

# Stepping Servos



## FWD Series

Stepping motors make it easy to control position and speed, and they are used in many applications. However, stepping motors driven with a conventional open loop control are sometimes unable to provide satisfactory results in response to the strong demand for improved equipment performance and reliability. Therefore, there are an increasing number of application which use a closed loop control system that employs a sensor. This page is intended to introduce you to stepping motor products for driving at high speed and with high accuracy. **Without the use of any sensor.** They are built using proprietary technology that we developed.



**Stepping Servos** are the type of products to which we applied our original technology for driving stepping motors at high speed and high accuracy. The products covered in this introduction include both stepping motors and drivers that can be operated at high speed, thanks to a new control system which monitors the rotor position and controls the excitation timing. Although our motors are standard 2-phase stepping motors, a 0.72deg/step angle is achieved using this driver (which is the same as in 5-phase stepping motors). The basic resolution of 0.72deg can be further divided into 80 parts (0.009 deg) using a micro-step function. This driver improves high-speed operation. Also, an out-of-step condition can now be detected in stepping motors and drivers, which is a first in the industry. (This is only possible at motor shaft speeds of 500 rpm or higher.)

Model name	Applicable motors	Rated Current (A/phase)	Max. static torque (mN-m)	Rotor inertia (g-cm <sup>2</sup> )	Power specifications (DC)
FWD2B1P15-11	KH42HM2-951	0.8	169	38	24V, 2.0A
FWD2B1P15-21	KH42JM2-951	0.8	314	56	24V, 2.0A
FWD2B1P15-31	KH42KM2-951	1.2	427	85	24V, 2.5A
FWD2B2P15-41	KH60JM2-951	2	918	275	24V, 4.0A
FWD2B2P15-51	KH60KM2-951	2	1360	400	24V, 4.0A
FWD2B2P15-11	KH56JM2-951	2	491	115	24V, 3.0A
FWD2B2P15-21	KH56KM2-951	2	915	188	24V, 3.5A
FWD2B2P15-31	KH56QM2-951	2	1510	269	24V, 4.0A

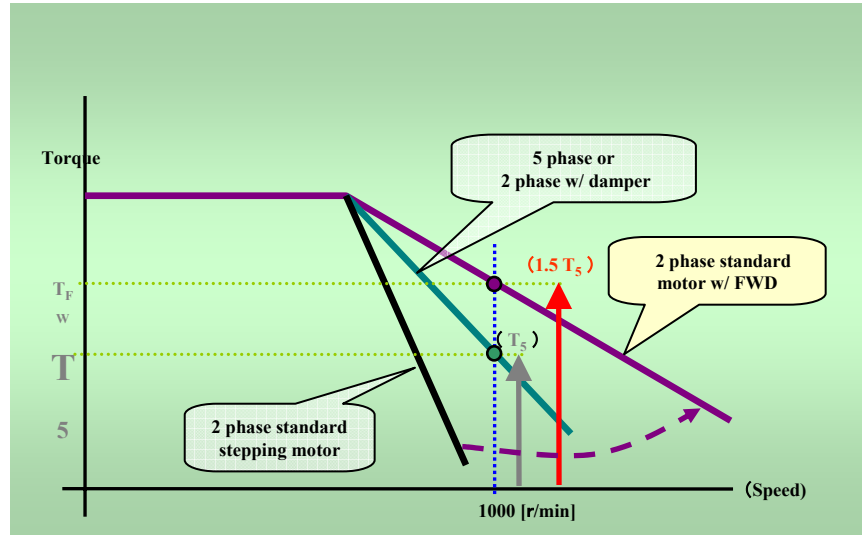
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### Stepping motor that can be operated at high speed:

Thanks to a new control system, in which the rotor position is monitored and the excitation timing is controlled motors can be run at 2000rpm or more without using an external damper. This new control system is effective in saving space by eliminating an external damper and in reducing the tact time of a high-speed drive.



### Thin drivers with a micro-step function:

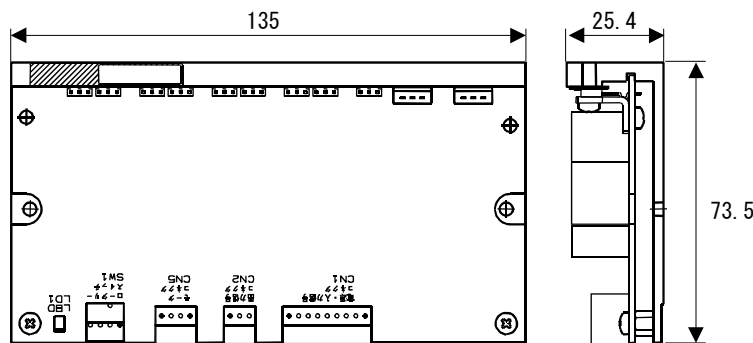
These are DC 24 V input drivers. A micro-step drive electrically subdivides the basic step angle, making it possible to have a basic step angle ranging from 0.72 down to 0.009deg without using a gear head. The resolution can be easily set using a rotary switch attached to the driver. The driver size is 135(L) x 73.5(W)x 25.4(H), and the driver design is very thin. These drivers are most suitable in applications involving multiple shafts.

### Vibration suppression:

Since a spark-advance-control system driver circuit controls the phase of the current relative to the polar position, vibration control is possible in principle. This is supplemented by our own vibration suppression function which uses a microcomputer. With this function, vibration at high speed is effectively suppressed, leaving only a very small amount of vibration.

### Variety of output signals:

Previously, detecting an out-of-step condition in a stepping motor was not possible using only stepping motors and drivers. Now the impossible has become possible using polar position information (At 500rpm or more). Detecting this signal allows more accurate control. In addition to this signal, an alarm signal and an index signal are output.



Input Voltage	DC 24V
Applicable motor	Our standard 2phase stepper, Size 17 & 23
Maximum output current	2A/phase(RMS)
Component	1MPU (H8S Micro processor) Logic control & analog current control
Input signal	Pulse
Function	Step-out detection, Reduce vibration, Micro-step driving
Micro-step resolution	0.72, 0.36, 0.18, 0.09, 0.072, 0.036, 0.018, 0.009 [deg/step]
Other	Power save function, Index pulse output