Product Information
EBG 172-EN

MITSUBISHI ELECTRIC
FACTORY AUTOMATION

FR-A700

Frequency Inverter

Top-class Drive Technology

Intelligent, flexible, powerful

SPEED UP — Comprehensive functions to guarantee faster production cycles with outstanding speed constancy and dynamic performance

INTELLIGENT DESIGN — Many key components with 10-year design guarantee a long service life

MORE FLEXIBILITY — Four overload ranges for easier product selection and greater flexibility

The New Drive For More Success

FR-A700: A comprehensive, high power line from 0.4 to 630 kW

The new FR-A700 frequency inverters combine innovative functions and reliable technology with maximum power, economy and flexibility. The FR-A700 is particularly well suited for demanding applications like cranes and lifting gear, high-bay warehousing systems, extruders, centrifuges and winding machines.

■ Precision without encoders

Even without encoders the FR-A700 continuously calculates the optimum magnetic flux for every operating state. A complex motor model and the specifications of the connected standard asynchronous motor are used to improve torque constancy across an extended speed range. For example, the system can generate torque of up to 200 % from a very low starting frequency of just 0.3 Hz. Known as real sensorless vector control (RSV), this new Mitsubishi Electric technology can even be used to regulate the torque. This now makes it possible to use inverters for many applications that were previously the exclusive domain of DC or closed-loop vector drives.

■ Ultra-precise speed and torque

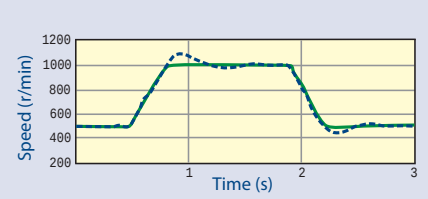
When operated with an encoder, the FR-A700 drives impress with ultra-precise speeds across the entire control range (precision ±0.01 %) and extremely exact torque control (±10 % precision and ±5 % repeatability). This outstanding performance makes it possible to switch from simple servos to inexpensive frequency inverter systems.

■ Cost effective positioning

In combination with closed-loop vector control the FR-A700 inverters can also be used for positioning, with the control being realised via pulse train, digital inputs or network.

■ Autotuning

The optimum performance achieved in encoderless vector operation depends on precise motor data. This new generation of inverters has an autotuning function that can obtain all the necessary specifications from the motor in less than a minute, even when the motor is not running. You can store the data records for up to two motors. In addition to this, the online autotuning function automatically registers and compensates changes in the data during operation – for example, changes caused by temperature fluctuations.



Without Autotuning (blue graph) there are deviations from the set speed. Autotuning (green graph) significantly reduces any overshoot.

Another tuning system known as easy gain tuning simplifies the optimisation of the speed control. This system monitors the motor's speed response and automatically optimises the control parameters, eliminating the need for time-consuming manual adjustment and calibration.

Flexible Concept

■ Network capabilities

The FR-A700 has very extensive networking capabilities. It comes with both a USB port and a connection for Modbus-RTU as standard equipment. Support is also available for Profibus, CC-Link, CANopen and the SSCNET III motion control network.

■ Service-friendly

The service-friendly design keeps maintenance times short. Even replacing the entire inverter is a quick and simple operation, the terminal block is removable and can be plugged directly into the replacement unit.

The FR-A700 series has the same installation footprint as its predecessors.

Service-friendly details: Accessible fans that are easy to replace.

■ Self-diagnostics prevent downtime

This inverter actively monitors its own functions. For example, a pre-alarm is triggered automatically if the fan performance drops to 40 %. An internal program monitors the ageing of the main circuit capacitors and an operating hours counter makes it easy to plan the best time for servicing. System protection and overload functions like phase failure monitoring for both the input and output circuits help to ensure trouble-free operation.

More for Your Money

These new inverters have ample reserve capacity. For example, even at high frequencies and the high nominal temperature of 50 °C (in the ND and HD overload ranges) you still don't have to reduce the output of the FR-A700. This is made possible by the use of high-quality power stage modules.

An EMC filter is included as standard equipment for full compliance with the EN 61800-3 standard. The FR-A700 models for the range up to 22 kW have an integrated brake transistor and the models up to 7.5 kW have an internal brake resistor.

■ Long service life guaranteed

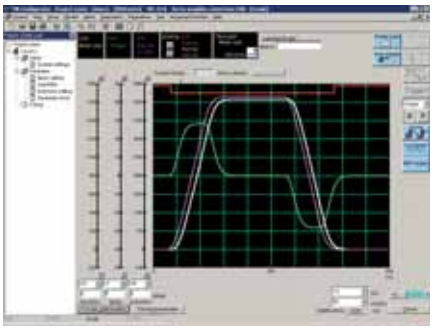
Mitsubishi Electric frequency inverter drives are known for their long service life, however the FR-A700 sets even higher standards in this area. Its key components are designed for a life of over 10 years. Among other things, this is achieved with heat-resistant high-performance capacitors and cooling fans with sealed bearings and special lubricants. The PCBs are also protected against aggressive environments with one or two layers of varnish.

■ Comprehensive PLC expertise

The integrated PLC functions of the FR-A700 series enable precise configuration for individual application needs. In addition to this, the inverter can even control simple applications itself without any support from other controllers. The PLC functions also provide access to the FR-A700's internal data registers and the states of its digital and analog I/Os. All the results of math calculations can be stored in the inverter's own EPROM memory, ensuring that the data is safeguarded against power failures. The internal PLC can be programmed with Mitsubishi Electric's user-friendly GX Developer programming software package.

■ User-friendly operation

Configuration and operation of the frequency inverter is simple. Setup is performed with the FR Configurator program, which can also download, store and document application data. Oscilloscope and machine analysis functions help the user to optimise the drive system. Data and settings from the predecessor series can be imported directly and converted for use in the new models.



The FR-A700's oscilloscope and machine analysis functions in operation.

The FR-DU07 configuration terminal with one-touch Digital Dial and 7-segment LED display provides manual access to all parameters and operating modes and is included as standard equipment. The optional FR-PU07 control terminal features a numeric keypad, plain text display in up to eight languages and enhanced features for storing up to three sets of data and transferring them to other frequency inverters. Getting started or upgrading to the new generation of frequency inverter drives could hardly be easier.

■ Four overload ranges

Many manufacturers of frequency inverter drives design their products for different overload modes, but seldom for more than two. The FR-A700 fully supports four overload ranges, which makes it very easy to select the right inverter for every application. For full details see the table overleaf.

Specifications ///

Overload capacity	SLD (super light duty)	LD (light duty)	ND (normal duty)	HD (heavy duty)
60 s overload	110 %	120 %	150 %	200 %
3 s overload	120 %	150 %	200 %	250 %
Ambient temperature	40 °C	50 °C	50 °C	50 °C

Type	Rated current [A]	Rated motor capacity [kW]	Rated current [A]	Rated motor capacity [kW]	Rated current [A] *	Rated motor capacity [kW] *	Rated current [A]	Rated motor capacity [kW]	W x H x D (mm)
FR-A740-00023-EC	2.3	0.75	2.1	0.75	1.5	0.4	0.8	0.25	150 x 260 x 140
FR-A740-00038-EC	3.8	1.5	3.5	1.5	2.5	0.75	1.5	0.4	
FR-A740-00052-EC	5.2	2.2	4.8	2.2	4	1.5	2.5	0.75	
FR-A740-00083-EC	8.3	3.7	7.6	3.7	6	2.2	4	1.5	
FR-A740-00126-EC	12.6	5.5	11.5	5.5	9	3.7	6	2.2	
FR-A740-00170-EC	17	7.5	16	7.5	12	5.5	9	3.7	220 x 260 x 170
FR-A740-00250-EC	25	11	23	11	17	7.5	12	5.5	
FR-A740-00310-EC	31	15	29	15	23	11	17	7.5	220 x 300 x 190
FR-A740-00380-EC	38	18.5	35	18.5	31	15	23	11	
FR-A740-00470-EC	47	22	43	22	38	18.5	31	15	220 x 400 x 195
FR-A740-00620-EC	62	30	57	30	44	22	38	18.5	
FR-A740-00770-EC	77	37	70	37	57	30	44	22	325 x 550 x 195
FR-A740-00930-EC	93	45	85	45	71	37	57	30	
FR-A740-01160-EC	116	55	106	55	86	45	71	37	435 x 550 x 250
FR-A740-01800-EC	180	90	144	75	110	55	86	45	465 x 620 x 300
FR-A740-02160-EC	216	110	180	90	144	75	110	55	
FR-A740-02600-EC	260	132	216	110	180	90	144	75	
FR-A740-03250-EC	325	160	260	132	216	110	180	90	465 x 740 x 360
FR-A740-03610-EC	361	185	325	160	260	132	216	110	
FR-A740-04320-EC	432	220	361	185	325	160	260	132	498 x 1010 x 380
FR-A740-04810-EC	481	150	432	220	361	185	325	160	
FR-A740-05470-EC	547	280	481	250	432	220	361	185	680 x 1010 x 380
FR-A740-06100-EC	610	315	547	280	481	250	432	220	
FR-A740-06830-EC	683	355	610	315	547	280	481	250	
FR-A740-07700-EC	770	400	683	355	610	315	547	280	790 x 1330 x 440
FR-A740-08660-EC	866	450	770	400	683	355	610	315	
FR-A740-09620-EC	962	500	866	450	770	400	683	355	995 x 1580 x 440
FR-A740-10940-EC	1094	560	962	500	866	450	770	400	
FR-A740-12120-EC	1212	630	1094	560	962	500	866	450	

* Standard operation/initial value

Operating conditions	Specifications
Voltage	Three-phase, 380 – 480 or 500 V (-15 %/+10 %)
Ambient temperature	–10 °C to +50 °C (non-freezing)
Storage temperature	–20 °C to +65 °C
Ambient humidity	Maximum 90 % relative humidity (non-condensing)
Altitude	Maximum 1000 m above sea level

Operating conditions	Specifications
Protection rating	IP20 up to 22 kW, IP00 from 30 kW
Shock resistance	10 G (for 00023 to 03610); 3 G (for ≤ 04320)
Vibration resistance	Maximum 0.6 G
Certifications	CE/UL/cUL/GOST

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