

**FR-S 500
FR-E 500
FR-A 500
FR-F 700**



**An Intelligent Solution
for Every Drive Task**





Mitsubishi Electric has operations all over the world, with 106 subsidiaries, 63 manufacturing facilities and over 100,000 employees. The company produces a very wide range of electrical products and components, including semiconductors, consumer electronics, PCs, mobile phones, air conditioners, elevators, colour stadium displays and even satellite technology.

Mitsubishi Electric is a world force in industrial automation

All over the world, state-of-the-art automation systems from Mitsubishi Electric are a driving force behind technological progress and economic success. Our great experience and competence have made us one of the world's biggest suppliers of automation technology. Every day, the over 7 million Mitsubishi frequency inverters now in operation prove their outstanding quality in heavy-duty industrial applications. The latest generation of our frequency inverters is once again the epitome of functionality and quality, meeting all international quality standards and conforming to the CE, UL, cUL and GOST requirements.

The FR-S 500E EC series

The small solution:
The FR-S 500 with V/f voltage-frequency control is a pace-setter in the miniature drive system class. It features ultra-compact dimensions, simple and secure operation and a wide range of technology functions. The integrated jog shuttle control gives the user fast, direct access to all important drive parameters.

Output range:
0.2 - 3.7kW,
200 - 240V/380 - 480V



The FR-E 500 EC series

The compact solution:
The FR-E 500 with SLV control sets new standards for vector-controlled drive systems. The inverters of the FR-E 500 series are packed with advanced features, including the Soft PWM system for reducing motor noise, powerful torque control and fast-response current control for motor acceleration and deceleration.

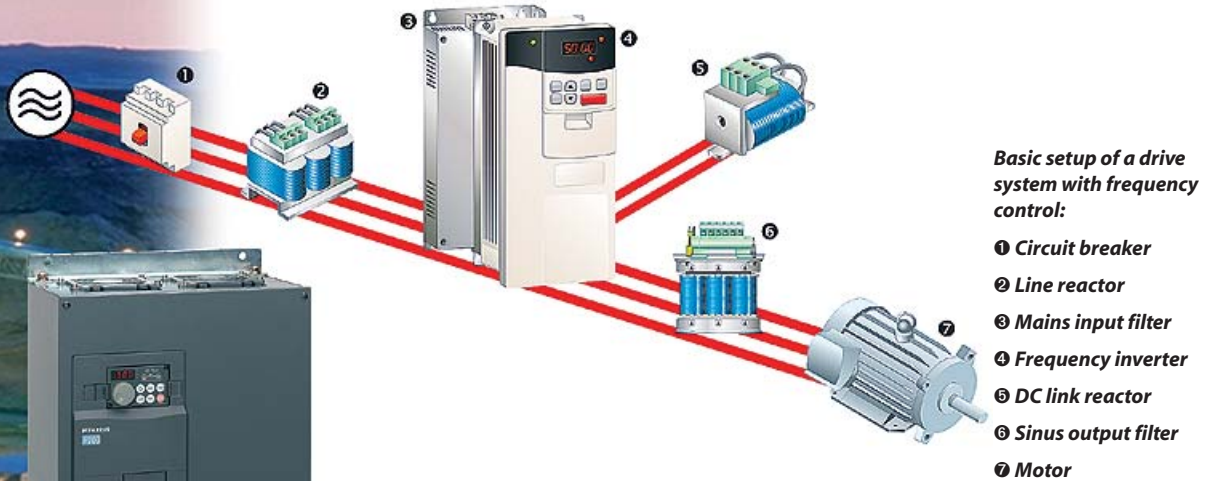
Output range:
0.4 - 7.5kW,
200 - 240V/380 - 480V

The FR-A 500 series

The powerful solution:
The FR-A 540 series is pure high technology. This new generation of Mitsubishi Electric controllers features Online Autotuning for outstanding speed constancy, excellent smooth running performance for wear-free operation of asynchronous motors, controlled shutdown after emergency stops and a large number of digital inputs and outputs. The FR-A 540 series is the ideal choice for demanding drive applications that could not be handled by previous three-phase AC inverters.

Output range:
0.4 - 450kW, 380 - 480V

Frequency inverters from Mitsubishi Electric – Superb quality and instant starting



The FR-F 700 series

The economical solution: The new FR-F700 is distinguished by its high energy-conservation potential – particularly when used with pumps and fans. Major energy savings are achieved especially in the important lower speed ranges and during the run-up and braking phases. At an initial frequency of 35Hz, for instance, the energy savings come to 57% when compared with conventional concepts. The forward-looking OEC (Optimum Excitation Control) technology effects an additional 10% energy saving. It provides the ideal flux to the motor at all times. The advantage: Maximum motor effectiveness at the highest efficiency.

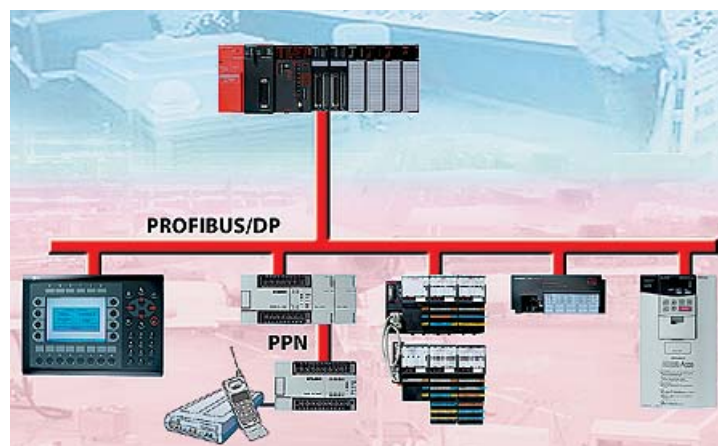
Output range:
0.75kW to 630kW, 380 to 480V
(as of 75kW: 380 to 500V)

State-of-the-art ASIC chips

A brand-new ASIC component reduces motor speed fluctuations to less than 50% of the values measured for traditional inverters (at 1Hz). This new chip also permits direct display and control of the operating status of the power circuit.

Network communications

Add-on option cards enable open communication with industry-standard bus systems like Profibus/DP, DeviceNet, CC-Link and CANopen, making it possible to integrate the frequency inverters in complete automation systems.



Practical functions and the ideal solution for every drive application



Our comprehensive range of frequency inverters offers a wealth of benefits for the user, making it easy to choose the perfect solution for every drive application.

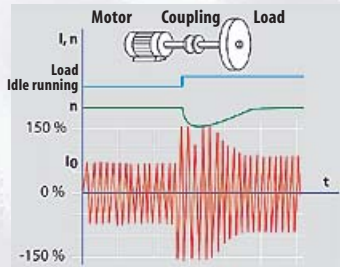
The designations for the FR-S 500, FR-E 500 and FR-A 500 series are based on the maximum possible overload.

Thus the value of 7.5K on the inverter data plate indicates its performance capacities at the desired 200% overload level. This high performance standard means that the inverter is overdimensioned where overload capacity of 150% or 100% is required; in these cases a smaller inverter may be chosen.

The adjacent table can be used to select the ideal inverter for the drive system.

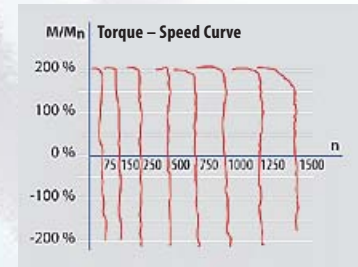
A 200% overload rating is standard

An overload capacity of 200% is standard for most Mitsubishi Electric frequency inverters. This means that they deliver double the performance of the competing inverters with the same rating.



Active current limiting

The perfect response characteristics of the current vector control system gives you the confidence you need for demanding drive applications. This system instantly identifies overcurrents and limits them automatically with lightning-speed response, allowing the motor to continue operating normally at the current threshold.



Vector control and slip compensation

The ideal combination of vector control and slip compensation makes it possible to cope with even the most difficult drive systems. There are no complex configuration procedures – entering the motor capacity is all it takes to activate this powerful function. Everything else is handled by the auto-adaptation capabilities. And the self-adjusting vector control system delivers powerful torque combined with exemplary motor speed constancy.

FR-S 520 SE ---k EC, 1~ 230 V		0,2	0,4	0,75	1,5
Overload 200 %	Rated motor output	0.2	0.4	0.75	1.5
	Rated current	1.4	2.5	4.1	7

FR-S 540E ---k EC, 3~ 400 V		0,4	0,75	1,5	2,2	3,7
Overload 200 %	Rated motor output	0.4	0.75	1.5	2.2	3.7
	Rated current	1.2/1.3	2.3/2.5	3.7/4.1	5.3/5.8	7.7/8.5

FR-E 520 S ---k EC, 1~ 230 V		0,4	0,75	1,5	2,2
Overload 150 %	Rated motor output	0.75	1.1	2.2	3
	Rated current	3.6	5	9.6	12
Overload 200 %	Rated motor output	0.4	0.75	1.5	2.2
	Rated current	2.5	4	7	10

FR-E 540 ---k EC, 3~ 400 V		0,4	0,75	1,5	2,2	3,7	5,5	7,5
Overload 150 %	Rated motor output	0.75	1.1	2.2	3	4	7.5	11
	Rated current	1.8	3	4.9	6.7	9.5	14	21
Overload 200 %	Rated motor output	0.4	0.75	1.5	2.2	4	5.5	7.5
	Rated current	1.6	2.6	4	6	9.5	12	17

FR-A 540 (L-G) ---k EC, 3~ 400 V		0,4	0,75	1,5	2,2	3,7	5,5	7,5	11	15	18,5	22	30
Overload 120 %	Rated motor output												
	Rated current												
Overload 150 %	Rated motor output	0.75	1.1	2.2	3	4	7.5	11	15	18.5	22	30	37
	Rated current	1.8	3	4.9	6.7	9.5	14	21	29	39	43	54	71
Overload 200 %	Rated motor output	0.4	0.75	1.5	2.2	4	5.5	7.5	11	15	18.5	22	30
	Rated current	1.5	2.5	4	6	9	12	17	23	31	38	43	57

FR-F 740 ---EC, 3~ 400 V		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930
Overload 120 %	Rated current	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93
	Rated motor output	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Overload 150 %	Rated current	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85
	Rated motor output	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45

IMPORTANT!

The new FR-F 700 series uses a designation scheme different from earlier series. The designation is assigned on the basis of maximum rated current!

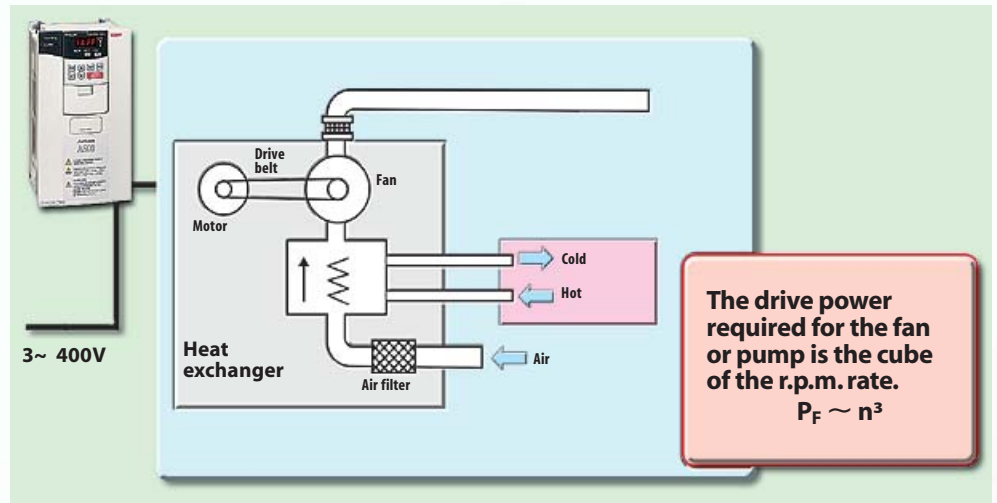
Between double and triple rated motor load torque is even possible during the startup phase and at low speeds, and at the same time the load-based motor slip is detected and accurately compensated.

Soft PWM function

Mitsubishi's specially-developed Soft PWM function complements the standard noise reduction functions, further reducing unnecessary motor noise and interference voltages. This adjustable PWM function enables whisper-quiet motor running, even at low switching frequencies. The function generates a minimal noise level that sounds rather like quietly-running water and is not at all unpleasant.

Cutting power consumption

The cutting-edge OEC technology (Optimum Excitation Control) developed by Mitsubishi turns frequency



inverters into real energy savers, achieving maximum drive capacity utilisation at minimum power consumption. This saves money and boosts operating efficiency. With rising electricity costs this means that Mitsubishi frequency inverters now pay for themselves even faster than before.

Optimum Excitation Control ensures that the motor being served gets just exactly the amount of magnetic flux required for optimum efficiency. This is particularly important at low speeds and during the run-up and braking phases. This concept extends the motor's service life and makes the entire drive system even more economical.

Drive system for a typical heat exchanger

No matter whether your application is simple or complex you can always find the right inverter in the comprehensive Mitsubishi range. Typical applications include:

- *Sawing, milling, grinding and milling machines*
- *Pumps, fans, door and gate drives*
- *Conveyor belts and screw conveyors*
- *Spinning and knitting machines, looms*
- *Material handling and palletising systems*
- *Machine tools and machining systems*



37	45	55	75	90	110	132	160	220	280	375	450	450			
			90	132	160	220	250	315	400	530	530	530			
			180	260	302	432	477	610	750	1010	1010	1010			
45	55	75	90	110	132	185	220	280	375	450	530	530			
96	108	138	180	216	260	361	432	547	722	866	1010	1010			
37	45	55	75	90	110	132	160	220	280	375	450	450			
71	86	110	144	180	216	260	325	432	547	722	866	866			
01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830	07700	08660	09620	10940	12120
116	180	216	260	325	361	432	481	547	610	683	770	866	962	1094	1212
55	90	110	132	160	185	220	250	280	315	355	400	450	500	560	630
106	144	180	216	260	325	361	432	481	547	610	683	770	866	962	1094
55	75	90	110	132	160	185	220	250	280	315	355	400	450	500	560

Flexible control units, versatile options and useful accessories



Setup parameters are easy to set and transfer with the control unit, which can also be used to transfer sets of parameters from one frequency inverter to another.

Standard control units

All the frequency inverters are fitted with a standard control unit matched to its performance range. In the FR-S 500 it is integrated into the unit; in the FR-A 500 and FR-F 700 it can be exchanged and other frequency converters may be used, if desired. The

plug-in control unit for the FR-E 500 is available as well. All the control units provide for clear, user-friendly and effective operation of the frequency converters. The display, designed for easy reading even at a distance, shows various operating magnitudes and error messages.

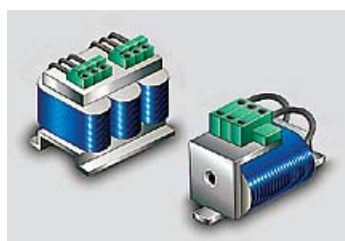
Internal and external expansion options

A comprehensive range of expansion options are available to adapt the frequency inverter to the task at hand. Installation of the expansion modules is quick and easy. There are two main groups, internal and external modules. The internal modules include input and output modules and communications modules for connection of the frequency inverters to networks, PCs, and PLCs. Another module enables connection of a pulse signal generator for position control and precise speed control via a feedback branch.

Wide range of accessories

Carefully matched accessories are available for each inverter series, including input reactors and DC reactors, noise and sine wave filters, and fans in various designs.

The mains input and DC link reactors help to compensate for voltage fluctuations whilst also increasing efficiency.



The extremely compact filter set efficiently eliminates interference and takes up very little space.



The fans are easily accessible for quick and easy replacement. Their service life can be increased significantly with the proper parameter settings.



Optional control units

The FR-PA02-02 with its additional functions can be used only with the FR-E 500 series. The FR-PU04 control unit with an expanded range of functions is available for all other series. It features a 10-key keypad for entering numerical values. A 4-line LCD display shows plain-text operating information, parameter names, or status and error messages. An additional 21 values and states are displayed and monitored, in any of eight languages (German, English, French, Spanish, Swedish, Italian, Finnish and Japanese).

User-friendly frequency inverter software

VFD Setup

The VFD Setup software package is a powerful tool for the configuration and operation of your Mitsubishi frequency inverter. The package runs under MS Windows®, making it possible to control the inverter with a standard PC. The package can be used to configure, operate, and monitor multiple inverters in a network from an ordinary PC or notebook computer. It is compatible with all Mitsubishi Electric 500 series inverters, which can be connected to the PC either directly (optional SC-FR PC adapter cable required) or via an RS-485 network.

System settings

Thanks to the inverters' network capabilities you can use the VFD Setup package to control up to 32 frequency inverters simultaneously.

Configuration

Settings can be displayed and configured in a variety of clear screens showing complete parameter lists and settings grouped by function.

Display functions

The intuitive display functions include data, analogue, oscilloscope, and alarm displays.



Diagnostics

Powerful inverter diagnostics for fast and effective troubleshooting.

Test mode

The test mode functions make it possible to simulate operation and set up the inverter with the Autotuning function.

File management

You can save your parameters in files on your PC and output them to a printer.

Help

Comprehensive online help is available for all configuration and operation questions.

Expansion cards

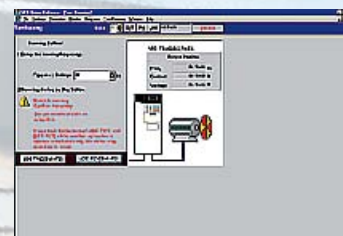
A variety of optional expansion cards are available. They make it possible to connect the system directly to a PLC or a computer. Expansion cards are also available with pulse train inputs, analogue inputs, digital inputs and outputs, and network interfaces.



Configuration of the inverter with the application and motor data



Display of system status values such as the PLC current frequency



The software can also be used to test the inverter.

Mitsubishi frequency inverters are packed with genuinely useful functions



Operating Specifications	Limits
Operating ambient temperature	-10°C to +50°C; max. ambient temp. of +40°C when utilising the 120% overload capacity (FR-A 540/FR-F 700 only)
Storage temperature	-20°C – +65°C
Relative humidity	Max. 90% (non-condensing)
Altitude	Max. 1,000m above sea level
Protection rating	Up to 22kW: IP20; from 30 kW: IP00
Impact resistance	10G (3 times each in 3 directions)
Vibration resistance	2G: resistance to vibrations from 10-55Hz for 2 hours along all three axes
Operating environment	Indoor environments only; avoid environments containing aggressive gases; install in a dust-free location
Approvals	CE/UL/cUL/GOST

- Automatic restart after power failures
- Online auto-tuning for exceptional speed constancy
- Even less motor noise thanks to the new "Soft PWM" system
- Controlled deceleration on power failure (Power-Down Braking)
- User-selectable positive/negative switching logic
- Network-compatible (Profibus/DP, DeviceNet, CC-Link, CANopen, LON Works)
- "Flying start" sequence
- Control unit with multi-language user interface (currently 8 languages)
- Automatic torque boosting
- Serial RS-485 port included as standard equipment
- PID controller
- 15 preset speed frequencies
- Multi-language control and diagnostics software package (option)
- User-friendly configuration and setup
- Output range from 0.2 kW to 630 kW
- Mains voltage range up to 500 V (as of 75 kW)
- Integrated EMC filter
- Expanded energy-saving functions
- OEC technology (Optimum Excitation Control)
- Decentralised inputs and outputs
- PTC input
- Expanded PID functions
- Simple Magnetic Flux Vector Control
- Long service life
- Complies with the CD, UL, cUL, GOST standards, recognised around the world

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