

Final Control Components

Electric Actuators



This symbol identifies those products which contains less than the maximum levels of the 10 restricted substances specified by the RoHS Directive.



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MSP Series

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MSP10

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PSN Series

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Compact Rotary Motion
Electric Actuators
MRP Series

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Rotary Motion
Electric Actuator
MRP10

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Position Sensors

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Valve Positioners
MEX Series

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**Manual Loading
Stations**

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Product videos are on our website!



STEPTOP Electric Actuator
Revolution of Electric Control Valves



Free from Requirements of Instrument Air Systems
Control Valves with STEPTOP Electric Actuators



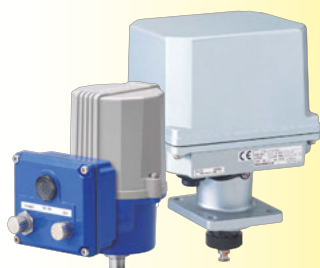
STEPTOP Electric Actuator
1/1000 Resolution Demo Kit



Control Valves with STEPTOP Electric Actuators
Application Examples Pulp & Paper Mill

● Please visit our website: https://www.mgco.jp/video_e/index.html

Electric Actuators Lineup



Linear
motion
type

MSP Series

Open network interface
CC-Link DeviceNet

150 N ● 33.7 lbf **300 N** ● 67 lbf **500 N** ● 112 lbf **700 N** ● 157 lbf

MSP4
CE UK CA IP66
Page 9

Open network interface
CC-Link DeviceNet

150 N ● 33.7 lbf **300 N** ● 67 lbf **500 N** ● 112 lbf **700 N** ● 157 lbf

MSP5
CE UK CA IP66
Page 9

Open network interface
Modbus
Auto-setup function

150 N ● 33.7 lbf **300 N** ● 67 lbf **450 N** ● 101 lbf **600 N** ● 135 lbf **700 N** ● 157 lbf

MSP40
IP66
Page 10

Open network interface
Modbus
Auto-setup function

MSP50
IP66
Page 10

Thrust

150 N 300 N 500 N 700 N

Torque

5 N·m 10 N·m 16 N·m 24 N·m 33 N·m

MRP Series

MRP4 Page 19
CE UK CA IP66

Open network interface
CC-Link DeviceNet



● 10 N·m
7.38 lbf-ft

MRP5
CE UK CA IP66
Open network interface
CC-Link DeviceNet
Page 19

MRP6
CE UK CA IP66
Open network interface
CC-Link DeviceNet
Page 19



● 5 N·m
3.69 lbf-ft



● 10 N·m
7.38 lbf-ft

● 16 N·m
11.8 lbf-ft

● 24 N·m
17.7 lbf-ft

● 33 N·m
24.3 lbf-ft

MRP10
CE UK CA IP66
Open network interface
Modbus
Terminal box with LED
Page 21

● 6 N·m
4.43 lbf-ft

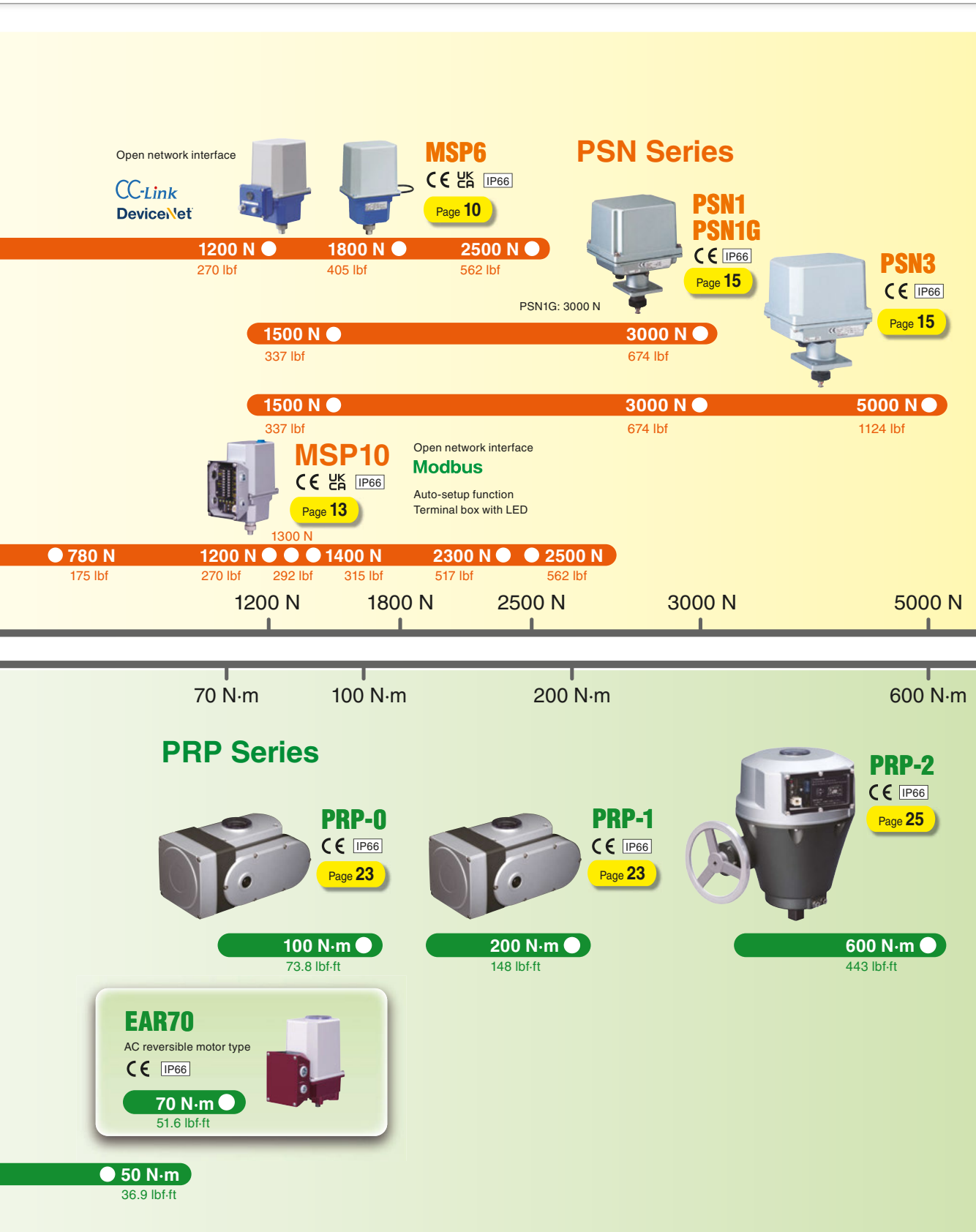
● 16 N·m
11.8 lbf-ft

● 35 N·m
25.8 lbf-ft

Rotary
motion
type



●Please consult with us for customized products.



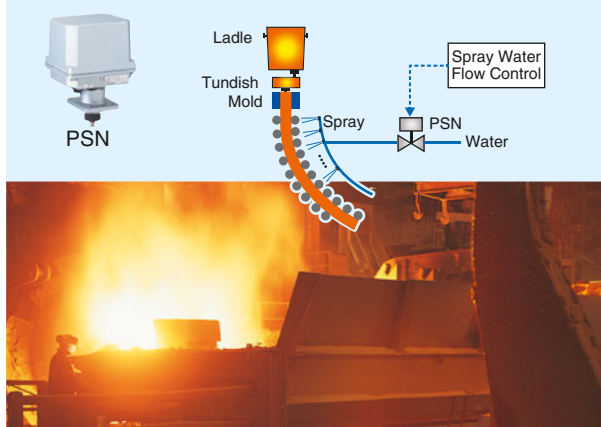
●Conformance with CE/UKCA depends upon models. Please refer to the data sheets for details.

Linear Motion Electric Actuators	MSP Series
	MSP10
	PSN Series
Rotary Motion Electric Actuators	MRP Series
	MRP10
	PRP Series
Position Sensors	
Valve Positioners	MEX Series
Manual Loading Stations	

Application Examples in Various Demanding Process Fields

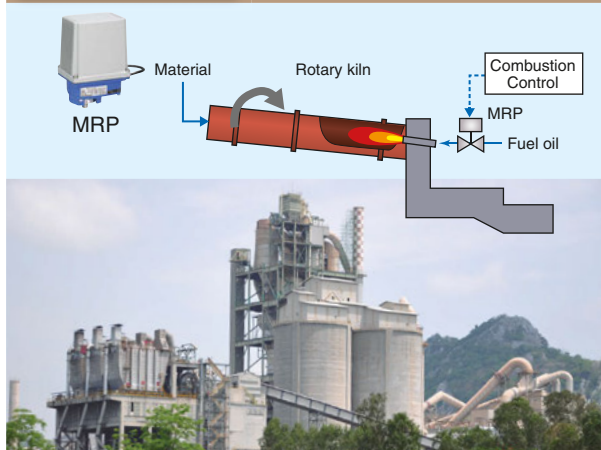
STEEL

Water Flow Control
in Continuous Casting Line



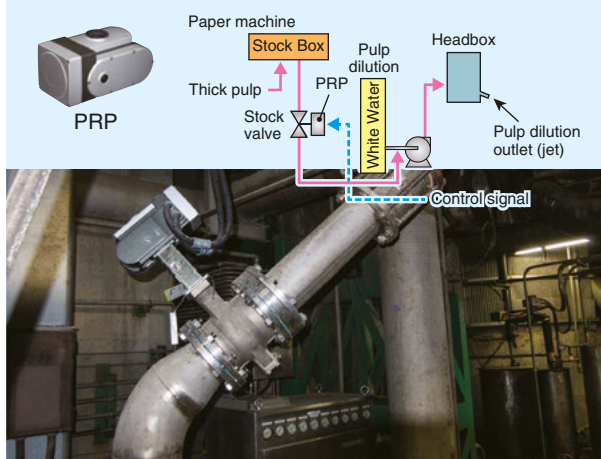
CEMENT

Fuel Flow Control in Rotary Kiln



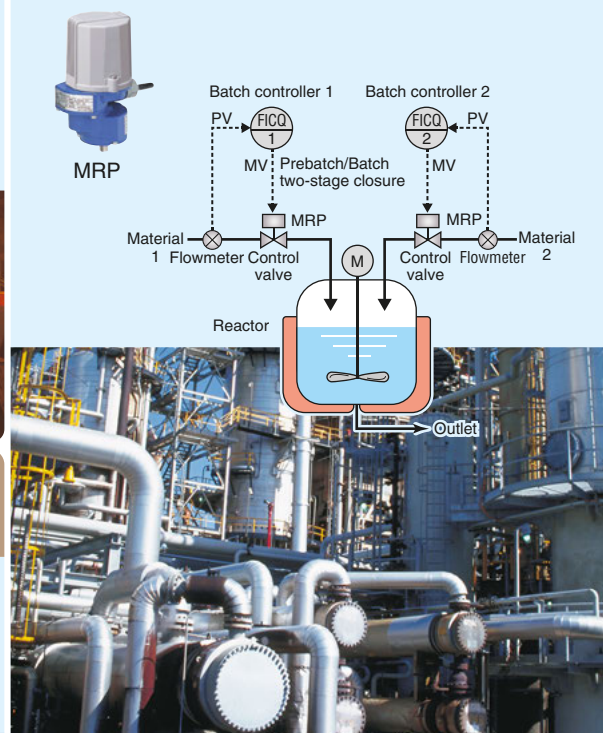
PAPER

Basis Weight Control



CHEMICAL

Batch Control



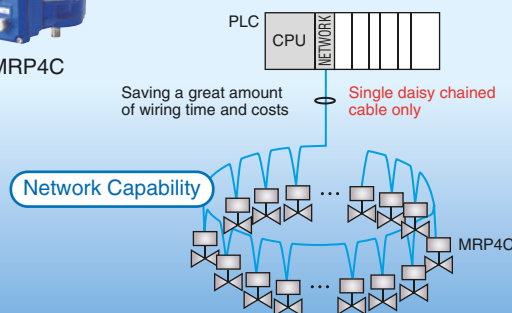
PAPER

Paper Profile Control



MRP4C

CP Control (Consistency Profiling):
Basis weight control applied in CP (Cross Paper) direction.
Called also CD (Cross Direction) profile control.



CP control unit.
Image by Kobayashi
Engineering Works Ltd.



MSP
Series

MSP10

PSN
Series

MRP
Series

MRP10

PRP
Series

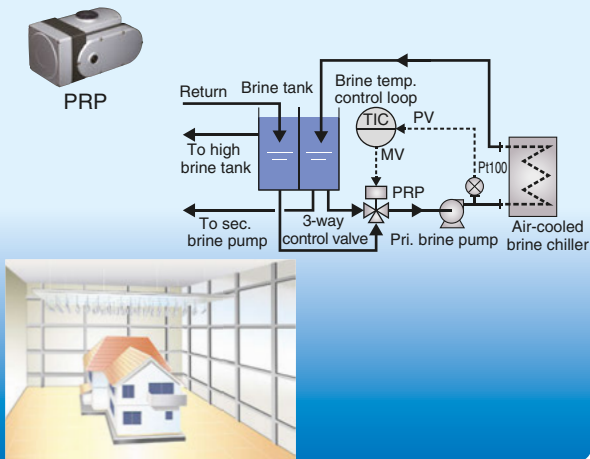
Position
Sensors

Valve
Positioners
MEX Series

Manual
Loading
Stations

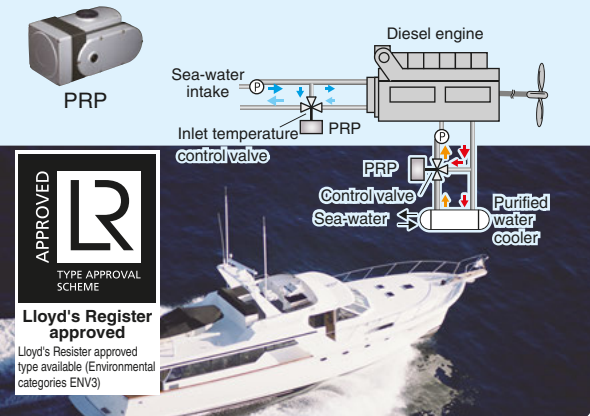
Linear Motion Electric Actuators

Rotary Motion Electric Actuators

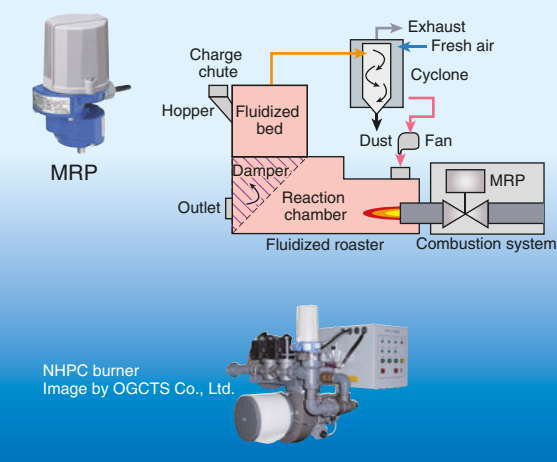
ENVIRONMENTAL
TEST CHAMBERBrine Temperature Control
in an Environmental
Test Chamber

SHIP

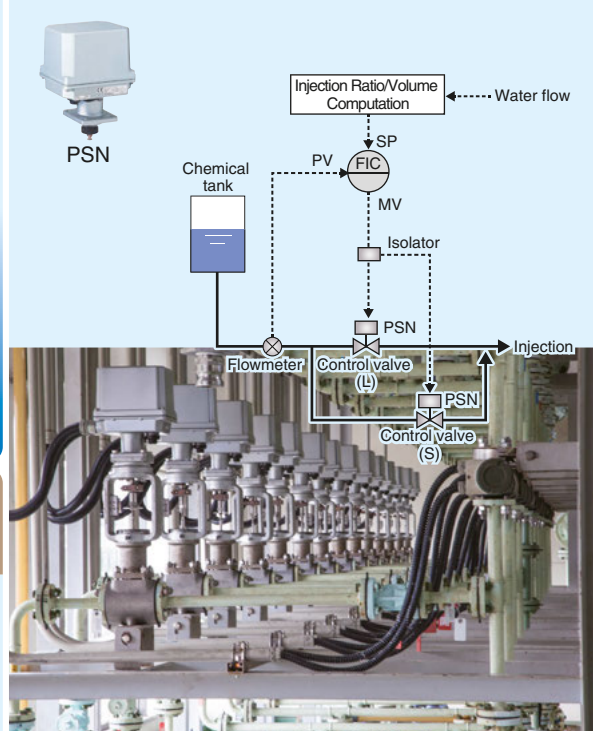
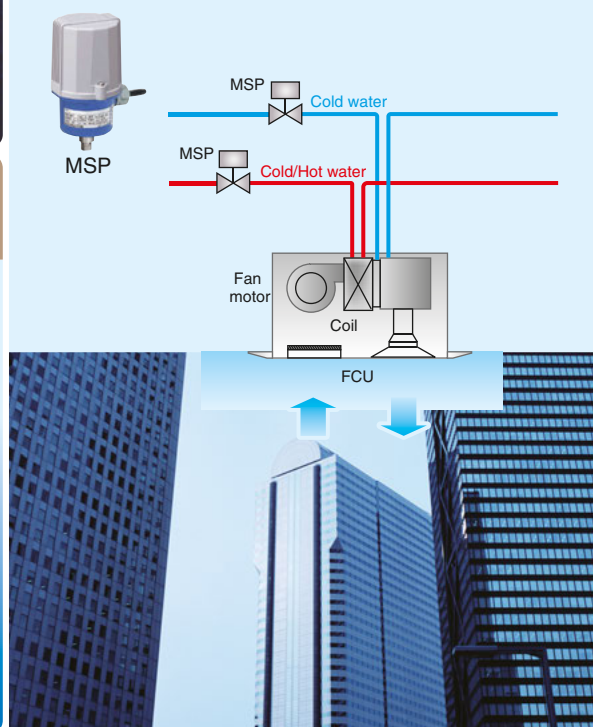
Diesel Engine Cooling System



FOOD

Gas Flow Control in Combustion
System for Roasting MachineWATER
TREATMENT

Chemical Injection Ratio Control

BUILDING
HVACCold/Hot Water Control
for Fan Coil UnitMSP
Series

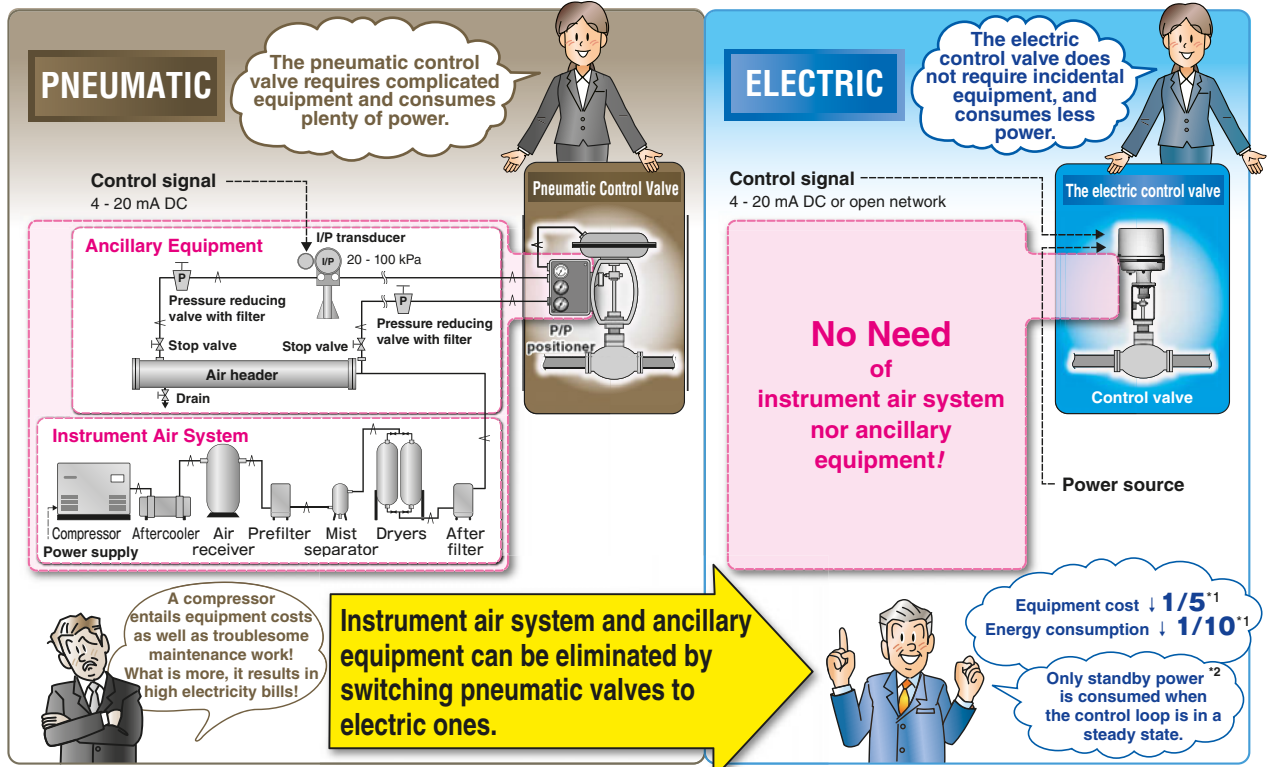
MSP10

PSN
SeriesMRP
Series

MRP10

PRP
SeriesPosition
SensorsValve
Positioners
MEX SeriesManual
Loading
Stations

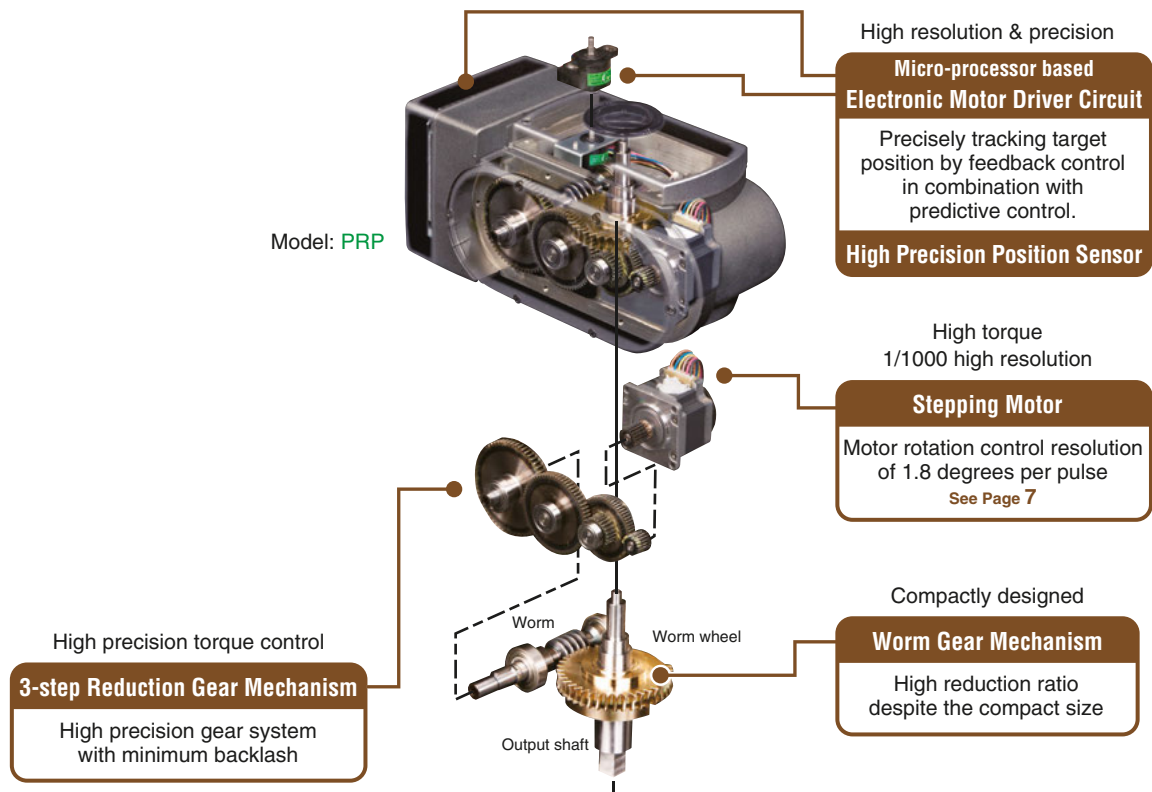
Electric valves can reduce the equipment cost to 1/5^{*1} and



*1. The data surveyed by us.

*2. Maximum power consumption: 240 VA Standby power: 20 VA
The data is provided on the condition that the PSN1 Electric Actuator is used.

Mechanism that achieves high precision and high resolution control



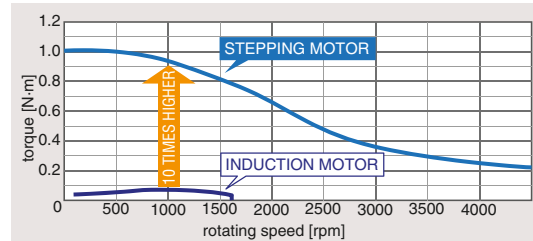
the energy consumption to $1/10^{*1}$ compared from those of pneumatic valves.

Features of Stepping Motor

Comparing to an induction motor

A stepping motor has the following advantages compared to an induction motor. It is most suitable as an actuating drive for small mechanisms including control valves.

- High torque for small size (approx. 10 times greater than an induction motor of the same mass)
- High torque at startup; with little torque variation during acceleration
- Variable rotating speed
- Rotating speed unaffected by load changes
- High precision positioning by acceleration/deceleration control
- Unaffected by voltage or frequency variations by the power source

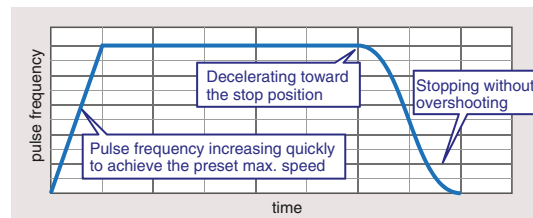


Predictive control enabling the motor to stop without overshooting

Basic rotating step per pulse of the two-phase stepping motor employed by the electric actuators is 1.8 degrees, thus requiring 200 pulses to complete a full 360-degree rotation.

The exact number of pulses is controlled by a micro-processor.

The "Predictive Control" employed as a part of its control algorithm enables the actuator to smoothly stop at an exact position (angle) without overshooting.



Mechanism of Stepping Motor

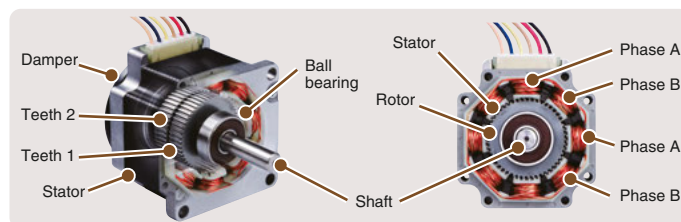
The below illustrations show cross section images of a stepping motor, called also "stepper motor" or "step motor."

The stepping motor consists of two major components: a stator (stationary part) and a rotor (rotating part).

The rotor is a permanent magnetic rotating shaft, surrounded by eight electromagnets or coils of two phases (A and B).

Each electromagnet is energized in turn, attracting and repulsing the rotor to rotate its shaft.

The motor shaft is connected to a damper that enhances the torque characteristics of the motor at high speed.



How Stepping Motor Works

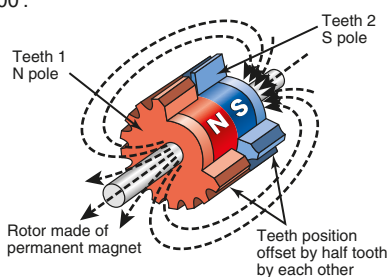
1/1000 Resolution

The N pole and S pole toothed gears are engaged with an offset of half tooth. The bottom of a N pole tooth is aligned with the top of a S pole tooth.

Each pulse moves the shaft by a quarter ($1/4$) tooth pitch while the N pole teeth and the S pole teeth are attracted and repulsed in turn. Each of those rotations is called a "step".

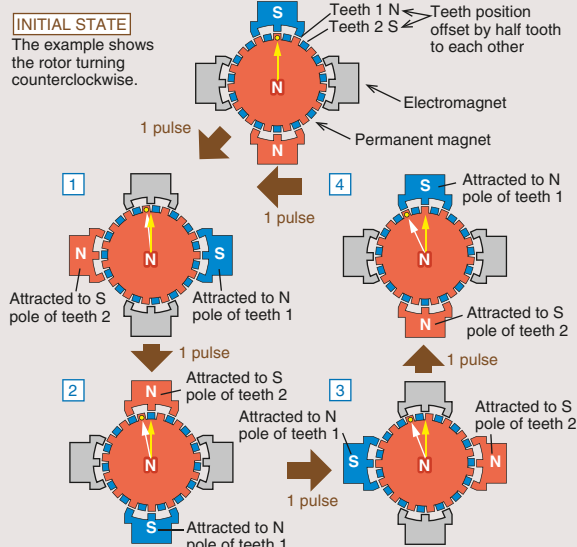
The motor has 50 teeth around the wheel, turning 1.8 degrees per step, requiring 200 pulses to make a complete rotation with an integer number of steps. In this way the motor can be turned by a precise mechanical angle in high resolution.

The motor shaft rotates more than 100 times while the actuator travels the entire stroke/span. The calculated resolution is greater than $1/20000$.



* The nominal resolution described in the actuator data sheet is $1/1000$, considering additional influencing factors such as the accuracy of the position detecting sensor, backlash of the reducing gear mechanism.

Simplified Stepping Motor Operation



● The actuator rotor has 50 teeth. The above is a simplified example with 15 teeth.

Linear Motion Electric Actuators	MSP Series
	MSP10
	PSN Series
Rotary Motion Electric Actuators	MRP Series
	MRP10
	PRP Series
Position Sensors	
Valve Positioners MEX Series	
Manual Loading Stations	

Compact Linear Motion Electric Actuators

MSP Series

High Resolution of 1/1000
Long Life Operation
Open Network Capable Actuator

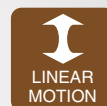
LINEAR MOTION

Stepping Motor Drive

Mechanical contacts reduced to the limit ensures long operating life.

Open Network Capable

Wiring cost can be reduced by the daisy-chained cable connection. Consult with us for open networks other than CC-Link, DeviceNet or Modbus.



2500 N
562 lbf
MAX THRUST

40 mm
1.57 in
MAX STROKE

AC
DC
POWERED



IP66



· Varies with the mode

Compact Size



Control Circuit

- Electronic limiter for full-open/-closed positions for easy calibration
- Overload protection functions

Stepping Motor

Network Terminal Box (network interface option)

Screw

Seal-spring

- Spring mechanism for both extending and retracting directions
- Constant sealing pressure (MSP4 for single direction only)

Output Stem

Network Cable Connection

Power Input Connection

Transparent image of MSP5D

MSP Series

MSP10

PSN Series

MRP Series

MRP10

PRP Series

Position Sensors

Valve Positioners
MEX Series

Manual Loading Stations

Linear Motion Electric Actuators

Rotary Motion Electric Actuators

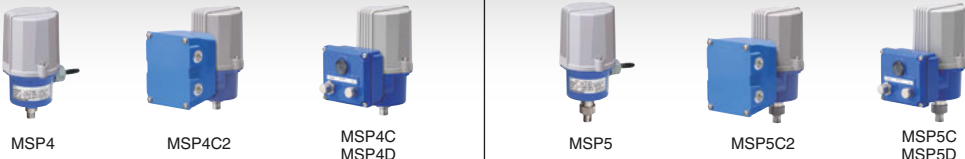








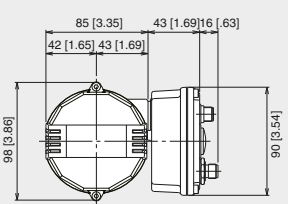
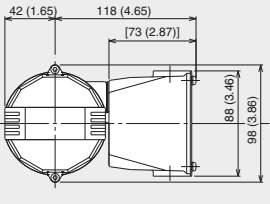
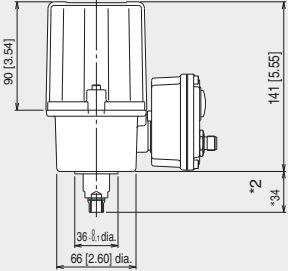
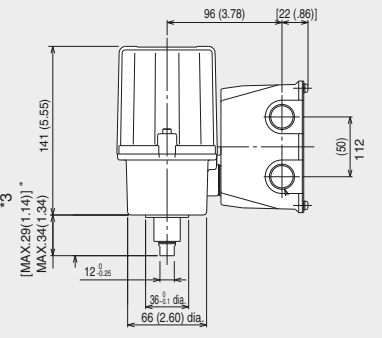
Linear Motion MSP Series

Analog I/O Type MSP Common Specifications

Input signal	: 4 - 20 mA or 1 - 5 V DC
Power input	: 24 V AC (only for MSP6, not selectable for CE) 100 - 120 V AC (not selectable for CE and UKCA) 200 - 240 V AC (not selectable for CE and UKCA) 24 V DC
Full-open/-closed signals	: Limit switch contact (Option)
Forced open/close signal	: Dry contact inputs (Option)
Manual operation function	: Option (MSP4, MSP5)
Degree of protection	: IP66
Wiring	: Cable, terminal box (Option)
Drive	: Stepping motor
Position detection	: Potentiometer
Position output	: 1 - 5 V DC (Not isolated)
Operating temperature	: -5 to +55°C (23 to 131°F)
Vibration	: 0.5 G (4.9 m/s ²) max.

Open Network Capable Type MSP Common Specifications

Power input	: 24 V DC
Degree of protection	: IP66, IP67 (MSPxD connector)
Wiring conduit	: Microconnector (MSP4C, MSP5C, MSP6C, MSP4D, MSP5D, MSP6D)
Drive	: Stepping motor
Position detection	: Potentiometer
Operating temperature	: -5 to +55°C (23 to 131°F)
Vibration	: 0.5 G (4.9 m/s ²) max.

MSP Series	
External View	
Model No.	MSP4 
	MSP4C2  MSP4C 
Model No.	MSP4D 
	MSP5C2  MSP5C 
Model No.	MSP5D 
	MSP5D 
Operation Time @ 10 mm	5 sec. / 150 N (33.5 lbf) 9 sec. / 300 N (67 lbf) 18 sec. / 700 N (157 lbf)
Stroke	15 mm (0.59")
Approx. Weight (network capable type)	1.4 kg [3.09 lb] (1.5 kg [3.3 lb], 1.8 kg [4.0 lb] (MSPxC2))
Resolution	1/1000 or 0.015 mm, whichever is greater, with 0.1 % deadband setting
External Dimensions ^{*1} (unit: mm [inch])	<div> <div>  </div> <div>  </div> </div> <div>  </div> <div>  </div>

*1. Dimensions for network capable types. *2. 50 [1.97] max. for MSP5C, MSP5D (40 [1.57] max. for 5-10 mm stroke)

*3. 50 [1.97] max. for MSP5C2 (40 [1.57] max. for 5-10 mm stroke)

MSP Series

MSP10

PSN Series

MRP Series

MRP10

PRP Series

Position Sensors


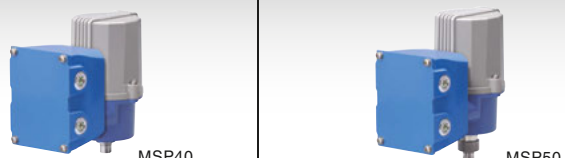





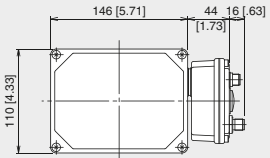
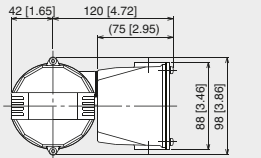
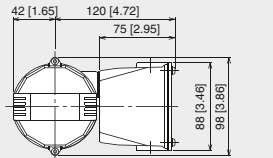
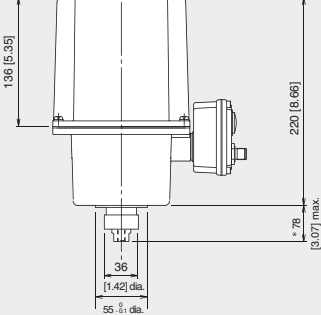
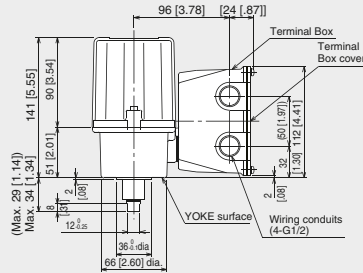
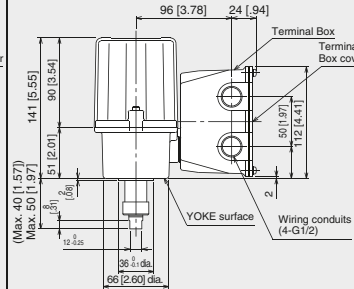

Valve Positioners
MEX Series

Manual Loading Stations

Linear Motion MSP Series

Modbus Type with Auto-Setup Function Common Specifications

Input signal	: 4 - 20 mA or 1 - 5 V DC	Alarm output (triggered when the output stem is locked)	
Power input	: 24 V DC	• Output type	: Photo MOSFET relay
Degree of protection	: IP66	• Rated load	: 160 V 150 mA AC/DC at peak
Wiring conduit	: 4-G 1/2	• ON resistance	: 8 Ω max.
Drive	: Stepping motor	• Leakage current during opening/closing	: 2 μA max.
Position detection	: Conductive potentiometer	Operating temperature	: -5 to +55°C (23 to 131°F)
Position output	: 4 - 20 mA DC or 20 - 4 mA DC (non-isolated) 1 - 5 V DC or 5 - 1 V DC (non-isolated)	Vibration resistance (Sweep endurance test (IEC 61298-3 compliant))	
		• Acceleration	: 19.6 m/s ² (2 G)

		MSP Series			
External View		<div></div> <div>MSP6 MSP6C MSP6D</div>		<div></div> <div>MSP40 MSP50</div>	
Model No.	Analog Type	<div><div>MSP6</div><div></div><div>—</div></div>			
	Network Capable Type	<div><div>CC-Link MSP6C</div><div></div><div>DeviceNet MSP6D</div><div></div><div>(IP67 connector)</div></div>		<div><div>Modbus Type with Auto-Setup Function Common Specifications MSP40</div><div></div><div>Modbus Type with Auto-Setup Function Common Specifications MSP50</div><div></div></div>	
Operation Time (10 mm/ Max. Thrust)		5 sec. / 600 N (135 lbf) 8 sec. / 1200 N (270 lbf) 15 sec. / 2500 N (562 lbf)		9 sec. / 600 N (125 lbf) 18 sec. / 1,200 N (270 lbf) 24 sec. / 1,800 N (405 lbf) 36 sec. / 2,500 N (562 lbf)	
Stroke		40 mm (1.57")		15 mm (0.59")	
Approx. Weight (Network capable type)		3.6 kg [7.9lb] (2.8 kg [6.17 lb])		1.9 kg (4.2 lb)	
Resolution		1/1000 or 0.015 mm (MSP6, MSP6D 0.02 mm), whichever is greater, with 0.1 % deadband setting			
External Dimensions ^{*1} (Unit: mm [inch])		<div></div>		<div></div>	
		<div></div>			
		<div></div>		<div></div>	
		<div></div>			
		*58 [2.28] max. for the stroke 10 – 20 mm		The dimension in () is when the stroke is set to 5 to 10 mm	
Accessory		Yoke set Model: YSS		Programming Unit Model: PU-2A 	

*1. Dimensions for network capable types.

AUTO-SETUP FUNCTION: MSP40 / MRP50

Auto-setup is the function for automatically adjusting the full-closed/-open positions and the seal spring pressure when the actuator is mounted on a valve.

By entering the valve stroke length and the necessary seal spring contraction amount using the Programming Unit (Model: PU-2A) or via Modbus communication, adjustments are performed automatically, saving manual calibrations and reducing commissioning time.



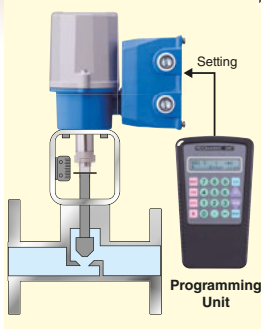
You do not have to have the Programming Unit to use the auto-setup function.

If you do not have the Programming Unit or do not wish to use Modbus communication, all you have to do is filling values of the valve stroke length and the necessary seal pressure in Ordering Information Sheet when you order the product. Our factory will proceed with all settings for you for free of charge.

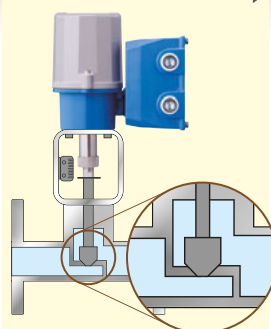
Auto-setup can be also performed by manipulating DIP switches equipped on the actuator unit.

Example with MSP40

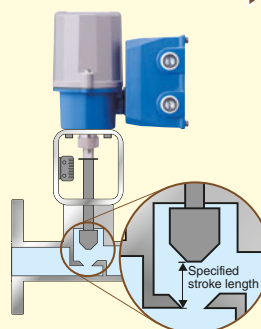
Calibration is processed and completed automatically.

1 Connecting to the valve

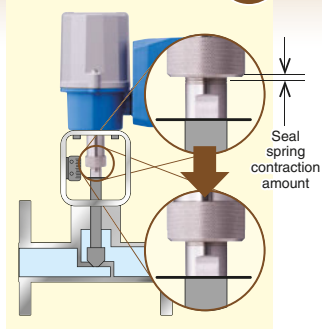
With the MSP40 mounted onto the valve, enter the stroke length and the seal spring contraction amount (extended stem) on the Programming Unit (Model: PU-2A).

2 Setting the full-closed position

Start the auto-setup process. Firstly, the stem moves downward until the plug hits the valve seat. (If it reaches the extended end before hitting the valve seat, the process is aborted as an error.)

3 Setting the full-open position

Secondly, it moves upward for a distance of the specified stroke. (If it hits the upper side of the valve seat before reaching the specified length, the process is aborted as an error.)

4 Pressing on seal spring

Then it moves downward again to the valve seat position and presses further on by the specified seal spring contraction amount. If there is no abnormality, the setting is saved and the stem goes back to 50% position to complete the setup.

Calibration is processed automatically by pressing keys on the Programming Unit after the actuator is mounted on a valve.

Linear Motion Electric Actuators	MSP Series
	MSP10
Rotary Motion Electric Actuators	PSN Series
	MRP Series
	MRP10
	PRP Series

Position
Sensors

Valve
Positioners
MEX Series

Manual
Loading
Stations

Linear Motion Electric Actuator

LINEAR MOTION

MSP10

**High resolution 1/1000, Modbus communication,
Easy installation and maintenance**

Auto-setup Function

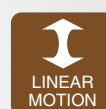
The time and effort required to adjust the valve opening is greatly reduced.
Those for maintenance work can be also saved.

Modbus Communication

Directly connectable to PLC/PC network
Actuators' operation data can be accumulated while in the normal operation.

Convenient Terminal Box

Terminal blocks, switches, buttons and LEDs are all housed in the terminal box for the ease of installation and maintenance.



2500 N
562 lbf
MAX THRUST

40 mm
1.57 in
MAX STROKE

24 V
DC
POWERED



· Varies with the model

Stepping Motor

Gears

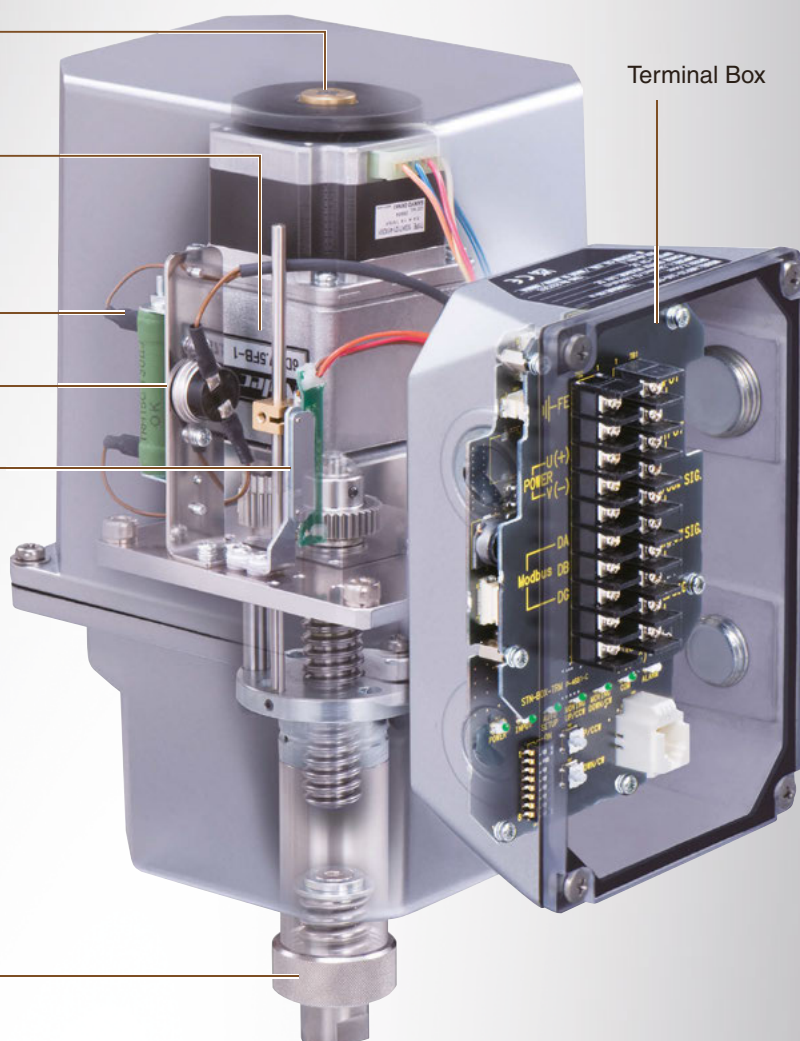
Heater

Temperature Sensor

Potentiometer

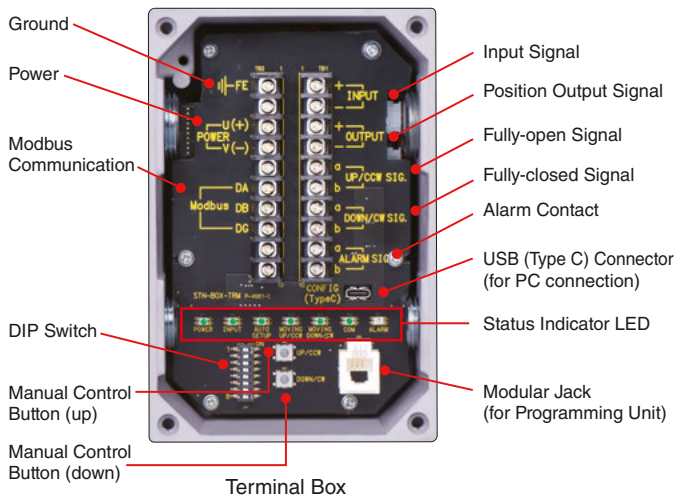
Terminal Box

Output Stem



Transparent image of MSP10

All Control Circuits Housed in the Terminal Box



1. Easy wiring

The terminal box is separate from the main unit to make wiring work easier.

2. Operation can be checked at a glance

LEDs for operating status indication can be checked through the rugged, transparent polycarbonate cover.

3. Easy parameter setting

Various parameters can be set with DIP switches or by using the Programming Unit (PU-2A) connected to the modular jack in the terminal box, without opening the cover of the main actuator body. In addition, parameters can also be set from a PC using the configurator software (Model: STCFG).^{*1}

Linear Motion MSP10

Main Specifications

■GENERAL SPECIFICATIONS

- Degree of protection** : IP66
Wiring conduits : G 1/2 female thread and G 3/4 female thread (total four)
Drive : Stepping motor
Position detection : Conductive potentiometer
Isolation : Power voltage or I/O signal to retract/UP signal position to extend/DOWN signal position to alarm signal to Modbus communication to metallic housing

Protective functions

- Automatically stops when thrust at lock (abnormal thrust increase)
- A heater is incorporated to use under cold areas.

■MODBUS COMMUNICATION

- Communication** : Half-duplex, asynchronous, no procedure
Standard : TIA/EIA-485-A compatible
Transmission distance : 500 meters max.

■INPUT SPECIFICATIONS

- Input signal** : 4 - 20 mA DC or 20 - 4 mA DC (non-isolated)
 1 - 5 V DC or 5 - 1 V DC (non-isolated)

■OUTPUT SPECIFICATIONS


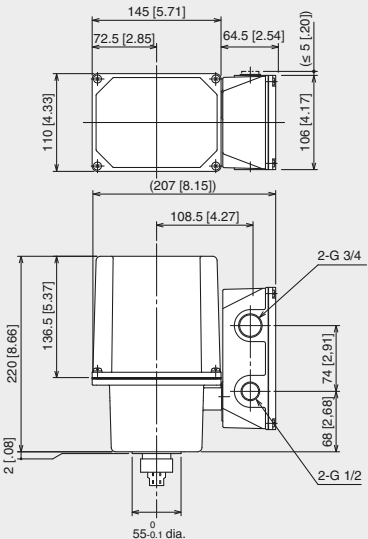

- Output signal** : 4 - 20 mA DC or 20 - 4 mA DC (non-isolated)
 1 - 5 V DC or 5 - 1 V DC (non-isolated)

Alarm output (triggered when the output stem is locked), **retract/UP signal position, extend/DOWN signal position**:
 Photo MOSFET relay

■INSTALLATION

- Power input** : 24 V DC
Operating temperature : -15 to +66°C (5 to 150.8°F)
 (No direct sunlight, radiant heat or heat transfer.)
Vibration resistance (Sweep endurance test (IEC 61298-3 compliant))

- Acceleration** : 19.6 m/s² (2 G)
Mounting orientation : DO NOT mount upside-down
Approx. weight : 4 kg (8.820 lb)

MSP10		External Dimensions (Unit: mm [inch])													
External View															
Model No.	MSP10 CE UK IP66 														
Output Stem Operation Distance	20mm [.79"] (adjustable to 10mm [.39"]) Max. stroke ≤ 20.0mm [.79"] or 40mm [1.57"] (adjustable to 20mm [.79"]) Max. stroke ≤ 40.0mm [1.57"]														
Operation Time ^{*2} @ 20 mm [.79"] /Thrust (Thrust at Lock)	<table><tr><td>3.2 sec./450N (500N)</td><td>7 sec./1200N (1500N)</td><td>13.5 sec./2500N (2700N)</td></tr><tr><td>4 sec./600N (620N)</td><td>8.4 sec./1300N (1500N)</td><td>15.2 sec./2500N (2700N)</td></tr><tr><td>5.7 sec./740N (790N)</td><td>10 sec./1400N (1500N)</td><td>16.5 sec./2500N (2700N)</td></tr><tr><td>7.4 sec./780N (790N)</td><td></td><td>19.5 sec./2300N (2700N)</td></tr></table>			3.2 sec./450N (500N)	7 sec./1200N (1500N)	13.5 sec./2500N (2700N)	4 sec./600N (620N)	8.4 sec./1300N (1500N)	15.2 sec./2500N (2700N)	5.7 sec./740N (790N)	10 sec./1400N (1500N)	16.5 sec./2500N (2700N)	7.4 sec./780N (790N)		19.5 sec./2300N (2700N)
3.2 sec./450N (500N)	7 sec./1200N (1500N)	13.5 sec./2500N (2700N)													
4 sec./600N (620N)	8.4 sec./1300N (1500N)	15.2 sec./2500N (2700N)													
5.7 sec./740N (790N)	10 sec./1400N (1500N)	16.5 sec./2500N (2700N)													
7.4 sec./780N (790N)		19.5 sec./2300N (2700N)													

^{*1} The configurator software (Model: STCFG) can be downloaded for free from our web site.

^{*2} Operation time can be changed on site using the configuration software (Model: STCFG) or the Programming Unit (Model: PU-2A).
 Be sure to confirm the data sheet.

MSP Series
MSP10
PSN Series
MRP Series
MRP10
PRP Series
Position Sensors
Valve Positioners MEX Series
Manual Loading Stations

Linear Motion Electric Actuators

LINEAR MOTION

PSN Series

High Resolution of 1/1000
Programmable opening/closing speed
Brushless Angle Sensor

Long Life and High Precision

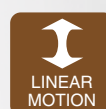
Stepping motor drive realizes long life and high precision control.

Open Network Capable

Contact us for details.

Quick Start

The actuator starts quickly with a minimal deviation of input signal from valve position.



5000 N
1124 lbf
 MAX THRUST

60 mm
2.36 in
 MAX STROKE

AC
DC
 POWERED



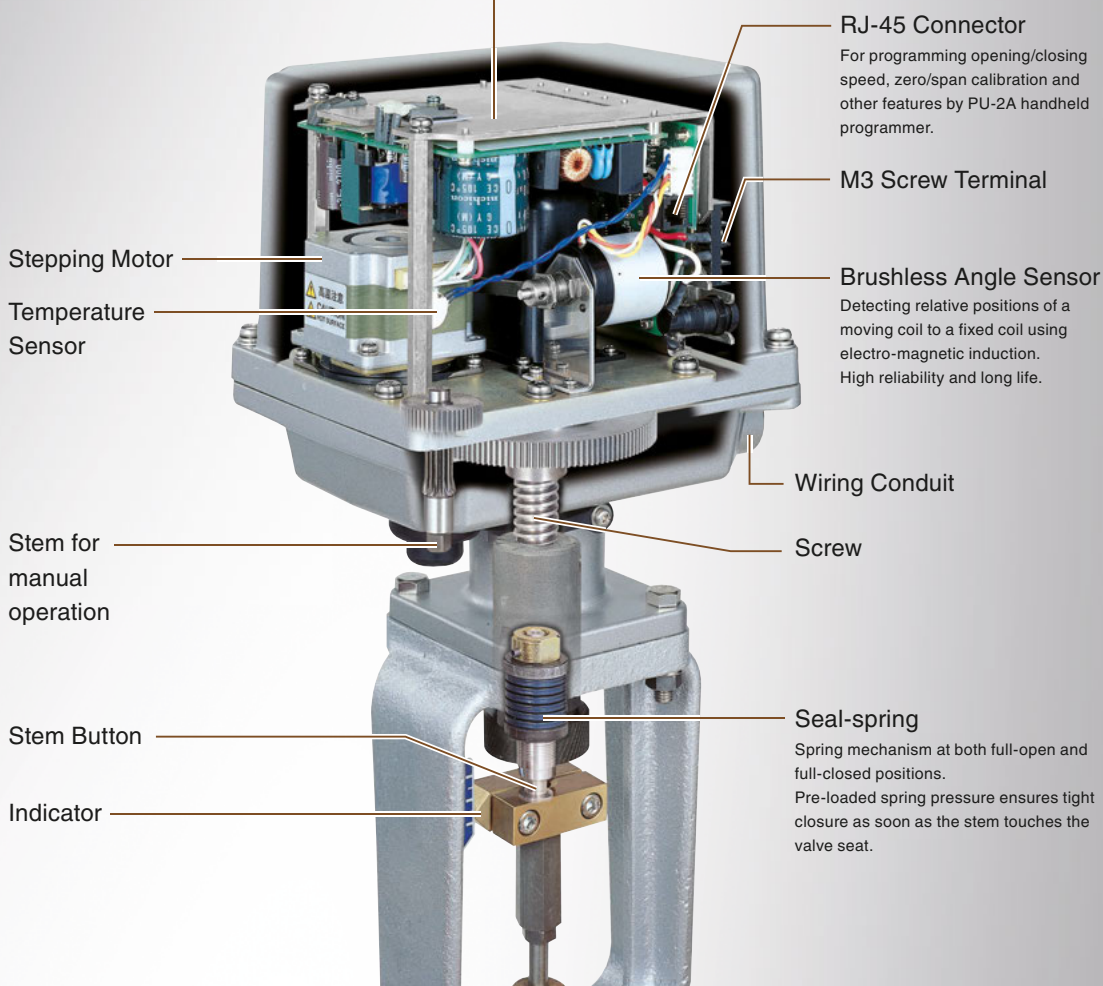
IP66



· Varies with the model

Environmentally Resistant CPU

High reliability CPU capable of withstanding up to 70°C



Transparent image of PSN1

Linear Motion PSN Series

PSN Series Common Specifications

Input signal : 4 - 20 mA or 1 - 5 V DC

Power input : 100 - 120 V AC (not selectable for CE)
200 - 240 V AC
24 V DC

Degree of protection : IP66

Wiring conduits : G 1/2 female thread (two),
G 3/4 female thread (two)

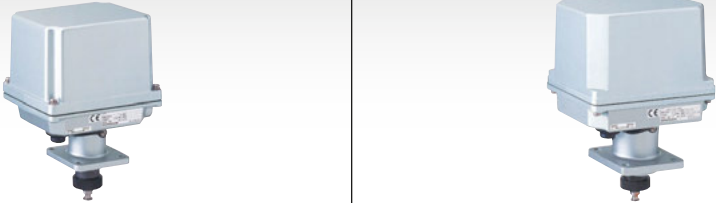






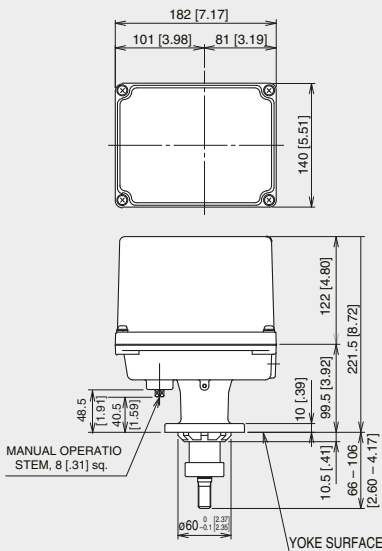
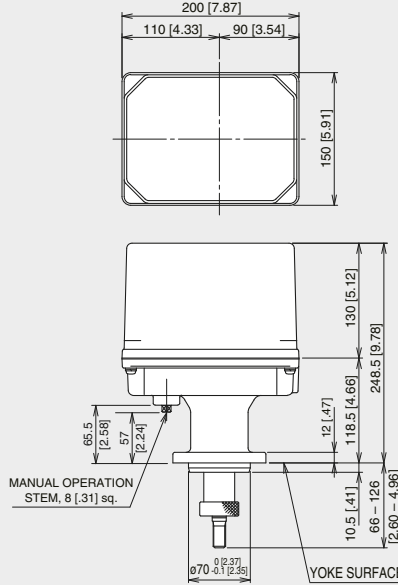



Drive : Stepping motor

Position detection : Brushless angle sensor

Manual operation : Available

Position signal : 4 - 20 mA DC

Vibration : $\leq 2 \text{ G}$ (19.6 m/s^2)

	PSN Series	
External View		
Model No.	PSN1   	PSN3   
Stroke	0 to 40 mm (0" to 1.57")	0 to 60 mm (0" to 2.36")
Max. Thrust	3000N	5000N
Opening/closing speed adjustment	0.30 - 5.65 mm/s	0.22 - 4.02 mm/s
Operating temperature	-25 to +55°C (-13 to +131°F)	-15 to +55°C (5 to 131°F)
Approx. Weight	5.9 kg (13.0 lb)	8.9 kg (18.7 lb)
Resolution	0.04 mm	0.06 mm
External Dimensions (Unit: mm [inch])		
Accessory	Manual Operation Spanner Model: HPSN2  Battery Model Model: PSN-BAT Programming Unit Model: PU-2A  	

MSP Series

MSP10

PSN Series

MRP Series

MRP10

PRP Series

Position Sensors

Valve Positioners
MEX Series

Manual Loading Stations

Linear Motion PSN Series

PSN1G Specifications

Input signal : 4 - 20 mA DC

Power input : 24 V DC

Degree of protection : IP66

Wiring conduits : G 1/2 female thread (two)

Drive : Stepping motor




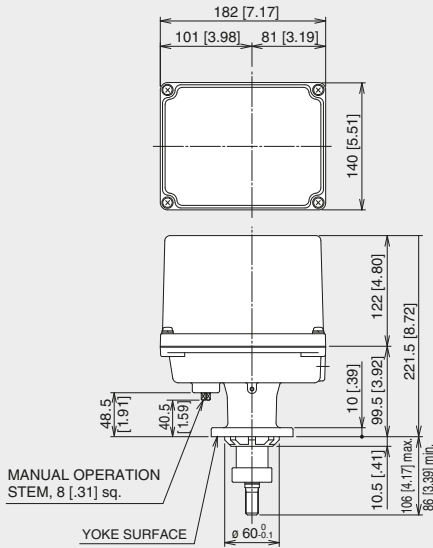



Manual operation : Available

Position signal : 4 - 20 mA DC

Operating temperature: -25 to +66°C (-13 to +150.8°F)

Vibration resistance (Sweep endurance test)

• **Acceleration** : 1 G (9.8 m/s²)

PSN1G	
External View	
Model No.	PSN1G  
Output Stem Operation Distance	0-20 mm (0" to .79")
Stroke	—
Max. Thrust	3200 N (reference value)
Operation speed (20 mm)/Max. Thrust	7.5 sec. /3200 N (reference value)
Operating temperature	-25 to +66°C (-13 to +150.8°F)
Approx. Weight	5.7 kg (12.57 lb)
Resolution	0.02 mm
External Dimensions (Unit: mm [inch])	 <p>182 [7.17] 101 [3.98] 81 [3.19] 140 [5.51] 122 [4.80] 221.5 [8.72] 101 [3.92] 99.5 [3.92] 10.5 [.41] 106 [4.17] max. 86 [3.39] min. 48.5 [1.91] 40.5 [1.59] MANUAL OPERATION STEM, 8 [.31] sq. YOKE SURFACE ø 60⁰_{-0.1}</p>
Accessory	Manual Operation Spanner Model: HPSN2  Programming Unit Model: PU-2A  

Video Library



Control Valves with STEPTOP Electric Actuators Application Examples Pulp & Paper Mill

This video introduces our STEPTOP electric actuators, with a focus on application examples in pulp and paper mills.

https://www.mgco.jp/video_e/stepstop_application/



Free from Requirements of Instrument Air Systems Control Valves with STEPTOP Electric Actuators

This video introduces common air systems and how electric control valves with STEPTOP actuators are revolutionizing the control valve industry.

https://www.mgco.jp/video_e/e_actuators_stepstop/



STEPTOP Electric Actuator Revolution of Electric Control Valves

The video compares the control result of an electric control valve with that of a pneumatic control valve, both installed in an actual flow control loop.

https://www.mgco.jp/video_e/e_actuators/index.html



STEPTOP Electric Actuator 1/1000 Resolution Demo Kit

The 1/1000 Resolution Demo Kit demonstrates STEPTOP's performance at a glance and shows the innovation in electric control valve technology.

https://www.mgco.jp/video_e/actuators/index.html

Collaboration Maps

The "Map" brochures explain the functions and applications of electric actuators with "manga" style illustrations.

ASAHI YUKIZAI CORPORATION

Japan



TOKO VALEX CO., LTD.

Japan



Dalian Shuntian Xingda Special Valve Co., Ltd.

China



Wuxi KELK Apparatus & Valve CO., LTD.

China



JDV CONTROL VALVES CO., LTD.

Taiwan



WYECO AUTO VALVES CO., LTD.

Taiwan



Linear Motion Electric Actuators

MSP Series

MSP10

PSN Series

Rotary Motion Electric Actuators

MRP Series

MRP10

PRP Series

Position Sensors

Valve Positioners
MEX Series

Manual Loading Stations

Compact Rotary Motion Electric Actuators

ROTARY MOTION

MRP Series

High Resolution of 1/1000
Long Life Operation
Open Network Capable Actuator

Stepping Motor Drive

Mechanical contacts reduced to the limit ensures long operating life.

Open Network Capable

Wiring cost can be reduced by the daisy-chained cable connection.
Consult with us for open networks other than CC-Link or DeviceNet.

Compact Size



33 N·m
24.3 lbf·ft
MAX TORQUE

90°
MAX ANGLE

AC
DC
POWERED



IP66



· Varies with the mode

Stepping Motor

Network
Terminal Box

Network
communication circuits
are incorporated.
(network interface
option)

Terminal Block

Station No. Setting

Zero/Span Adjustments

Forced Control Buttons

Potentiometer

Output Stem

Transparent image of MRP5C2







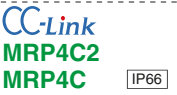
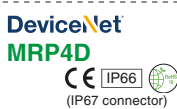

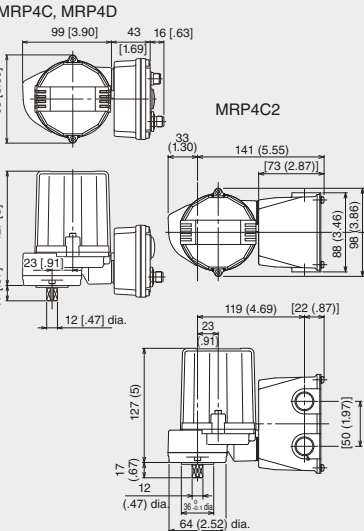
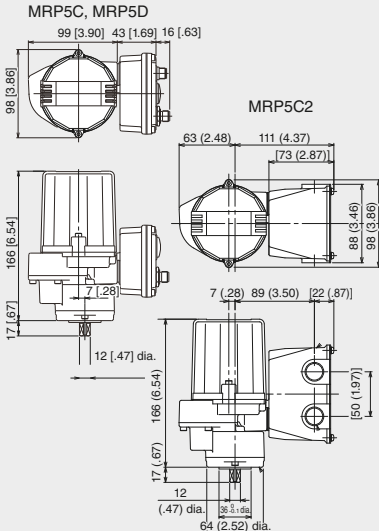
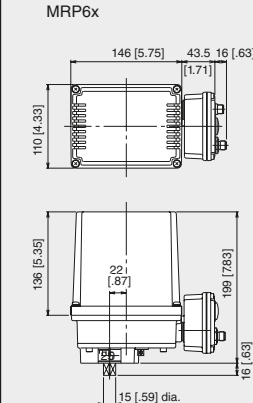
Rotary Motion MRP Series

Analog I/O Type MRP Common Specifications

Input signal	: 4 - 20 mA or 1 - 5 V DC
Power input	: 100 - 120 V AC (Not selectable for CE and UKCA) 200 - 240 V AC (Not selectable for CE and UKCA) 24 V DC
Degree of protection	: IP66
Wiring	: Cable Terminal box (Option)
Drive	: Stepping motor
Position detection	: Potentiometer
Position output	: 1 - 5 V DC (not isolated)
Full-open / -closed signals	: Limit switch contact (Option)
Forced open/close signal	: Dry contact (Option)
Operating temperature	: -5 to +55°C (23 to 131°F)
Vibration	: 0.5 G (4.9 m/s ²) max.

Open Network Capable Type MRP Common Specifications

Power input	: 24 V DC
Degree of protection	: IP66 IP67 (MRPx connector)
Wiring conduits	: Microconnector (MRP4C, MRP5C, MRP6C, MRP4D, MRP5D, MRP6D) With terminal block (MRP4C2, MRP5C2)
Drive	: Stepping motor
Position detection	: Potentiometer
Operating temperature	: -5 to +55°C (23 to 131°F)
Vibration	: 0.5 G (4.9 m/s ²) max.

		MRP Series								
External View		 MRP4 MRP4C2 MRP4C MRP4D			 MRP5 MRP5C2 MRP5C MRP5D			 MRP6 MRP6C MRP6D		
Model No.	Analog Type	 MRP4			 MRP5			 MRP6		
	Network Capable Type	 MRP4C2 MRP4C			 MRP4D MRP5C2 MRP5C			 MRP6C MRP6D		
Operation Time (90°) /Torque		7 sec. /5 N·m (3.69 lbf·ft) 13 sec. /5 N·m (3.69 lbf·ft)			12 sec. /5 N·m (3.69 lbf·ft)			13 sec. /10 N·m (7.38 lbf·ft)		
					22 sec. /10 N·m (7.38 lbf·ft)					
Span		45 to 90 degrees, 90 to 180 degrees			45 to 90 degrees			45 to 90 degrees, 90 to 180 degrees		
Approx. Weight (network capable type)		1.3 kg [2.87 lb] (1.4 kg [3.1 lb], 1.7 kg [3.7 lb] (MRP4C2))			1.7 kg [3.7 lb] (1.8 kg [4.0 lb], 2.0 kg [4.4 lb] MRP5C2))			2.8 kg (3.0 kg)		
Resolution		1/1000 or 0.09°, whichever is greater, with 0.1 % deadband setting								
External Dimensions*1 (Unit: mm [inch])										

*1. Applicable to network capable type

MSP Series

Linear Motion Electric Actuators

MSP10

PSN Series

MRP Series

Rotary Motion Electric Actuators

MRP10

PRP Series

Position Sensors

Valve Positioners MEX Series

Manual Loading Stations

Rotary Motion Electric Actuator

ROTARY MOTION

MRP10

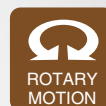
**High resolution 1/1000, Modbus communication,
Easy installation and maintenance**

Convenient Terminal Box

Terminal blocks, switches, buttons and LEDs are all housed in the terminal box for the ease of installation and maintenance.

Modbus Communication

Directly connectable to PLC/PC network
Actuators' operation data can be accumulated while in the normal operation.



50 N·m
36.9 lbf·ft
MAX TORQUE

90°
MAX ANGLE

24 V
DC
POWERED



IP66



- Varies with the mode

Indicator

Heater

Stepping Motor

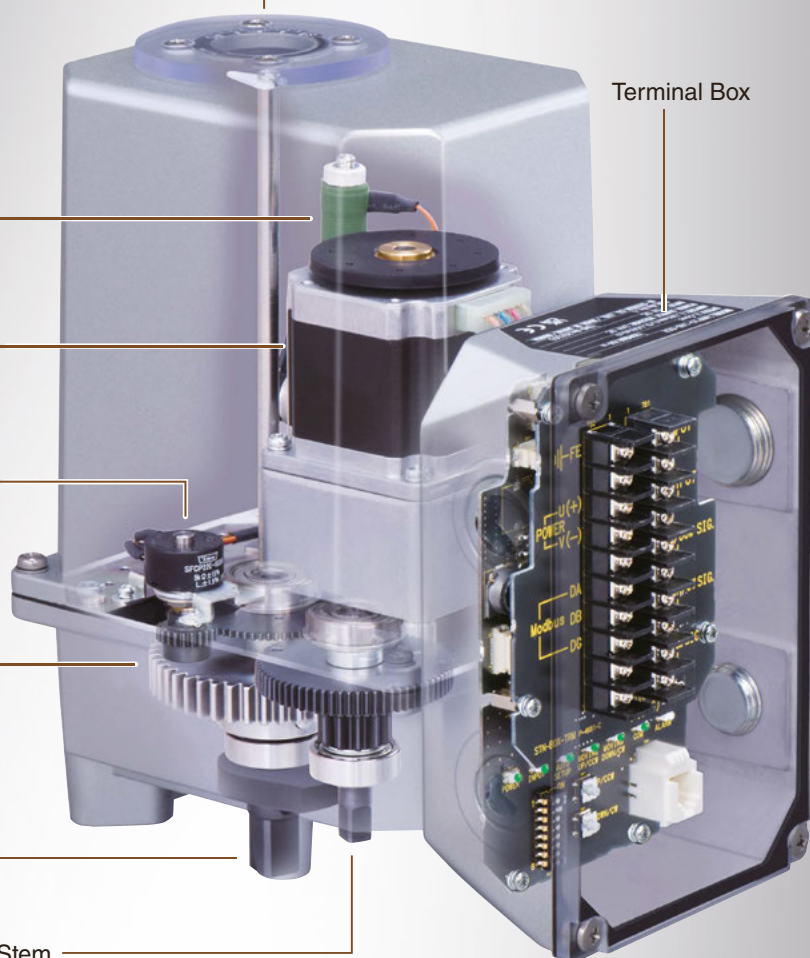
Potentiometer

Gears

Output Stem

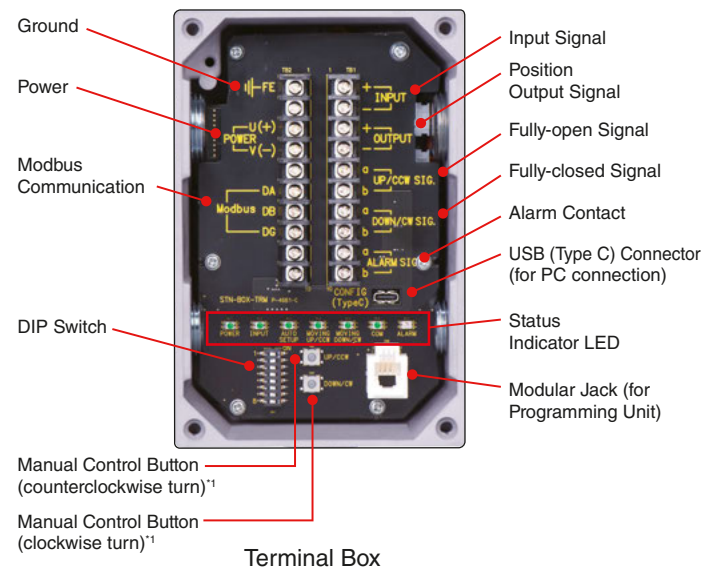
Manual Operation Stem

Terminal Box



Transparent image of MRP10

All Control Circuits Housed in the Terminal Box



1. Easy wiring

The terminal box is separate from the main unit to make wiring work easier.

2. Operation can be checked at a glance

LEDs for operating status indication can be checked through the rugged, transparent polycarbonate cover.

3. Easy parameter setting

Various parameters can be set with DIP switches or by using the Programming Unit (PU-2A) connected to the modular jack in the terminal box, without opening the cover of the main actuator body. In addition, parameters can also be set from a PC using the configurator software (Model: STCFG).^{*2}

Rotary Motion MRP10

Main Specifications

■GENERAL SPECIFICATIONS

- Degree of protection** : IP66
- Wiring conduits** : G 1/2 female thread and G 3/4 female thread (total four)
- Drive** : Stepping motor
- Position detection** : Conductive potentiometer
- Isolation** : Power voltage or I/O signal to full-open signal position to full-close signal position to alarm signal to Modbus communication to metallic housing

Protective functions

- Automatically stops when torque at lock
- A heater is incorporated to use under cold areas.

■MODBUS COMMUNICATION

- Communication** : Half-duplex, asynchronous, no procedure
- Standard** : TIA/EIA-485-A compatible
- Transmission distance** : 500 meters max.

■INPUT SPECIFICATIONS

- Input signal** : 4 - 20 mA DC or 20 - 4 mA DC (non-isolated)
1 - 5 V DC or 5 - 1 V DC (non-isolated)

■OUTPUT SPECIFICATIONS

- Output signal** : 4 - 20 mA DC or 20 - 4 mA DC (non-isolated)
1 - 5 V DC or 5 - 1 V DC (non-isolated)

Alarm output (triggered when the output stem is locked), **Full-open signal, full-close signal**: Photo MOSFET relay

■INSTALLATION

- Power input** : 24 V DC
- Operating temperature** : -25 to +66°C (-13 to 150.8°F)
(No direct sunlight, radiant heat or heat transfer.)
- Vibration resistance** (Sweep endurance test (IEC 61298-3 compliant))

- Acceleration** : 19.6 m/s² (2 G)
- Mounting orientation** : DO NOT mount upside-down
- Approx. weight** : 4.4 kg (8.820 lb)

MRP10		External Dimensions (Unit: mm [inch])
External View		
Model No.	MRP10 CE UK CA IP66	
Operation Torque (torque at lock (approx.)) / Operation Time (90 degrees)	6 N·m (8 N·m) / 2.5 sec. 16 N·m (18 N·m) / 3.5 sec. 35 N·m (44 N·m) / 7.5 sec. 50 N·m (55 N·m) / 9.5 sec.	

*1. Indicates the direction in which the output stem rotates when viewed from the top of the product cover.
 *2. The configurator software (Model: STCFG) can be downloaded for free from our web site.

MSP Series
MSP10
PSN Series
MRP Series
MRP10
PRP Series
Position Sensors
Valve Positioners MEX Series
Manual Loading Stations

Rotary Motion Electric Actuators

ROTARY MOTION

PRP Series

High resolution 1/1000, High speed operation 8.5 sec./90°,
Freely selectable opening/closing speed

Long Life and High Precision

Stepping motor drive realizes long life and high precision control.

IP66

IP66 degree of protection

Open Network Capable

Contact us for details.

Lloyd's Register Type Approval

Lloyd's Register approved type available
(Environmental categories ENV3)



200 N·m
148 lbf·ft
MAX TORQUE



90°
MAX ANGLE

AC
POWERED



IP66

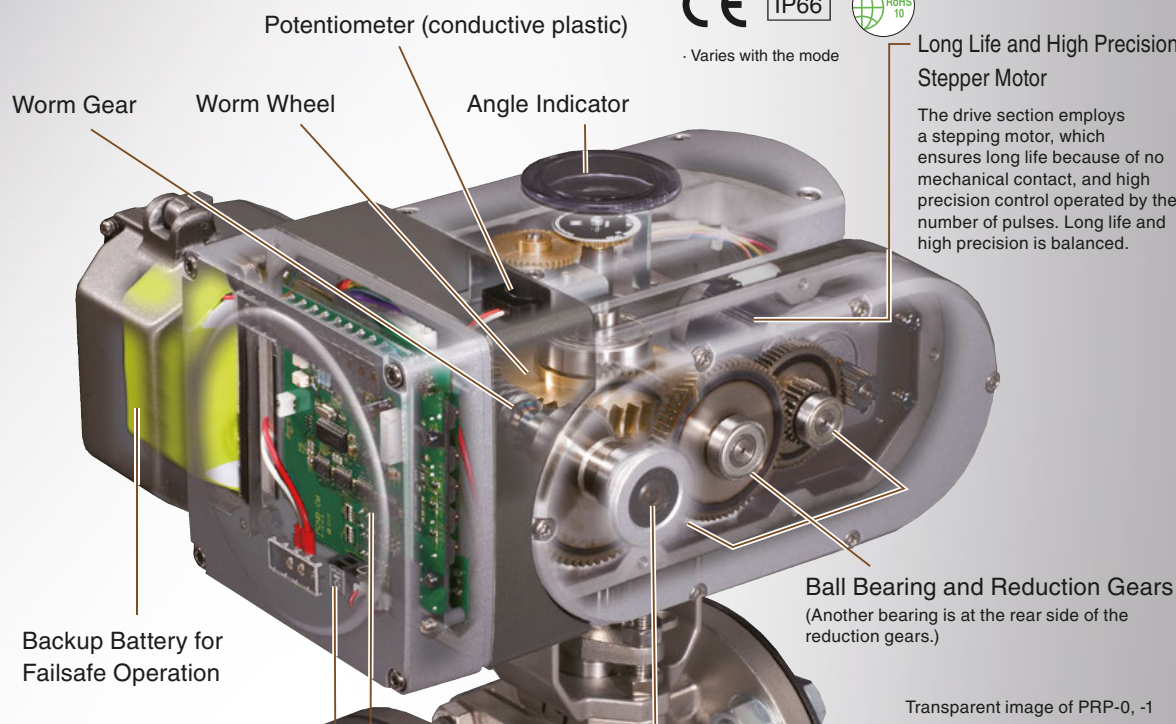


· Varies with the mode

Actuator mounting dimensions
compliant with ISO 5211/Table 1, 2 F7
(PRP-1)

Long Life and High Precision
Stepper Motor

The drive section employs
a stepping motor, which
ensures long life because of no
mechanical contact, and high
precision control operated by the
number of pulses. Long life and
high precision is balanced.



Transparent image of PRP-0, -1

RJ-45 Connector
For programming with PU-2A
hand held programmer

User-configurable items:

- Full-closed/open position
- Opening/closing speed
- Closed/open side limiter
- Full-closed/open signal
- Split range and point
- Deadband
- Restart limiting timer

High Speed Opening/Closing
8.5 to 125 sec./90°

Opening/closing speed can be changed on site.

Heater with Temperature Sensor
Contributing to Energy Saving

A typical countermeasure for cold environment
is a heater working on for 24 hours/365 days,
which inevitably wastes energy to some extent.
The PRP is equipped with a temperature sensor
attached to its stepping motor, and supplies current
to the motor to heat it to maintain the internal
temperature.

MSP
Series

MSP10

PSN
Series

MRP
Series

MRP10

PRP
Series

Position
Sensors

Valve
Positioners
MEX Series

Manual
Loading
Stations

Rotary Motion PRP Series

PSN Series Common Specifications

Input signal : 4 - 20 mA or 1 - 5 V DC

Power input : 100 - 120 V AC (Not selectable for CE)
200 - 240 V

Degree of protection : IP66

Wiring conduits : G 1/2 female thread (two)

Drive : Stepping motor

Position detection : Potentiometer









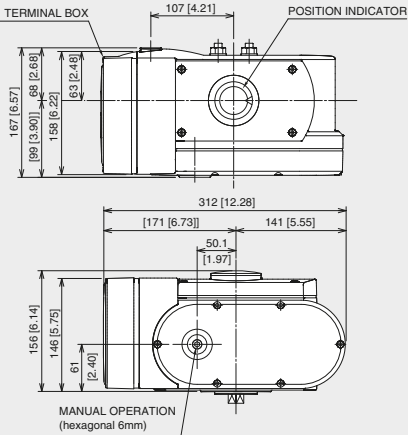
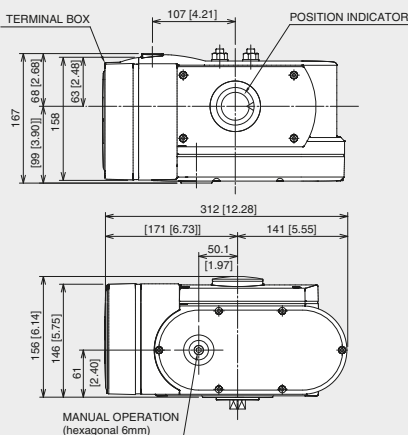


Manual operation : Available

Position output : 4 - 20 mA DC

Operating temperature : -20 to +55°C (-4 to +131°F) (Standard models)
5 to 70°C (41 to +158°F) (Lloyd's Register approved)

Vibration: Passed test condition below

· **Acceleration** : 2 G (19.6 m/s²) (Standard models)
0.7 G (6.9 m/s²) (Lloyd's Register approved)

	PRP Series	
External View		
Model No. Standard models	PRP-0x   	PRP-1x   
Model No. Lloyd's Register approved (Environmental categories ENV3)	PRP-0xx-x/LR	PRP-1xx-x/LR
Operational Angle	90°	
Max. Torque	100 N·m	200 N·m
Operation Time (90°)	12 sec. (PRP-01) 24 sec. (PRP-03) 8.5 - 125 sec. (PRP-00)	16 sec. (PRP-11) 24 sec. (PRP-13) 16 - 125 sec. (PRP-10)
Approx. Weight	10.8 kg (23.8 lb)	
Resolution	1/200 with 0.5 % deadband (factory setting); 1/1000 with 0.1 % deadband	
External Dimensions (Unit: mm [inch])		
Accessory	Battery Model: PSN-BAT Programming Unit Mode: PU-2A  	

Rotary Motion Electric Actuators

EAR Series



Insulation class B (130°C)

AC reversible motor enhances reliability against heat.

Suitable for outdoor environment

IP66 degree of protection

Resistant to vibration

Normal operation confirmed in vibration testing for 2 G in three dimensions

* Refer to data sheet for external dimensions.

Input signal : 4 - 20 mA or 1 - 5 V DC

Power supply voltage : 100 V AC±10%
200 V AC±10%

Position detection : Potentiometer (conductive plastic)

Manual operation : Available

Operating temperature : -10 to +60°C (14 to 140°F)

Sweep endurance test condition (IEC 61298-3 compliant)

· **Acceleration** : 19.6 m/s² (2 G)

Torque : 70 N·m

Operational Angle : 90° (direct and reverse rotation)

Approx. weight : 4.7 kg (10.4 lb)

Linear resolution : 1/200

Product name	Model No.
EAR Series	EAR70

MSP Series

MSP10

PSN Series

MRP Series

MRP10

PRP Series

Position Sensors

Valve Positioners MEX Series

Manual Loading Stations

Rotary Motion Electric Actuator

ROTARY MOTION

PRP-2

High torque 600 N·m and high resolution 1/1000

High torque 600 N·m

Planetary gear mechanism for speed reduction realizes the high torque of 600 N·m despite its compact size.

Long Life and High Precision

Stepping motor drive realizes long life and high precision control.

Manual Handle Locked During Motor Operation

The worm gear for manual operation is locked to prevent the manual handle from turning during normal operation.

Open network interface

HART 7 Under development



600 N·m
443 lbf·ft
MAX TORQUE

90°
MAX ANGLE

AC
POWERED



IP66



Angle Indicator

Stepping Motor

Thermal Control

Potentiometer for Position
Detection

Planetary Gear
Mechanism

Manual
Control

Endurable
Gear
Mechanism

Output Stem

Sun Gear

Planetary Gears

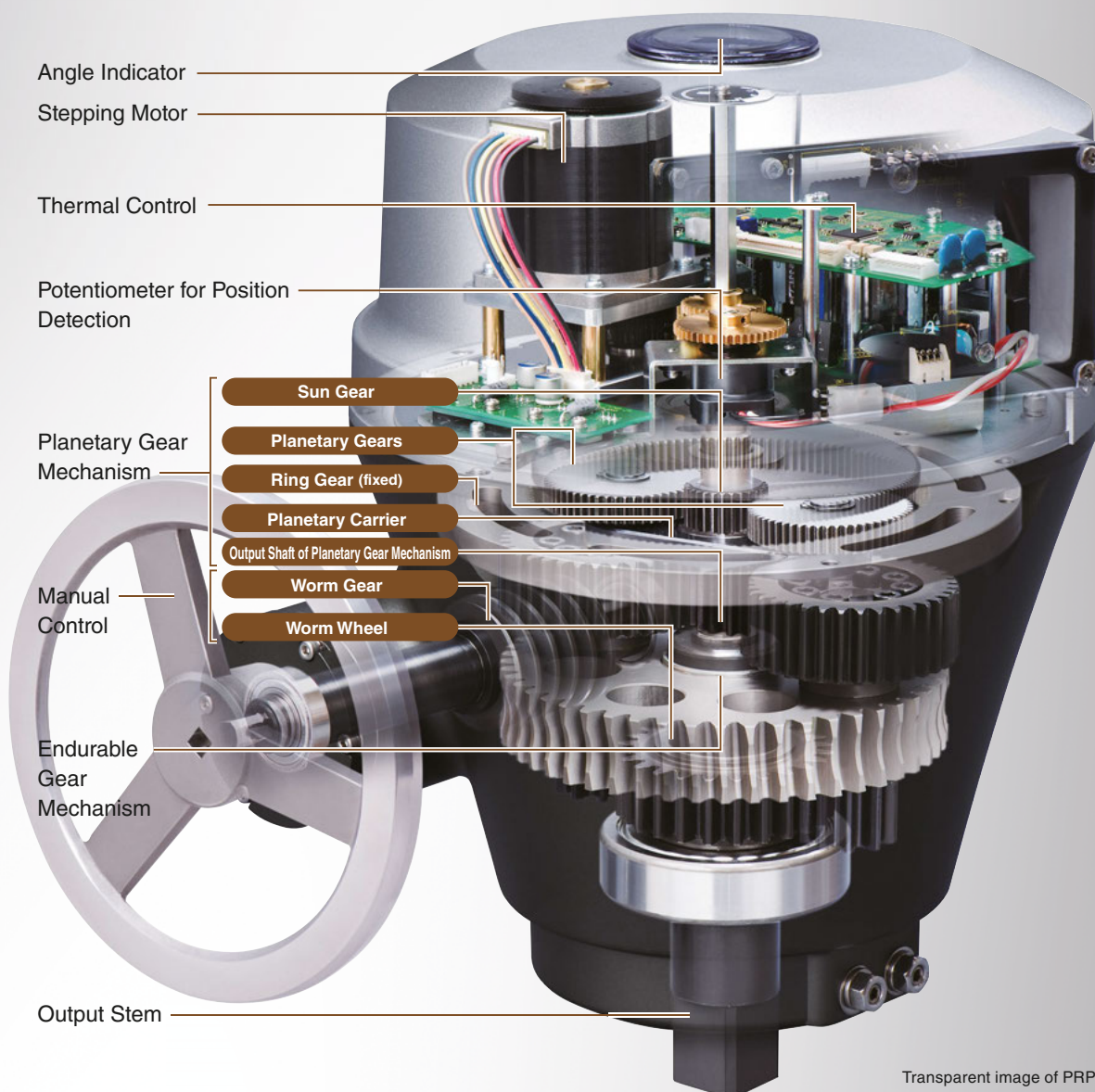
Ring Gear (fixed)

Planetary Carrier

Output Shaft of Planetary Gear Mechanism

Worm Gear

Worm Wheel



Transparent image of PRP-2

MSP Series

MSP10

PSN Series

MRP Series

MRP10

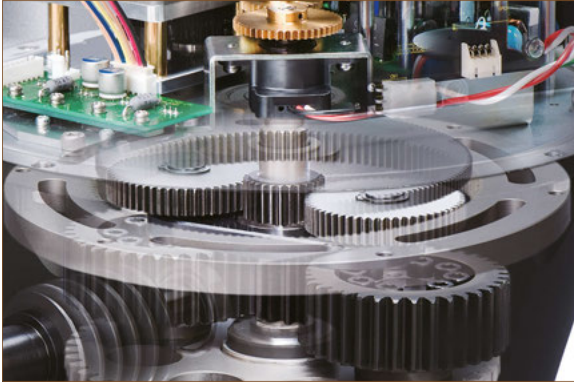
PRP Series

Position Sensors

Valve
Positioners
MEX Series

Manual
Loading
Stations

Planetary Gear Mechanism



A planetary gear mechanism consists of two gears (the "planet") revolving around the center of the other (the "sun"), just like the planets revolve around the sun. A planetary carrier connects to the centers of the two planetary gears and rotates, to rotate the output shaft of the mechanism in turn.

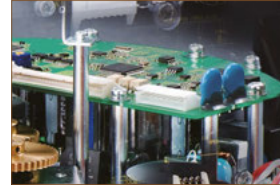
The planetary gear mechanism can yield higher torque with a smaller number of gears compared from that required by a combination of spur gears, resulting in compact size and small backlash.

Stepping Motor



The drive section employs a stepping motor featuring no mechanical contact structure and long life. The minimum rotating angle of the motor is 1.8 degrees per pulse, enabling high accuracy opening control.

Thermal Control



The motor control circuit board is separated from the other electronic circuits. The heat dissipation efficiency of the board itself is also improved.

Endurable Gear Mechanism



Dry bearings needing no lubrication are employed to balance robustness of the bearings and high reliability/long life.

Potentiometer for Position Detection




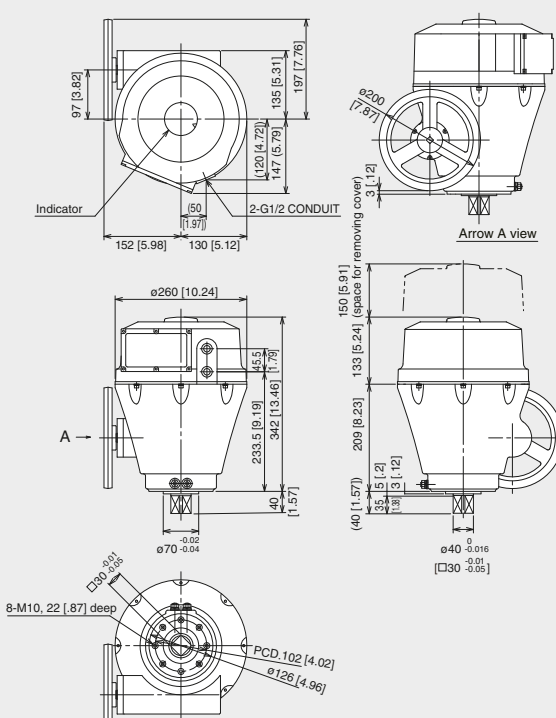
The class of potentiometer typically used for industrial vehicles or construction machines is used to realize vibration resistance, high quality and long life.

Rotary Motion PRP-2

Main Specifications

Input signal	: 4 - 20 mA or 1 - 5 V DC
Power input	: 100 - 120 V AC or 200 - 240 V AC
Degree of protection	: IP66
Wiring conduits	: G 1/2 female thread (two)
Drive	: Stepping motor
Position detection	: Potentiometer (conductive plastic type)

Manual operation	: Available
Position output	: 4 - 20 mA DC
Operating temperature	: -20 to +55°C (-4 to +131°F)
Vibration: Passed test condition below (Fixed frequency endurance test, Sweep endurance test)	
Acceleration	: 2 G (19.6 m/s ²)

PRP-2		External Dimensions (Unit: mm [inch])	
External View			
Model No.	PRP-2 CE IP66		
Operational Angle	90°		
Max. Torque	600 N·m		
Operation Time (90°)	50 sec./90° 34 sec./90° Specified time (refer to the instruction manual)		
Approx. Weight	26.5 kg (58.42 lb)		
Linearity resolution adj.	1/300 to 1/1000		
Accessory	Programming Unit Model: PU-2A CE		

MSP Series

MSP10

PSN Series

MRP Series

MRP10

PRP Series

Position Sensors

Valve Positioners
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Stations

Position Sensors

**Reliable brushless construction
Robust and compact!**

Long-life Brushless Angle Sensor Incorporated

2-wire position transmitters and limit alarms incorporating a brushless angle sensor are lined up.

Flame-proof type 2-wire position transmitters are also available.

Visit our website for details.



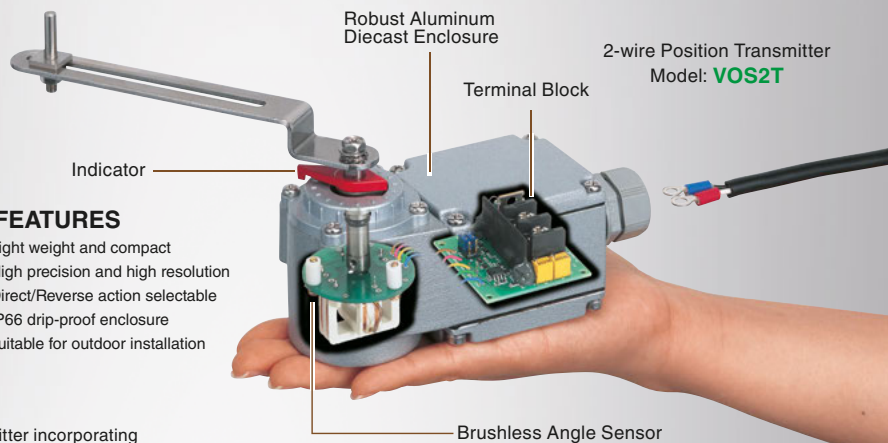
Brushless Angle Sensor

A type of angle sensor detecting positional relationship between a fixed coil and a movable coil, using the principle of magnetic induction. It has no electrical sliding part, featuring high reliability and long life.

FEATURES

- Light weight and compact
- High precision and high resolution
- Direct/Reverse action selectable
- IP66 drip-proof enclosure suitable for outdoor installation

The VOS2T is a 2-wire position transmitter incorporating a brushless angle sensor. It detects the rotating angle of pneumatic/electric actuators, and transmits 4 - 20 mA output signal proportional to the angle.



Transparent image of VOS2T

Valve Positioners MEX Series

Position Control Using Direct/Reverse Acting Motors

Multiple High Performance Functions

Deadband adjustment, timer adjustment, electronic limits

High Accuracy Positioning

A model for high accuracy positioning by employing reverse-phase breaks is available.

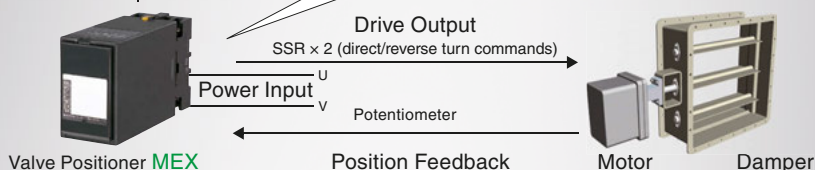
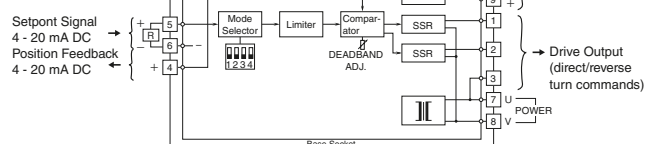
Various Mounting Options

Panel mount type with manual control function, device built-in type, and other types

Visit our website for details.



CIRCUIT DIAGRAM



The MEX compares a setpoint signal from the controller or PLC and a position feedback signal from the position sensor, and controls SSR or 24 V AC dry contact switches to match both signals.

Manual Loading Stations

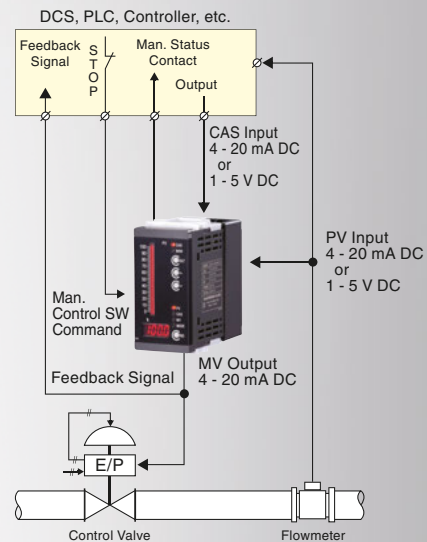
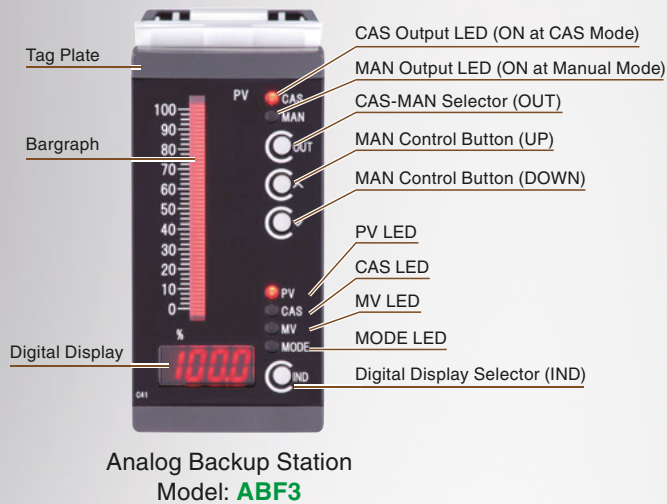
Holding the Signal Before Control Output Failure

Backup, Hold and Manipulation of MV Output Signal

Used as a backup of DCS, PLC or a PID controller

MV output signal is held when an "abnormality" signal (contact) or manual switching command contact is received.

Final control element can be manually controlled by increasing/decreasing MV output signals using external UP/DOWN switches.



Manual Loader SM10

Manual Loading Station with Backup

The analog (MV) output (4 - 20 mA or other current/voltage range) of the SM10 can be used to track a cascade (CAS) input (e.g. MV output from an external controller), or to provide a specific value for manual control.

Users can choose their own scaleplate specifications using Scale Plate Designer on our website and confirm the final design at site.

Product name	Model No.
MANUAL LOADER (with 4-digit digital meter, LED bar indicator)	SM10

Linear Motion Electric Actuators	MSP Series
	MSP10
	PSN Series
Rotary Motion Electric Actuators	MRP Series
	MRP10
	PRP Series

Position
Sensors

Valve
Positioners
MEX Series

Manual
Loading
Stations



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