PRP SERIES SPECIFICATIONS

COMMON SPECIFICATIONS

Input signal : 4-20 mA DC or 1-5 V DC
Power input : 100-120 V AC (Not selectable for CE)
200-240 V AC
Protection level : IP66
Wiring conduit : G 1/2 (two)

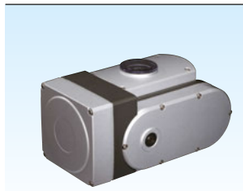
Motor : Stepping motor
Position detection : Potentiometer
Manual control : Provided
Position output : 4-20 mA DC
Operating temperature : -20 to +55°C (Standard type),
5 to 70°C (Lloyd's Register approved type)
Vibration
· Acceleration : 2 G (19.6 m/s²) (Standard type),
0.7G (6.9 m/s²) (Lloyd's Register approved type)

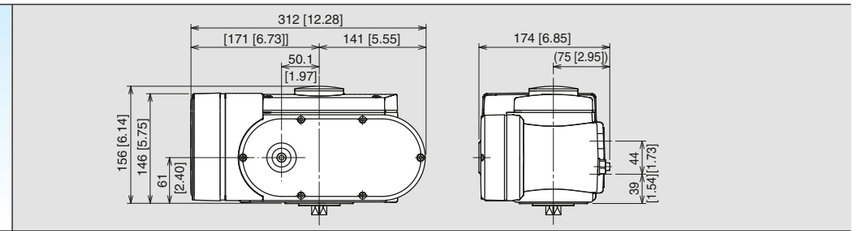
PRP Series PRP-2

Standard Type	**Model : PRP-0x** IP66 CE	**Model: PRP-1x** IP66 CE
Lloyd's Register Approved (Environmental categories ENV3)	**Model : PRP-0xx-x/LR** IP66	**Model: PRP-1xx-x/LR** IP66
Operational Angle	90°	
Max. Torque	100 N·m	200 N·m
Operation Time (90°)	12 seconds (PRP-01) 24 seconds (PRP-03) 8.5 to 125 seconds (PRP-00)	16 seconds (PRP-11) 24 seconds (PRP-13) 16 to 125 seconds (PRP-10)
Weight	Approx. 10.8 kg (approx. 12.1 kg with failsafe function option)	
Resolution	1/200 (deadband set to 0.5 %), 1/1000 (deadband set to 0.1 %)	

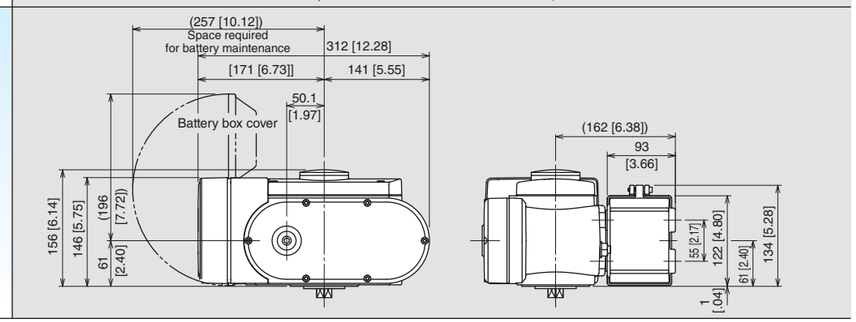
· Contact us for network capability.

EXTERNAL DIMENSIONS unit: mm (inch)





Failsafe function



Website Request Info

MG CO., LTD.
(formerly M-System Co., Ltd.)
www.mgco.jp

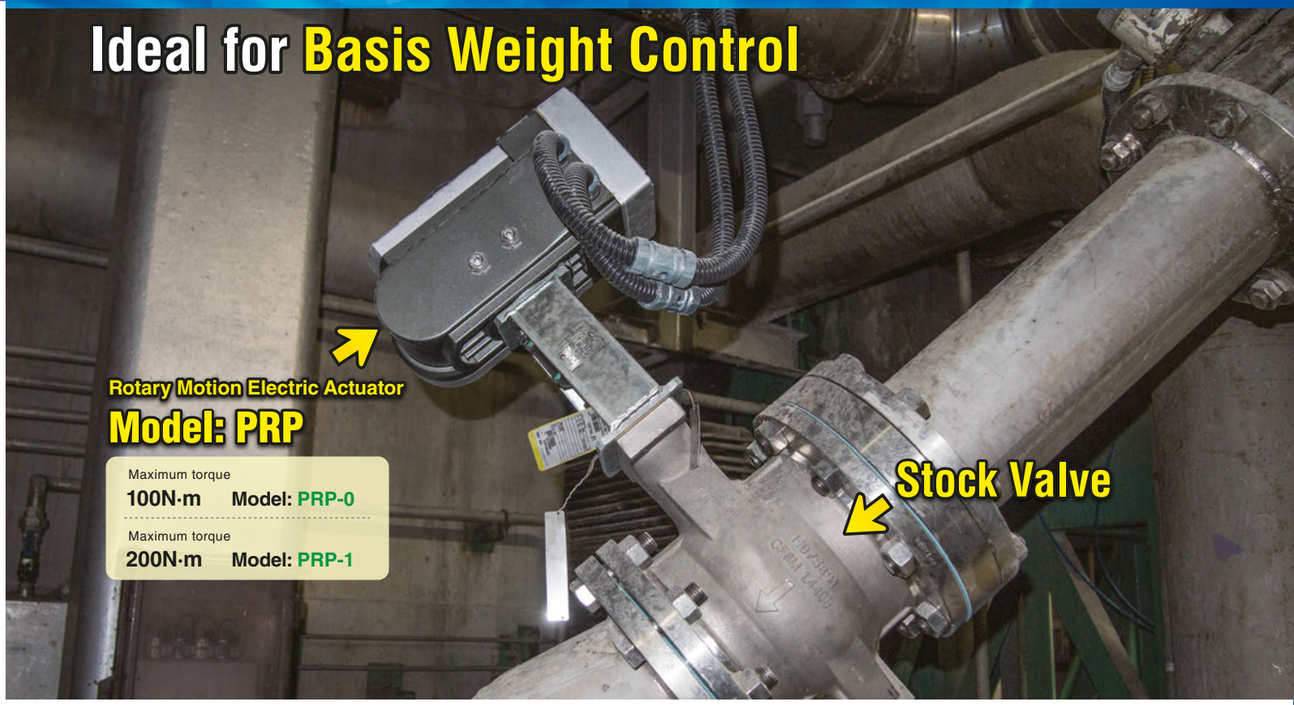
Your local representative:

High Performance Electric Actuator for Stock Valve

2024-01
EC-4823
4-2009
Rev. 1

High Performance Electric Actuator for Stock Valve

PRP Series



MG CO., LTD.
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Make Greener automation

Actuator Mechanism Ensuring High Precision Control of Stock Valves

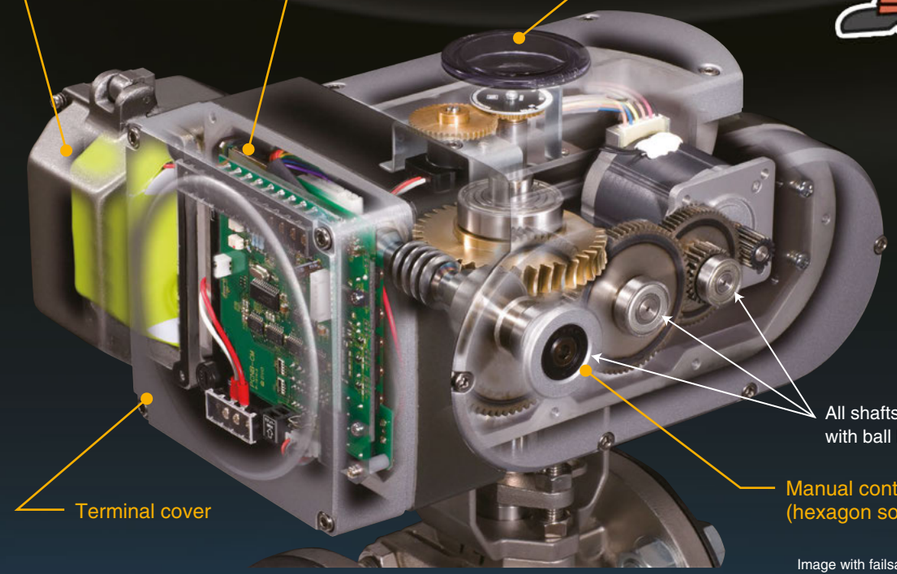


Image with failsafe function option

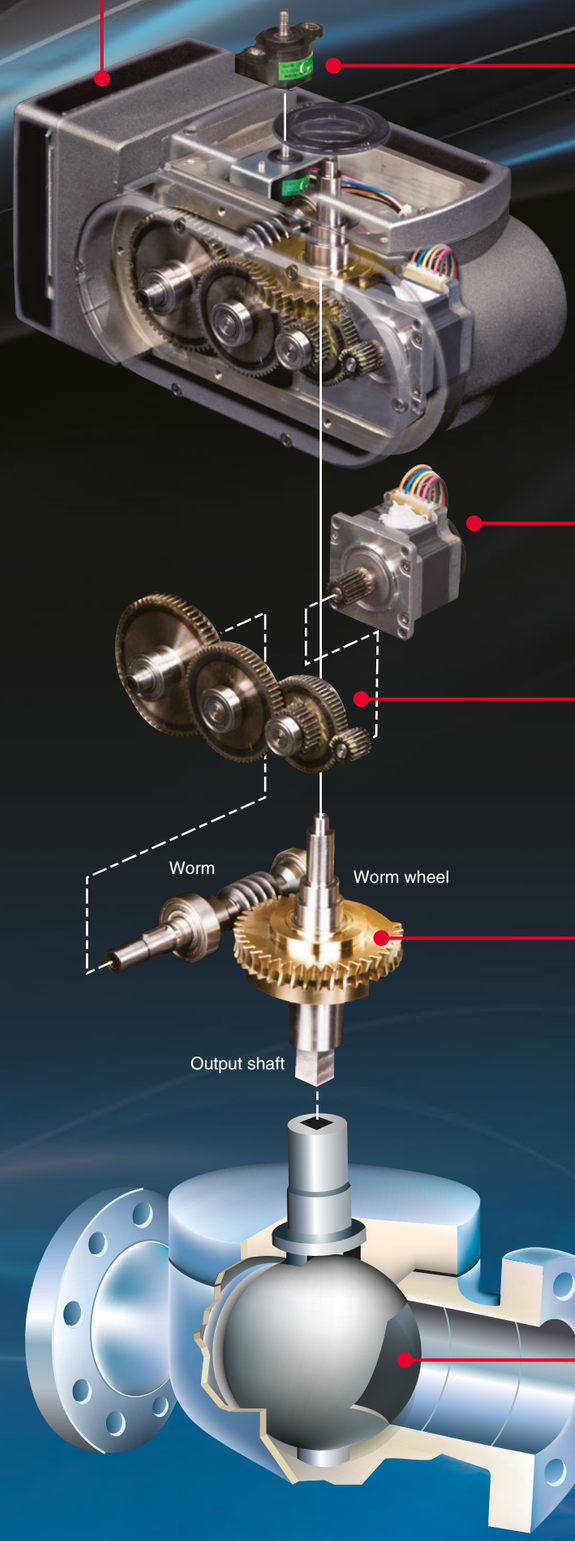
Rotary Motion Electric Actuator
PRP Series

Maximum torque **100 N·m** **Model: PRP-0**

Maximum torque **200 N·m** **Model: PRP-1**

Four reasons why the PRP is ideal for basis weight control

- Valve opening control in 1/1000 high resolution.
- Excellent repeatability and linearity of positioning.
- Opening/closing speed programmable in conjunction with the B/M control system (16 to 999 seconds per full span) to adapt with design speed changes of the paper machine.
- The actuator mass significantly reduced from conventional ones thanks to the high-torque design is convenient as replacement.



Stopping at the target position without overshooting

High resolution & precision

Micro-processor based
Electronic Motor Driver Circuit

Precisely tracking target position by feedback control in combination with predictive control

High Precision Position Sensor

High torque
1/1000 high resolution

Stepping Motor

Motor rotation control resolution of 1.8 degrees per pulse

See Page 7

High precision torque control

3-step Reduction Gear Mechanism

High precision gear system with minimum backlash

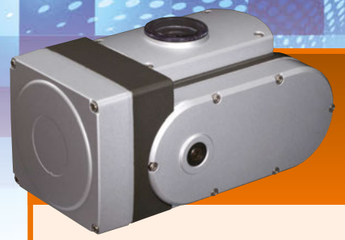
Compactly designed

Worm Gear Mechanism

High reduction ratio despite the compact size

Stock Valve

V-port ball valves are typically used.



INSTALLATION EFFECTS

The following positive effects have been observed by introducing the PRP for a stock valve.

❶ Overall cost ≈1/3

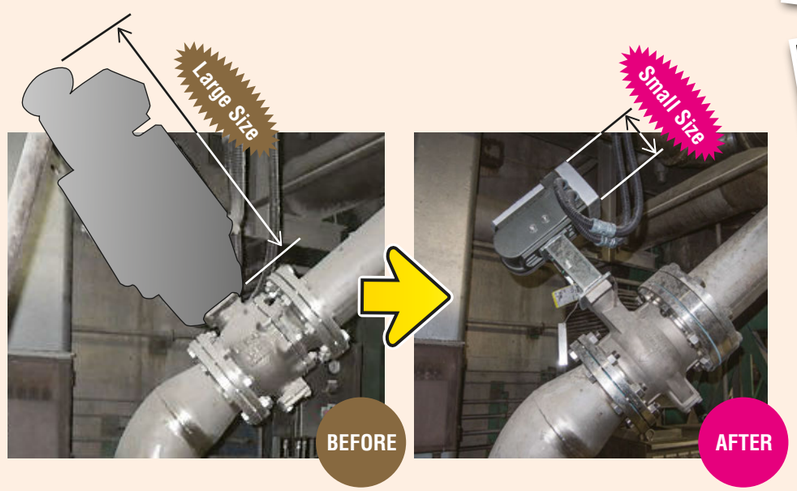
Calculation of the overall cost is based on an actual project in Japan, including the net cost of a replacement of the existing actuator, a control panel and installation fee.
Consult us for detailed information.

❷ Delivery leadtime ≈1/9

Delivering a replacement of the existing actuator typically takes 9 months.
1 month will suffice for delivery of the PRP.

❸ Weight (mass) ≈1/10

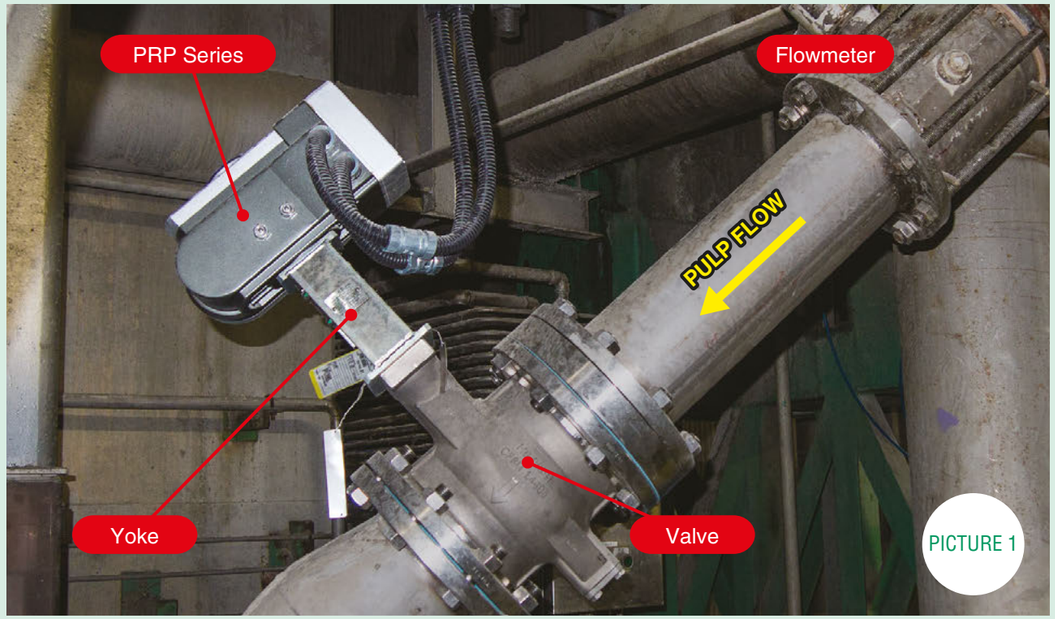
Mass of the old actuator and the PRP is compared in the images below.
(In this project, the valve was also replaced.)



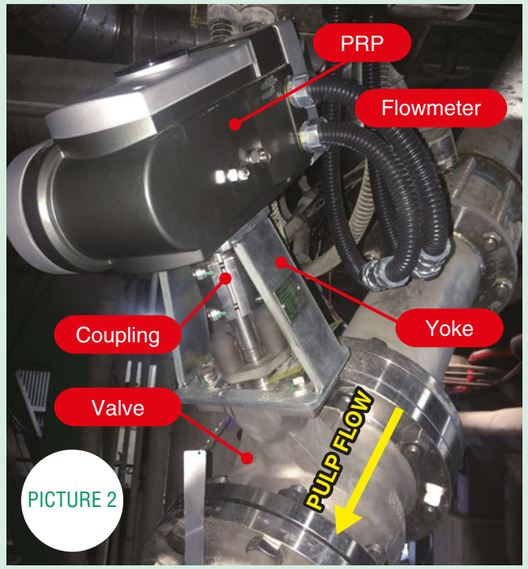
The PRP is easily adaptable with future design speed changes of the paper machine thanks to the opening/closing speed which is programmable in conjunction with the B/M control system.

APPLICATION EXAMPLE

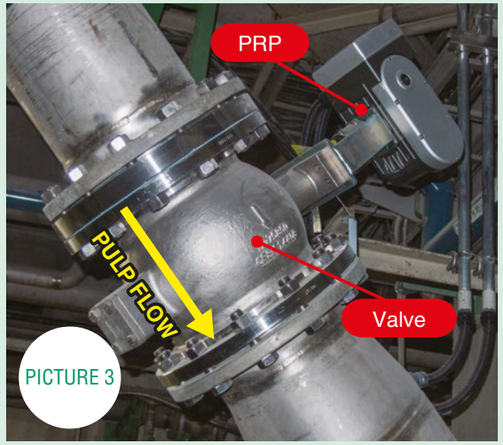
Multilayer Paperboard Machine



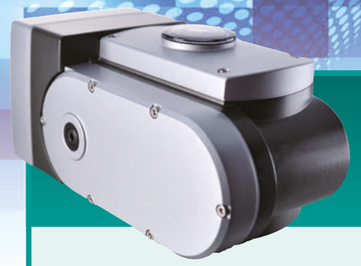
Electric Actuator PRP Series connected to the bottom-layer pulpstock valve in the multilayer paperboard machine, with an electromagnetic flowmeter measuring pulp flow.



Closeup of Picture 1: PRP

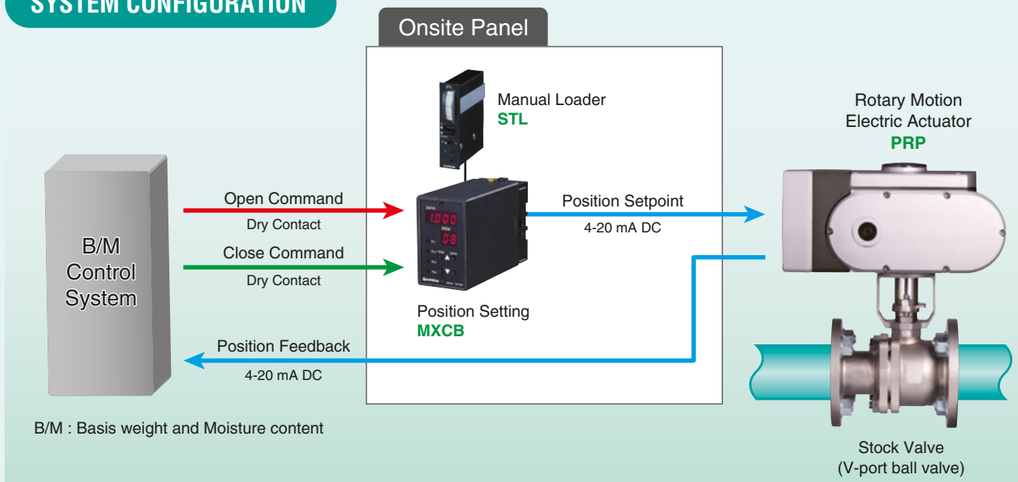


PRP connected to the top-layer pulpstock valve



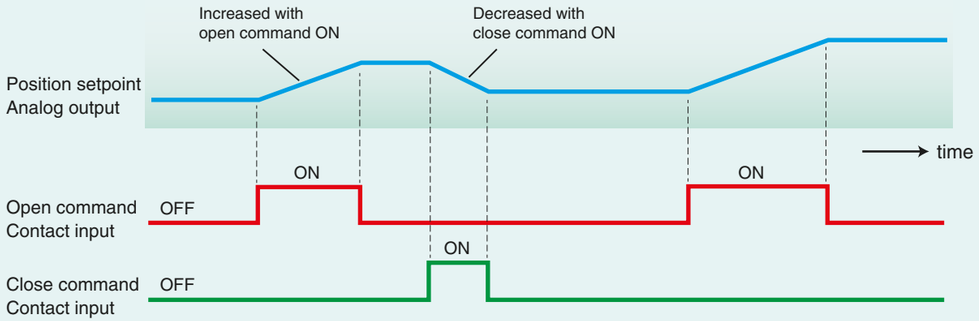
PULPSTOCK CONTROL

SYSTEM CONFIGURATION



B/M : Basis weight and Moisture content

RELATION BETWEEN POSITIONING COMMAND AND SETPOINT SIGNAL



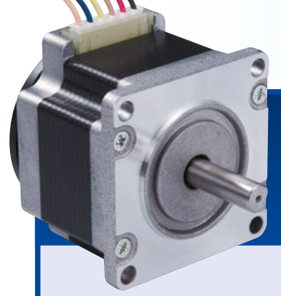
The above diagram shows the control scheme of a stock valve operating system.

In the automatic operating mode, the B/M control system provides open and close contact command signals to the MXCB which increases/decreases the analog output signal proportionally to the ON time duration of the respective contact signals. They are provided from the manual loader STL in case of manual operating mode.

The analog output accuracy is approximately 0.1%. The **PRP** actuator is able to control the valve with 1/1000 resolution. The combination of these devices ensures the precise basis weight control.

The valve position signal is fed back to the B/M control system to quickly eliminate errors.

The travel time of an entire span (open from/to close) is programmable between 16 to 999 seconds depending upon the parameter combinations of the **PRP** and the MXCB.



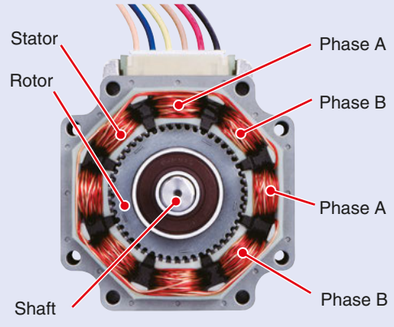
STEPPING MOTOR

A stepping motor generates a torque ≈10 times higher than an induction motor does.

The stepping-motor-driven actuator, PRP Series, is most suitable for operating stock valves that require high resolution, good linearity and high torque control ability.

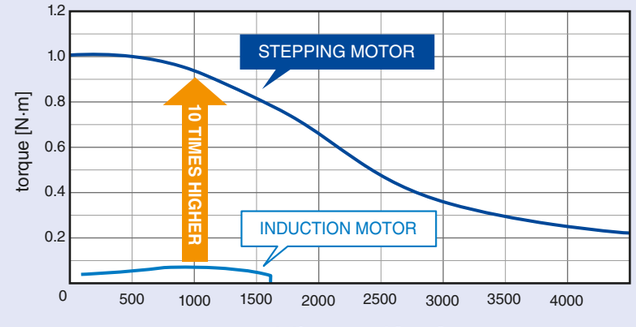
The PRP is significantly smaller compared to conventional actuators using induction motors.

MECHANISM



2-phase/8-pole motor

TORQUE COMPARISON TO AN INDUCTION MOTOR



rotating speed [rpm]

A stepping motor rotates by a constant angle per pulse.

A stepping motor, also called a pulse motor, is a motor that rotates in synchronization with a command pulse signal. The principle of rotation of a simplified 2-phase, 8-pole stepping motor model is shown in the figure below.

A stepping motor consists of a stator with windings and a rotor using a powerful neodymium magnet. Energizing the stator windings to generate a magnetic force is called excitation. By sequentially exciting the multiple stator windings based on the command pulse, the motor rotates stepwise, utilizing the action of attraction and repulsion between the magnetic poles of the stator and rotor.

The rotation angle of a stepping motor is always determined by the constant mechanical accuracy (motor structure and machining accuracy) for each command pulse signal. Therefore, a stepping motor performs highly accurate positioning control.