decelerations can be set individually.)
Multi-speed	15 speeds
Speed command*2	0 to 5VDC, 0 to 10VDC, 4 to 20mA, digital setting with setting dial, 0±10VDC (when using optional analog terminal block), digital setting with operation panel or parameter unit, pulse input (when using optional pulse train terminal block)
Safety stop*3	Output shutoff S1 and S2
Alarm output*4	1 changeover contact (230VAC 0.3A, 30VDC 0.3A), open collector output
Output signal*4	Two types of open collector outputs and one type of contact output (1 changeover contact) can be selected from inverter running, up to frequency, frequency detection, output current detection, operation ready, overload warning, fault output, and alarm, etc.
Monitor function	One monitored item can be selected from output frequency, motor current (steady or peak value), output voltage, frequency setting value, motor torque, converter output voltage, regenerative brake duty, and output power, etc. Pulse train output (1440 pulse/s 1mA)*5, analog output 0 to 10VDC (when using optional analog terminal block), pulse output (when using optional pulse train terminal block)
Restart after instantaneous power failure	Available (reduced voltage method (frequency search selectable))
Removable terminal block	Used for control circuit terminals
Communication function	RS-485 supported (Modbus-RTU) as standard. CC-Link, PROFIBUS-DP, DeviceNet™, LonWorks® options available. FL remote communication and CC-Link communication models also available.

*1: Braking torque is the average short-time torque when a motor decelerates to a stop from 60Hz in the shortest time. (It varies with the motor loss.) It is not a continuous regenerative torque. The average deceleration torque becomes lower when a motor decelerates from a frequency higher than the base frequency.The inverter is not equipped with a built-in brake resistor. Use an optional brake resistor for an operation with large regenerative power. (Not available for 0.1K and 0.2K.) Brake unit (FR-BU2) can be also used.
*2: For the FL remote communication model, commands can be input from the operation panel or through FL remote communication. For the CC-Link communication model, commands can be input from the operation panel or through CC-Link communication.
*3: Not available for the standard model.
*4: The FL remote communication model and the CC-Link communication model have only one open collector output terminal. (For the FL remote communication model, the terminal is fixed to output the safety monitor output signal (not selectable).)
*5: Not available for the FL remote communication model and the CC-Link communication model.

Air conditioning inverter

FR-F700PJ Series

IM & IPM

Standard Fan | Standard Pump | Standard Air conditioning

Features

■Suitable for both the general-purpose motor and the IPM motor

· This series can drive both a general-purpose motor and an IPM motor. Switching between the two motor controls is simple—just a single parameter setting. Initially, a general purpose motor could be used, then upgraded to an IPM motor without switching this inverter, leading to lower cost of equipment. (Compatible with the MM-EF series IPM motors.)

■Environmentally friendly

· Power factor improving DC reactor, common mode choke (line noise filter), capacitive filter (radio noise filter) are all essential for air conditioning applications, and all of these are included in the Filterpack. The inverter with Filterpack (FR-F7□0PJ-□F) is also available.
The wiring with different options is no longer required.

· Less wiring and smaller space is required when Filterpack is used. Filterpack also enables compliance with the harmonic suppression guideline, the architectural standard specifications (electrical installation), and the architectural standard specifications (machinery installation) (2010 revisions) in Japan.

The inverter with Filterpack

■Easy-to-use

· The following functions provide the ideal operation for fans and pumps (PID control, Optimum excitation control, regeneration avoidance, and automatic restart after instantaneous power failure).

■Improved reliability and easy maintenance

· Spring clamp terminals provide high reliability and easy wiring.

· The lives of the cooling fan and capacitor have been extended.

· Using the self-diagnosis function, the component life warning can be output and the degree of deterioration can be monitored to prevent malfunction.

Model

F R - F 7 **4** 0 P J - **3.7K** **□**

Symbol	Voltage class
2	200V class
4	400V class

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

Symbol	Filterpack
None	Without
F	With*

Inverter model	Inverter capacity
FR-F720PJ	0.4kW to 15kW
FR-F740PJ	0.4kW to 15kW

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

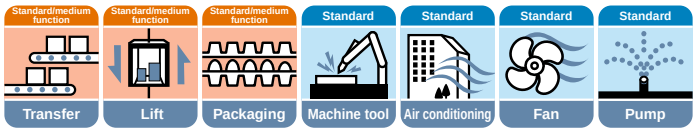
Specifications

Control method		Soft-PWM control, high carrier frequency PWM control (V/F control, General-purpose magnetic flux vector control, Optimum excitation control, and IPM motor control can be selected)
Starting torque	General-purpose motor control	120% (at 1Hz) with General-purpose magnetic flux vector control and slip compensation
	IPM motor control	50%
Output frequency range	General-purpose motor control	0.2 to 400Hz
	IPM motor control	MM-EF : 0 to 135Hz
Regenerative braking torque	General-purpose motor control	15%*1
	IPM motor control	5% (10% for 1.5kW or lower)*1
Acceleration/deceleration time setting		0.1 to 3600s (up to two types of accelerations and decelerations can be set individually.)
Multi-speed		15 speeds
Speed command		0 to 5VDC, 0 to 10VDC, 4 to 20mA, digital input with setting dial, digital setting with operation panel or parameter unit
Alarm output		1 changeover contact (230VAC 0.3A. 30VDC 0.3A), open collector output
Output signal		One type of open collector output and one type of contact output (1 changeover contact) can be selected from inverter running, up to frequency, frequency detection, output current detection, operation ready, overload warning, fault output, and alarm, etc.
Monitor function		One monitored item can be selected from output frequency, motor current (steady or peak value), output voltage, frequency setting value, converter output voltage, regenerative brake duty, and output power, etc. Pulse train output (1440 pulses/s 1mA)
Restart after instantaneous power failure		Available (reduced voltage method (frequency search selectable))
Communication function		RS-485 supported (Modbus-RTU) as standard

*1: Regenerative braking torque is the average short-time torque when a motor decelerates to a stop from the rated speed in the shortest time. (It varies with the motor loss.) It is not a continuous regenerative torque. The average deceleration torque becomes lower when a motor decelerates from a speed higher than the rated speed.When the regenerative power is large, use a braking option.

Simple and compact inverter

FR-D700 Series



Features

■Improved reliability and easy maintenance

- Spring clamp terminals provide high reliability and easy wiring.
- Shutoff circuit (hardware) securely provides emergency output shutoffs.
- The inverter with the safety stop function can comply with the safety standards without incurring too much cost.
- Parameter writing/reading can be restricted with a 4-digit password.
- The lives of the cooling fan and capacitor have been extended.
- Using the self-diagnosis function, the part life warning can be output and the degree of deterioration can be monitored to prevent malfunction.

■Pursuing the best performance

- The General-purpose magnetic flux vector control and the auto tuning function enable reliable operation in applications that require large starting torque. (150% 1Hz, 200% 3Hz (3.7K or lower with the slip compensation))

■Easy-to-use (pursuing the easy operation)

- The non-slip, adaptable scroll speed setting dial allows for quick jumps or precise increments based on turning speed.
- Setting can be made easily from a personal computer with FR Configurator.

- An enclosure surface operation panel, which can be attached on an enclosure surface, is available as an option. Operation panel for the FR-E500 series inverters can be also connected.
- The inverters with 0.4K or higher capacity have built-in regenerative brake transistors, and their usage can be extended to a lift application.

■Environmentally friendly

- Filter options reduce the electromagnetic noise generated at the inverter and enables the compliance with the harmonic suppression guidelines of Japan.

Model

F R - D 7 **4** 0 **□** - **0.4K**

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

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

Symbol	Applicable motor capacity
0.1K to 15K	Represents the capacity (kW)

Inverter model	Inverter capacity
FR-D720	0.1kW to 15kW
FR-D740	0.4kW to 15kW
FR-D720S*	0.1kW to 2.2kW
FR-D710W*	0.1kW to 0.75kW

*The output of the single-phase 200V and single-phase 100V input models is three-phase 200V.

Specifications

Control method	Soft-PWM control, high carrier frequency PWM control (V/F control, General-purpose magnetic flux vector control, Optimum excitation control can be selected)
Starting torque	150% 1Hz, 200% 3Hz (3.7K or lower) with General-purpose magnetic flux vector control and slip compensation
Output frequency range	0.2 to 400Hz
Regenerative braking torque*	0.1K/0.2K·····150%, 0.4K/0.75K·····100%, 1.5K·····50%, 2.2K or higher·····20%
Acceleration/deceleration time setting	0 to 3600s (up to two types of accelerations and decelerations can be set individually.)
Multi-speed	15 speeds
Speed command	0 to 5VDC, 0 to 10VDC, 4 to 20mA, digital input with setting dial, digital setting with operation panel or parameter unit
safety stop	Monitor output S0, output shutoff S1 and S2
Alarm output	1 changeover contact (230VAC 0.3A. 30VDC 0.3A), open collector output
Output signal	One type of open collector output and one type of contact output (1 changeover contact) can be selected from inverter running, up to frequency, frequency detection, output current detection, operation ready, overload warning, fault output, and alarm, etc.
Monitor function	One monitored item can be selected from output frequency, motor current (steady or peak value), output voltage, frequency setting value, converter output voltage, regenerative brake duty, and output power, etc. Pulse train output (1440 pulses/s 1mA)
Restart after instantaneous power failure	Available (reduced voltage method (frequency search method selectable))
Communication function	RS-485 (Modbus-RTU) supported as standard

*: Braking torque is the average short-time torque when a motor decelerates to a stop from 60Hz in the shortest time. (It varies with the motor loss.) It is not a continuous regenerative torque.
The average deceleration torque becomes lower when a motor decelerates from a frequency higher than the base frequency.
The inverter is not equipped with a built-in brake resistor. Use an option brake resistor for an operation with large regenerative power. Brake unit (FR-BU2) can be also used.

Vector inverter

FR-V500(L) Series

Features

■Pursuing the best performance

- The model adaptive speed control improves the speed command trackability.
  (Speed response 800rad/s (55K or lower), speed control range 1:1500)
- The adaptive magnetic flux observer reduces torque fluctuation caused by changes in the motor temperature. The motor's internal flux can be calculated at a high accuracy, thus improving the torque accuracy.
  (Repeated torque accuracy ±5%.)
- The simple gain tuning function eliminates the need to adjust the speed control gain and position loop gain.

■Easy-to-use

- The machine analyzer function of the setup software vibrates the motor to analyze the resonance frequency of the machine. The notch filter function is available to avoid machine resonances.
- The terminal dedicated to encoder signals is equipped as standard.
- Combination with a 1500r/min dedicated motor (SF-V5RU) is possible with the same capacities.

- Encoder expandability
  The power voltage and output circuit can be selected according to each encoder. (Differential line driver/ complementary, separate power supply (5.5/12/24V) required.)
  The dedicated motor (SF-V5RU) encoder is compatible with a 2048P/R resolution and 12V power voltage.

Model

F R - V 5 2 0 - 1.5K -

Symbol	Voltage class	Symbol	Voltage class
V520	200V class 55K or lower	V520L	200V class 75K or higher
V540	400V class 55K or lower	V540L	400V class 75K or higher

Symbol	Applicable motor capacity
1.5K to 250K	Represents the capacity (kW)

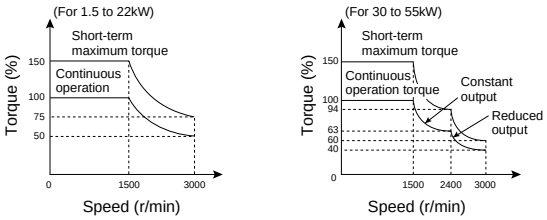
Symbol	Dedicated model
None	Standard model
80	Sensorless vector control model
A1	Dancer control model

Inverter model	Inverter capacity
FR-V520(L)	1.5kW to 75kW
FR-V540(L)	1.5kW to 250kW

Vector control motor Dedicated motor

SF-V5RU

- When used in combination with the vector inverter FR-V500 or the FR-A700 inverter, 100% torque continuous operation is possible from 1500r/min to the ultra-low speed of 0r/min.
- An encoder and cooling fan are built-in.
- In addition to the standard type with legs, the flange type and type with brakes can be manufactured.

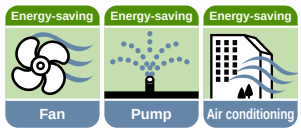


*The maximum speed for the 55kW is 2400r/min.

Premium high-efficiency IPM motor

MM-EFS Series

Compatible inverter: FR-F700P



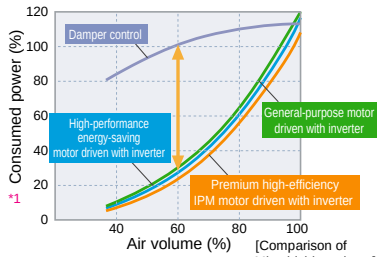
Features

■Energy savings 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. Using this characteristic, the consumed power is reduced when air volume is adjusted with speed control.

*1: Rate motor output is 100%.

[Example of blower operation characteristic]



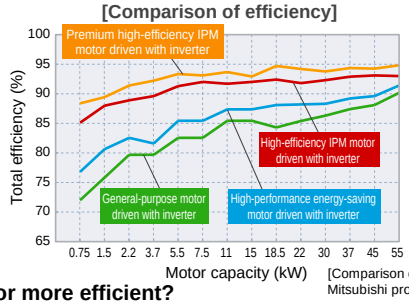
[Comparison of Mitsubishi products]

■Energy savings with IPM motor

●High efficiency achieved with IPM

· 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]



[Comparison of Mitsubishi products]

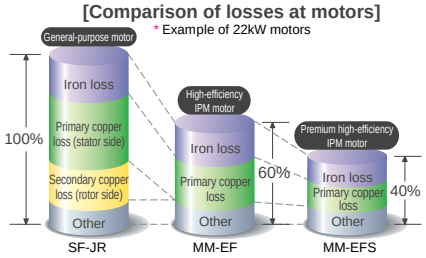
●Why is the IPM motor more efficient?

· No current flows to the rotor (secondary side), and no secondary copper loss is generated.

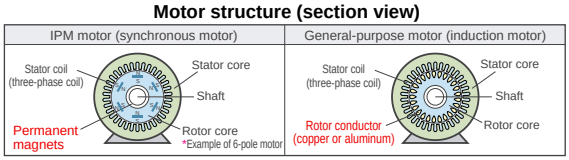
· Magnetic flux is generated with permanent magnets, and less motor current is required.

· Embedded magnets provide reluctance torque*2, and the reluctance torque can be applied.

[Comparison of losses at motors]



Motor structure (section view)



*2: **Reluctance torque**
Reluctance torque occurs due to magnetic imbalance on the rotor

■IE4-equivalent efficiency level

· High-efficiency IPM motor "MM-EF series" is equivalent to IE3 (premium efficiency).
Premium high-efficiency IPM motor "MM-EFS series" provides even better efficiency that is equivalent to IE4 (super premium efficiency), the highest efficiency class*.

*As of October 2010

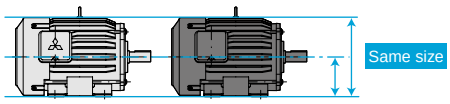
IEC 60034-30 Efficiency class	Efficiency of Mitsubishi motors	
	General-purpose motor	IPM motor
IE4 (super premium efficiency)*	—	Premium high-efficiency IPM (MM-EFS)
IE3 (premium efficiency)	—	High-efficiency IPM (MM-EF)
IE2 (high efficiency)	High-performance energy-saving motor (SF-HR)	—
IE1 (standard efficiency)	Standard three-phase motor (SF-JR)	—
Below the class		

High ↑ Efficiency ↓ Low

*: 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 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. (55kW or lower)



■Improved lifespan and reliability

· Bearing grease lasts longer than that of general-purpose motors.
Design life: Approx. 7 years (60000 hours)

· The motor is equipped with anti-creep bearings as standard.
Slip does not occur with synchronous motor, and precise operation is achievable.

· Magnetic pole positions are detected automatically.
The motor does not use a magnetic position sensor consisting of electric devices, and that ensures high reliability.

Model

M M - E F S 7 1 M 4 ☐ ☐

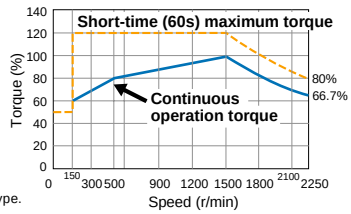
Symbol	Output
See motor models in table below	See rated output in table below

Symbol	Rated speed*1
1M	1500r/min

Symbol	Voltage class
None	200V
4	400V

Symbol	Forced-cooling fan
None	Without (fan-cooled type)
Y	With

Symbol	Installation compatibility with general-purpose motor
None	Compatible
Z	Not compatible



*1: It can be also used for an application with the rated speed 1800r/min.
Please contact your sales representative for a special specification such as long-axis type, flange shape, water-proof outdoor type, and salt-proof type.

Rated output (kW)		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
Motor model name		7	15	22	37	55	75	11K	15K	18K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K
200V class	MM-EFS☐1M	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	—	—	—	—
400V class	MM-EFS☐1M4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○

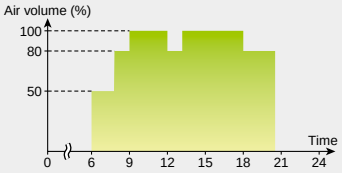
●: Available ○: To be released —: Not available

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

■Compatible inverter
FR-F740P-1.5K to 45K manufactured in January 2011 or later are compatible with the premium high-efficiency IPM motor MM-EFS series.
For more release schedules of compatible models, please refer to the inverter page on the "MELFANS Web," the Mitsubishi Electric FA network service on the world wide web (URL: http://www.MitsubishiElectric.co.jp/melfansweb).

■Air conditioning in a building [Inverter + general-purpose motor (SF-JR)] ➔ [Inverter + IPM motor (MM-EFS)]

(Conditions: The electricity cost is 14 yen/kWh. The CO_2 emission is 1,000kWh ≈ 0.555ton - CO_2 emission)

Conditions	Operation patterns
[Units to drive] •Fans for air conditioning 5.5kW x 10 units 7.5kW x 10 units 3.7kW x 100 units 	 5110 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 

The effects of replacing conventional systems with inverter driven IPM motors

●Annual energy saving effect
(differences in the amount and cost)

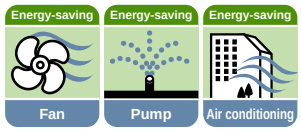
Approx. 0.28 million kWh

Approx. 3.99 million yen

●Annual CO_2 emission reduction

Approx. 0.28 million kWh

158 tons



High-efficiency IPM motor

MM-EF Series

Compatible inverter
FR-F700P
FR-F700PJ

Model

M M - E F 4 2 4 ☐

Symbol	Output	Symbol	Output
4	0.4kW	11K	11kW
7	0.75kW	15K	15kW
15	1.5kW	⋮	⋮
⋮	⋮	110K	110kW

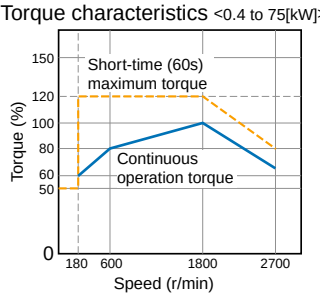
Symbol	Rated speed
2	1800r/min

Symbol	Voltage class
None	200V
4	400V

Symbol	Protective structure
None	IP44
P2	IP45

■Caution
· The IPM motor MM-EF series cannot be driven with a commercial power supply.
· The total wiring length for an IPM motor should be 100m or less.
· Only one IPM motor can be connected to each inverter.

●Torque characteristics <0.4 to 75[kW]>



Related Products

Magnetic motor drive

MELIPM Series

Features

· 150% starting torque can be generated with the low-speed series using Mitsubishi's original sensor-less control.
With the high-speed series, a 120% starting torque can be generated.
· This is a synchronous motor free of the "slip" generated with the induction motor. This motor rotates at the set speed.
· The 7200r/min and 10000r/min types are compatible with the high-speed series.
· This compact and lightweight motor drive is approx. 30% smaller and approx. 50% lighter than conventional models. (Compared with Mitsubishi three-phase IM 1.5kW) Use this motor to downsize machines and save space.
· The totally enclosed self-cooling type does not have an outer fan, so the wind noise is greatly reduced, and a sound level of 11dB is achieved even during low carrier operation. (Compared with Mitsubishi three-phase IM 1.5kW)

Model

Motor

M M - C F 5 2

Symbol	Series name
CF	CF Series
BF	BF Series

Symbol	Speed (r/min)
2	2000
7	7200
A	10000

Symbol	Rated output (kW)
4 to 70	0.4 to 7.0

* Other models, such as electromagnetic brake-attached type, axis-shape type, power-input type, are also available. Refer to the product catalog for the detail.

Drive unit

M D - A X 5 2 0 - 0.5K - ☐

Symbol	Series name
AX520	AX520 Series (low speed)
CX520	CX520 Series (low speed)
CX522	CX522 Series (high speed)

Symbol	Applicable motor rated output (kW)
0.4K to 7.0K	0.4 to 7.0

Symbol	High-speed series (CX522) rated speed (r/min)
None	7200
A0	10000

* Refer to the product catalog for the motor combinations and capacity ranges.

High-function, high-performance
Lift

Inverter with power regeneration function

FR-A701 Series

Features

■Easy-to-use

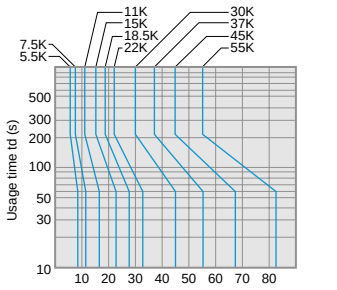
- The number of wires in the main circuit has been reduced to approx.40% and the installation area has been reduced to approx.60% (for 7.5K) compared to the conventional configuration with stand-alone common converters. Use this model to save the wiring and the space.
- For easy replacement, the installation size is the same as the conventional model (FR-A201).
- The braking circuit is built-in for this inverter, so the selection procedure for a braking option is no longer required.
- The FR-A701 is based on the A700 series demonstrating the highest level of driving performance, long-life parts, life diagnosis function, network capability, eco-friendliness*1, simple operation and easy maintenance.

*1: EMC filter is not equipped.

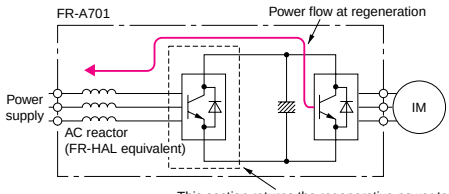
- The total cost is reduced compared to the conventional system (inverter + power regenerative converter + AC reactor). Less heat is generated in this inverter because the regenerative power is returned to the power supply, leading to energy savings.

■Pursuing the best performance

- It has excellent braking capacity. (The regenerative braking torque is 100% for continuous operation and 150% for 60s.)



Power regeneration



• In power regeneration, large braking capacity is obtained by returning the regenerative energy to the power supply.

Model

F R - A 7 2 1 - 5.5K

Symbol	Voltage class
A721	200V class
A741	400V class

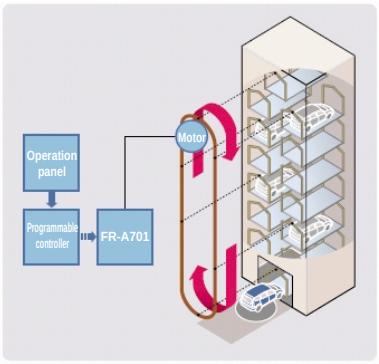
Symbol	Applicable motor capacity
5.5K to 55K	Represents the capacity (kW).

Applicable motor (kW)	5.5	7.5	11	15	18.5	22	30	37	45	55
Three-phase 200V class FR-A721-□□	●	●	●	●	●	●	●	●	●	●
Three-phase 400V class FR-A741-□□	●	●	●	●	●	●	●	●	●	●

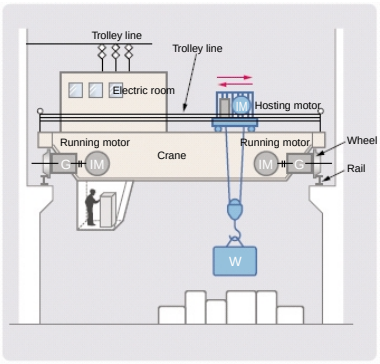
●: Available

Application

● Multi-story parking lot



● Ceiling crane



*As the inverter does not have an explosion proof structure, install it in a non-hazardous place.

Hazardous area

Chemical factory, etc.

Inverter for pressure-resistant explosion-proof type motor

FR-B, B3 Series

- This inverter for pressure-resistant explosion-proof type motor, in combination with the Mitsubishi pressure-resistant explosion-proof type motor, has passed the explosion-proof test by the Japanese Ministry of Health, Labour and Welfare.
- Always install the inverter away from the explosive environment.

Variable torque type		
Applicable motor output [kW]	200V class	400V class
0.2	FR-B-750	FR-B-750
0.4		
0.75		
1.5	FR-B-1500	FR-B-1500
2.2	FR-B-2200	FR-B-2200
3.7	FR-B-3700	FR-B-3700
5.5	FR-B-5.5K	FR-B-7.5K
7.5	FR-B-7.5K	
11	FR-B-11K	FR-B-15K
15	FR-B-15K	
22	FR-B-22K	FR-B-22K
30	FR-B-30K	FR-B-37K
37	FR-B-37K	
45	FR-B-45K	FR-B-55K
55	FR-B-55K	
75	FR-B-75K	FR-B-75K
90	—	FR-B-90K
110	—	FR-B-110K

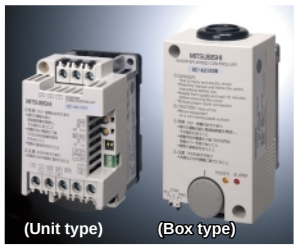
Constant torque type		
Applicable motor output [kW]	200V class	400V class
0.4	FR-B3-400	FR-B3-H400
0.75	FR-B3-750	FR-B3-H750
1.5	FR-B3-1500	FR-B3-H1500
2.2	FR-B3-2200	FR-B3-H2200
3.7	FR-B3-3700	FR-B3-H3700
5.5	FR-B3-5.5K	FR-B3-H5.5K
7.5	FR-B3-7.5K	FR-B3-H7.5K
11	FR-B3-11K	FR-B3-H11K
15	FR-B3-15K	FR-B3-H15K
18.5	FR-B3-18.5K	FR-B3-H18.5K
22	FR-B3-22K	FR-B3-H22K
30	FR-B3-30K	FR-B3-H30K
37	FR-B3-37K	FR-B3-H37K

Standard Transfer | Standard Air conditioning | Standard Fan | Standard Pump

Speed controller

SC-A Series

- This controller can be used with easy settings. (Parameters do not need to be set.)
- A box type, unit type, module type or panel installation type (low noise) can be selected to match applications.
- The single-phase 100V input series (40, 100W) is also available. (The output is three-phase 200V.)
- An electronic thermal is equipped as standard.



Model

S C - A □ □ □ □

Symbol	Noise, etc.
None	Standard
N	Low-noise

Symbol	Voltage class
1	100V class
2	200V class

Symbol	Capacity
040	Inverter capacity (W) *2
100	
200	
400	

Symbol	Specifications
B	Speed control box
U	Speed control unit
M	Speed control module
*1-07	Panel installation type speed controller

*1: Low-noise type
*2: Refer to the product catalog for the capacity range.

Standard Transfer

Inverter with built-in PLC function

FR-C500 Series

- This inverter series enables PLC control without a controller (without I/O options).
- The inverters with the built-in CC-Link function require less wiring.

Model

F R - C 5 2 0 - 0.1K

Symbol	Voltage class
2	200V class

Symbol	Applicable motor capacity
0.1K to 3.7K	Represents the capacity (kW).*

* Refer to the product catalog for the capacity range.

Option Series

Option lineup

A wide variety of options which improve function and performance, such as installation attachments, are available for the FR series lineup.

Control function expansion
- 1 Plug-in option: Orientation control Machine end orientation; Encoder feedback control; Vector control; Position control; Encoder pulse division output; Motor thermistor interface

Additional input/ output
- 1 Plug-in option: 16-bit/12-bit digital input; Pulse train input; Extra contact input; High-resolution analog input; Digital output; Relay output; Analog output Coded analog output; Additional open collector output; Trace card; Built-in encoder power supply; 24VDC input

Communication support
- 2 Plug-in option: RS-485; CC-Link; LONWORKS®; DeviceNet™; PROFIBUS-DP; Modbus Plus; Ethernet; SSCNET; SSCNET III; FL remote
- 3 Cable option: SSCNET cable; SSCNET III cable

Encoder cable

Improved operability
- 4 Operation option: Parameter unit; Parameter unit connection cable; Operation panel; Connectors
- 5 Software: FR Configurator; USB cable

Power factor improvement
- 6 Reactor: AC reactor; DC reactor; Filterpack; High power factor converter

Improved regeneration performance
- 7 Braking option: Brake resistor; Brake unit; Power regeneration converter; Power regeneration common converter

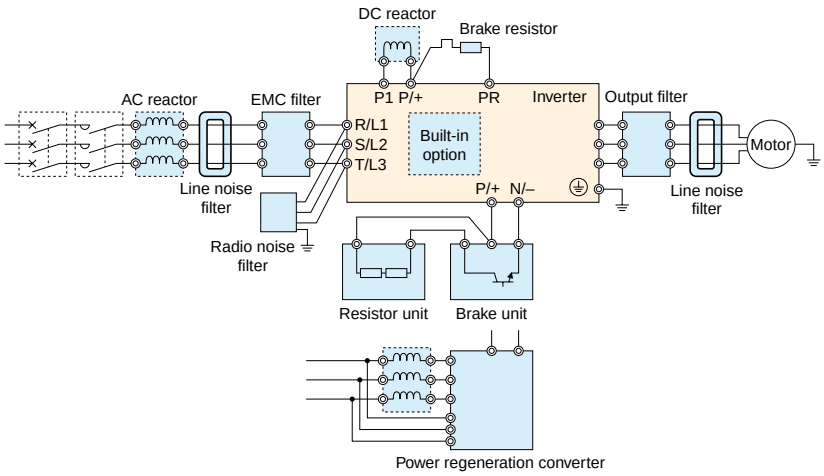
Noise reduction
- 8 Noise filter: Radio noise filter; Line noise filter; EMC Directive compliant noise filter; Filterpack
- 9 Output filter: Surge voltage suppression filter; Sine wave filter

Operation panel mounting attachment
- 10 Structure option: Heatsink protrusion attachment; Totally enclosed structure specification attachment; Attachment for conduit connection; Intercompatibility attachment; EMC filter mounting attachment; DIN rail mounting attachment

System support
- 11 FR series controller and setter: Manual controller with frequency meter; DC tach. follower; Three speed selector; Remote speed setter; Ratio setter; Speed detector; Master controller; Soft starter; Deviation detector; Preamplifier
- 12 Parts and others: Pilot generator; Deviation sensor; Frequency setting potentiometer Meter Potentiometer; Frequency meter; Calibration resistor

Option connections

The main option connections are shown below.



List of options

●: Available ×: Not available

	Name	Model	Applicable inverter					
			FR-A700	FR-F700P	FR-E700	FR-F700PJ	FR-D700	FR-V500(L)
Plug-in option (control function expansion, additional input/output)								
1	Orientation control Encoder feedback control Vector control	FR-A7AP	●	×	×	×	×	Vector control/orientation control are available as standard
	Orientation control Pulse train input	FR-A5AP	Single-phase pulse train input is standard	×	×	×	×	●
	Machine end orientation	FR-V5AM	×	×	×	×	×	●
	Position control	FR-V5AP	×	×	×	×	×	●
	12V control circuit terminal block with encoder power supply	FR-A7PS	●	×	×	×	×	×
	Orientation control/encoder feedback control vector control/position control/encoder pulse dividing output	FR-A7AL	●	×	×	×	×	×
	16-bit digital input	FR-A7AX	●	●	E-kit compatible	×	×	×
		FR-V5AH	×	×	×	×	×	●
	12-bit digital input	FR-A5AX	×	×	×	×	×	●
	Analog output (2 terminals) Digital output (7 terminals)	FR-A7AY	●	●	E-kit compatible	×	×	×
		FR-A5AY	×	×	×	×	×	●
	Relay output (3 terminals)	FR-A7AR	●	●	E-kit compatible	×	×	×
		FR-A5AR	×	×	×	×	×	●
	Relay output (1 terminal) (RS-485 communication)	FR-A5NR	×	×	×	×	×	●
	Coded analog output High-resolution analog input Motor thermistor interface	FR-A7AZ	●	×	×	×	×	×
	24VDC input	FR-E7DS	×	×	Compatible only with E700-SC	×	×	×
	Extra contact input (6 terminals) High-resolution analog input Motor thermistor interface	FR-V5AX	×	×	×	×	×	●
	Additional open collector output Encoder pulse division output	FR-V5AY	×	×	×	×	×	●
	Trace card	T-TRC50	×	×	×	×	×	●
Plug-in option (communication support)								
2	RS-485	PU connector (main body)	Standard	Standard	Standard *1	Standard	Standard	Standard
		Dedicated terminal block (main body)	Standard	Standard	×	×	×	×
		FR-A5NR	×	×	×	×	×	●
		FR-E7TR	×	×	Only the standard models are compatible	×	×	×
	USB	USB connector	Standard	×	Standard	×	×	×
	CC-Link	FR-A7NC	●	●	E-kit compatible	×	×	×
		FR-A5NC	×	×	×	×	×	●
		Dedicated model	×	×	E700-NC	×	×	×
	LonWorks®	FR-A7NL	●	●	E-kit compatible	×	×	×
	DeviceNet™	FR-A7ND	●	●	E-kit compatible	×	×	×
		FR-A5ND	×	×	×	×	×	●
	PROFIBUS-DP	FR-A7NP	●	●	E-kit compatible	×	×	×
		FR-A5NPA	×	×	×	×	×	●
	Modbus Plus	FR-A5NM	×	×	×	×	×	Compatible only with V500L
	Ethernet	FR-V5NE	×	×	×	×	×	Compatible only with V500
	FL remote	FR-A7NF	●	●	×	×	×	×
		Dedicated model	×	×	E700-NF	×	×	×
	SSCNET	FR-V5NS	×	×	×	×	×	●
	SSCNET III	FR-A7NS	●	×	×	×	×	×
Dedicated cable option								
3	Encoder cable	FR-V7CBL□□	●	×	×	×	×	×
		FR-V5CBL□□	×	×	×	×	×	●
		FR-JCBL□□	●	×	×	×	×	●
	USB cable	MR-J3USBCBL3M	×	×	●	×	×	×
	SSCNET cable	FR-V5NSCBL□□	×	×	×	×	×	●
	SSCNET III cable	MR-J3BUS□M-□	●	×	×	×	×	×
Operation option								
4	Parameter unit	FR-PU07	●	●	●	●	●	×
		FR-PU07BB	●	●	●	×	×	×
		FR-PU04	●	●	●	●	●	×
		FR-PU04V	×	×	×	×	×	●
	Operation panel	FR-PA07	×	×	●	●	●	×
	Parameter unit connection cable	FR-CB20□	●	●	●	●	●	●
	Operation panel connection connector	FR-ADP	●	●	×	×	×	×
Software								
5	FR Configurator	FR-SW3-SETUP-W□	●	●	Only the standard models are compatible	×	●	×
		FR-SW2-SETUP-W□	●	●	×	×	×	×
		FR-SW1-SETUP-W□	×	×	×	×	×	●
Reactor								
6	AC reactor	FR-HAL	●	●	●	●	●	●
	DC reactor	FR-HEL	● *2	● *2	●	●	●	● *2
Braking option								
7	Brake resistor	MRS,MYS	×	×	● *3	● *3	● *3	×
	High-duty brake resistor	FR-ABR	● *3	×	● *3	● *3	● *3	● *3
	Brake unit	FR-BU2	● *4	● *4	● *4	● *4	● *4	● *4
	Resistor unit	GRZG	●	●	●	●	●	●
		FR-BR	●	●	●	●	●	●
		MT-BR5	●	●	×	×	×	●
	Power regeneration common converter	FR-CV	●	●	●	●	●	●
	Dedicated standalone reactor	FR-CVL	●	●	●	●	●	●
	Power regeneration converter	FR-RC	●	●	●	●	●	●
		MT-RC	●	●	×	×	×	●
	High power factor converter	FR-HC2	●	●	●	●	●	●
		FR-HC	●	●	●	●	●	●
		MT-HC	●	●	×	×	×	●
Noise filter								
8	Radio noise filter	FR-BIF	Equivalent part built-in	Equivalent part built-in	●	●	●	●
	Line noise filter	FR-BSF01	● *5	● *5	●	●	●	●
		FR-BLF	● *5	● *5	●	●	●	●
	EMC Directive compliant noise filter	Built-in filter	Standard (2nd Environment)		×	×	×	×
		SF□□	×	×	●	×	●	●
		FR-E5NF	×	×	●	●	●	×
		FR-S5NFSA	×	×	●	×	●	×
	Filterpack (DC reactor and noise filter)	FR-BFP2	×	×	●	● *6	●	×

	Name		Model	Applicable inverter					
				FR-A700	FR-F700P	FR-E700	FR-F700PJ	FR-D700	FR-V500(L)
Output filter									
9	Surge voltage suppression filter		FR-ASF	● *7	● *8	●	● *8	●	×
			FR-BMF	● *7	● *8	●	● *8	●	×
	Sine wave filter	Reactor	MT-BSL(-HC)	● *7	● *8	×	×	×	×
		Capacitor	MT-BSC	● *7	● *8	×	×	×	×
Structure option									
10	Heatsink protrusion attachment		FR-A7CN	●	●	×	×	×	×
			FR-E7CN	×	×	●	●	●	×
			FR-A5CN	×	×	×	×	×	●
			MT-A5CN	×	×	×	×	×	●
	Totally enclosed structure specification attachment		FR-A5CV	×	×	×	×	×	●
	Attachment for conduit connection		FR-A5FN	×	×	×	×	×	●
	Intercompatibility attachment		FR-AAT	●	●	●	●	●	×
			FR-A5AT	●	●	●	●	●	●
			FR-E7AT	×	×	●	×	×	×
	EMC filter mounting attachment		FR-E5T	×	×	●	●	●	×
	DIN rail mounting attachment		FR-UDA	×	×	● *9	● *9	● *9	×
FR Series controller and setter									
11	Manual controller with frequency meter		FR-AX	●	●	●	●	●	●
	DC tach. follower		FR-AL	●	●	●	●	●	●
	Three speed selector		FR-AT	●	●	●	●	●	●
	Remote speed setter		FR-FK	●	●	●	●	●	●
	Ratio setter		FR-FH	●	●	●	●	●	●
	Speed detector		FR-FP	●	●	●	●	●	●
	Master controller		FR-FG	●	●	●	●	●	●
	Soft starter		FR-FC	●	●	●	●	●	●
	Deviation detector		FR-FD	●	●	●	●	●	●
	Preamplifier		FR-FA	●	●	●	●	●	●
Parts and others									
12	Pilot generator		QVAH-10	●	●	●	●	●	●
	Deviation sensor		YVGC-500W-NS	●	●	●	●	●	●
	Frequency setting potentiometer, Meter, Potentiometer		WA2W 1kΩ	●	●	●	●	●	●
	Frequency meter		YM206NRI 1mA	●	●	●	●	●	×
	Calibration resistor		RV24YN 10kΩ	●	●	●	●	●	×

*1: PU connector is disabled for the FL remote communication model and the CC-Link communication model.
*2: The DC reactor is equipped as standard with the 75K or higher capacities.
*3: Only compatible with models which have a built-in brake transistor.
*4: The 200V class 0.2K or lower, 400V class 1.5K or lower cannot be used with the brake unit.
*5: An equivalent part (common mode choke) is built into the input side of 55K or lower capacities.
*6: Filterpack (FR-BFP2) is enclosed for the inverter with Filterpack ("F" is marked at the end of its model name on the packaging box).
*7: Cannot be used with vector control or Real sensorless vector control.
*8: Not available under IPM motor control.
*9: Compatible with 3.7kW or lower capacities.

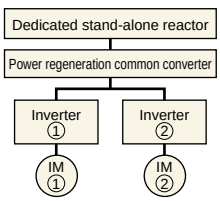
Power regeneration common converter

FR-CV

· Continuous regenerative operation at 100 % torque is possible with this converter. It is useful for lift operation and line control. (Regeneration at a max. 150% torque for 60s is possible.)
· This converter is a common converter. Each inverter does not need a brake unit when this converter is used. Use this converter to cut down the total space and the cost.

Voltage	Applicable inverter capacity	Main body	Dedicated stand-alone reactor	Voltage	Applicable inverter capacity	Main body	Dedicated stand-alone reactor
200V	7.5K	FR-CV-7.5K(-AT)	FR-CVL-7.5K	400V	7.5K	FR-CV-H7.5K(-AT)	FR-CVL-H7.5K
	11K	FR-CV-11K(-AT)	FR-CVL-11K		11K	FR-CV-H11K(-AT)	FR-CVL-H11K
	15K	FR-CV-15K(-AT)	FR-CVL-15K		15K	FR-CV-H15K(-AT)	FR-CVL-H15K
	22K	FR-CV-22K(-AT)	FR-CVL-22K		22K	FR-CV-H22K(-AT)	FR-CVL-H22K
	30K	FR-CV-30K(-AT)	FR-CVL-30K		30K	FR-CV-H30K(-AT)	FR-CVL-H30K
	37K	FR-CV-37K	FR-CVL-37K		37K	FR-CV-H37K	FR-CVL-H37K
	55K	FR-CV-55K	FR-CVL-55K		55K	FR-CV-H55K	FR-CVL-H55K

* Dedicated stand-alone reactor is an option.



High power factor converter

FR-HC2

· Harmonic current is greatly suppressed, and the equivalent capacity conversion coefficient K5=0 in the "Japanese specific consumer higher harmonics suppression guidelines" is achieved.
· Input current waveforms are improved to be sine waves.
· Power regeneration function is provided as standard.

Voltage class	High power factor converter	Standard accessories
200V class	FR-HC2-7.5K FR-HC2-15K FR-HC2-30K FR-HC2-55K FR-HC2-75K	Reactor 1, reactor 2, external box* (Use in combination with the above accessories. The wires for connecting the standard accessories are not included.)
400V class	FR-HC2-H75K FR-HC2-H110K FR-HC2-H280K FR-HC2-H560K	

* Peripheral devices are separately provided for FR-HC2-H280K or higher (not provided in a box).

Brake unit

FR-BU2

· The regenerative power from the motor is consumed as heat to improve the braking capacity of the motor.
· Connect this unit to the DC bus voltage directly to use with the conventional inverter.
· This unit can replace conventional models, BU, FR-BU, and MT-BU5.
· The units can be connected in parallel to handle large capacity.

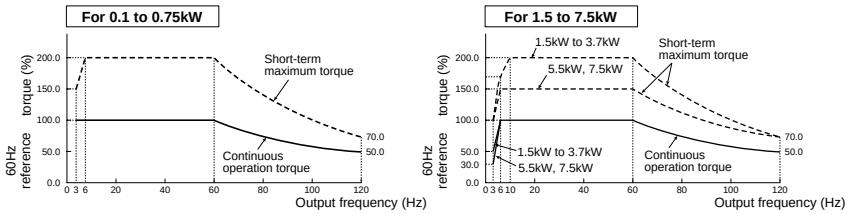
Voltage class	Brake unit model	Voltage class	Brake unit model
200V class*	FR-BU2-1.5K	400V class*	FR-BU2-H7.5K
	FR-BU2-3.7K		FR-BU2-H15K
	FR-BU2-7.5K		FR-BU2-H30K
	FR-BU2-15K		FR-BU2-H55K
	FR-BU2-30K		FR-BU2-H75K
	FR-BU2-55K		FR-BU2-H220K
			FR-BU2-H280K

* Resistors and resistor units are required. Refer to the Instruction Manual for the combination patterns.

Geared motor

GM-S,GM-D,GM-SSY,GM-SHY Series

- A wide constant torque range is available even with the standard product. (When used with Mitsubishi inverter with magnetic flux vector control) (0.1K to 0.75K)
  The load torque does not need to be reduced at low speeds, and continuous operation with a constant torque (100% torque) is possible in the speed ratio 1/20 (3 to 60Hz).
  These geared motors can be used for a variety of variable speeds from 3 to 120Hz. The constant output characteristics apply at 60Hz or higher.
- Note that the following operation characteristics are not attainable when driving under V/F control.



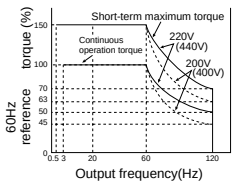
* Refer to the product catalog for detailed specifications.

Constant torque motor Dedicated motor

SF-HRCA

- When used in combination with Mitsubishi inverter under Advanced magnetic flux vector control, the load torque does not need to be reduced at low speeds, and constant torque operation is possible in the control speed ratio of 1:20 (3 to 60Hz).

Example) Combination with FR-A720-2.2K



High-performance energy-saving motor

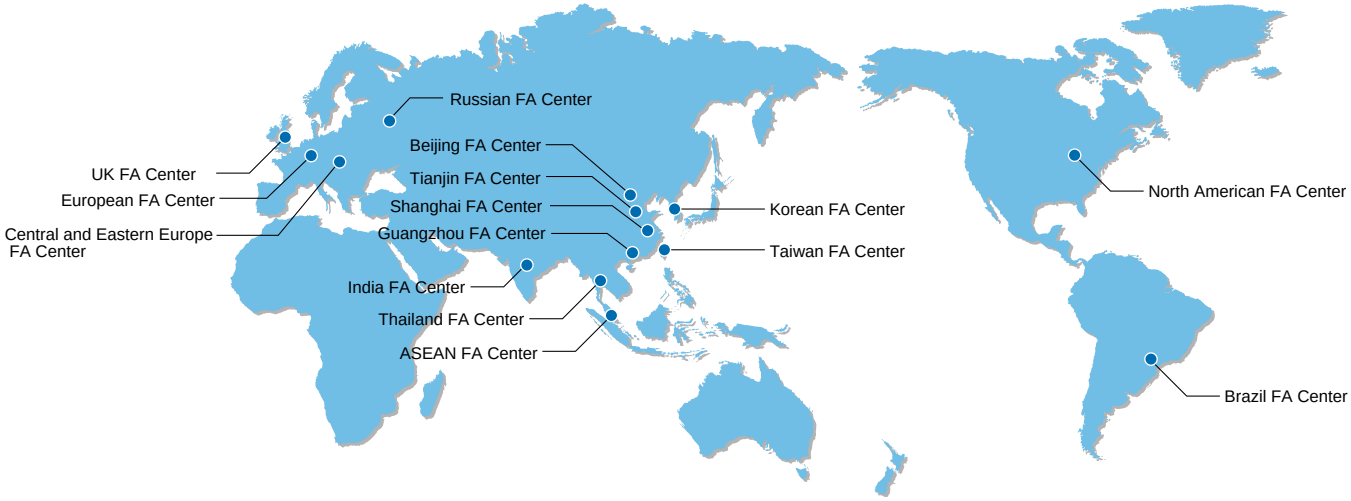
SF-HR

- Constant torque operation in the speed ratio of 1:10 (6 to 60Hz) is possible when used in combination with Advanced magnetic flux vector control.

List of Alternate Models for Older Series

Old series model	End of production	End of repair part supply	Alternate model
FR-E	September 1993	August 2000	FR-A700
FR-F2	December 1986	November 1993	FR-A700
FR-K	December 1986	November 1993	FR-A700
FR-K3	July 1989	June 1996	FR-A700
FR-F300	July 1989	June 1996	FR-A700
FR-K400	July 1989	June 1996	FR-A700
FR-Z100	December 1994	December 2001	FR-A700
FR-Z200	June 1996	June 2003	FR-A700
FR-F400	June 1995	June 2002	FR-A700
FR-Z020	March 1994	March 2001	FR-D700 FR-E700
FR-Z123	March 1995	March 2002	FR-D700 FR-E700
FR-Z300	June 1994	June 2001	FR-A700
FR-Z024	October 1995	October 2002	FR-D700 FR-E700
FR-A200	October 1995	October 2002	FR-A700
FR-A100	April 1996	April 2003	FR-F700P
FR-U100	September 2001	September 2008	FR-D700
FR-A200E	April 2000	April 2007	FR-A700
FR-A100E	September 2000	September 2007	FR-F700P
FR-V200	April 1996	April 2003	FR-V500 FR-A700 + FR-A7AP/A7AL
FR-V200E	October 2004	October 2011	FR-V500 FR-A700 + FR-A7AP/A7AL
FR-A500(L)	April 2007	April 2014	FR-A700
FR-F500(L)	May 2006	May 2013	FR-F700P
FR-A024	December 2008	December 2015	FR-E700 FR-D700
FR-A201	September 2009	September 2016	FR-A701
FR-S500	May 2006	May 2013	FR-D700
FR-A201E	September 2009	September 2016	FR-A701
FR-S500E	August 2010	August 2017	FR-D700
FR-E500	April 2011	April 2018	FR-E700

International FA Center



North American FA Center

MITSUBISHI ELECTRIC AUTOMATION, INC.
500 Corporate Woods Parkway, Vernon Hills, IL60061 U.S.A
TEL. +1-847-478-2100 FAX. +1-847-478-0327

Korean FA Center

MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD.
B1F,2F, 1480-6, Gayang-Dong, Gangseo-Gu, Seoul, 157-200, Korea
TEL. +82-2-3660-9607 FAX. +82-2-3664-0475

Taiwan FA Center

SETSUYO ENTERPRISE CO., LTD.
6F No.105, Wu Kung 3rd RD, Wu-Ku Hsiang Taipei Hsien, 248, Taiwan
TEL. +886-2-2299-2499 FAX. +886-2-2299-2509

Beijing FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
BEIJING OFFICE
9F Office Tower 1, Henderson Center, 18 Jianguomennei Avenue, Dongcheng District, Beijing, China 100005
TEL. +86-10-6518-8830 FAX. +86-10-6518-8030

Russian FA Center

MITSUBISHI ELECTRIC EUROPE B.V.
-Representative Office in St. Petersburg
Sverdlovskaya Emb.,44, Bld Sch, BC "Benua";195027, St.Petersburg, Russia
TEL. +7-812-633-3496 FAX. +7-812-633-3499

Tianjin FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
TIANJIN OFFICE
B-2 801/802, Youyi Building, No.50 Youyi Road, Hexi District, Tianjin, China 300061
TEL +86-22-2813-1015 FAX. +86-22-2813-1017

Shanghai FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
4/F Zhi Fu Plazz, No.80 Xin Chang Road, Shanghai, China 200003
TEL. +86-21-6121-2460 FAX. +86-21-6121-2424

Guangzhou FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
GUANGZHOU OFFICE
Rm.1609, North Tower, The Hub Center, No.1068, Xing Gang East Road, Haizhu District, Guangzhou, China 510335
TEL. +86-20-8923-6713 FAX. +86-20-8923-6715

India FA Center

Mitsubishi Electric Asia Pvt. Ltd. Gurgaon Branch
2nd Floor, DLF Building No.9B, DLF Cyber City Phase III, Gurgaon 122002, Haryana, India
TEL. +91-124-4630300 FAX. +91-124-4630399

Thailand FA Center

MITSUBISHI ELECTRIC AUTOMATION (THAILAND) CO., LTD.
Bang-Chan Industrial Estate No.111, Soi Serithai 54,
T.Kannayao, A.Kannayao, Bangkok 10230
TEL. +66-2-906-3238 FAX. +66-2-906-3239

ASEAN FA Center

MITSUBISHI ELECTRIC ASIA PTE, LTD.
307 Alexandra Road #05-01/02, Mitsubishi Electric Building, Singapore 159943
TEL. +65-6470-2480 FAX. +65-6476-7439

European FA Center

MITSUBISHI ELECTRIC EUROPE B. V. GERMAN BRANCH
Gothaer Strasse 8, D-40880 Ratingen, Germany
TEL. +49-2102-486-0 FAX. +49-2102-486-1120

UK FA Center

MITSUBISHI ELECTRIC EUROPE B. V. UK BRANCH
Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, UK.
TEL. +44-1707-276100 FAX. +44-1707-278695

Central and Eastern Europe FA Center

MITSUBISHI ELECTRIC EUROPE B.V. CZECH BRANCH
Avenir Business Park, Radlicka 714/113a,158 00 Praha 5, Czech Republic
TEL. +420-251-551-470 FAX. +420-251-551-471

Brazil FA Center

MELCO-TEC Representacao Comercial e Assessoria Tecnica Ltda.
Av. Paulista 1439, conj.74, Bela Vista CEP: 01311-200
Sao Paulo-SP-Brazil
TEL. +55-11-3146-2202 FAX. +55-11-3146-2217

⚠ Safety Warning

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

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

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
www.MitsubishiElectric.co.jp/melfansweb

L(NA)06036-C(1105)MDOC