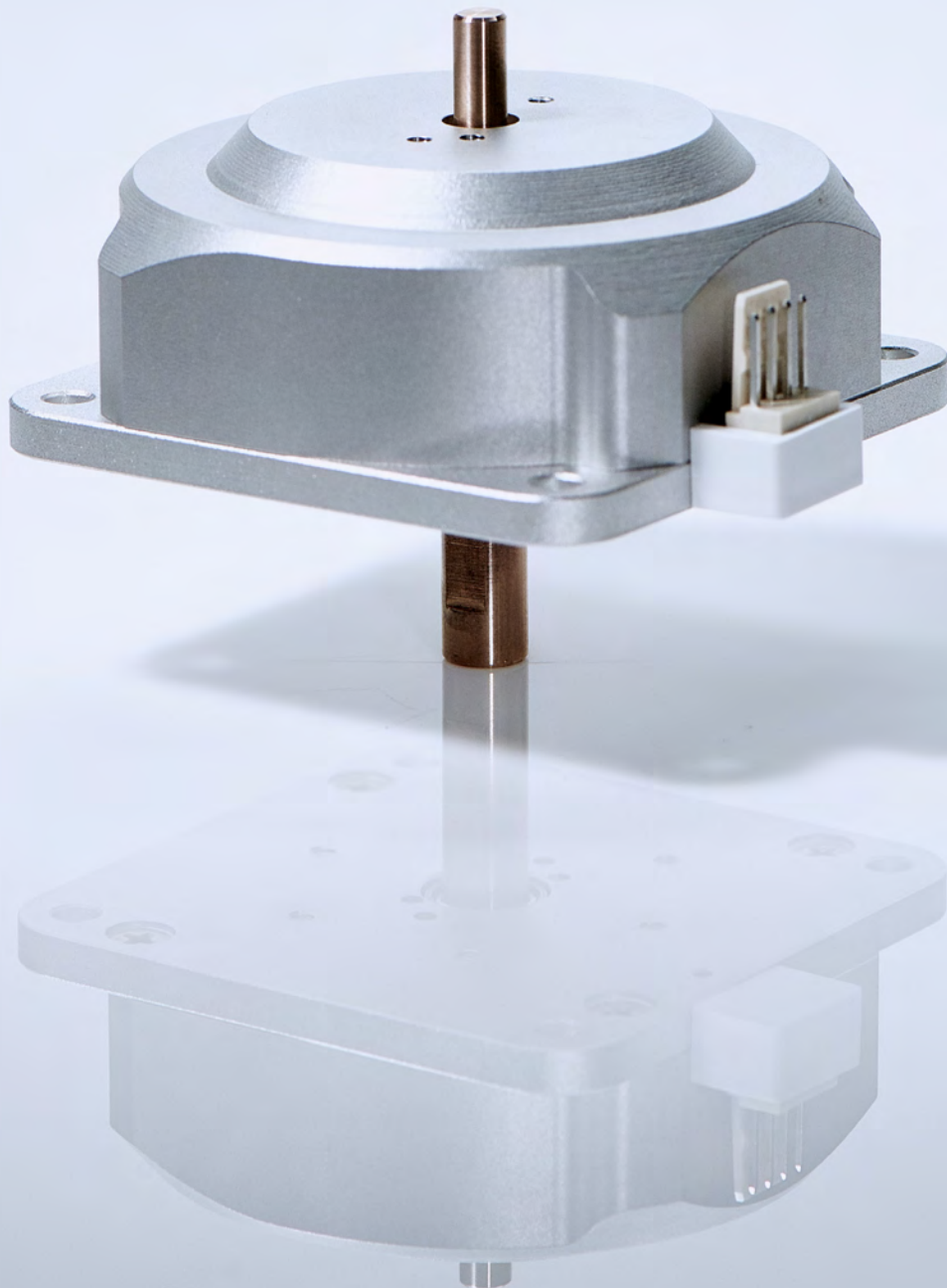
A detailed close-up photograph of a piezo-sonic motor. The central component is a polished metal shaft with a threaded section. It is surrounded by a circular housing with several gold-colored screws. The outer ring of the motor features a series of copper-colored, rectangular slots or teeth. The lighting is dramatic, highlighting the metallic textures and the precision engineering of the device.

PIEZO SONIC MOTOR

Product catalog

Piezosonic Motor

New choice to realize Small size, High torque, Quiet and Non-backlash.



A big energy from a small body

Piezosonic motor engineers who have been researching and developing for more than 20 years have been working on solving two contradictory problems of ultrasonic motors such as longer life and higher torque.

As a result, we succeeded in prolonging the life as compared with conventional ultrasonic motors. In addition, the technology received a prize from [The Japan Society for Precision Engineering] that is academic societies in Japan. (Patent pending)

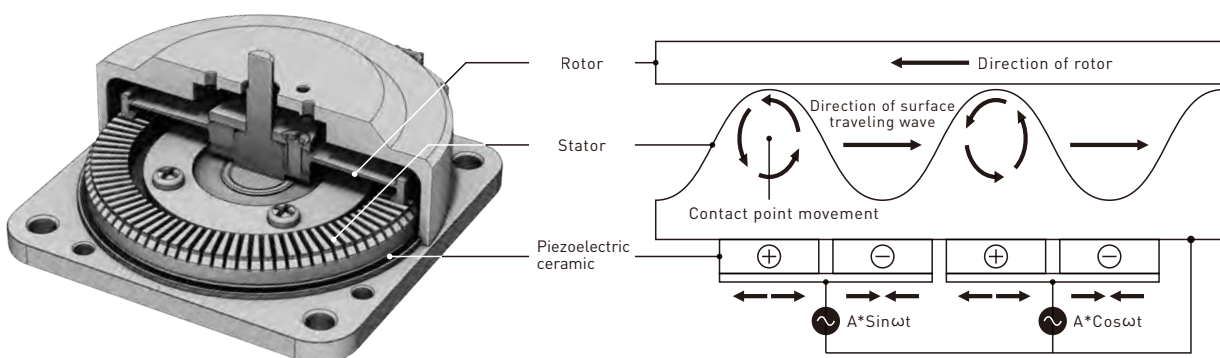
We are developing ultrasonic motors suitable for stages for semiconductor manufacturing equipment requiring high precision, nonmagnetic and high torque, and various positioning devices.

And, because we have the circuit technology of ultrasonic motor which is difficult to configure, we are developing a driver with a drive circuit with excellent response and control characteristics.

PIEZOSONIC MOTOR

What is Piezosonic Motor?

Piezosonic motors do not use magnets and coils. The driving energy is the vibration of piezoelectric ceramic. Because it rotates by using friction, it is small and lightweight. The torque is 5 to 10 times that of a DC motor of the same size. Since it does not use coils and magnets for the drive source, it can construct a nonmagnetic motor, and it can be used with confidence in a semiconductor manufacturing equipment or the like which is unlikely to be affected by high magnetic field in MRI and magnetic field. In addition, it is possible to maintain posture with non-energized or non-control signals. And because there is no backlash, highly accurate position control by direct drive of the device is possible. It is also highly responsive to start and stop signals. Our ultrasonic motor is suitable for transport equipment such as stage, camera cloud stand, gimbal, indexing device and articulated robot joint motor.



Comparison with other types

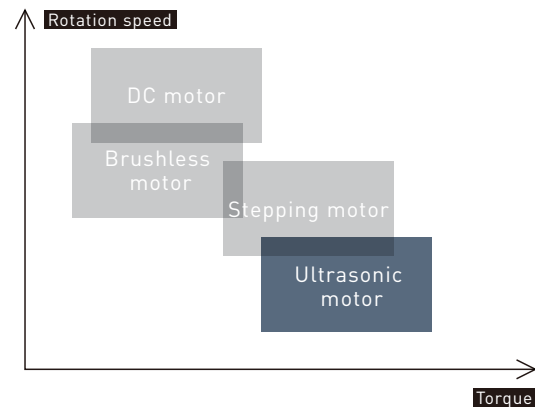
Even though it is small and quiet, precise positioning with high torque is possible.

Rotation speed · Torque

This figure focuses on the relationship between the torque and the rotation speed of the same size Ultrasonic motor, DC motor, Brushless motor, Stepping motor.

The ultrasonic motor has characteristics of Low speed and High torque compared with other motors.

Because of the frictional force it can maintain high holding force even when it is not controlled and there is no backlash. So you can construct a direct drive actuator system that does not use gears.



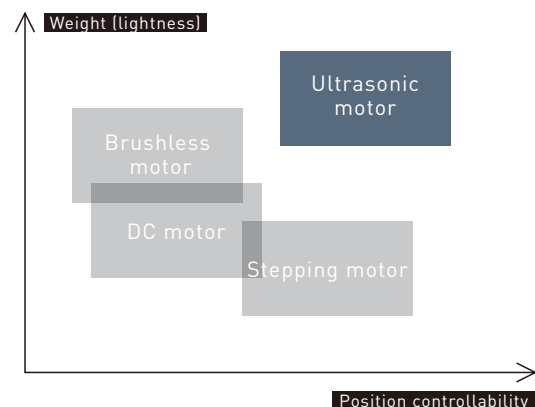
Weight · Position control

This figure focuses on the relationship between position controllability and weight (lightness) of the same sized Ultrasonic motor, DC motor, Brushless motor, and Stepping motor.

The ultrasonic motor has a feature that it is lighter and has higher position controllability than other motors.

Since the weight of the rotating part is light, the inertia is small, and when the driving signal stops it will stop by the frictional force quickly, so precise positioning is possible.

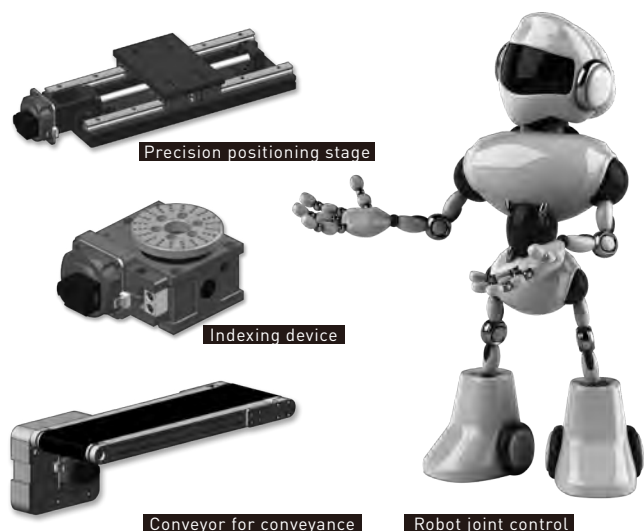
※The final positioning accuracy depends on external sensors (encoder, potentiometer and control controller).



Application example of Ultrasonic motor

Ideal for equipment that repeats move and stop

- Compact transport device usable in office etc.
- Small sorting and dispensing equipment available in offices, etc.
- Silent moving device for monitoring camera
- Gimbal device for attitude control
- Transportation motor in medical equipment in MRI
- Robot arm capable of fine control
- Motor for driving in a strong radiation environment
- Motor for vacuum environment (space environment etc.)



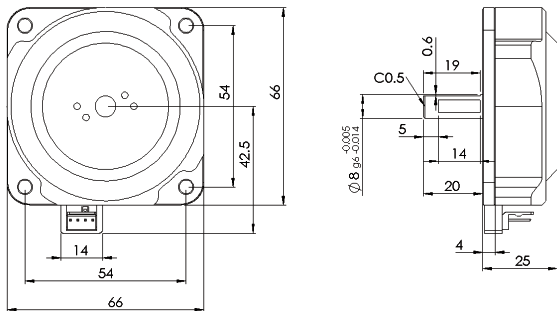
Motor for general environment

PSM60S SERIES

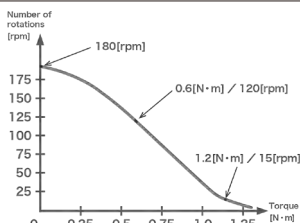
PSM60S-A



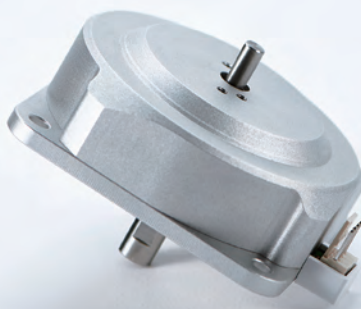
Sensorless single-shaft motor for general environment.
The minimum size in PSM 60S series.
It is suitable for positioning using a sensor mounted on the device or as an intermittent same action motor with a timer.



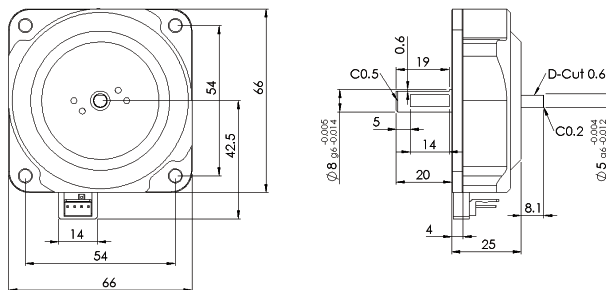
Model Name	Single-shaft motor PSM60S-A
Drive Frequency	40~45 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	120 [rpm]
Maximum Speed	180 [rpm]
Rated Torque	0.6 [N·m]
Maximum Torque	1.2 [N·m]
Holding Torque	1.2 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	66×66×45 [mm]
Weight	230 [g]
Encoder resolution	Without encoder, single-shaft
Minimum Accuracy	Depends on external sensor



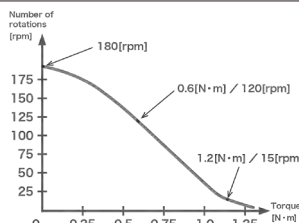
PSM60S-B



Sensorless double-shaft motor for general environment.
It has a sub shaft for directly attaching external sensors made by other companies to the motor.
Control using the encoder and tacho generator becomes possible.



Model Name	Double-shaft motor PSM60S-B
Drive Frequency	40~45 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	120 [rpm]
Maximum Speed	180 [rpm]
Rated Torque	0.6 [N·m]
Maximum Torque	1.2 [N·m]
Holding Torque	1.2 [N·m]
Direction & Response	CW, CCW, CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	66×66×53 [mm]
Weight	233 [g]
Encoder resolution	Without encoder, double-shaft
Minimum Accuracy	Depends on external sensor



Motor for general environment

PSM60S SERIES

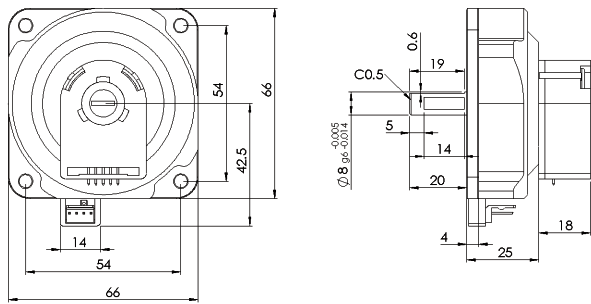
PSM60S-E



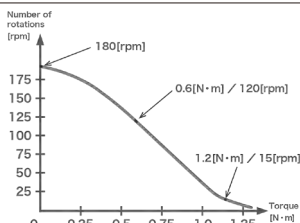
Motor with 500 p/r encoder for general environment. Equipped with 500 pulse/turn TTL signals output encoder.

Motor position and speed can be controlled with accuracy of $\pm 0.18^\circ$ (Multiplying by 4 times).

It is ideal as a motor for transfer equipment using ball screws.



Model Name	Motor with 500 p/r encoder PSM60S-E
Drive Frequency	40~45 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	120 [rpm]
Maximum Speed	180 [rpm]
Rated Torque	0.6 [N·m]
Maximum Torque	1.2 [N·m]
Holding Torque	1.2 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	66×66×63 [mm]
Weight	250 [g]
Encoder resolution	500 [p/r]
Minimum Accuracy	0.18°



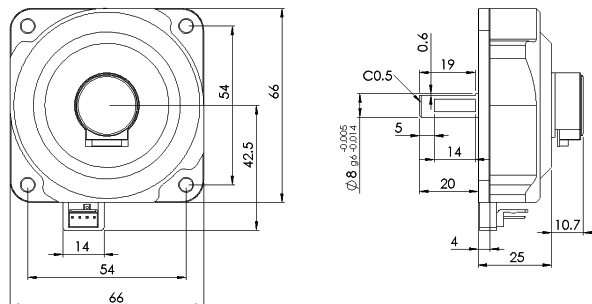
PSM60S-ET



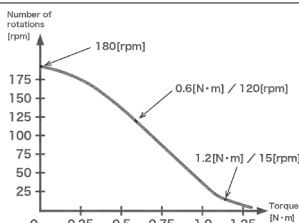
Motor with 1,000 p/r encoder for general environment. Equipped with 1,000 pulse/turn TTL signals output encoder.

Motor position and speed can be controlled with accuracy of $\pm 0.09^\circ$ (Multiplying by 4 times).

It is ideal as a motor for transportation equipment such as high-precision positioning stages.



Model Name	Motor with 1,000 p/r encoder PSM60S-ET
Drive Frequency	40~45 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	120 [rpm]
Maximum Speed	180 [rpm]
Rated Torque	0.6 [N·m]
Maximum Torque	1.2 [N·m]
Holding Torque	1.2 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	66×66×56 [mm]
Weight	240 [g]
Encoder resolution	1,000 [p/r]
Minimum Accuracy	0.09°



Motor for general environment

PSM60S SERIES

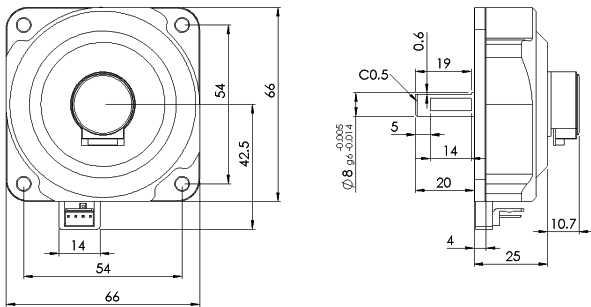
PSM60S-E2T



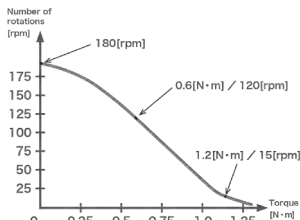
Motor with 2,000 p/r encoder for general environment. Equipped with 2,000 pulse/turn TTL signals output encoder.

Motor position and speed can be controlled with accuracy of $\pm 0.045^\circ$ (Multiplying by 4 times).

It is ideal as a motor for ultra-high precision indexing equipment.



Model Name	Motor with 2,000 p/r encoder PSM60S-E2T
Drive Frequency	40~45 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	120 [rpm]
Maximum Speed	180 [rpm]
Rated Torque	0.6 [N·m]
Maximum Torque	1.2 [N·m]
Holding Torque	1.2 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	66×66×56 [mm]
Weight	240 [g]
Encoder resolution	2,000 [p/r]
Minimum Accuracy	0.045°



Motor for magnetic field environment

PSM60N SERIES

PSM60N-A

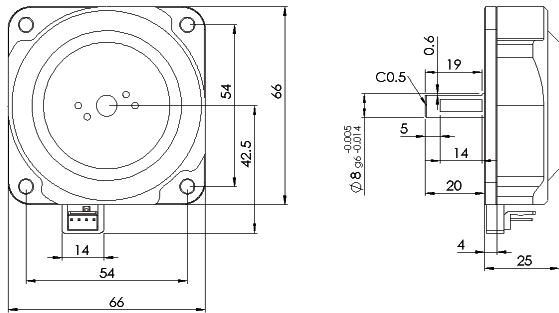


Sensorless single-shaft motor for magnetic field environment.

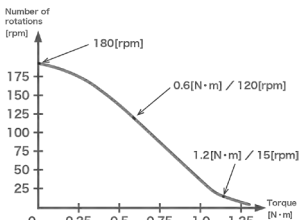
Applicable to 3 [T] magnetic field environment.

Minimum size for PSM 60 N series.

It is ideal as a positioning and transport motor using sensors installed in devices such as MRI and elemental analyzers that are used in high-magnetic field.



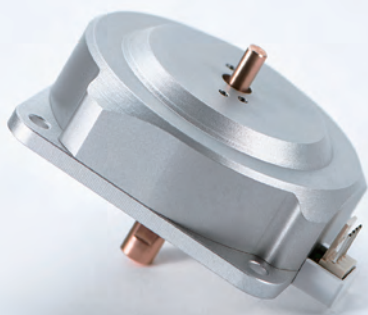
Model Name	Single-shaft motor PSM60N-A
Drive Frequency	40~45 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	120 [rpm]
Maximum Speed	180 [rpm]
Rated Torque	0.6 [N·m]
Maximum Torque	1.2 [N·m]
Holding Torque	1.2 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	66×66×45 [mm]
Weight	230 [g]
Encoder resolution	Without encoder, single-shaft
Minimum Accuracy	Depends on external sensor



Motor for magnetic field environment

PSM60N SERIES

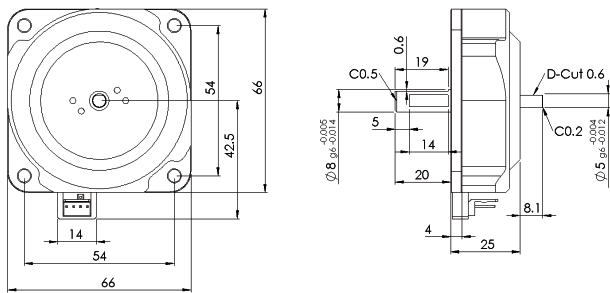
PSM60N-B



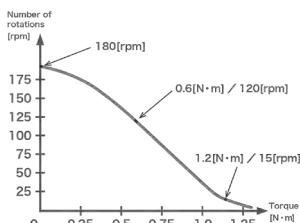
Sensorless double-shaft motor for magnetic field environment.

It has a subshaft for mounting external sensors of other manufacturers directly to the motor.

This motor can control the equipment using a third-party encoder or tacho generator that can be used in a magnetic field.



Model Name	Double-shaft motor	PSM60N-B
Drive Frequency	40~45 [KHz]	
Drive Voltage	130 [Vrms]	
Rated Speed	120 [rpm]	
Maximum Speed	180 [rpm]	
Rated Torque	0.6 [N·m]	
Maximum Torque	1.2 [N·m]	
Holding Torque	1.2 [N·m]	
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)	
Temperature Range	-10 ~ +55 [°C]	
Life Time	3,000 [Hours]	
Size(W×D×H)	66×66×53 [mm]	
Weight	233 [g]	
Encoder resolution	Without encoder, double-shaft	
Minimum Accuracy	Depends on external sensor	



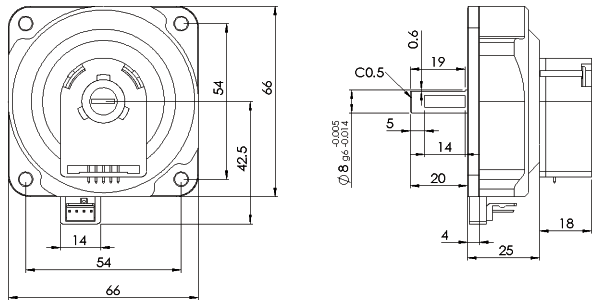
PSM60N-E



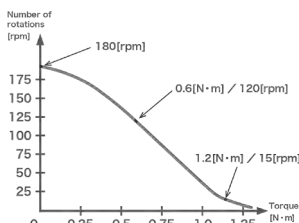
Motor with 500 p/r encoder for magnetic field environment.

Equipped with 500 pulse/turn TTL signals output encoder. Motor position and speed can be controlled with accuracy of $\pm 0.18^\circ$ (Multiplying by 4 times) in a magnetic field environment of 3 [T].

It is ideal as a motor for transfer equipment using ball screws.



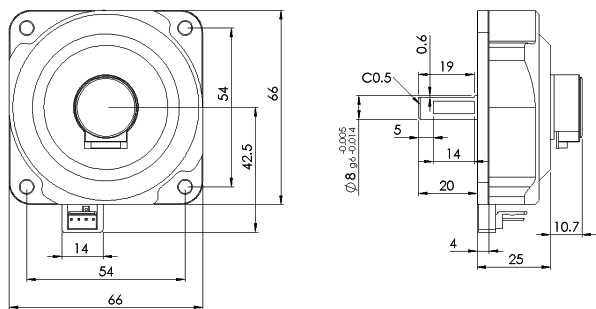
Model Name	Motor with 500 p/r encoder	PSM60N-E
Drive Frequency	40~45 [KHz]	
Drive Voltage	130 [Vrms]	
Rated Speed	120 [rpm]	
Maximum Speed	180 [rpm]	
Rated Torque	0.6 [N·m]	
Maximum Torque	1.2 [N·m]	
Holding Torque	1.2 [N·m]	
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)	
Temperature Range	-10 ~ +55 [°C]	
Life Time	3,000 [Hours]	
Size(W×D×H)	66×66×63 [mm]	
Weight	250 [g]	
Encoder resolution	500 [p/r]	
Minimum Accuracy	0.18°	



PSM60N SERIES



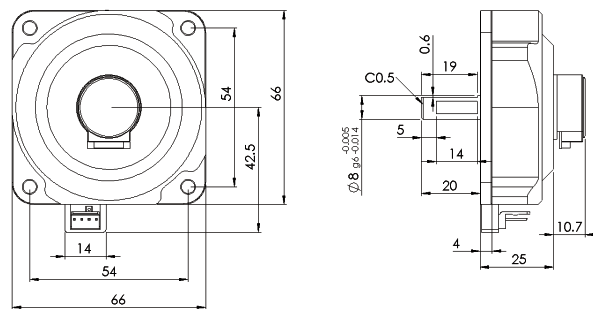
Equipped with 1,000 pulse/trun TTL signals output encoder. Motor position and speed can be controlled with accuracy of $\pm 0.09^\circ$ (Multiplying by 4 times) in a magnetic field of 3 [T]. It is ideal as a motor for high-precision positioning stages used in MRI.



Model Name	Motor with 1,000 p/r encoder PSM60N-ET
Drive Frequency	40~45 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	120 [rpm]
Maximum Speed	180 [rpm]
Rated Torque	0.6 [N·m]
Maximum Torque	1.2 [N·m]
Holding Torque	1.2 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	66×66×56 [mm]
Weight	240 [g]
Encoder resolution	1,000 [p/r]
Minimum Accuracy	0.09°



Equipped with 2,000 pulse/turn TTL signals output encoder. Motor position and speed can be controlled with an accuracy of $\pm 0.045^\circ$ (Multiplying by 4 times) in a magnetic field of 3 [T]. It is ideal as a motor for ultra-high precision indexing equipment used in MRI.



Model Name	Motor with 2,000 p/r encoder PSM60N-E2T	
Drive Frequency	40~45 [KHz]	
Drive Voltage	130 [Vrms]	
Rated Speed	120 [rpm]	
Maximum Speed	180 [rpm]	
Rated Torque	0.6 [N·m]	
Maximum Torque	1.2 [N·m]	
Holding Torque	1.2 [N·m]	
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)	
Temperature Range	-10 ~ +55 [°C]	
Life Time	3,000 [Hours]	
Size(W×D×H)	66×66×56 [mm]	
Weight	240 [g]	
Encoder resolution	2,000 [p/r]	
Minimum Accuracy	0.045°	

Motor for general environment

PSM40S SERIES

APPEARANCE / FEATURES

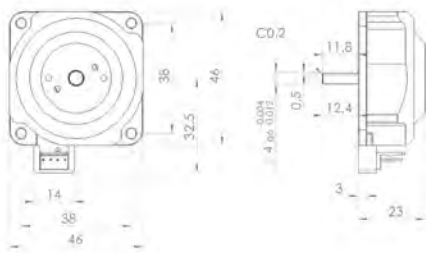
PSM40S-A



Sensorless single-shaft small motor for general environment.

The minimum size in PSM 40S series.

It is suitable for positioning using a sensor mounted on the device or as an intermittent same action motor with a timer.



※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD Φ28 on the motor base side

Model Name	Single-shaft motor	PSM40S-A
Drive Frequency	52~58 [KHz]	
Drive Voltage	130 [Vrms]	
Rated Speed	150[rpm]	
Maximum Speed	250[rpm]	
Rated Torque	0.15 [N·m]	
Maximum Torque	0.3 [N·m]	
Holding Torque	0.3 [N·m]	
Direction & Response	CW, CCW, Less than 1 [ms] [No-load]	
Temperature Range	-10 ~ +55 [°C]	
Life Time	3,000 [Hours]	
Size(W×D×H)	46×46×35.5 [mm]	
Weight	83 [g]	
Encoder resolution	Without encoder, Single-shaft	
Minimum Accuracy	Depends on external sensor	

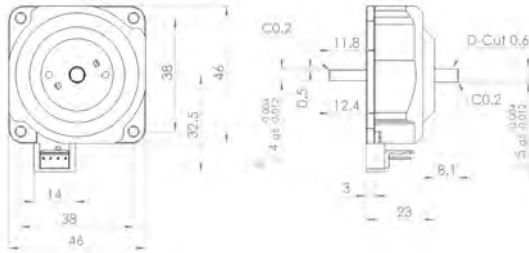
PSM40S-B



Sensorless double-shaft small motor for general environment.

It has a sub shaft for directly attaching external sensors made by other companies to the motor.

Control using the encoder and tacho generator becomes possible.



※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD Φ28 on the motor base side

Model Name	Double-shaft motor	PSM40S-B
Drive Frequency	52~58 [KHz]	
Drive Voltage	130 [Vrms]	
Rated Speed	150[rpm]	
Maximum Speed	250[rpm]	
Rated Torque	0.15 [N·m]	
Maximum Torque	0.3 [N·m]	
Holding Torque	0.3 [N·m]	
Direction & Response	CW, CCW, Less than 1 [ms] [No-load]	
Temperature Range	-10 ~ +55 [°C]	
Life Time	3,000 [Hours]	
Size(W×D×H)	46×46×43.5 [mm]	
Weight	84 [g]	
Encoder resolution	Without encoder, double-shaft	
Minimum Accuracy	Depends on external sensor	

※PSM40 series will be made to order.

DESIGN

SPEC

Motor for general environment

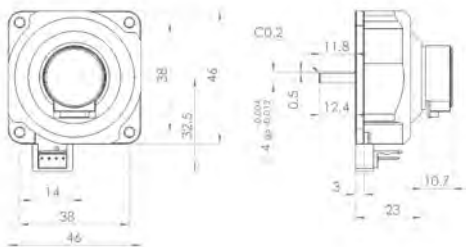
PSM40S SERIES

PSM40S-E



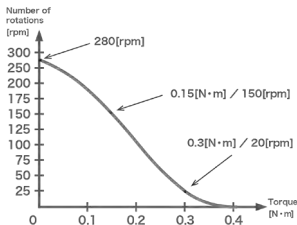
Small motor with 500 p/r encoder for general environment.

Equipped with 500 pulse/turn TTL signals output encoder. Motor position and speed can be controlled with accuracy of $\pm 0.18^\circ$ (Multiplying by 4 times). It is ideal as a motor for small transfer equipment using ball screws.



※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD $\Phi 28$ on the motor base side

Model Name	Motor with 500 p/r encoder PSM40S-E
Drive Frequency	52~58 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	150[rpm]
Maximum Speed	250[rpm]
Rated Torque	0.15 [N·m]
Maximum Torque	0.3 [N·m]
Holding Torque	0.3 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	46×46×46 [mm]
Weight	90[g]
Encoder resolution	500 [p/r]
Minimum Accuracy	0.18°

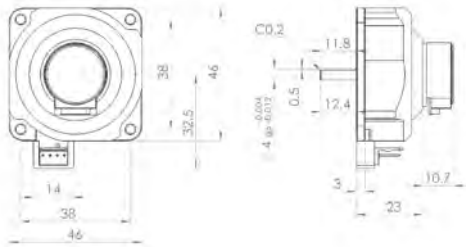


PSM40S-ET



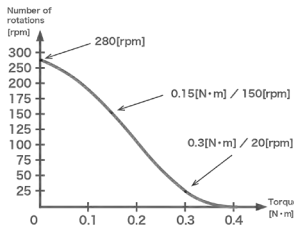
Small motor with 1,000 p/r encoder for general environment.

Equipped with 1,000 pulse/turn TTL signals output encoder. Motor position and speed can be controlled with accuracy of $\pm 0.09^\circ$ (Multiplying by 4 times). It is ideal as a motor for small transportation equipment such as high-precision positioning stages.



※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD $\Phi 28$ on the motor base side

Model Name	Motor with 1,000 p/r encoder PSM40S-ET
Drive Frequency	52~58 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	150[rpm]
Maximum Speed	250[rpm]
Rated Torque	0.15 [N·m]
Maximum Torque	0.3 [N·m]
Holding Torque	0.3 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	46×46×46 [mm]
Weight	90[g]
Encoder resolution	1,000 [p/r]
Minimum Accuracy	0.09°



※PSM40 series will be made to order.

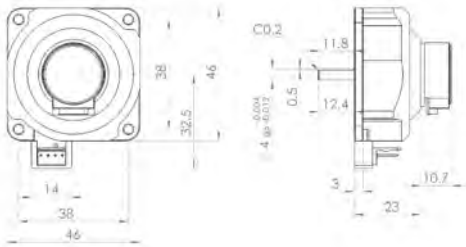
Motor for general environment

PSM40S SERIES

PSM40S-E2T



Small motor with 2,000 p/r encoder for general environment.
Equipped with 2,000 pulse/turn TTL signals output encoder.Motor position and speed can be controlled with accuracy of $\pm 0.045^\circ$ (Multiplying by 4 times).
It is ideal as a motor for ultra-high precision indexing equipment.



※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD $\Phi 28$ on the motor base side

Model Name	Motor with 2,000 p/r encoder PSM40S-E2T
Drive Frequency	52~58 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	150[rpm]
Maximum Speed	250[rpm]
Rated Torque	0.15 [N·m]
Maximum Torque	0.3 [N·m]
Holding Torque	0.3 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	46×46×46 [mm]
Weight	90[g]
Encoder resolution	2,000[p/r]
Minimum Accuracy	0.045°

※PSM40 series will be made to order.

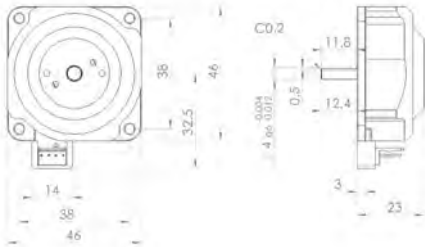
Motor for magnetic field environment

PSM40N SERIES

PSM40N-A



Sensorless single-shaft small motor for magnetic field environment.
Applicable to 3 [T] magnetic field environment.
Minimum size for PSM 60 N series.
It is ideal as a positioning and transport motor using sensors installed in devices such as MRI and elemental analyzers that are used in high-magnetic field.



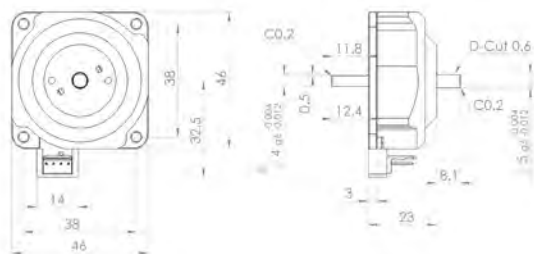
※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD $\Phi 28$ on the motor base side

Model Name	Single-shaft motor PSM40N-A
Drive Frequency	52~58 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	150[rpm]
Maximum Speed	250[rpm]
Rated Torque	0.15 [N·m]
Maximum Torque	0.3 [N·m]
Holding Torque	0.3 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	46×46×35.5 [mm]
Weight	83 [g]
Encoder resolution	Without encoder, Single-shaft
Minimum Accuracy	Depends on external sensor

PSM40N SERIES



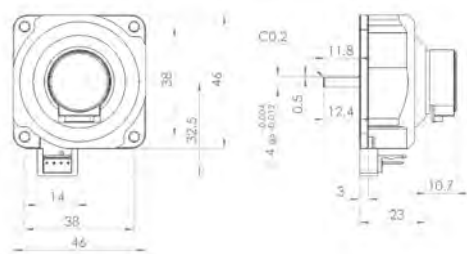
This motor can control the equipment using a third-party encoder or tacho generator that can be used in a magnetic field.



Model Name	Double-shaft motor PSM40N-B
Drive Frequency	52~58 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	150[rpm]
Maximum Speed	250[rpm]
Rated Torque	0.15 [N·m]
Maximum Torque	0.3 [N·m]
Holding Torque	0.3 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] { No-load }
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	46×46×43.5 [mm]
Weight	84 [g]
Encoder resolution	Without encoder, Single-shaft
Minimum Accuracy	Depends on external sensor



It is ideal as a motor for small transfer equipment using ball screws.



Model Name	Motor with 500 p/r encoder	PSM40N-E
Drive Frequency	52~58 [KHz]	
Drive Voltage	130 [Vrms]	
Rated Speed	150[rpm]	
Maximum Speed	250[rpm]	
Rated Torque	0.15 [N·m]	
Maximum Torque	0.3 [N·m]	
Holding Torque	0.3 [N·m]	
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)	
Temperature Range	-10 ~ +55 [°C]	
Life Time	3,000 [Hours]	
Size(W×D×H)	46×46×46 [mm]	
Weight	90[g]	
Encoder resolution	500 [p/r]	
Minimum Accuracy	0.18°	

Motor for magnetic field environment

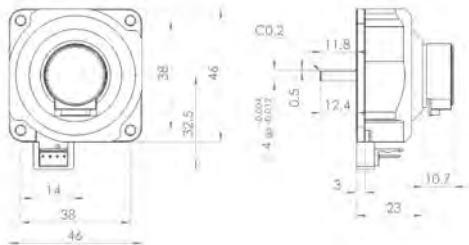
PSM40N SERIES

APPEARANCE / FEATURES

PSM40N-ET



Small motor with 1,000 p/r encoder for magnetic field environment.
Equipped with 1,000 pulse/turn TTL signals output encoder. Motor position and speed can be controlled with accuracy of $\pm 0.09^\circ$ (Multiplying by 4 times) in a magnetic field of 3 [T]. It is ideal as a motor for high-precision positioning stages used in MRI.



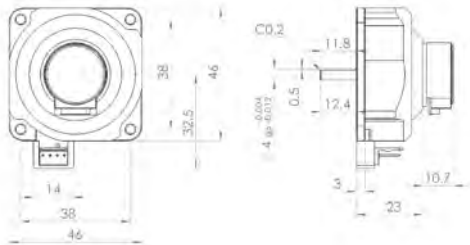
※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD $\Phi 28$ on the motor base side

Model Name	Motor with 1,000 p/r encoder PSM40N-ET
Drive Frequency	52~58 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	150[rpm]
Maximum Speed	250[rpm]
Rated Torque	0.15 [N·m]
Maximum Torque	0.3 [N·m]
Holding Torque	0.3 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	46×46×46 [mm]
Weight	90[g]
Encoder resolution	1,000 [p/r]
Minimum Accuracy	0.09°

PSM40N-ET2



Small motor with 2,000 p/r encoder for magnetic field environment.
Equipped with 2,000 pulse/turn TTL signals output encoder. Motor position and speed can be controlled with an accuracy of $\pm 0.045^\circ$ (Multiplying by 4 times) in a magnetic field of 3 [T]. It is ideal as a motor for ultra-high precision indexing equipment used in MRI.



※ There is a mounting screw hole with a depth of 3.5 mm with 3-M3 PCD $\Phi 28$ on the motor base side

Model Name	Motor with 2,000 p/r encoder PSM40N-E2T
Drive Frequency	52~58 [KHz]
Drive Voltage	130 [Vrms]
Rated Speed	150[rpm]
Maximum Speed	250[rpm]
Rated Torque	0.15 [N·m]
Maximum Torque	0.3 [N·m]
Holding Torque	0.3 [N·m]
Direction & Response	CW, CCW, Less than 1 [ms] (No-load)
Temperature Range	-10 ~ +55 [°C]
Life Time	3,000 [Hours]
Size(W×D×H)	46×46×46 [mm]
Weight	90[g]
Encoder resolution	2,000[p/r]
Minimum Accuracy	0.045°

※PSM40 series will be made to order.

DESIGN

SPEC

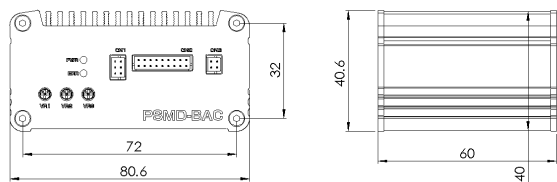
Motor Driver

PSMD SERIES

PSMD-BAC



Intuitive analog control model.
Motor rotation direction can be controlled by 2 TTL signals, and motor speed can be controlled by analog voltage of 0 ~ 3.2 [V].
Ideal for simple control of ultrasonic motors.



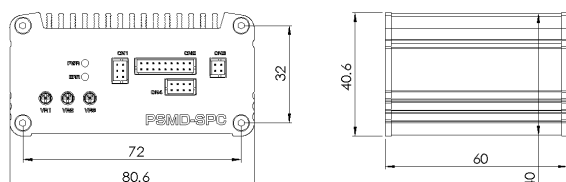
Model Name	Basic driver PSMD-BAC
Frequency / Wave Form	20 [KHz] ~ 55 [KHz] / Synthetic sine wave
Motor Drive Voltage	130 [Vrms] ~ 140 [Vrms]
Variable speed system	Analog voltage (DC 0 [V] ~ 3.2 [V])
No-load Speed Range	1 [rpm] ~ Maximum number of revolutions of the motor
Start-Stop Control	Switch to CW, CCW control terminal, Operation by external signal (active-low)
Starting Response	10 [ms] (No inertial load)
Stopping Response	Less than 1 [ms] (No inertial load)
Temperature Range	-10 [°C] ~ +60 [°C]
Power Supply	DC 24 [V] ± 0.5 [V] / Normal 1 [A], up to 2.5 [A]
Over Current Protection	Equipped with Resettable overcurrent protection circuit
Life Time	Operation 10,000 [Hours] or 1 year after shipment whichever is shorter
Size(W×D×H)	80 × 60 × 45 [mm]
Weight	250[g]
Remarks	Basic model

※ It is adjusted by the motor of the serial number and the pair at the time of shipment.
※ PSM60/40 S motor for general environment, PSM60/40 N Motor for magnetic field environment can be controlled in the same way.

PSMD-SPC



Analog control model with speed stabilization function using encoder signal added to PSMD-BAC.
Motor rotation direction can be controlled by 2 TTL signals, and motor speed can be controlled by analog voltage of 0 ~ 3.2 [V].
Ideal for constant-velocity control of ultrasonic motors with external analog voltage.



Model Name	Driver with speed stabilization function PSMD-SPC
Frequency / Wave Form	20 [KHz] ~ 55 [KHz] / Synthetic sine wave
Motor Drive Voltage	130 [Vrms] ~ 140 [Vrms]
Variable speed system	Analog voltage (DC 0 [V] ~ 3.2 [V])
No-load Speed Range	1 [rpm] ~ Maximum number of revolutions of the motor
Start-Stop Control	Switch to CW, CCW control terminal, Operation by external signal (active-low)
Starting Response	10 [ms] (No inertial load)
Stopping Response	Less than 1 [ms] (No inertial load)
Temperature Range	-10 [°C] ~ +60 [°C]
Power Supply	DC 24 [V] ± 0.5 [V] / Normal 1 [A], up to 2.5 [A]
Over Current Protection	Equipped with Resettable overcurrent protection circuit
Life Time	Operation 10,000 [Hours] or 1 year after shipment whichever is shorter
Size(W×D×H)	80 × 60 × 45 [mm]
Weight	250[g]
Remarks	With speed stabilization function

※ It is adjusted by the motor of the serial number and the pair at the time of shipment.
※ PSM60/40 S motor for general environment, PSM60/40 N Motor for magnetic field environment can be controlled in the same way.

Motor Driver

PSMD SERIES

APPEARANCE / FEATURES

PSMD-PCC

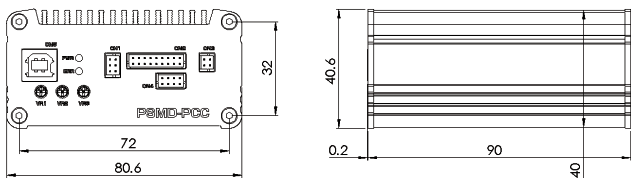


In addition to the functions of the PSMD-SPC, this model enables digital control of the motor rotation direction and speed directly from a PC connected via USB.

The motor can be controlled by a digital signal without inputting TTL signal for rotation direction control or analog voltage for speed control.

Ideal for precise control of ultrasonic motors.

DESIGN



SPEC

Model Name	High-precision control driver with USB connection PSMD-PCC
Frequency / Wave Form	20 [kHz] ~ 55 [kHz] / Synthetic sine wave
Motor Drive Voltage	130 [Vrms] ~ 140 [Vrms]
Variable speed system	Analog voltage (DC 0 [V] ~ 3.2 [V])
No-load Speed Range	or Digital signal control from USB connected devices
Start-Stop Control	0.1 [rpm] ~ Maximum number of revolutions of the motor
Starting Response	Operation by external signal (active-low) or Digital signal control from USB connected devices
Stopping Response	10 [ms] (No inertial load)
Temperature Range	Less than 1 [ms] (No inertial load)
Power Supply	-10 [°C] ~ +60 [°C]
Over Current Protection	DC 24 [V] ± 0.5 [V] / Normal 1 [A], up to 2.5 [A]
Life Time	Equipped with Resettable overcurrent protection circuit
Size(W×D×H)	Operation 10,000 [Hours] or 1 year after shipment whichever is shorter
Weight	80 × 90 × 45 [mm]
Remarks	270[g]
	Can be operated by connecting to a PC via USB

※ It is adjusted by the motor of the serial number and the pair at the time of shipment.

※ PSM60/40 S motor for general environment, PSM60/40 N Motor for magnetic field environment can be controlled in the same way.

Pin Assignment of the Driver

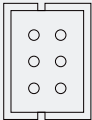
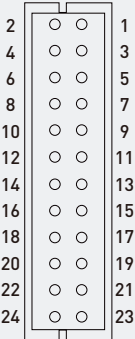
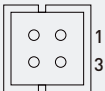
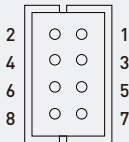

Each driver is equipped with a volume for adjustment (VR1-VR3) and various connectors (CN1-CN5) according to its characteristics

- VR1: Volume for minimum speed adjustment (PSMD-BAC, SPC only)
- VR2: Volume for maximum speed adjustment (PSMD-BAC, SPC only)
- VR3: CW and CCW speed balancing volume (PSMD-BAC, SPC only)

- CN1: Power connector (All Drivers)
- CN2: Connector for motor control signal (All Drivers)
- CN3: Connector for motor connection (All Drivers)

- CN4: Connector for encoder (PSMD-SPC, PCC only)
- CN5: Connector for PC connection (PSMD-PCC only)

Be sure to check the information of each terminal before using.

CN1 	<ul style="list-style-type: none">1. Main_power_input (+24V)2. Main_power_input (+24V)3. GND4. GND5. CASE6. CASE																								
CN2 	<table><tr><td>1. Reference Output (3.3 V)</td><td>13. PWM_code_O2 input</td></tr><tr><td>2. Speed specified voltage input</td><td>14. PWM_code_O1 input</td></tr><tr><td>3. GND</td><td>15. PWM_code_O0 input</td></tr><tr><td>4. Direction Control: CW</td><td>16. PWM_SEL_input</td></tr><tr><td>5. Direction Control: CCW</td><td>17. ERROR_output</td></tr><tr><td>6. GND</td><td>18. AUX_O1_input</td></tr><tr><td>7. SPI_CS input</td><td>19. AUX_O0_input</td></tr><tr><td>8. SPI_CLK input</td><td>20. GND</td></tr><tr><td>9. SPI_DT input</td><td>21. Phase_A_output</td></tr><tr><td>10. SPI_DT output</td><td>22. Phase_B_output</td></tr><tr><td>11. BOOST mode input</td><td>23. --</td></tr><tr><td>12. GND</td><td>24. --</td></tr></table>	1. Reference Output (3.3 V)	13. PWM_code_O2 input	2. Speed specified voltage input	14. PWM_code_O1 input	3. GND	15. PWM_code_O0 input	4. Direction Control: CW	16. PWM_SEL_input	5. Direction Control: CCW	17. ERROR_output	6. GND	18. AUX_O1_input	7. SPI_CS input	19. AUX_O0_input	8. SPI_CLK input	20. GND	9. SPI_DT input	21. Phase_A_output	10. SPI_DT output	22. Phase_B_output	11. BOOST mode input	23. --	12. GND	24. --
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12. GND	24. --																								
CN3 	<table><tr><td>1. Sin signal output</td><td>Red</td></tr><tr><td>2. Cos signal output</td><td>White</td></tr><tr><td>3. FB signal input</td><td>Yellow</td></tr><tr><td>4. GND</td><td>Black</td></tr></table>	1. Sin signal output	Red	2. Cos signal output	White	3. FB signal input	Yellow	4. GND	Black																
1. Sin signal output	Red																								
2. Cos signal output	White																								
3. FB signal input	Yellow																								
4. GND	Black																								
CN4 	<table><tr><td>1. Voltage output for encoder (+5V)</td><td>Red</td></tr><tr><td>2. GND</td><td>Black</td></tr><tr><td>3. Encoder A phase (+) input</td><td>Blue</td></tr><tr><td>4. Encoder A phase (-) input</td><td>Green</td></tr><tr><td>5. Encoder B phase (+) input</td><td>White</td></tr><tr><td>6. Encoder B-phase (-) input</td><td>Gray</td></tr><tr><td>7. Encoder Z-phase (+) input</td><td>Yellow</td></tr><tr><td>8. Encoder Z-phase (-) input</td><td>Orange</td></tr></table>	1. Voltage output for encoder (+5V)	Red	2. GND	Black	3. Encoder A phase (+) input	Blue	4. Encoder A phase (-) input	Green	5. Encoder B phase (+) input	White	6. Encoder B-phase (-) input	Gray	7. Encoder Z-phase (+) input	Yellow	8. Encoder Z-phase (-) input	Orange								
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8. Encoder Z-phase (-) input	Orange																								
CN5 	<table><tr><td>1. --</td></tr><tr><td>2. - Data</td></tr><tr><td>3. + Data</td></tr><tr><td>4. GND</td></tr></table>	1. --	2. - Data	3. + Data	4. GND																				
1. --																									
2. - Data																									
3. + Data																									
4. GND																									

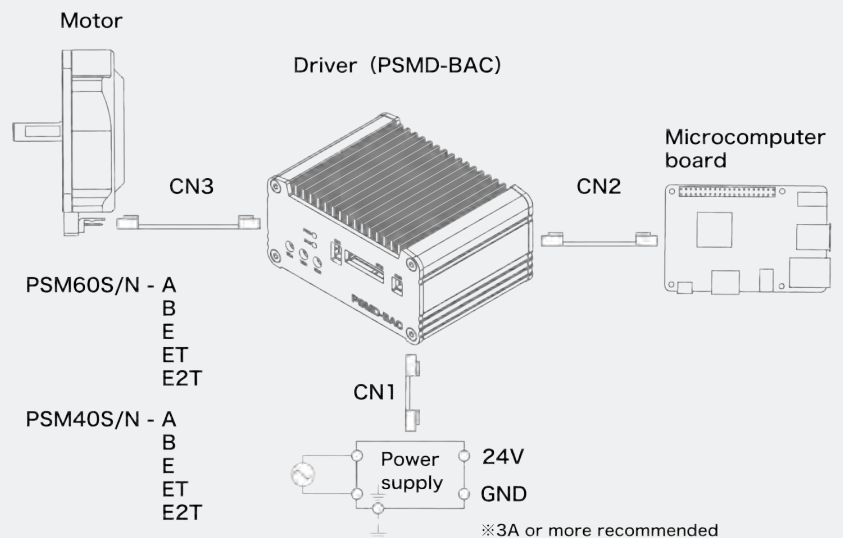
How to connect the motor and the driver

PSMD-BAC

No encoder signal, simple operation using the control board

The signals required for motor control are the microcomputer board port and Analog voltage output. Or, operation with a switch and a semi-fixed resistor is possible.

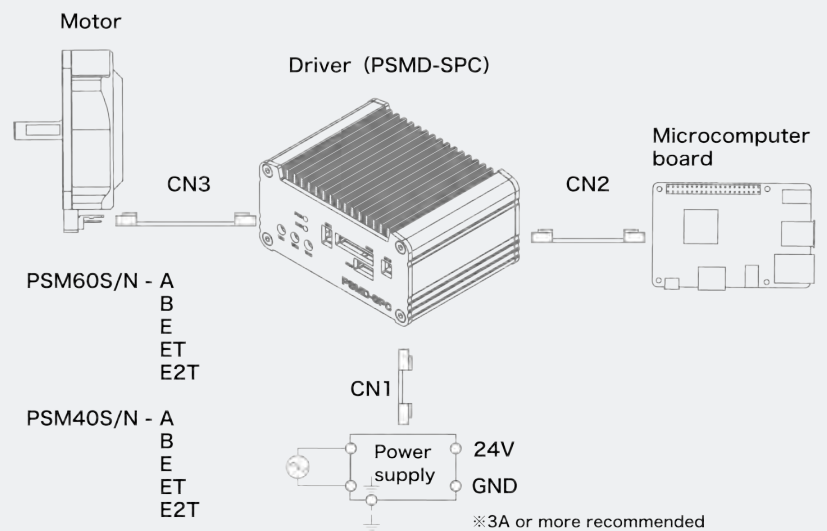
Enter the CN1 DC24 V power supply, the TTL signal level signal (2: Active-Low), which controls the motor's rotational direction (CW/CCW) and stop state to CN2, and an Analog signal of DC0 V to 3.2 V for Speed change. Connect the CN3 to the signal input terminal of the motor.



PSMD-SPC[1]

No encoder signal, simple operation using the control board

Enter the CN1 dc24v power supply, the TTL signal level signal (2: Active-Low), which controls the motor's rotational direction (CW/CCW) and stop state to CN2, and an analog signal of dc0v to 3.2 V for Speed change. Connect the CN3 to the signal input terminal of the motor. The signal required for motor control can be used for the port and analog voltage output of the microcomputer board, or it is possible to use the switch and the semi-fixed resistor. CN4 is not used because the motor has no encoder.

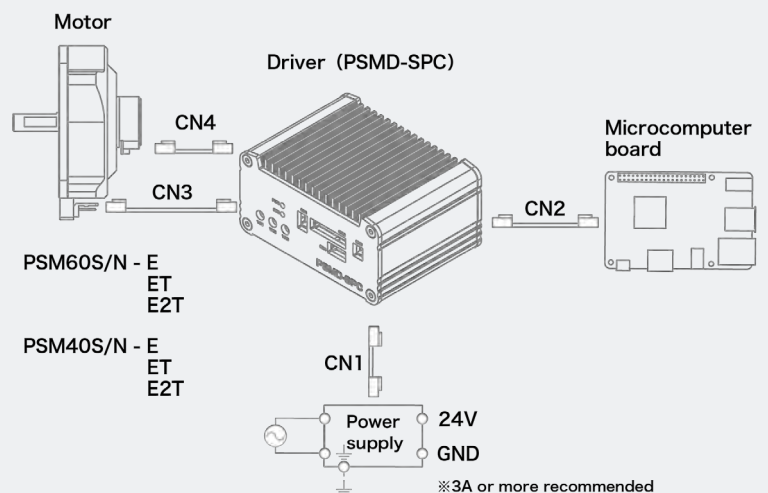


PSMD-SPC[2]

Speed control and position control by encoder signal

It is possible to maintain the speed of the motor by adding a constant voltage to the speed designation terminal without the speed control on the external microcomputer board by the speed stabilization function using the encoder signal.

Enter the CN1 DC24 V power supply, the TTL signal level signal (2: Active-Low), which controls the motor's rotational direction (CW/CCW) and stop state to CN2, and an Analog signal of DC0 V to 3.2 V for Speed change. Connect the CN3 to the signal input terminal of the motor. Connect the CN4 to the encoder signal terminal of the motor.



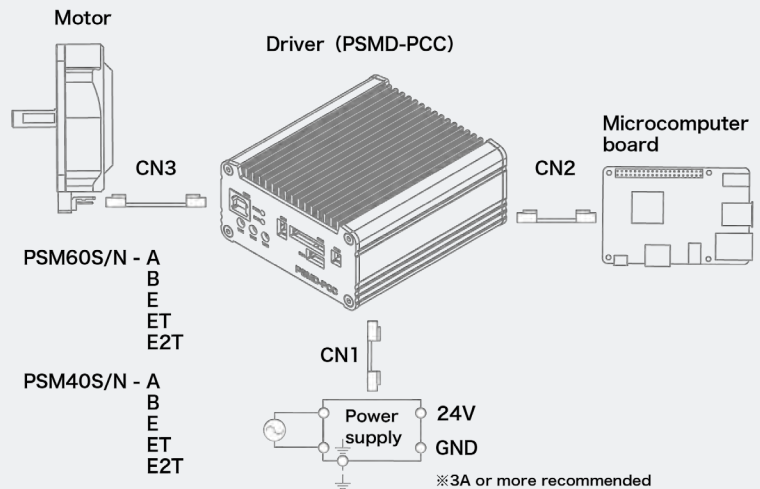
How to connect the motor and the driver

PSMD-PCC[1]

No encoder signal, simple operation using the control board

The signals required for motor control are the microcomputer board port and Analog voltage output. Or, operation with a switch and a semi-fixed resistor is possible.

Enter the CN1 DC24 V power supply, the TTL signal level signal (2: Active-Low), which controls the motor's rotational direction (CW/CCW) and stop state to CN2, and an Analog signal of DC0 V to 3.2 V for Speed change. Connect the CN3 to the signal input terminal of the motor. CN4 and CN5 are not connected.

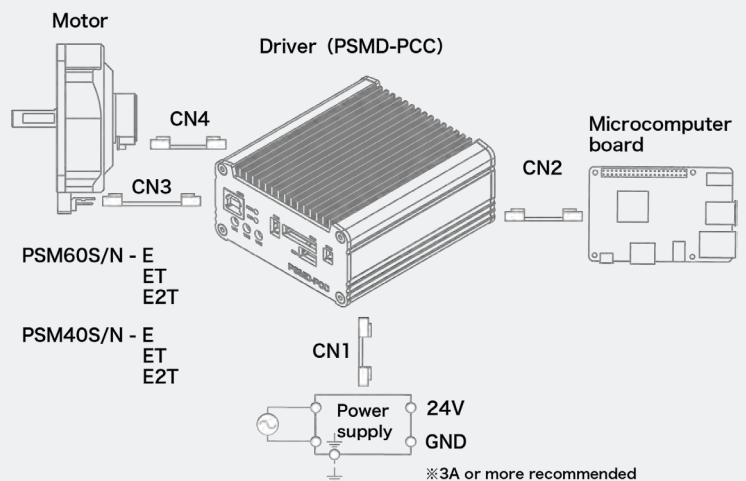


PSMD-PCC[2]

Speed control and position control by encoder signal

It is possible to maintain the speed of the motor by adding a constant voltage to the speed designation terminal without the speed control on the external microcomputer board by the speed stabilization function using the encoder signal.

Enter the CN1 DC24 V power supply, the TTL signal level signal (2: Active-Low), which controls the motor's rotational direction (CW/CCW) and stop state to CN2, and an Analog signal of DC0 V to 3.2 V for Speed change. Connect the CN3 to the signal input terminal of the motor. Connect the CN4 to the encoder signal terminal of the motor. CN5 is not connected.

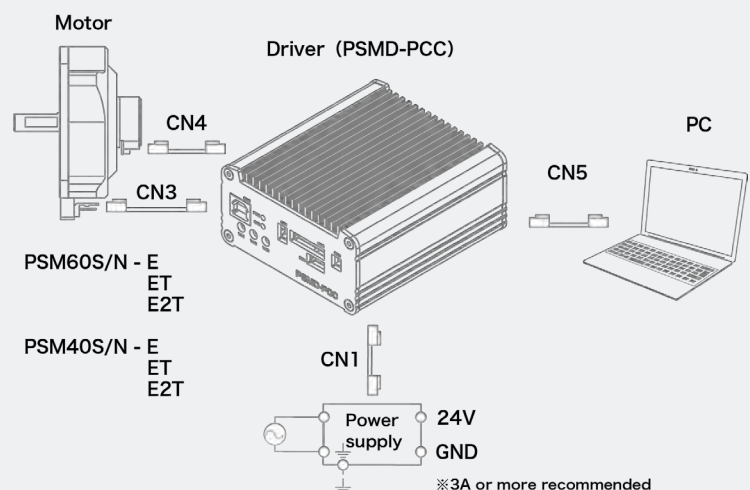


PSMD-PCC[3]

PC application control via USB connection

It is possible to control the rotation direction of the motor (CW/CCW), stop state, and control instructions for speed change via USB. Because the analog voltage control signal is not necessary, it is possible to operate the Ultrasonic Motor easily without the peripheral device such as a microcomputer board is prepared.

CN1 Connect DC24 V power. CN2 is not connected. Connect the CN3 to the signal input terminal of the motor. Connect the CN4 to the encoder signal terminal of the motor. Connect the CN5 to the USB terminal of the PC.



Frequently Asked Questions

F A Q

Q Where can I buy a product?

- A** There are three ways to purchase our products.
1. Purchase from our affiliated trading company
 2. Online purchases on the WEB (Yahoo! Shopping)
 3. Please contact us directly and purchase
- If you would like to receive a quantity discount, please contact us directly.

Q Please tell me how to order products.

- A** The order method is different depending on the method of purchase.
1. In case of purchase from WEB, please order the necessary quantity from Yahoo! Shopping site. As soon as we confirm the information, we will inform you the delivery date.
 2. In case of direct purchase from us or our affiliated company, please ask for a quotation. If you request us directly, please use the email or contact form.

Q Can I order from one piece?

- A** All of our products can be purchased from one piece.

Q Which drivers should I choose?

- A** If you use a motor that is not equipped with an encoder (* *-A or-B), PSMD-BAC will be recommended. (Although PSMD-SPC and PSMD-PCC are also available, since the encoder signal from the motor is not input, the speed stabilizing function etc. can not be used.)
- If you use a motor equipped with an encoder (* *-E, -ET, E2T), PSMD-SPC and PSMD-PCC are recommended.
- With these drivers, it is possible to easily realize motor control using the encoder signal from the motor.

Q How are endurance times calculated?

- A** We consider the condition that the maximum torque has dropped to 60% against the characteristics at the time of shipment as the motor's life expectancy.

Q Can I use it in a vacuum environment?

- A** Our Ultrasonic Motor can operate even in a vacuum. However, in a vacuum environment, the condition of friction is deteriorated, so the life expectancy may be shortened. The operation is not guaranteed because it is different from the use in the general environment.

Q Is there anything special to pay attention to in the usage environment or storage environment?

- A** Because the Ultrasonic Motor rotates by using friction, it is necessary to avoid the state of the friction greatly changes. For example, please refrain from using it in water, high humidity, hot environment (humidity: 60% or more, temperature: 65 °c or higher).

Q What is the difference with DC motor etc.?

- A** When compared to a DC motor with the same torque, our Ultrasonic Motor is small in size from 1/5 to 1/10 times. The weight also becomes lighter along with it. The Ultrasonic Motor is very quiet sound even in operation. Even with non-energized / uncontrolled situations, our Ultrasonic Motor can maintain attitude and angle with electric power 0 by friction force.

Q What are the advantages of Ultrasonic Motors?

- A** Ultrasonic Motors are compatible with non-magnetic environments that can be used in small, high torque, static and magnetic fields. By turning an existing motor into our Ultrasonic Motor, you can expect to reduce the overall size and power consumption of the entire device. In addition, it can be positioned with high accuracy as a motor for transfer equipment used in MRI, semiconductor manufacturing equipment, and elemental analysis equipment.

Q What are the disadvantages of Ultrasonic Motors?

- A** Our Ultrasonic Motors life can compete with that of stepper motors. However, it is still shorter than the life of a DC motor.

Q How far can the motor and driver be separated?

- A** The standard cable length is 3m. Motor and driver can be separated up to 30m (limited to our genuine products).

Q Is it possible to custom order?

- A** We can customize one shaft length change and one diameter change. It is also possible to produce a complete custom motor. Please contact us by e-mail or contact form for custom specifications.



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