

MOTION CONTROL PRODUCT RANGE



*Easy to use solutions
for positioning systems*

THE ULTIMATE IN INTELLIGENT SERVO CONTROL



The world's number one in industrial automation systems brings you the very best in easy-to-use motion control solutions.

Mitsubishi Electric delivers intelligent control systems that combine high functionality hardware with tailor-made yet flexible software. It's a combination that your business – and our competitors – will find hard to beat!

Designed to suit your application

Our systems give you the accuracy, power and high response that are critical to the success and profitability of your business. Our versatility means we can design specific systems to meet your control demands, from knitting & embroidery machines to industrial printing presses, high frequency conveyors to component inserters...whatever they may be.

The best in Motion Control products

Mitsubishi Electric's complete range of servos, vector drives and specifically designed motors, have been tried and tested the world over. Powerful and agile combinations can be easily configured using Windows and DOS based software, greatly reducing commissioning time and increasing control.

Flexibility as standard

Another major benefit is that Mitsubishi products can easily be integrated into existing systems, so existing non-Mitsubishi systems can be upgraded over time, without the need for complete refurbishment.

A world of support

And, as you would expect from a globally respected company, Mitsubishi Electric provide a level of technical support, training and service that means your investment is always protected.



Servo Amplifiers – Real Time Adaptive Tuning For Advanced Digital Servo Control

REAL TIME ADAPTIVE TUNING is what makes the Mitsubishi servo range stand above its competitors. This unique technology means the servo delivers maximum dynamic performance as it automatically tunes itself to the demands of the application, cutting down vital commissioning and adjustment time – saving you time and money.

MR-C Servo Amplifier – Ideal Stepper Replacement

The compact MR-C offers many benefits of closed loop performance at open loop prices.

Smooth continuous torque – with encoder feedback and speeds of up to 4500 rpm, up to 300% rated torque is achieved from 0 to full speed.

High dynamic performance – for demanding applications with short duty cycles, eliminating cogging and stalling problems to increase production output and reduce down time.

Real Time Adaptive Tuning – automatic gain settings remove the headache of commissioning closed loop systems, making installation quick and easy.

Other major features include

- **Simple test operation** providing jog functions from the unit keys
- **Ultra-low inertia motors** from the HC-PQ range for demanding duty cycles and fast dynamic response
- **Extensive protective functions** to prevent damage to the amplifier and motor



For technical details see page 9

- **Global standards compliance** with CE and UL approval
- **Serial communications interface** option with Windows based set-up software providing advanced commissioning and troubleshooting tools

MR-J2-A Servo Amplifier – Advanced Digital Servo

The MR-J2 provides intelligent advanced dynamic performance without the need for complex set-up or programming.

Three in one – with a digital interface for position control, an analogue interface for speed and another for torque control, the MR-J2 can easily be retro-fitted into existing applications or used to design revolutionary new control systems for new machines.

Other major features include

- **RS 232C Serial communications interface** – allows a Windows based programming package to read/write and store parameters together with extensive monitoring and diagnostic functions. (RS 485 option also available).
- **Absolute positioning system** – all motors in this range are fitted with absolute encoders backed by a battery in the amplifier to eliminate the need to re-home on power down and so reduce production time.
- **Servo-lock anti-vibration function** – this function eliminates the encoder bounce that is often associated with brushless servo systems.



For technical details see page 9

- **Built-in dynamic brake and regenerative resistor** – the servo motor can be stopped immediately in the event of a power failure without the need for an external regeneration unit.
- **Compatible** – with all of MR-J2 range motors

MR-J2-B servo amplifier – high performance serial control

Taking the advanced performance of the MR-J2-A to the next level, the MR-J2-B incorporates a high speed serial interface for control and monitoring.

5.5 MBaud communication – using Mitsubishi Servo control network SSCNet. SSCNet information

Motion controllers – compatible with the Mitsubishi motion controllers 4, 8 and up to 32 axis controllers

Other major features include

- **Serial communications interface** with Windows based set-up software providing advanced commissioning and troubleshooting tools
- **Global standards compliance** with CE and UL approval
- **Compatible** with all of MR-J2 range motors



For technical details see page 9

MR-J2-C-S100 servo amplifier – and much, much more

Combining the advanced servo performance with motion control functionality, the MR-J2-C-S100 becomes the ideal solution for individual position control applications.

3ms response time – a super low response time to an input command signal guarantees excellent performance in even the most demanding applications

7 selectable programmes – up to 7 programmes can be stored in the unit and selected as required using external inputs or the RS 232/485 interface.

Simple programming interface – using the common Windows based set-up software, programmes of up to 60 steps can be developed and tested using simple command instructions

Programmable I/O – Six programmable I/O can be referenced from the outside world to provide an interface to machine control.

Zero/home position return function – with several configurations, home position return can be carried out with a simple command

Other major features include

- **Manual pulse generator** input can be used to teach or set-up positions
- **Absolute position detection system** avoids the need to return to home position after power failure
- **RS 485 multi-drop capability** facilitates easy programming and control of several servo systems.
- **Compatible** with all of MR-J2 range motors



For technical details see page 9

Vector Drives

The V240E is a closed loop vector drive with the power to produce torque from zero speed, combined with the positioning accuracy expected from servo applications.

This power and accuracy is enhanced by a range of features to ensure that even the most demanding applications can be easily tackled by the V240E.

Extensive power range – from 1.5 to 45kW the V240E can cover even the most demanding applications.

Flexible control – with three selectable control modes for speed, torque and position control the V240E can be easily integrated into a wide range of existing applications or used to simplify new designs.

Auto-tuning – To increase flexibility, the V240E is compatible with a wide range of standard AC induction motors and a simple auto-tune function will make all the required measurements and settings.

Simple user interface – the V240E is fitted with a comprehensive parameter unit that provides both parameter information together with status and monitoring functions.

OPTIONS – a range of option cards are available for the V240E that include the following functions:

- **Motor thermistor interface** – motor temperature data can be fed into the drive to modify settings based on temperature rise
- **RS 485 Serial communications** – for set-up and control the several drives can be linked via RS 485 from a PC or PLC



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- **Orientation control** – to fix the motor shaft in a preset position, this option provides repeated positional accuracy of +/- 1.5 and incorporates a compensation function for gear backlash.
- **Encoder pulse train output** – for master slave applications the master drive can provide an encoder output signal to any other drives slaved to it.

Drive Selection Guide

Feature	MR-C	MR-J2-A	MR-J2-B	MR-J2-C-S100	V240E
Power range	50W to 400W	50W to 3.5kW			1.5 to 45kW
Control mode	Position Speed (*1)	Position Speed Torque	Position	Position Speed	Position Speed Torque
Command interface	Pulse train	Pulse train (P) 0 to 10 v (S) +/-8V (T)	SSCNet high speed serial communications	Pulse train (P) RS232C/RS 485 (P) 0 to 10V (S)	Pulse train (P) +/-10V (S) +/-10V (T)
Encoder output	No	Yes	No	No	Yes (option)
Input pulse frequency	200kpps	400kpps	–	400kpps	400kpps
Serial comms	RS232C option	RS 232C RS 485 (*2)	SSCNet (upto 5.5 MBaud)	RS 232C RS 485	RS 485
Compatible motors	HC-PC	HC-MF, HA-FF, HC-SF, HC-RF			Standard induction motor

(*1) Limited functionality (*2) Available on request

PRODUCT RANGE

Motors

To address the needs of an unlimited range of applications Mitsubishi has developed a number of brushless servo motors with dynamic characteristics to match the machine performance.

Compact design – all of the motors are extremely compact and have been developed using rare earth magnets (Neodymium Boron Iron) and unique concentrated winding techniques.

Encoder feedback – encoders are fitted to all of the motors and communicate via a high speed serial link with the servo amplifier. This reduces cable size and increases immunity to noise.

Automatic servo motor recognition – as an added benefit of the encoder serial link the servo can also check that the correct motor has been connected. This avoids mismatch and possible damage.

Built-in DC brake – for vertical lifting/lowering applications, motors are available with a built in 24V DC electromechanical brake

Environmental protection – IP65 rating ensures that the motors will withstand tough operating environments.



For technical details see table below

Motor Selection Guide

Feature	HC-PQ-EC	HC-MF-EC	HA-FF-EC	HC-RF	HC-SF
Amplifier	MR-C	MR-J2			
Power range	30 to 400W	50 to 750W	50 to 600W	1kW to 2kW	50W to 3.5kW
Rated torque range (Nm)	0.09 to 1.27	0.16 to 2.4	0.16 to 1.9	3.2 to 6.4	2.4 to 16.7
Peak torque range	0.4 to 2.9	0.5 to 7.2	0.5 to 5.7	7.9 to 15.9	7.2 to 50.1
Encoder feedback	Incremental 4000ppr	Absolute 8192 ppr	Absolute 8192 ppr	Absolute 16384	Absolute 16384 ppr
IP Rating	IP 44	IP 44	IP 65	IP 65	IP 65
Rated Speed	3000 rpm	3000 rpm	3000 rpm	3000 rpm	2000 rpm
Max Speed	4500 rpm	4500 rpm	4000 rpm	4500 rpm	3000 rpm
Inertia (kg cm²)	0.014 to 0.145	0.019 to 0.6	0.063 to 1.2	1.5 to 2.3	6.6 to 82
Max ratio load/motor	30:1 or less	30:1 or less	10:1 or less	5:1 or less	15:1 or less
Typical applications	Electronic, assembly printing, machines indexing applications	Label printers, component inserters, small robots, knitting and embroidery machines	Conveyors, food preparation machinery, industrial printers, small X-Y tables	Roll feeders, high frequency conveyors, industrial printing machines, loaders and unloaders.	Conveyor machinery, X-Y tables, robots, loaders and, unloaders winders and tension devices
For detailed Specs	Page 11	Page 12	Page 13	Page 14	Page 15

Controllers

Building on its strong PLC hardware, Mitsubishi has developed a range of position controllers that integrate seamlessly with the PLC and the servos and provide exceptional functionality.

D75 – 3 axis positioning module

Incorporating up to 3 axes of motion control from one slot in the PLC, the D75 module offers a solution that is easy to integrate and simple to configure including a variety of advanced functions designed specifically for motion control.

High speed processor – Utilising a 32-bit RISC processor, the D75 can calculate the complex algorithms required to control intricate motion profiles

Flash ROM memory – The D75 utilises Flash ROM based memory for storing motion profiles, parameter and operating system data eliminating the need for battery back-up.

Circular interpolation – The two and three axis models have ability to accurately control two axes interpolated motion profiles such as circles and arcs.

600 Motion profiles per axis – A motion profile consists of the pattern, control method, accel time, decel time position address, speed, dwell time and M codes and up to 600 of these profiles (per axis) can be stored in the unit.



For technical details see back page

Pulse and serial options – two versions of the D75 are now available: the D75P which gives a pulse train output; the D75M which uses SSCNet, Mitsubishi's servo control network to provide 2.5 MBaud serial communication for control and full monitoring of status and position data.

FX-1PG – Single axis positioning module

This useful addition to the FX Series peripherals allows the FX to be seriously considered in the field of simple, single axis, positioning control. Utilising many built in features, positioning control becomes a case of selecting the speed and distance to be travelled and sending that data to the FX-1PG. All speed acceleration and deceleration values can be automatically taken care of by the FX-1PG.

Versatile positioning – positioning can be configured to absolute or relative distances from the current position.

Easy configuration – positioning can be defined in pulses, linear distance and angles and no extra teaching panels are required

Pre-defined functions – The FX-1PG comes with 7 pre-defined motor control functions e.g. jog, home position return, single and two-speed positioning

Up to 8 axes – a maximum of 8 FX-1PGs may be connected to an FX system and units are also available for the FX0N and FX2N models.



For technical details see back page

Servo Setup Software

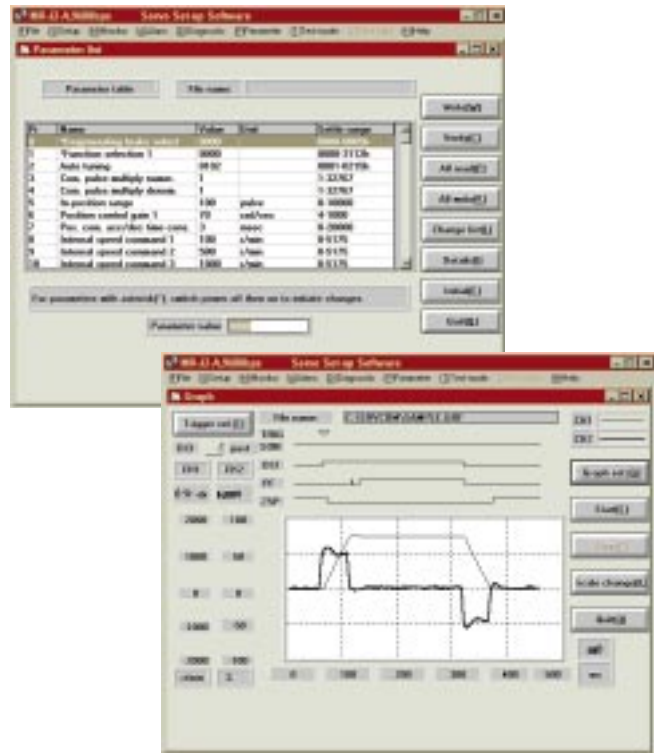
A Windows-based programming software package has been developed to make life easier when commissioning and controlling the servos.

The software offers the following functions:

- **Parameter** read, write and store
- **Extensive diagnostics** including I/O status monitoring
- **Batch** and high speed monitoring
- **Graphing function** for dynamic performance monitoring
- **Alarm history** and troubleshooting

Further benefits include:

- **Compatible** with all servos
- **Test mode** operation allows user to check hardware
- **Parameter** storage useful when commissioning many drives
- **Diagnostic information** reduces commissioning time

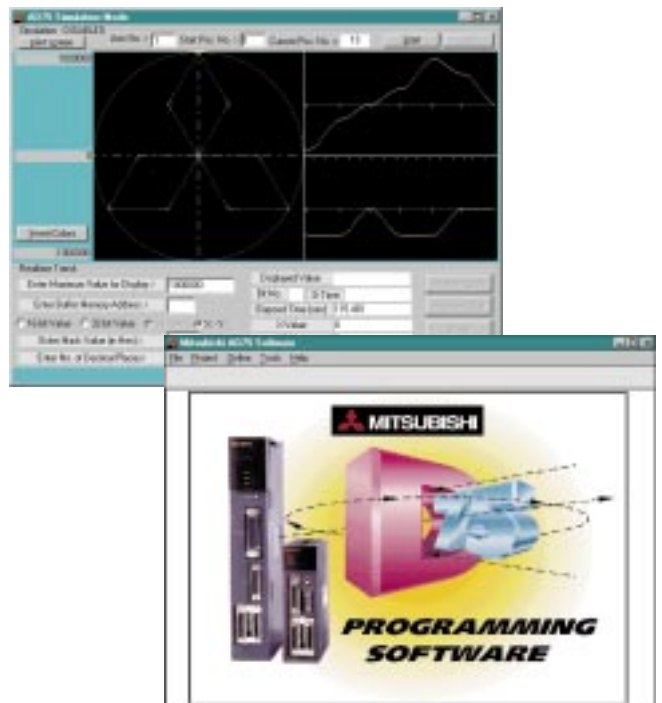


D75 Setup Software

With the SWOIVD-AD75 DOS based programming software package, motion profiles are easy to programme, greatly reducing development and troubleshooting time.

The software offers the following functions:

- **Position** data programming
- **Parameter** setup
- **Monitoring** – operation, I/O, error information
- **Test mode**
- **Trace mode** to view position information graphically
- **Real time** trend function
- **Simulation mode** to check positioning information graphically
- **Error message information** for easy diagnostics.



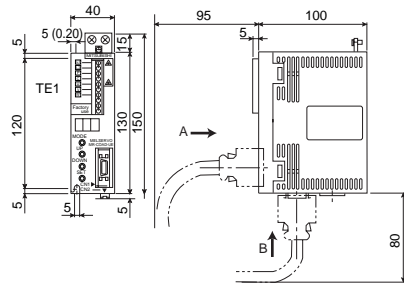
Accessories

Mitsubishi also provide a wide range of accessories including cables, connectors and terminal box assemblies to make connection as easy as possible.

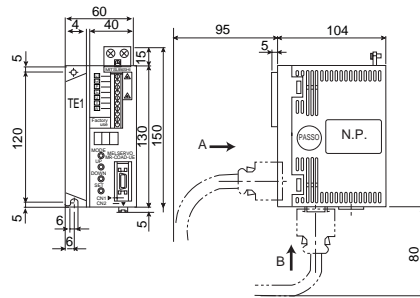
TECHNICAL SPECIFICATIONS

MR-C servo amplifier

● MR-C10A-UE, 20A-UE, 10A1-UE, 20A1-UE



● MR-C40A-UE

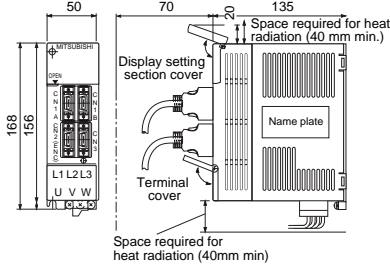


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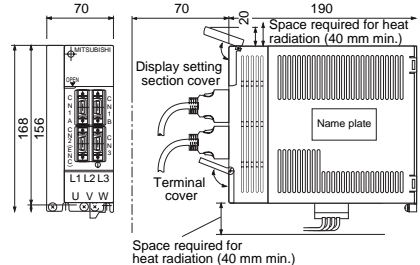
Servo amp model MR-C		10A	20A	40A
Power supply	Volt/Frequency	Single phase 200 to 230V AC 50/60Hz		
Control system		Sinusoidal PWM control/current control system		
Control mode		Pulse train input position control		
Auto Tuning		Real Time Adaptive Tuning		
Safety features		Over current, excess regen voltage, overload, motor overhear, regeneration error overspeed, encoder error, under voltage/power failure, and excess error protection		
Position control specifications	Max i/p pulse frequency	200kpps		
	Feedback pulse	4000 pulse/rev servo motor resolution		
	Command pulse multiple	Electronic gear A, B: 1 - 999 1/50<A/B<20		
Interface power supply		External 24V DC or 5V DC power supply required		
Weight (kg)		0.6	0.6	1.0
Communication with personal computer	Required option	RS-232C option unit (MR-C-T01), communication cable, setup software		
	Functions	Status display, diagnostic display, alarm display, parameter setting, operation waveform monitor		

MR-J2-A servo amplifier (Information also applies to MR-J2-B and MR-J2-CS-100)

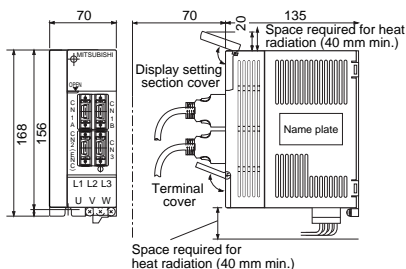
● MR-J2- 10 A/B/C, 20 A/B/C



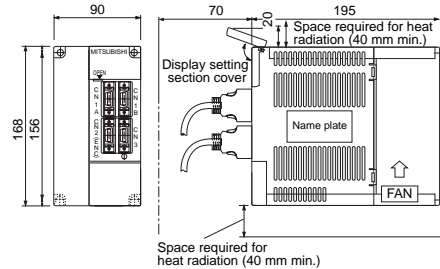
● MR-J2- 70 A/B/C, 100 A/B/C



● MR-J2- 40 A/B/C, 60 A/B/C



● MR-J2- 200 A/B/C, 350 A/B/C

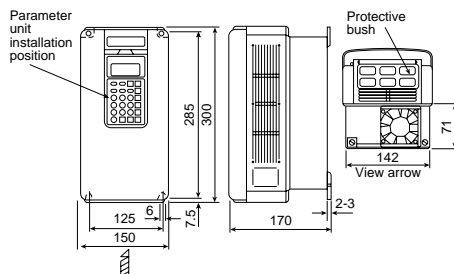


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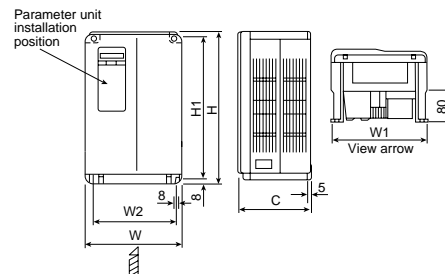
Servo amp model MR-J2-A/B/C-S100		10A	20A	40A	60A	70A	100A	200A	350A
Power supply	Volt/frequency	3-phase 300 to 230V AC 50/60Hz							
Control system		Sinusoidal PWM control/current control system							
Speed frequency response		250Hz or more							
Safety features		Over current, excess regen voltage, overload, motor overhear, regeneration error, over speed, encoder error, under voltage/sudden power failure and excess error protection							
Torque limit input		0 to ±10V DC/maximum torque							
Position control specifications	Max i/p pulse frequency	400kpps (differential), 200kpps (open collector)							
	Feedback pulse	Up to 16384 pulses per servo motor rotation							
	Command pulse multiple	Electronic gear A/B/ multiple: A, B: 1 - 32767 1/50<A/B<50							
Speed control specifications	Control range	External speed 1: 1000 internal speed 1: 5000							
	Command input	0 to ±10V DC/maximum speed							
	Fluctuation rate	0.03% max (load fluctuation 0 to 100%) ±0.02% max (power fluctuation ±10%) 0.02% max (ambient temp 25°C ±10°C when using external analog speed)							
Torque control specification	Command input	0 to ±8V DC/maximum torque							
Weight (kg)		0.7	0.7	1.1	1.1	1.7	1.7	2.0	2.0

FR-V240E closed loop vector inverter

● FR-V240E-1.5k, 2.2k

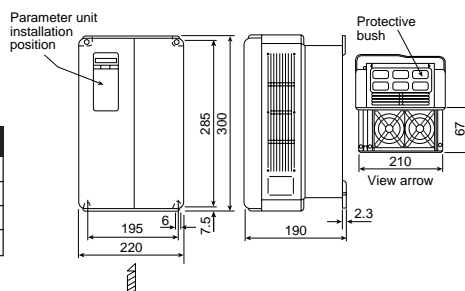


● FR-V240E-7.5k, 11k, 15k, 18.5k

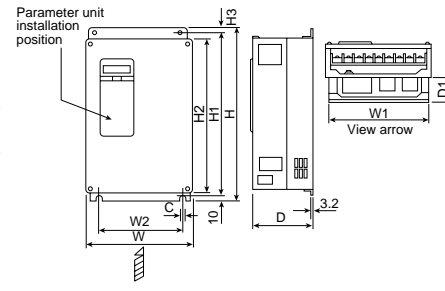


Inverter Type	W	W1	W2	H	H1	D
FR-V240E-7.5K	250	242	230	400	380	190
FR-V240E-11K	250	242	230	400	380	190
FR-V240E-15K	300	292	280	450	430	195
FR-V240E-18.5K	300	292	280	450	430	195

● FR-V240E-3.7k, 5.5k



● FR-V240E-22k, 30k, 37k, 45k



Inverter Type	W	W1	W2	H	H1	H2	H3	D	D1	C
FR-V240E-22K	340	324	270	550	530	510	10	195	78	10
FR-V240E-30K	450	434	380	550	525	495	15	250	130	12
FR-V240E-37K	450	434	380	550	525	495	15	250	130	12
FR-V240E-45K	480	484	410	700	675	645	15	250	130	12

Units: mm

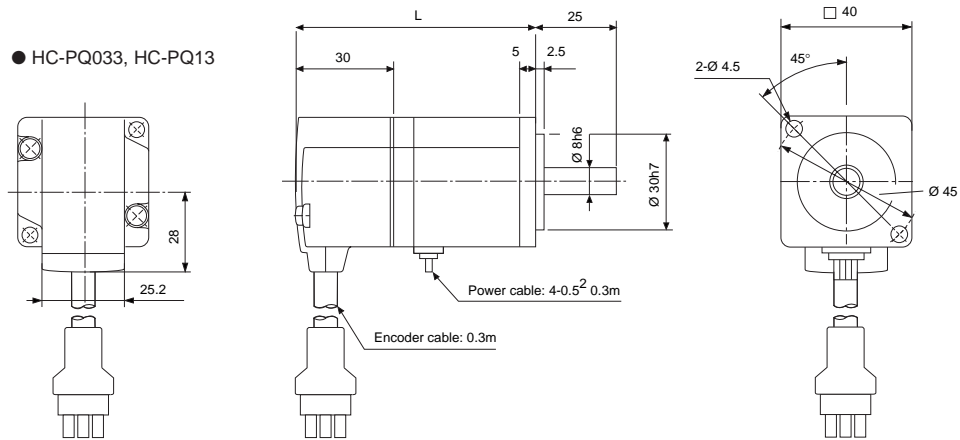
Type	FR-V240E	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K		
Inverter	Output	Rated Capacity (kVA)	3.1	4.5	6.9	9.6	12.6	18.3	24.6	30.1	35.8	44.0	57.8	67.5	
		Rated Current (A)	4.5	6.5	10.0	13.9	18.2	26.3	35.5	43.5	51.8	63.3	83.5	97.5	
		Overload Current Rating	*1 150% 60 seconds, 200% 0.5 seconds (inverse-time characteristics)												
	Power Supply	Voltage	*2 Three-phase, 380V to 460V 50Hz/50Hz												
		Regenerative braking torque	Maximum value/time 100%/5seconds					20% *3							
		Permissible AC voltage fluctuation	Permissible duty 2%ED												
		Permissible frequency fluctuation	Continuous *3												
		Rated input AC voltage, frequency	Three-phase, 380V to 460V 50Hz/60Hz												
		Permissible AC voltage fluctuation	323V to 506V 50Hz/60Hz *4												
		Permissible frequency fluctuation	± 5%												
Inverter	Input Signals	Instantaneous voltage drop immunity	Operation continues at 320V or higher. If voltage drops from rated voltage to less than 320V operation continues for 15msec												
		Power supply capacity (kVA) *5	4.5	5.5	9	12	17	20	28	34	41	52	66	80	
		Protective structure (JEM 1030)	Enclosed type (IP20)						Open type (IP00)						
		Cooling system	Forced air cooling												
Vector Inverter Motor	Control Specifications	Approx weight (kgf)	4.5	4.5	7.5	7.7	16	16	20	20	33	54	54	72	
		Control system	High carrier frequency PWM control, full digital vector control												
		Speed control range	1.5 to 1500r/min (constant torque), 1500 to 3000r/min (constant output) (when vector inverter motor is used)												
		Speed setting resolution	0.03% to the maximum setting (minimum setting in 1r/min increments)												
		Acceleration/deceleration time	0.1% of the maximum set speed												
		Acceleration/deceleration pattern	0 to 3600 seconds (acceleration and deceleration can be set individually in 0.1 sec increments)												
		Torque limit level	Linear or S-pattern acceleration/deceleration mode can be selected												
		Speed mode	Torque limit value can be set (0 to 200% variable)												
		Torque mode	+10V DC												
		Position mode	+10V DC												
Inverter	Output Signals	Position mode	Pulse train input												
		Open collector signals	3 points can be selected from among up-to-speed, overload detection, undervoltage detection, inverter running, minor fault, torque detection, ready, low-speed signal, speed detection and parameter unit operation signal												
		Analog output	2 points can be selected from among speed, output current, output voltage, speed setting, output frequency, output torque, DC bus voltage and load meter.												
Vector Inverter Motor	Protective functions	Digital output (PLG output)	A-phase, B-phase, Z-phase (Div. of A-phase & B-phase is possible) (when option FR-VPA, VPB VPC (A-phase, B-phase only) is mounted)												
		Structure	Totally enclosed forced draft system												
Vector Inverter Motor	Detector encoder	Protective functions	Overcurrent, output short circuit protection (acceleration, deceleration, constant speed), regenerative, overvoltage, undervoltage, no signal, excessive speed deviation, overload, (electronic thermal overload protection), brake transistor alarm*6, overspeed, motor overheat etc												
		Detector encoder	Encoder 1000P/R, A, B, Z + 5VDC power supply												

Note:

- The percentage of the overload current rating indicates a ratio to the rated output current of the inverter. For repeated use, it is necessary to wait until the inverter and motor return to temperature below the value under 100% load.
- The maximum output voltage does not exceed the power supply voltage. Below the power supply voltage the maximum output voltage can be set as required.
- Indicates the average torque when the inverter is decelerated to a stop from 60Hz. Changes according to motor loss.
- If the power supply voltage fluctuation is 342V or less or 484V or more when using the 400V class inverter, the internal transformer's tap must be changed.
- The power supply capacity depends on the value of impedance on the power supply side (including the input reactor and cables).
- Not provided for the FR-V240E-7.5K to 45k which does not have a built in brake circuit.

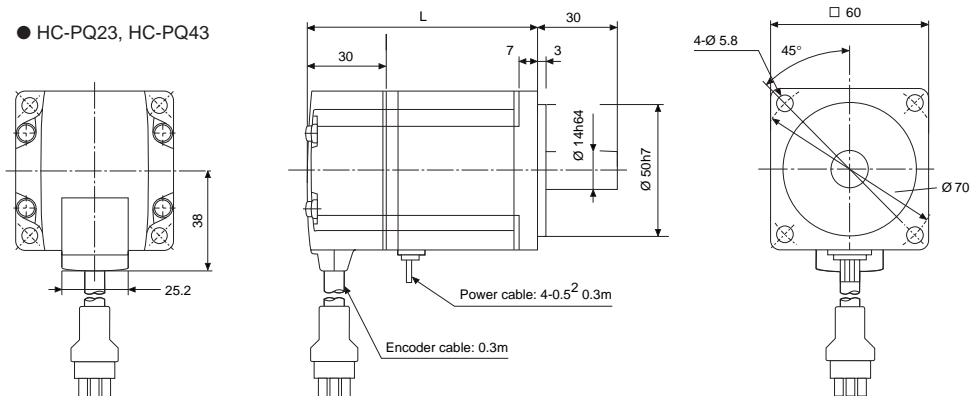
HC-PQ-EC Motors

● HC-PQ033, HC-PQ13



Model	Variable Dimension L	Inertia QD2 (kgf·cm ²)	Weight (kg)	Brake Static Friction Torque (N.M)
HC-PQ033-EC	73.5	0.057	0.35	-
HC-PQ053-EC	79.5	0.074	0.4	-
HC-PQ13-EC	94.5	0.12	0.53	-
HC-PQ033B-EC	101.5	0.069	0.69	0.32
HC-PQ053B-EC	107.5	0.086	0.72	0.32
HC-PQ13B-EC	122.5	0.129	0.86	0.32

● HC-PQ23, HC-PQ43



Model	Variable Dimension L	Inertia QD2 (kgf·cm ²)	Weight (kg)	Brake Static Friction Torque (N.M)
HC-PQ23-EC	98	0.35	0.99	-
HC-PQ43-EC	119	0.57	1.48	-
HC-PQ23B-EC	130	0.543	1.63	1.3
HC-PQ43B-EC	155	0.763	2.13	1.3

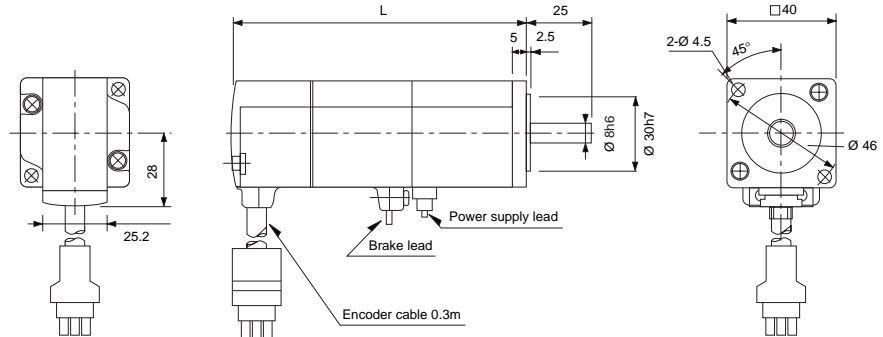
Units: mm

Servo motor	HC-PQ-EC					
Servo amplifier	MR-C	033	053	13	23	43
Continuous duty	Rated output (kW)	30	50	100	200	400
	Rated torque	Nm	0.095	0.16	0.32	0.64
Rated speed	Rpm	3000				
Maximum speed	Rpm	4500				
Maximum torque	Nm	0.38	0.64	1.28	1.92	2.92
Moment of inertia - J	Kg·cm ²	0.014	0.019	0.03	0.089	0.145
Recommended load to rotor inertia ratio		30 times or less				
Power supply capacity	KVA	0.1	0.2	0.3	0.5	0.9
Rated current	A	0.85	0.85	0.85	1.5	2.8
Maximum current	A	5.0	5.0	5.0	6.0	6.44
Speed/position detector		Encoder (resolution 4000 pulses per rev.)				
Structure		Totally enclosed, self cooled, IP44				
Weight	Kg	0.32	0.37	0.50	0.96	1.42

HC-MF-EC Motors

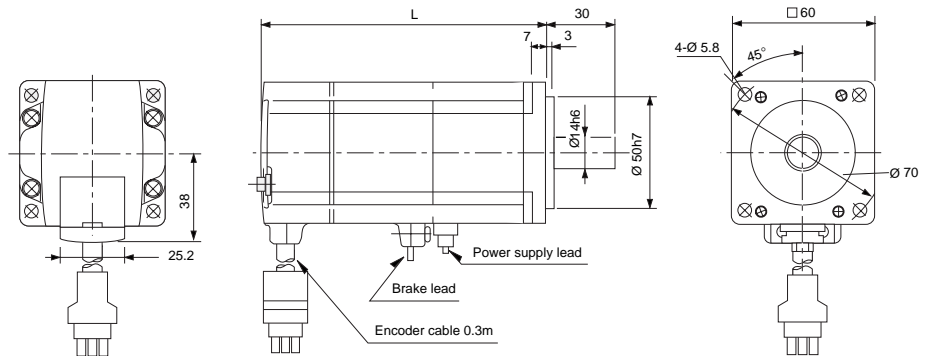
● HC-MF053 (B), HC-MF13 (B)

Model	Variable Dimensions L
HC-MF053-EC	89.5
HC-MF13-EC	104.5
HC-MF053B-EC	117.5
HC-MF13B-EC	132.5



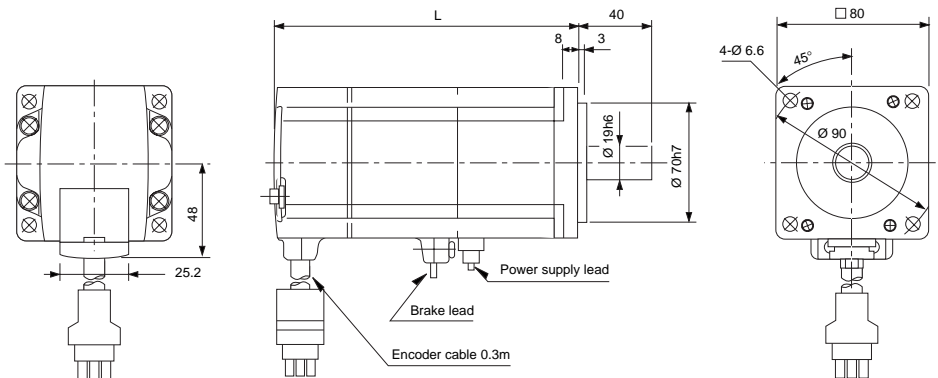
● HC-MF23 (B), HC-MF43 (B)

Model	Variable Dimensions L
HC-MF23-EC	108
HC-MF43-EC	133.5
HC-MF23B-EC	140.5
HC-MF43B-EC	165.5



● HC-MF73(B)

Model	Variable Dimensions L
HC-MF73-EC	150
HC-MF73B-EC	185.5



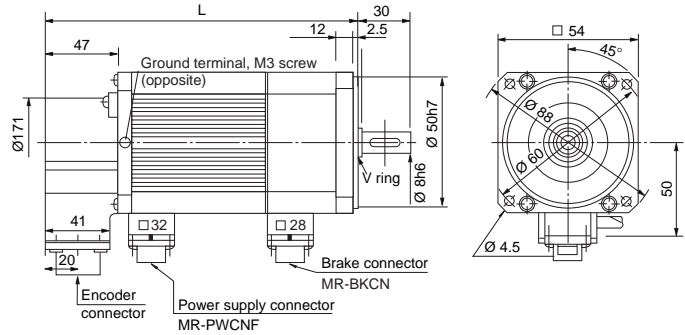
Units: mm

Servo motor	HC-MF-EC	053-EC	13-EC	23-EC	43-EC	73-EC
Servo amplifier	MR-J2	10A	10A	20A	40A	70A
Continuous duty	Rated output (kW)	0.05	0.1	0.2	0.4	0.75
	Rated torque	Nm	0.16	0.32	0.64	1.3
Rated speed	Rpm	3000				
Maximum speed	Rpm	4500				
Maximum torque	Nm	0.48	0.95	1.9	3.8	7.2
Moment of inertia - J	Kg.cm ²	0.019	0.03	0.088	0.143	0.6
Recommended load to rotor inertia ratio		30 times or less				
Power supply capacity	KVA	0.3	0.3	0.5	0.9	1.3
Rated current	A	0.85	0.85	1.5	2.8	5.1
Maximum current	A	2.6	2.6	5.0	9.0	18
Speed/position detector		Encoder (resolution 8192 pulses per rev.)				
Structure		Totally enclosed, self cooled, IP44				
Weight	Kg	0.4	0.53	0.99	1.45	3.0

HA-FF-EC Motors

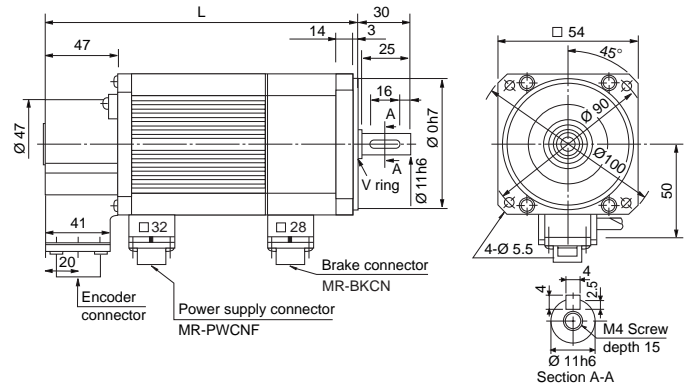
● HA-FF053 (B), HA-FF13 (B)

Model	Variable Dimension L (mm)	Output (W)	Inertia J (Kg.cm ²)	Weight (Kg)
HA-FF053-EC	120	50	0.063	1.8
HA-FF13-EC	137	100	0.10	2
HA-FF053-ECB	155	50	0.08	2.1
HA-FF13-ECB	172	100	0.11	2.3



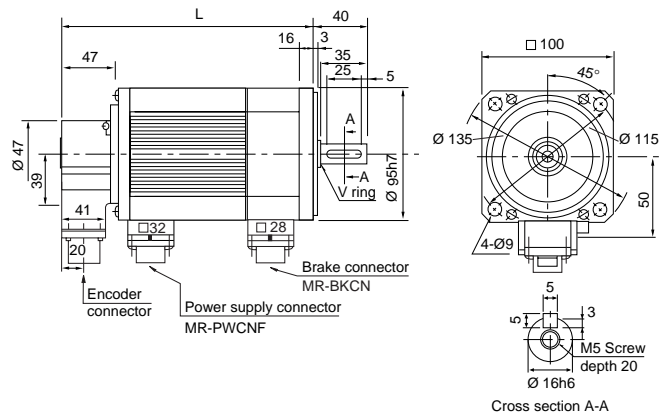
● HA-FF23 (B), HA-FF33 (B)

Model	Variable Dimension L (mm)	Output (W)	Inertia J (Kg.cm ²)	Weight (Kg)
HA-FF23-EC	145	200	0.35	2.6
HA-FF33-EC	162	300	0.50	2.9
HA-FF23B-EC	182	200	0.48	3.5
HA-FF33B-EC	200	300	0.63	3.8



● HA-FF43 (B), HA-FF63 (B)

Model	Variable Dimensions	Output (W)	Inertia J (Kg.cm ²)	Weight (Kg)
HA-FF43-EC	169	400	0.98	4.7
HA-FF63-EC	184	600	1.2	5.3
HA-FF43B-EC	206	400	1.33	5.8
HA-FF63B-EC	221	600	1.55	6.4

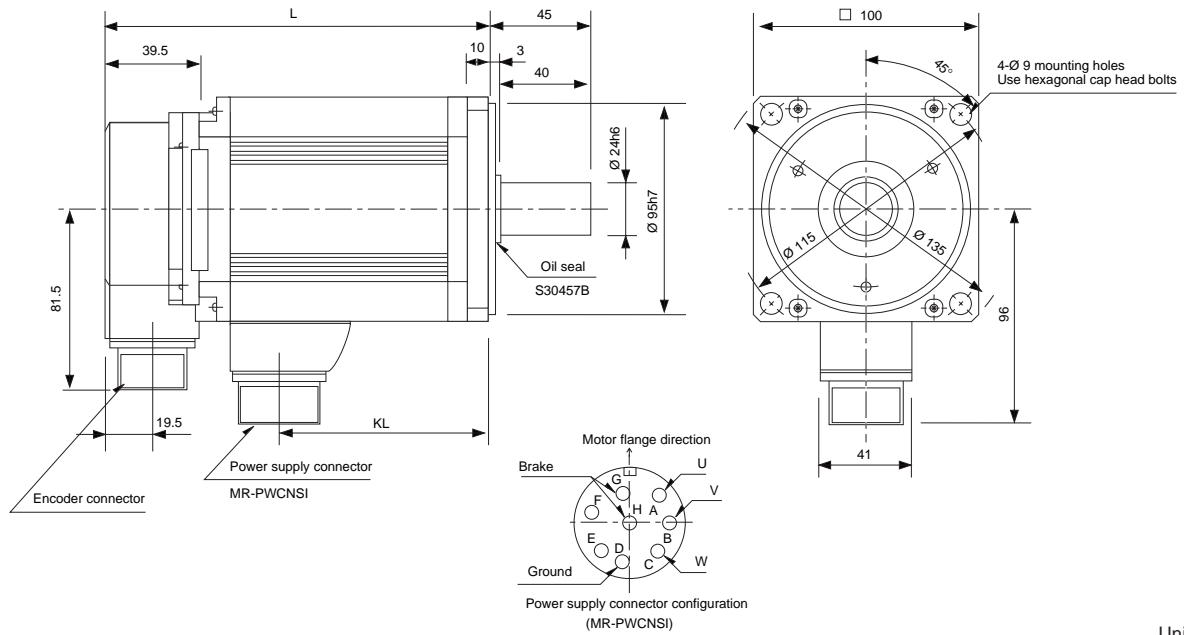


Units: mm

Servo motor	HA-FF-EC	053-EC	13-EC	23-EC	33-EC	43-EC	63-EC
Servo amplifier	MR-J2	10A	10A	20A	40A	40A	60A
Continuous duty	Rated output (kW)	0.05	0.1	0.2	0.3	0.4	0.6
	Rated torque	Nm	0.16	0.32	0.64	0.95	1.3
Rated speed	Rpm	3000					
Maximum speed	Rpm	4000					
Maximum torque	Nm	0.48	0.95	1.9	2.9	3.8	5.7
Moment of inertia - J	Kg.cm ²	0.063	0.095	0.35	0.5	0.98	1.2
Recommended load to rotor inertia ratio		10 times or less					
Power supply capacity	KVA	0.3	0.3	0.5	0.7	0.9	1.1
Rated current	A	0.6	1.1	1.3	1.9	2.5	3.6
Maximum current	A	1.8	3.3	3.9	5.7	7.5	10.8
Speed/position detector		Encoder (resolution 8192 pulses per rev.)					
Structure		Totally enclosed, self cooled, IP65					
Weight	Kg	1.3	1.5	2.3	2.6	4.2	4.8

HC-RF Motors

● HC-RF103 (B), HC-RF153 (B), HC-RF203 (B)



Units: mm

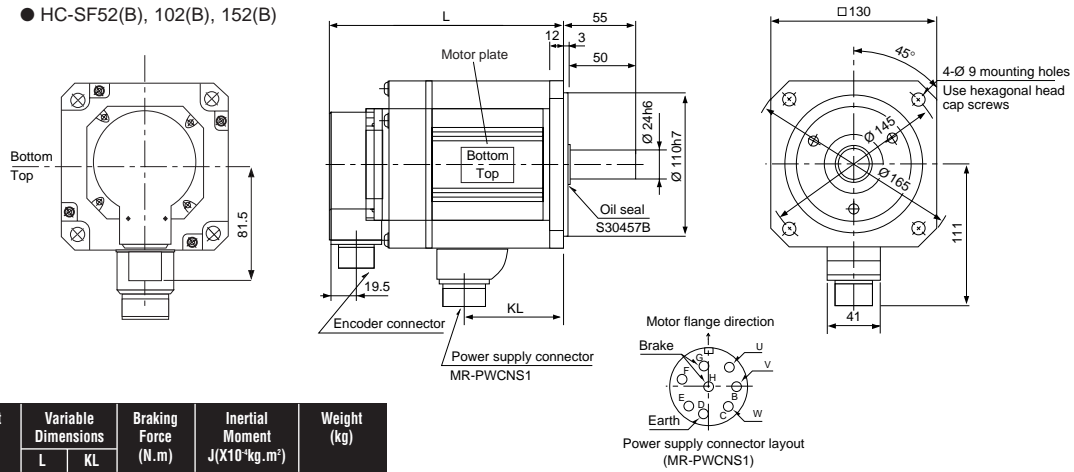
Model	Variable Dimensions	
	L	KL
HC-RF103	147	-
HC-RF153	172	-
HC-RF203	197	-
HC-RF103B	185	71
HC-RF153B	210	96
HC-RF203B	235	121

Servo motor	HC-RF		103	153	203
Servo amplifier	MR-J2		200A	200A	350A
Continuous duty	Rated output (kW)		1.0	1.5	2.0
	Rated torque	Nm	3.18	4.78	6.3
Rated speed	Rpm		3000		
Maximum speed	Rpm		4500		
Maximum torque	Nm		7.95	11.9	15.9
Moment of inertia - J	Kg.cm ²		1.5	1.9	2.3
Recommended load to rotor inertia ratio	5 times or less				
Power supply capacity	KVA		1.7	2.5	3.5
Rated current	A		6.1	8.8	14
Maximum current	A		18.4	23.4	37
Speed/position detector	Encoder (resolution 16384 pulses per rev.)				
Structure	Totally enclosed, self cooled, IP65				
Weight	Kg		3.9	5.0	6.2

SPECIFICATIONS

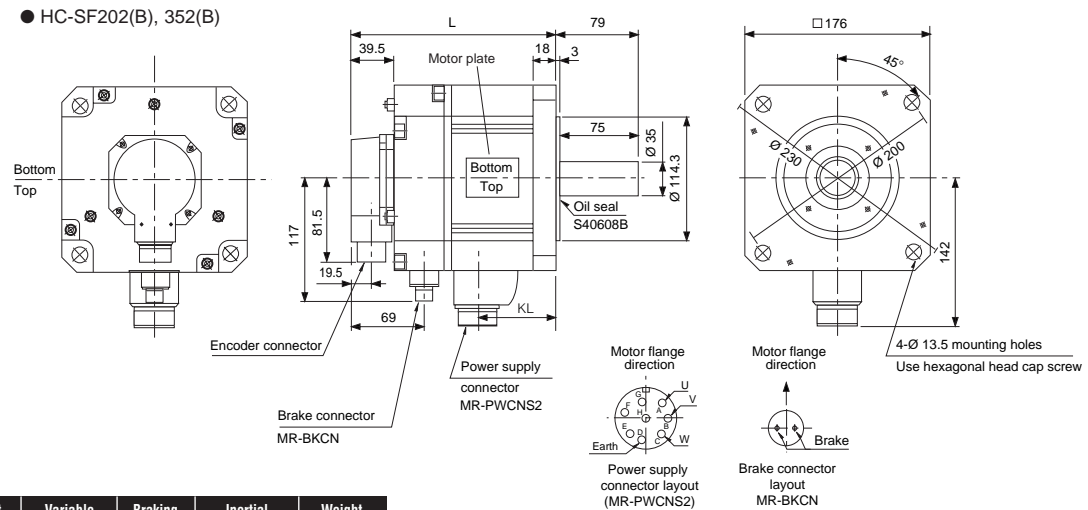
HC-SF Motors

● HC-SF52(B), 102(B), 152(B)



Model	Output (kW)	Variable Dimensions		Braking Force (N.m)	Inertial Moment J($\times 10^{-4}$ kg.m ²)	Weight (kg)
		L	KL			
HC-SF52	0.5	120	51.5	-	6.6	5.0
HC-SF102	1.0	145	75.5	-	13.7	7.0
HC-SF152	1.5	170	101.5	-	20	9.0
HC-SF52B	0.5	153	51.5	8.5	8.3	7.5
HC-SF102B	1.0	178	76.5	8.5	15.4	9.5
HC-SF152B	1.5	203	101.5	8.5	21.7	11.5

● HC-SF202(B), 352(B)



Model	Output (kW)	Variable Dimensions		Braking Force (N.m)	Inertial Moment J($\times 10^{-4}$ kg.m ²)	Weight (kg)
		L	KL			
HC-SF202	2.0	145	68.5	-	42.5	12.0
HC-SF352	3.5	187	110.5	-	82.0	19.0
HC-SF202B	2.0	193	68.5	43.1	52.5	18.0
HC-SF352B	3.5	235	110.5	43.1	92.5	25.0

Units: mm

Servo motor	HC-SF	52	102	152	202	352
Servo amplifier	MR-J2	60A	100A	200A	200A	350A
Continuous duty	Rated output (kW)	0.5	1.0	1.5	2.0	3.5
	Rated torque	Nm	2.39	4.78	7.16	9.55
Rated speed	Rpm	2000				
Maximum speed	Rpm	3000			2500	
Maximum torque	Nm	7.16	14.4	21.6	28.5	50.1
Moment of inertia - J	Kg.cm ²	6.6	13.7	20.0	42.5	82.0
Recommended load to rotor inertia ratio		15 times or less				
Power supply capacity	KVA	1.0	1.7	2.5	3.5	5.5
Rated current	A	3.2	6	9	11	17
Maximum current	A	9.6	18	27	33	51
Speed/position detector		Encoder (resolution 16384 pulses per rev.)				
Structure		Totally enclosed, self cooled, IP65				
Weight	Kg	5.0	7.0	9.0	12.0	19.0

TECHNICAL SPECIFICATIONS

FX-1PG Single axis positioning control module

Item	Specification
No. of axes	One axis per module, up to 8 modules per base unit
Pulse output	10pps to 100kpps
Command units	Pulse/s, cm/min, deg/min, inch/min
Pulse spec.	32 bit accuracy Absolute/relative positioning
Pulse output format	Forward/Reverse pulse or pulse and direction. Open collector output.
Pulse source	+24VDC at 40mA or less (input signals) 60mA at 5V supplied internally from the PLC For pulse outputs, power is supplied from the servo amp. With steppers an external 5V supply is required.
I/O spec.	8 I/O points of the full system configuration are occupied by one module

D75 Multi-axis positioning control modules

Model	A1SD75P1-S3 A1Sd75M1	A1SD75P2-S3 A1SD75M2	A1SD75P3-S3 A1SD75M3
No. of I/O points	32 I/O used		
No. of control axes	1	2	3
Interpolation	None	2 axis circular 2 axis circular	2 axis linear 2 axis linear
Control units	mm, inch, degrees, pulse		
Positioning patterns	600 patterns/axis with flash ROM backup		
Positioning methods	Point to point control, speed/position control, Locus control (all available absolute or incremental)		
Position command range	-214748364.8 to 214748364.7 (m), -21474.83648 to 21474.83647 (inch), -21474.83648 to 21474.83647 (degrees), -2147483648 to 2147483647 (pulses),		
Speed command range	0.001 to 6000000.00 (mm/min), 0.001 to 600000.000 (inch/min) 0.0001 to 600000.000 (degree/min), 1 to 1000000 (pls/sec)		
Accel/decel	Automatic trapezoidal or S-pattern accel/decel 0-65535 (msec) with up to 4 selectable patterns		
Compensation	Sudden stop decel time – 1 to 65535 (ms) Start-up time – 10ms or less Electronic gear – 0 to 65535 unit magnification Backlash compensation – 0 to 65535 position command unit Error compensation function – with mechanical system error		
Home position return	Near zero point DOG, 2 counting types and 3 stopper types		

For More Information

If you would like to know more about how Mitsubishi Electric can provide your business with successful Motion Control Solutions, contact your local distributor.



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