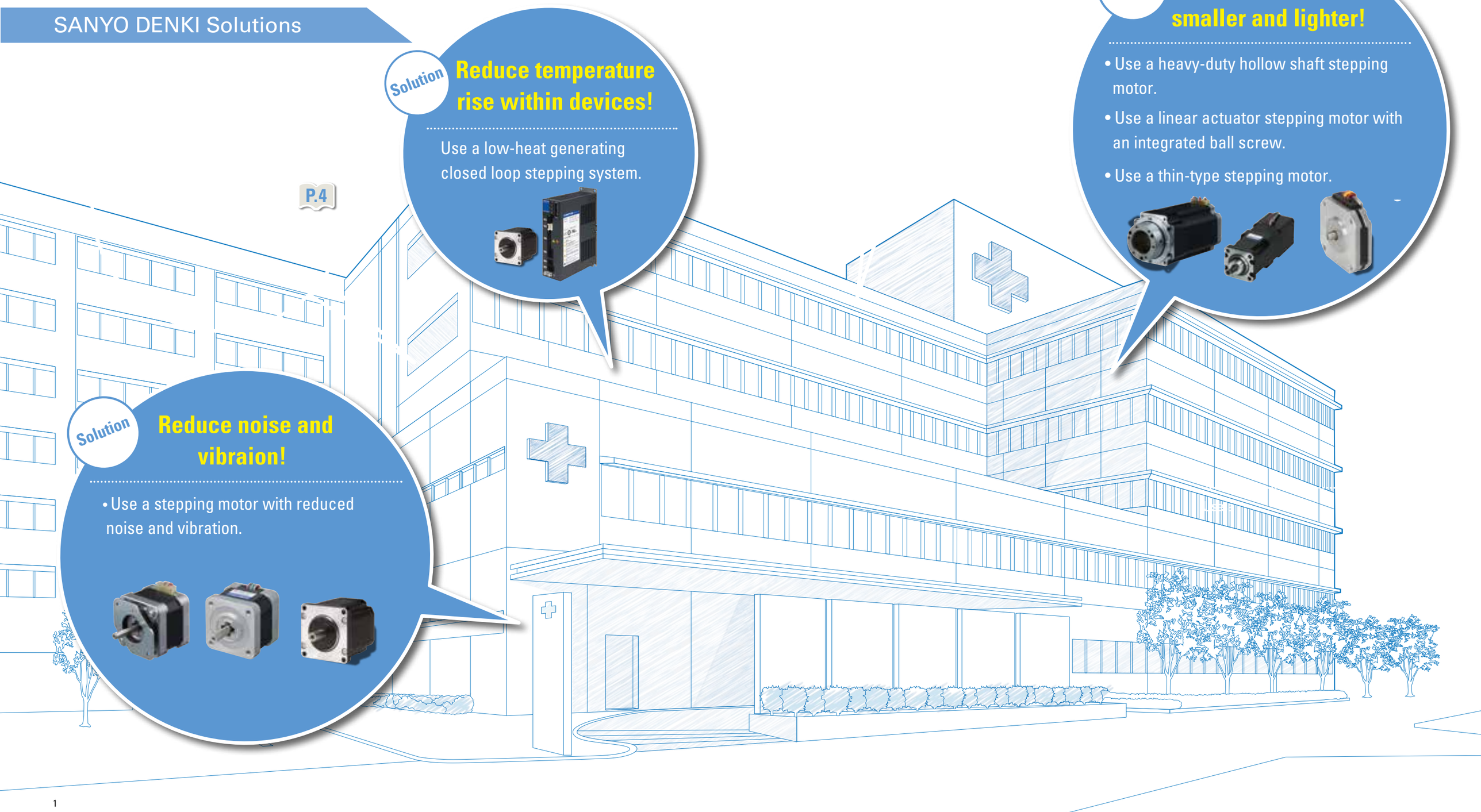
SANYO DENKI

helps raise the performance and usability of medical devices.

We provide a variety of solutions to support the medical field.

SANYO DENKI Solutions



Solution

Reduce temperature rise within devices!

Use a low-heat generating closed loop stepping system.

P.4

Solution

Make devices smaller and lighter!

- Use a heavy-duty hollow shaft stepping motor.
- Use a linear actuator stepping motor with an integrated ball screw.
- Use a thin-type stepping motor.

Solution

Reduce noise and vibraion!

- Use a stepping motor with reduced noise and vibration.

Solution

Reduce temperature rise within devices!
Reduce noise and vibration!

Details in → p. 18

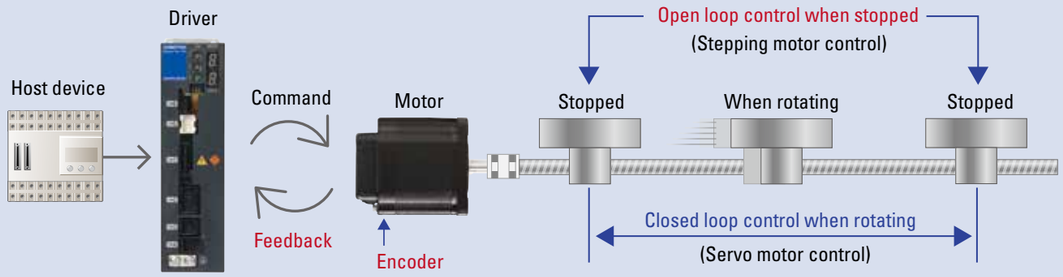
Closed Loop Stepping Systems

Model No. PB

Flange size 28 mm sq. to 86 mm sq.

Efficient driving

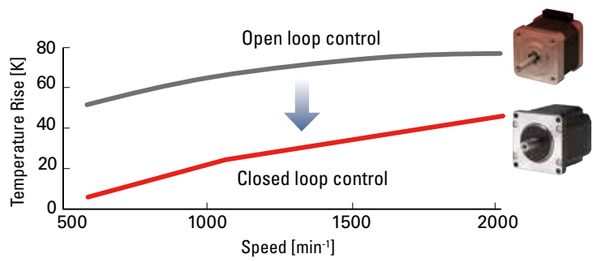
Closed loop stepping systems combine stepping motors with position detecting encoders that provide feedback for closed loop control. Without step-out, they are more reliable than open loop stepping systems. They also have efficient driving.



Closed loop control for low heat generation

An open loop control system continuously supplies rated current to a stepping motor, regardless of the load.
The closed-loop control system Model No.PB can supply only the current necessary for the motor' s required torque, lowering heat generation.

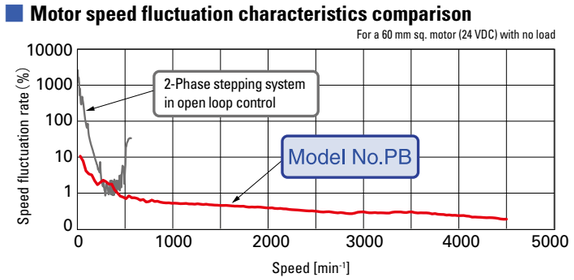
■ **Motor temperature rise comparison**



Low vibration

The encoder detects the position of the rotor and controls the current supply for the best excitation timing. Since closed-loop control does not supply excess current to the motor, it produces less vibration than open loop stepping systems.

■ **Motor speed fluctuation characteristics comparison**



- 2-Phase stepping system — Motor: 103H7822-0410, Driver: US1D200P10
- Closed loop stepping system — Motor: PBM603DXK50, Driver: PB4003P340

Solution

Reduce noise and vibration!

Details in → p. 18

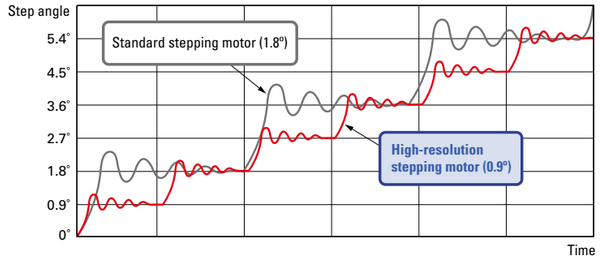
High-Resolution Stepping Motor

2-Phase

Flange size 42 mm sq., 60 mm sq. Step angle 0.9°

Decrease vibration by increasing the resolution of the motor.

■ **Motor step response comparison**



Compared to standard stepping motors, high-resolution stepping motors have less overshoot and undershoot per step, so they can be driven with less vibration.

Solution

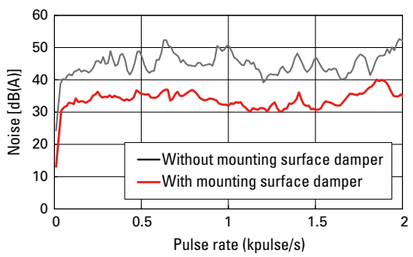
Mounting Surface Damper

2-Phase

Flange size 42 mm sq. motor

Suppress vibration of the motor with rubber, reducing noise and transmission of vibration to the equipment.

■ **Noise level comparison (with/without mounting surface damper)**



Motor: 103H5208-0410
Driving circuit: US1D200P10
Power supply voltage: 24 VDC
Excitation current: 1.2 A/phase (set value)
Excitation method: 2-Phase excitation
Background noise: 12.6 dB(A)
Mounting method: Mounting plate
Rubber hardness of mounting surface damper: 45°
Measurement position: 0.5 m from the side of the motor

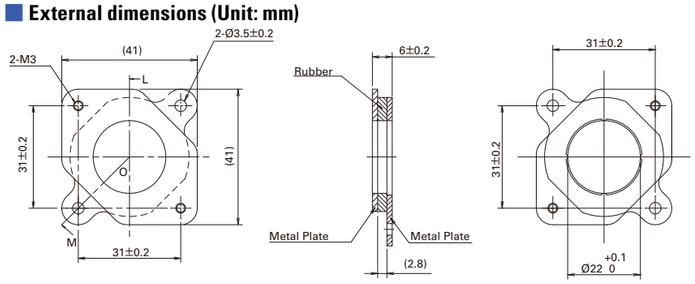
Note 1: Noise effect varies depending on the housing where the mounting surface damper is installed.
2: We can provide motors with mounting surface dampers installed. Please contact a SANYO DENKI sales representative.
3: Please pay attention to motor temperature rise since motors get hot with damper installed.

■ **Damper specifications**

Model no.: 3535051-1
Hardness: 45°
Material: Nitrile rubber

Note: Mounting screws need to be prepared by the customer.

■ **External dimensions (Unit: mm)**



Solution

Make devices smaller and lighter!

Heavy-Duty Hollow Shaft Stepping Motor

2-Phase

Flange size **42** mm sq. Thrust load: 370 N (Approx. 37 kg)
60 mm sq. Thrust load: 450 N (Approx. 45kg)

This stepping motor has an allowable thrust load (limit value of load that can be applied in the direction parallel to the shaft axis) 37 times* that of our existing product.
It can be used for applications where large loads are applied.

* 370 N as opposed to 10 N of our existing model (for 42 x 42 mm sized model)

Compatible driver

Model no.: BS1D200P10 (DC input)
Operating current selection switch setting: With an SL2423-5241 motor: A (1 A/phase)
With an SL2603-5741 motor: 0 (2 A/phase)

Driver/motor connection relay cable

Model no.: 1 m : F2C02M0100A
2 m : F2C02M0200A
3 m : F2C02M0300A

Precautions on use

When used for driving objects like circular tables, load inertia applied to the motor is higher and stopping time may be longer.

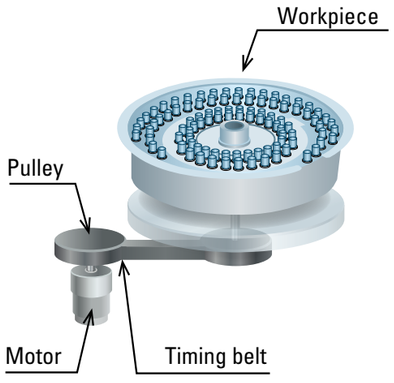
Notes on use

- The protection rating of this product is IP40. If the usage environment will contain mist, water, or powder, take measures to protect the motor.
- The allowable load limit of this product is detailed below. Do not exceed the below load limits.
  42 mm sq. Thrust load: 370 N
  60 mm sq. Thrust load: 450 N
- When using an extension cable between the motor and driver, be aware of voltage drop and use a cable under approximately 3 m.

For example, when using this motor in a rotary table...

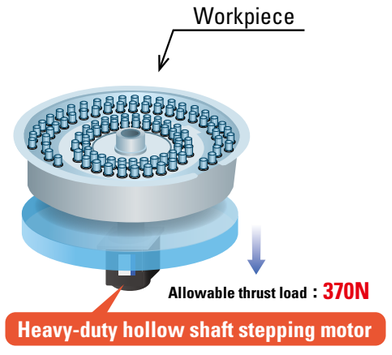
Former mounting method

Because it is not capable of receiving the load of the workpiece directly, the table is indirectly driven using a pulley and timing belt.



Solution

Simplify the mechanism by directly receiving the load of the workpiece.



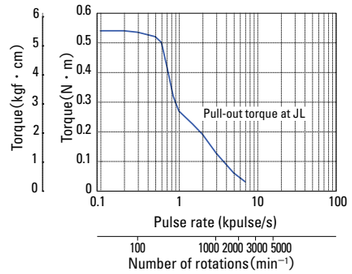
42 mm sq. 1.8° /step RoHS Bipolar

Model number	Holding torque at 2-phase excitation	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass	Motor length (L)
Single shaft	[N·m] or greater	A /phase	Ω /phase	mH /phase	× 10^{-4}kg・m^2	kg	mm
SL2423-5241	0.52	1	4.8	10.5	0.2	0.5	67.5

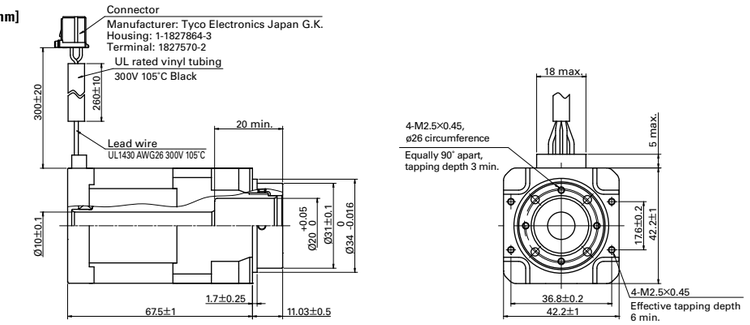
Characteristics diagram

SL2423-5241

Drivers : BS1D200P10
Power supply voltage: 24 VDC, Wiring current: 1 A/phase
2-Phase excitation (full step)
J_L=0.94 × 10^{-4}kg・m^2 when rubber coupling used
Maximum starting rate: 1060 pulse/s
Maximum slew rate: 1150 pulse/s



Dimensions [Unit: mm]



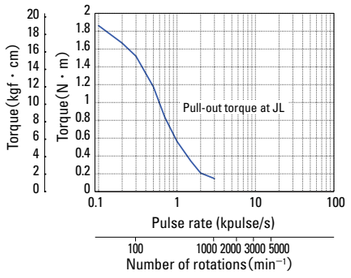
60 mm sq. 1.8° /step RoHS Bipolar

Model number	Holding torque at 2-phase excitation	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass	Motor length (L)
Single shaft	[N·m] or greater	A /phase	Ω /phase	mH /phase	× 10^{-4}kg・m^2	kg	mm
SL2603-5741	2	2	2.4	11	1.34	1.6	98.7

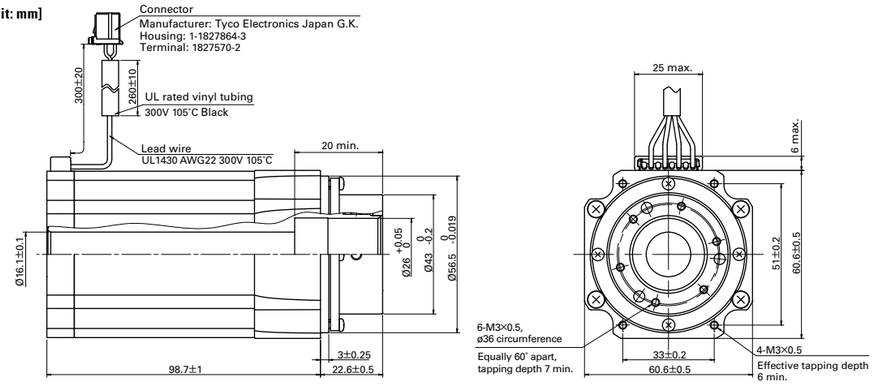
Characteristics diagram

SL2603-5741

Drivers : BS1D200P10
Power supply voltage: 24 VDC, Wiring current: 1 A/phase
2-Phase excitation (full step)
J_L=0.94 × 10^{-4}kg・m^2 when rubber coupling used
Maximum starting rate: 600 pulse/s
Maximum slew rate: 610 pulse/s



Dimensions [Unit: mm]



Solution

Make devices smaller and lighter!

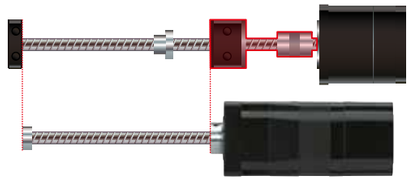
Details in → p. 18

Linear Actuator Stepping Motor

5-Phase

Flange size 42 mm sq., 60 mm sq.

A stepping motor and ball screw are integrated into one compact unit.

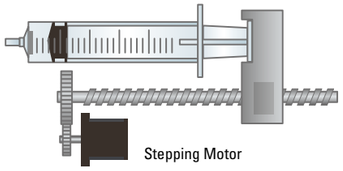


Reduced complexity

In devices such as syringe pumps...

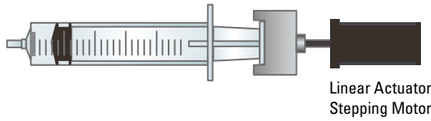
Formerly

The mechanism is large because of the external ball screw.



Solution

Installation space can be decreased by simplifying the mechanism.



Solution

Flange size 42 mm sq., 60 mm sq.

Details in → p. 18

Thin-type Stepping Motor

2-Phase

Flange size

42mm sq. Motor length: 11.6 mm (Mass: 0.07 kg), 18.6 mm (Mass: 0.14 kg)

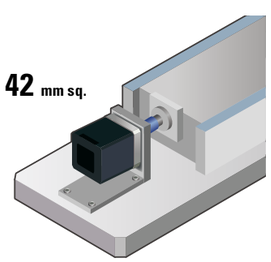
50mm sq. Motor length: 11.4 mm (Mass: 0.09 kg), 16.4 mm (Mass: 0.15 kg)

This thin and lightweight motor can be installed in narrow spaces.

Formerly

Large motors make devices bigger and heavier.

42 mm sq.



Motor length: 33 mm

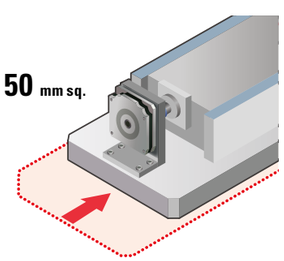
Motor mass: 0.23 kg

Holding torque: 0.2 N·m

Solution

Small motors help make devices compact and lighter.

50 mm sq.



Motor length: 16.4 mm

Approx. 50% smaller than our existing motor

Motor mass: 0.15 kg

Approx. 35% smaller than our existing motor

Holding torque: 0.215 N·m

SANMOTION Series Product Lineup

Closed Loop Stepping System SANMOTION Model No.PB Type R: AC input, RS-485 + parallel I/O type

● **Common motor specifications** Lead wire length: 500 ± 20 mm ● **Common driver specifications** Dimensions (W x H x D): 42 x 170 x 120 mm

Motor dimensions Flange size x motor length (mm)	Maximum stall torque (N·m)	Motor model number	Driver model number (Input power supply 100 to 115 VAC)	Driver model number (Input power supply 200 to 230 VAC)
42×55.9	0.35	PBM423FXK30-M	PB4A002R300	PB4A002R301
60×68.8	1.3	PBM603FXK30-M		
60×100.8	1.9	PBM604FXK30-M		
86×79.5	3.1	PBM861FXK30-M		
86×110	6.1	PBM862FXK30-M		

Closed Loop Stepping System SANMOTION Model No.PB Type P: AC input, Pulse train input type

● **Common motor specifications** Lead wire length: 500 ± 20 mm ● **Common driver specifications** Dimensions (W x H x D): 42 x 170 x 120 mm

Motor dimensions Flange size x motor length (mm)	Maximum stall torque (N·m)	Motor model number	Driver model number (Input power supply 100 to 115 VAC)	Driver model number (Input power supply 200 to 230 VAC)
42×55.9	0.35	PBM423FXK30-M	PB4A002P300	PB4A002P301
60×68.8	1.3	PBM603FXK30-M		
60×100.8	1.9	PBM604FXK30-M		
86×79.5	3.1	PBM861FXK30-M		
86×110	6.1	PBM862FXK30-M		

Closed Loop Stepping System SANMOTION Model No.PB Type P: DC input, Pulse train input type, Multi-axis

● **Common motor specifications** Lead wire length: 500 ± 20 mm ● **Common driver specifications** Power supply: 24/48VDC, Dimensions (W x H x D): 60 x 160 x 95 mm, No. of controllable axes: 4

Motor dimensions Flange size x motor length (mm)	Maximum stall torque (N·m)	Motor model number	Driver model number
28×59.2	0.055	PBM281DXE50	PB4D003P340
28×78.5	0.115	PBM285DXE50	
42×55.9	0.39	PBM423DXK50	
60×68.8	1.05	PBM603DXK50	
60×100.8	1.85	PBM604DXK50	

Closed Loop Stepping System SANMOTION Model No.PB Type P: DC input, Pulse train input type, Multi-input type (pulse train/RS-485 + parallel I/O)

● **Common motor specifications** Lead wire length: 500 ± 20 mm ● **Common driver specifications** Power supply: 24/48VDC, Dimensions (W x H x D): 32 x 160 x 95 mm

Motor dimensions Flange size x motor length (mm)	Maximum stall torque (N·m)	Motor model number	Driver model number (Single power supply type)	Driver model number (Dual power supply type)
28 × 58.5	0.055	PBM282FXE20	PB3D003M200	PB3D003M201
28 × 77.8	0.115	PBM284FXE20		
42 × 57.6	0.39	PBM423FXE20		
60 × 70.3	1.3	PBM603FXE20		
60 × 102.3	1.9	PBM604FXE20		

5-Phase Stepping System SANMOTION F5 Linear Actuator Stepping Motor

● **Common motor specifications** Lead wire length: SL5421 motors··· 300 mm or longer, SL5601 motors··· 600 mm or longer
● **Driver (Model no.: FS1D140P10) specifications** Power supply: 24/36VDC, Full-step/Half-step, Dimensions (W x H x D): 64 x 37 x 56 mm

Motor dimensions Flange size x motor length (mm)	Brake	Rated current (A/phase)	Stroke (mm)	Thrust (N)	Speed (mm/s)	Resolution (mm)	Motor model number	Driver model number
42 × 87	No	0.75	50	370	48	0.004	SL5421-7241	FS1D140P10
42 × 117	Yes	0.75	50	370	48	0.004	SL5421-72XB41	
60 × 135.6	No	1.4	80	450	64	0.008	SL5601-8241	
60 × 135.6	Yes	1.4	80	450	64	0.008	SL5601-82XB41	

2-Phase Stepping System SANMOTION F2

Bipolar, Thin-type Stepping Motor

● **Common motor specifications** Lead wire length: 300 mm or longer

Motor dimensions Flange size x motor length (mm)	Maximum stall torque (N·m)	Rated current (A/phase)	Step angle (degree)	Shaft	Mass (kg)	Motor model number
42 × 11.6	0.083	1.0	1.8	Single shaft	0.07	SS2421-5041
42 × 18.6	0.186	1.0	1.8	Single shaft	0.14	SS2422-5041
50 × 11.4	0.1	1.0	1.8	Single shaft	0.09	SS2501-8040
50 × 16.4	0.215	1.0	1.8	Single shaft	0.15	SS2502-8040

Drivers for these motors need to be prepared by the customer.

Bipolar, High-Resolution Stepping Motor

● **Common motor specifications** Lead wire length: 300 mm or longer ● **Common driver specifications** Power supply: 24/36VDC, Microstepping, Dimensions (W x H x D): 64 x 29 x 56 mm

Motor dimensions Flange size x motor length (mm)	Maximum stall torque (N·m)	Rated current (A/phase)	Step angle (degree)	Shaft	Motor model number	Driver model number
42 × 33	0.23	2	0.9	Single shaft	SH1421-5241	BS1D200P10
42 × 39	0.34	2	0.9	Single shaft	SH1422-5241	
42 × 48	0.48	2	0.9	Single shaft	SH1424-5241	
60 × 42	0.69	2	0.9	Single shaft	SH1601-5240	
60 × 54	1.28	2	0.9	Single shaft	SH1602-5240	
60 × 76	2.15	2	0.9	Single shaft	SH1603-5240	