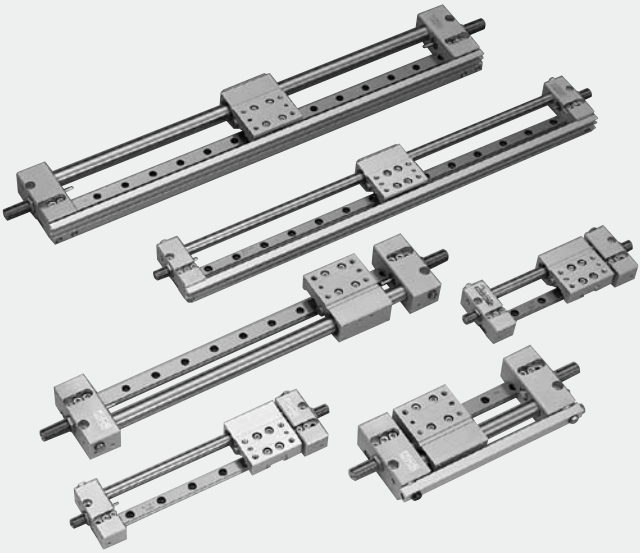
PICO RODLESS Ⅱ

PICO RODLESS Ⅱ®

PRM2 Series



INDEX★

PICO RODLESS Ⅱ

PRM2 Series

High Rigidity Linear Guide + Rodless Cylinder
Small Size, Lightweight and Compact

Linear Guide

High Accuracy, High Rigidity Linear Guide is built-in.

Stopper for Stroke Adjustment

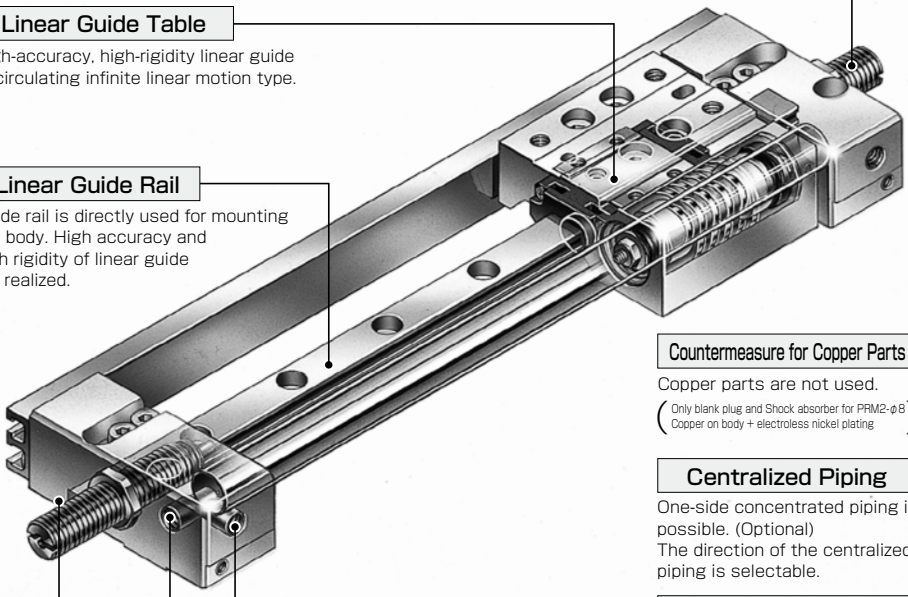
Selectable between shock absorber and rubber stopper.

Linear Guide Table

High-accuracy, high-rigidity linear guide of circulating infinite linear motion type.

Linear Guide Rail

Guide rail is directly used for mounting the body. High accuracy and high rigidity of linear guide are realized.



Countermeasure for Copper Parts

Copper parts are not used.

(Only blank plug and Shock absorber for PRM2-φ8 Copper on body + electroless nickel plating)

Centralized Piping

One-side concentrated piping is possible. (Optional)
The direction of the centralized piping is selectable.

Piping Port

Possible in the axial and lateral directions.

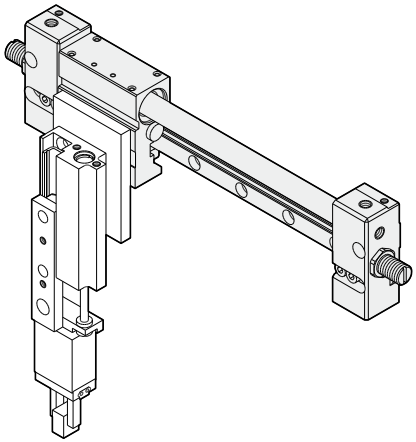
Datum Plane

A recess is provided in the end plates on both sizes, which allows positioning by pressing on the datum plane of the rail.

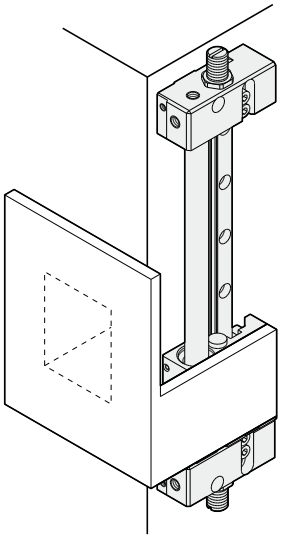
Summary of the Pico Rodless Ⅱ PRM2 Series

The series of high-accuracy guided rodless cylinders pursues utmost size and weight reduction and compactness. The overall length has been significantly reduced by providing a connecting magnet in the body and piston. Aluminum alloy is employed for the body and there is no extra base on the bottom side of the linear guide, which has made it possible to realize a significant weight reduction and restrain the height. For mounting, the linear guide rail can be directly used, which allows the high accuracy, high rigidity and high mounting accuracy of the linear guide to be fully brought out. The stroke can be adjusted by either of the two methods: shock absorber and rubber stopper. One-side concentrated piping is also possible. Model with the threaded holes in the table top side for mounting a load that are provided with helical inserts is also available made to order.

■Application Examples : PICO RODLESS Ⅱ



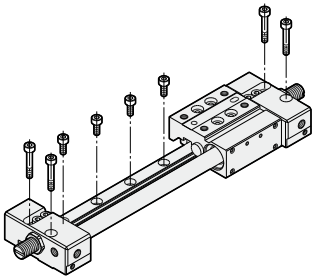
Chuck Movement



Opening and Closing of the Door

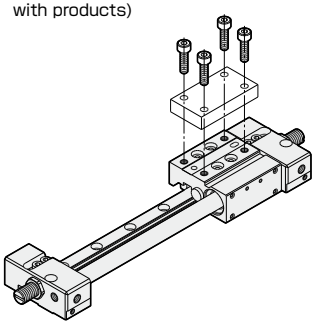
■MAIN BODY INSTALLATION

(Bolt as shown in the figure are not supplied with products)



■MOUNTING

(Bolt as shown in the figure are not supplied with products)



Custom Made
Grease Converted Product
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Custom Made
With Helical Insert
607 Page

Thin Rodless φ16,φ25,φ32
PRD Series
611 Page

Block Type Rodless
PRZ Series
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Model Code Example

PRM2S-SD12-100-QZ-RS-RB12LA

●Series Name

●Bore Size

8	φ8
12	φ12

Cable Length●

No Code	1m
LA	3m

Magnet and Switch Rail●

No Code	None
S	Magnet and Switch Rail

A magnet and switch rail is required when mounting switches.

●Number of Switches

1	1
2	2
3	3

Switch●

No Code				
RB1	Straight	DC12~24V	2 Wires Reed Rwitch	With Indicator Light
RC1	Angle			
RB2	Straight	DC12~24V	2 Wires Reed Rwitch	Without Indicator Light
RC2	Angle			
RB4	Straight	DC12~24V	2 Wires Solid State Switch	With Indicator Light
RC4	Angle			
RB5	Straight	DC5~24V	3 Wires Solid State Switch	With Indicator Light
RC5	Angle			

Direction Of Cable Outlet

RB····Straight Outlet Cable RC····Angle Outlet Cable

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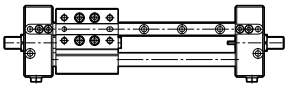
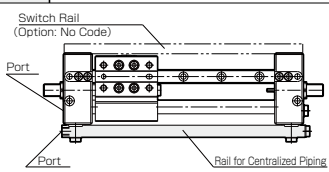
Centralized Piping●

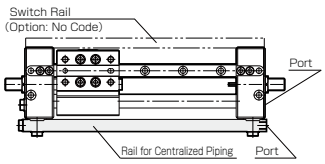
SD None



SL Centralized Piping Port Left



SR Centralized Piping Port Right



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●Installation Positions of Magnet and Switch Rail

No Code	Guide Side Mounting
RS	Cylinder Side Mounting

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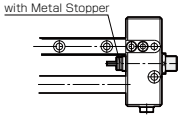
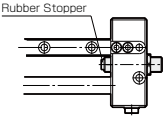
For models with centralized piping, the indication of the mounting position of the magnet switch rail (PRM2S) is always no symbol (mounted on the guide side).

●Stopper Type

QZ	Both Sides Shock Absorber	QT	Both Sides Rubber Stopper





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●Stroke

Bore Size	Standard Stroke(mm)					
	50	100	150	200	250	300
φ12	●	●	●	●	●	●
φ16	●	●	●	●	●	●

Intermediate Stroke

Please adjust with Stopper (Shock Absorber)

Model	Magnet, Switch Rail	Centralized Piping
PRM2	None	●
PRM2S	Guide Side Mounting(Option Code: None)	●
	Cylinder Side Mounting(Option Code: RS)	×

SPECIFICATIONS

Bore Size		φ8mm	φ12mm
Magnet Holding Force		35N	79N
Maximum Load Mass	With Shock Absorber	2kg	3kg
	With Rubber Stopper	1kg	1.5kg
Port Size		M5×0.8	
Guide Mechanism		Precision Linear Ball Bearing	
Type of Operation		Double Acting	
Fluid		Air	
Maximum Operating Pressure		0.65MPa	
Minimum Operating Pressure		0.32MPa	0.25MPa
Pressure		0.9MPa	
Operating Temperature		5~60℃	
Maximum Operating Speed		500mm/s	
Minimum Operating Speed		190mm/s	190mm/s
Cushioning		Shock Absorber(with Metal Stopper) Rubber Stopper	
Lubrication		Not required	

THE TYPE OF LINEAR GUIDE

Model	Type
PRM2−φ8	THK SRS 9MUUC1
PRM2−φ12	THK SRS 12MSSC1

Pre-load:Zero or slightly pre-loaded

STROKE ADJUSTMENT RANGE

Model	Shock Absorber	Rubber Stopper
	QZ	QT
PRM2−φ8	Each −19 mm on one side (total −22 mm)	Each −19 mm on one side (total −22 mm)
	Each +0.9 mm on one side (total +1.8 mm)	Each +0.9 mm on one side (total +1.8 mm)
PRM2−φ12	Each −21 mm on one side (total −42 mm)	Each −21 mm on one side (total −42 mm)
	Each +0.9 mm on one side (total +1.8 mm)	Each +0.9 mm on one side (total +1.8 mm)

THEORETICAL THRUST

Unit:N

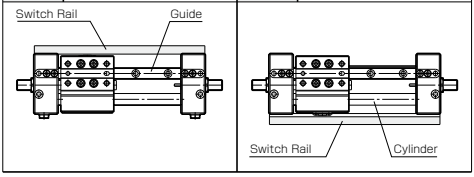
Bore Size (mm)	Operating Pressure MPa				
	0.3	0.4	0.5	0.6	0.65
φ8	———	20	25	30	33
φ12	34	45	57	68	73

When used vertically, the PRM2-φ8 from the theoretical thrust please pull 10N.
PRM2-φ12 is 35N.

1MPa=10.2kgf/cm²
1N=0.102kgf

INSTALLATION POSITIONS OF MAGNET AND SWITCH RAIL

No Code	Guide Side	RS	Cylinder Side



For models with centralized piping, the indication of the mounting position of the magnet switch rail (PRM2S) is always no symbol (mounted on the guide side).

OPTIONAL PARTS CODES

Name

PARTS CODE
Note
PARTS CODE
Note

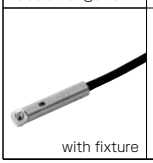
Content

Switch Fixture

BF(PRM)
Screw, Nut

Reed Switch(2 Wires, with Indicator Light)

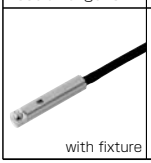
Straight Outlet Cable	Angle Outlet Cable
RB1(PRM) Cable Length:1m	RC1(PRM) Cable Length:1m
RB1LA(PRM) Cable Length:3m	RC1LA(PRM) Cable Length:3m


with fixture


with fixture

Reed Switch(2 Wires, without Indicator Light)

Straight Outlet Cable	Angle Outlet Cable
RB2(PRM) Cable Length:1m	RC2(PRM) Cable Length:1m
RB2LA(PRM) Cable Length:3m	RC2LA(PRM) Cable Length:3m


with fixture


with fixture

Shield

MS(PRM□)
Fill in □ as bore size
Before mounting, apply anaerodic adhesive to the screws.


with mounting screws

Solid State Switch(2 Wires, with Indicator Light)

Straight Outlet Cable	Angle Outlet Cable
RB4(PRM) Cable Length:1m	RC4(PRM) Cable Length:1m
RB4LA(PRM) Cable Length:3m	RC4LA(PRM) Cable Length:3m


with fixture


with fixture

Solid State Switch(3 Wires, with Indicator Light)

Straight Outlet Cable	Angle Outlet Cable
RB5(PRM) Cable Length:1m	RC5(PRM) Cable Length:1m
RB5LA(PRM) Cable Length:3m	RC5LA(PRM) Cable Length:3m


with fixture


with fixture

Shock Absorber

ABK8
For ϕ8(M8×0.75)
ABK10
For ϕ12(M10×1)


with nut

Adjuster Bolt with Rubber

AG(M8–32)
For ϕ8(M8×0.75)
AG(M10–50)
For ϕ12(M10×1)


with nut

Lock Nut

NTS(M8)
For ϕ8(M8×0.75)
NTS(M10)
For ϕ12(M10×1)

Common to shock absorber and adjustment bolt with rubber.

Magnet

RK(PRM)
Before mounting, apply anaerodic adhesive to the screws.


with mounting screws

Switch Rail

RJ(PRM A– B C)
Specify the bore size for A, stroke for B and magnet switch rail mounting position for C.
Example) The Rail for PRMS-SD12-100-QZRS is RJ (PRM12-100RS).


with fixing bolts

Repair Parts Kit

HP(PRM□)
Fill in □ as bore size

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With Cylinder Repair Grease

Cylinder Repair Grease

HG(PRM8)
For ϕ8
HG(PRM12)
For ϕ12

Grease exclusively for the cylinder. The grease is different from that for the guide. Do not use this grease for the guide.

Plug

BS–M5
with gasket

BR–M5
Coat BR-M5 with seal tapes or sealing liquid when using it.

Centralized Piping Rail

PC(PRM A– B)
Specify the bore size for A and stroke for B.
Example) The Centralized Piping for PRMS-SL12-100-QZ is RJ (PRM12-100RS).

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with fixture

Product MASS

●Mass of PRM2

Unit: g

Model	Stroke (mm)					
	50	100	150	200	250	300
PRM2−ϕ8	240	260	280	300	320	340
PRM2−ϕ12	470	510	550	590	630	670

Note: with shock absorber, rubber stopper are both the same mass.

●Additional Mass of Centralized Piping

Unit: g

Model	Stroke (mm)					
	50	100	150	200	250	300
PRM2−ϕ8	40	50	60	70	80	90
PRM2−ϕ12	45	55	65	75	85	95

Note: SL, SR are both the same mass.

●Additional Mass of Magnet, Switch Rail

Unit: g

Model	Stroke (mm)					
	50	100	150	200	250	300
PRM2−ϕ8	45	60	75	90	105	120
PRM2−ϕ12	55	70	85	100	115	130

NOTE: No code, RS both the same mass of the magnet switch rail mounting position.

●Mass of Switch

Unit: g

Type	Mass
RB1, RB2, RB4, RB5	15
RC1, RC2, RC4, RC5	
RB1LA, RB2LA, RB4LA, RB5LA	35
RC1LA, RC2LA, RC4LA, RC5LA	

METHOD TO CALCULATE THE MASS

Ex. PRM2S−SR8−100−QZ−RS−RB42LA

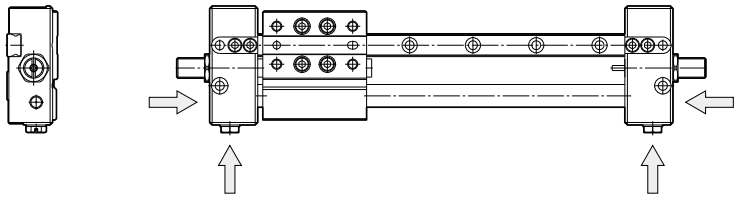
Basic Mass····· 260g
Centralized Piping(SR)····· 50g
Magnet, Switch Rail····· 60g
Switch····· 35×2=70g

260+50+60+70=440g

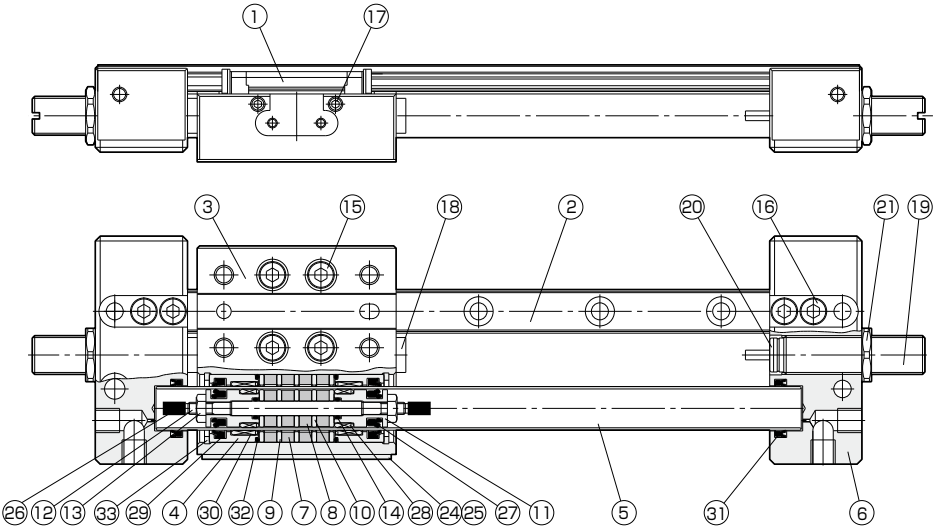
Modification of Port Position

■Port

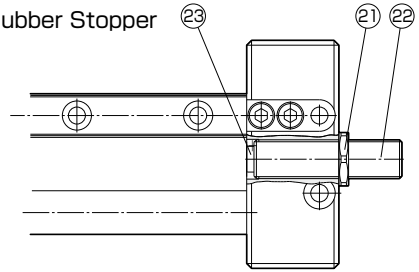
The position can be selected from two points for each of the plates on both ends.
Change the port position by the placement of the blank plug (BS-M5).
When the magnet switch rail mounting position is on the cylinder side, only the axial direction is available for the port.
Blank Plug BR-M5 if Projection is not allowed ☞page 588
Port Change for Centralized Piping Type ☞page 591



STRUCTURE AND PRINCIPAL COMPONENTS



Stopper Type : Both Sides Rubber Stopper



Note: The tube slightly moves in the axial (up to about 1.5 mm) and circumferential directions, which is due to the play provided for preventing galling with the guide and not an abnormality.

PRINCIPAL COMPONENTS

No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Linear Guide Table	Stainless Steel, Resin		14	O-ring	NBR	
2	Linear Guide Rail	Stainless Steel		15	Fixing Bolt	Steel	Nickel Plating
3	Body	Aluminum Alloy	White Alumite	16	Fixing Bolt	Steel	Nickel Plating
4	Rod Cover	Aluminum Alloy	White Alumite	17	Fixing Screw	Stainless Steel	
5	Tube	Stainless Steel	Hard Chromium Plated	18	Stopper Catcher	Carbon Steel (Heat Processed)	Electroless Nickel Plating
6	Plate	Aluminum Alloy	White Alumite	19	Shock Absorber	Steel(For ø8: Copper Alloy)	Electroless Nickel Plating
7	Outer Magnet	Rare-earth Magnet		20	Metal Stopper	Steel	Heat Treatment (Nitriding)
8	Inner Magnet	Rare-earth Magnet		21	Lock Nut	Steel	Electroless Nickel Plating
9	Outer Yoke	Steel	Electroless Nickel Plating	22	Adjuster Bolt (for Rubber)	Steel	Electroless Nickel Plating
10	Inner Yoke	Steel	Electroless Nickel Plating	23	Cushion Rubber	Urethane Rubber	
11	Piston	Aluminum Alloy	White Alumite	24	Shield	Steel	Electroless Nickel Plating
12	Rod	Stainless Steel		25	Screw	Steel	Nickel Plating
13	Nut	Steel	Nickel Plating	26	Cushion Rubber	Urethane Rubber	

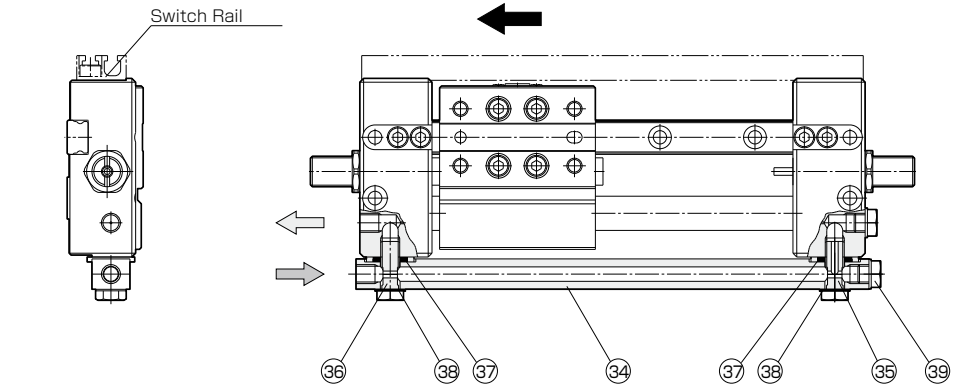
Note: No.24, No.25 is the only case of PRM2S.
Please do not turn the No.17 fixing screw.

REPAIR PARTS (With Grease)

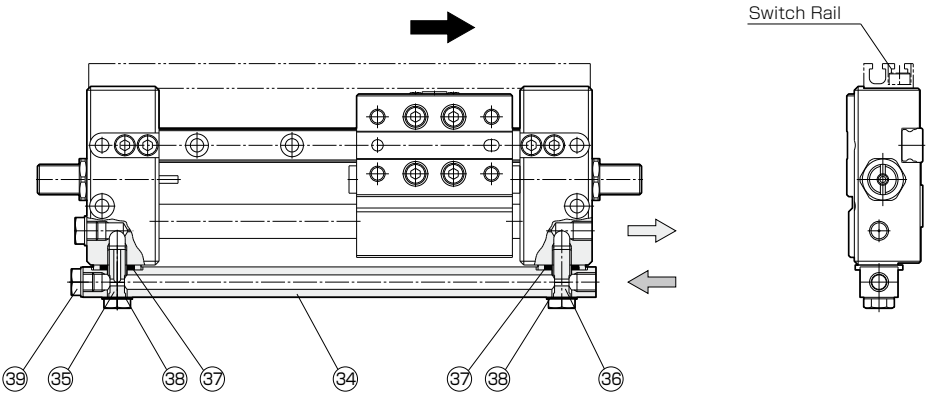
No.	Name	Material	Qty	Remarks	No.	Name	Material	Qty	Remarks
27	Piston Seal	NBR	2		31	Packing	NBR	2	
28	Wear Ring	Synthetic Resin	2		32	O-ring	NBR	2	
29	Dust Seal	NBR	2		33	Circlip	Steel	2	Nickel Plating
30	Bush	Synthetic Resin	2						

DIRECTION OF CENTRALIZED PIPING AND PORT

■SL(Centralized Piping　Port Left Side)



■SR(Centralized Piping　Port Right Side)



■Change from SL to SR and Precautions

Plugs A and B have different shapes and simply changing the placement of the blank plug (No. 39) cannot change between SL and SR.
Follow the procedure below to change plug A for plug B.
Plugs A and B are in different colors: silver and black respectively.

●Gradually loosen plugs A (No. 35) and B (No. 36) and remove the centralized piping rail (No. 34).
●Attach the gasket (No. 38) and exchange the locations of plugs A and B.
●Remove the blank plug and attach it on the plug A side.
●Insert the seal washer and screw in plugs A and B to secure the centralized piping rail.

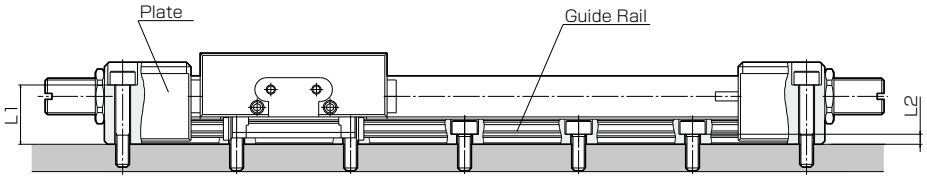
Centralized Piping Rail

No.	Name	Metarial	Qty	Remarks	No.	Name	Metarial	Qty	Remarks
34	Centralized Piping Rail	Aluminum Alloy	1		37	Seal Washer	NBR、Steel	2	
35	Plug A	Carbon Steel	1	Electroless Nickel Plating	38	Gasket	NBR、Steel	2	
36	Plug B	Carbon Steel	1	Black Nickel Plating	39	Blank Plug	Copper	1	Electroless Nickel Plating

The parts on this parts list are grouped into one set as a part separately offered.

BODY INSTALLATION

Top Mounting(Plate, Guide Rail Thru Hole used)



⚠Caution

- Ensure that the mating mounting surface is a flat surface (recommended flatness: 0.05 mm) and tighten evenly.
- For securing, use all mounting holes of the plates on both sides and the guide rail.
  Securing only with either the plates or guide rail or, even if both plates and guide rail are used for securing, failure to use all mounting holes may lead to damage to the actuator or insufficient rigidity.

Plate Portion Mounting Bolt

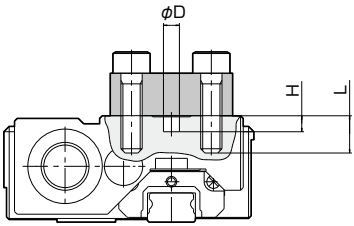
Model	Bolt Size	Thru Hole Length L1(mm)	Fastening Torque N·m
PRM2-ϕ8	M3	13	1.1
PRM2-ϕ12	M4	15	2.5

Guide Rail Portion Mounting Bolt

Model	Bolt Size	Thru Hole Length L2(mm)	Fastening Torque N·m
PRM2-ϕ8	M3	2.2	1.1
PRM2-ϕ12	M3	3	1.1

MOUNTING ON TABLE

Top Mounting



Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PRM2-ϕ8	M4×0.7	7	2.5	$\phi 3^{+0.06}_{+0.012}$ depth3
PRM2-ϕ12	M4×0.7	8	2.5	$\phi 3^{+0.06}_{+0.012}$ depth3

PRECAUTIONS FOR MAINTENANCE AND DISASSEMBLY

⚠ Caution

Structure And Principal Components ☞ page 590
Structural Drawing with Centralized Piping ☞ page 591

	Step	Notes
1	· Loosen the bolt connecting between the plate and the linear guide rail. · Remove the plate.	· Make sure that no pressurized air is in the tube and there is no residual pressure.
2	· Replace the packing of the plate.	· Ensure that the housing is not scratched. · Apply a sufficient amount of grease. Inadequate application may adversely affect durability. · For the grease, use the special grease included in the repair parts set. · The packing needs to be correctly oriented.
3	· Force the body to be displaced from the piston. · Pull the piston out of the tube. · Pull the tube out of the body.	· Do this without pulling the tube out of the body. · Move to a point where the holding force that connects between the body and the piston disappears. · Pulling the tube out of the body while the holding force remains makes it impossible to remove because of the magnetism of the magnet. · Do this without pulling the tube out of the body. · Do this while the piston is not in the tube.
4	· Remove the retaining ring for hole and the rod cover. · Replace the dust seal, bushing and O-ring. · Secure the rod cover with the retaining ring for hole.	· Remove, replace and reattach the rod cover on one side at a time. Removing both of them at the same time may cause the magnet assembly to come apart, leading to failure. · Ensure that the dust seal and bushing housings are not scratched. · For the grease, use a sufficient amount of the special grease included in the repair parts set. · Dust seals need to be correctly oriented. · Mount the retaining ring for hole with the side that does not have a shear droop on the circumference facing outside.
5	· Remove the old piston seals and wear rings. · Replace the wear rings. · Apply grease on the entire surface of new piston seals and mount the seals.	· Ensure that the piston seal and wear ring housings are not scratched. · Apply a sufficient amount of grease. Inadequate application may adversely affect durability. · For the grease, use the special grease included in the repair parts set. · Apply a sufficient amount of grease. Inadequate application may adversely affect durability. · Piston seals need to be correctly oriented.
6	· Apply grease on the outer circumference of the piston and inner circumference of the cylinder tube. · Insert the piston into the tube. · Insert the tube into the plate. · Mount the plate on the guide rail and secure with the bolts.	· Apply new grease after wiping the old grease off. · Apply a sufficient amount of grease on the entire outer circumferential surface of the piston. Inadequate application may adversely affect durability. · For the grease, use the special grease included in the repair parts set. · Ensure that the packing is not scratched. · Apply an anaerobic adhesive on bolts and tighten with the specified torque. (See Table below)
7	· Apply grease on the outer circumferential surface of the tube. · Remove the absorber. · Move the body in the direction of piston displacement to align the body with the piston. · Mount the absorber.	· For the grease, use the special grease included in the repair parts set. · If they are displaced, sufficient holding force cannot be obtained, which may cause malfunction. · Moving the body until it touches the plate brings the cushion rubber to come in contact with the plate and the piston is mounted at the right position.

Notes on Magnetic Products

The piston in the tube and the body contain a magnet with strong magnetism. Bringing it close to any magnetic recording medium may cause the data to be erased.
Do not bring it close to any device that may malfunction due to magnetism.

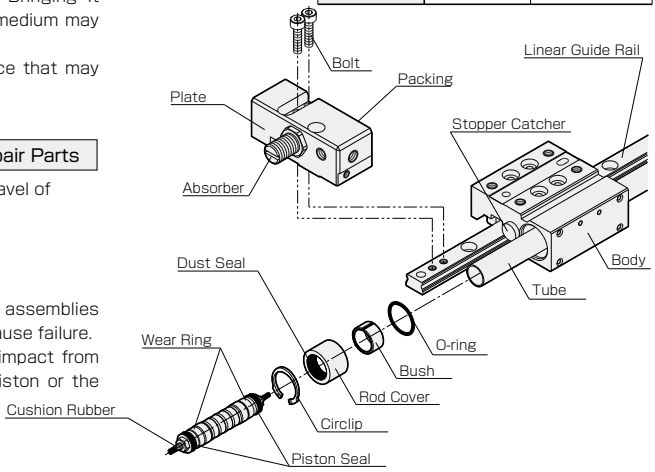
Timing of Replacement of Repair Parts

As a rule, replace at intervals of travel of about 800 km.

Magnet Assembly

Do not disassemble the magnet assemblies in the piston or the body. It may cause failure. The magnet may be damaged if impact from dropping, etc. is applied to the piston or the body.

Model	Bolt Size	Fastening Torque
PRM2−ϕ8	M3×0.5	1.1N·m
PRM2−ϕ12	M4×0.7	2.5N·m

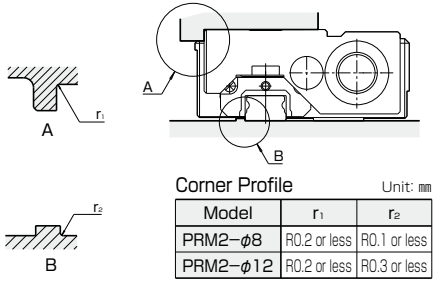


⚠ Caution

Mounting Surface Accuracy

①Ensure that the mating mounting surface of a machine, equipment, jig, etc. to be mounted on the body top side or the guide rail bottom side of PICO RODLESS Ⅱ is a flat surface machined to high precision without unevenness or projections and mounting is correct in order to achieve stable, high-accuracy linear motion.
Low mounting surface accuracy or incorrect mounting may cause looseness, increase the rolling resistance or adversely affect the service life.
Mounting Datum Plane of Body and Table ☞ page 596

②It is recommended to provide a recess in the corner of a mating mounting surface of the body and the guide rail but a curve as shown in the figure below can be made for use.
A larger corner profile than the chamfer dimension of the body or guide table may cause inaccurate contact with the abutting surface.

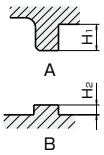


Corner Profile Unit: mm

Model	r1	r2
PRM2−φ8	R0.2 or less	R0.1 or less
PRM2−φ12	R0.2 or less	R0.3 or less

③Ensure that there is no squareness error between the body or guide rail mounting surface and the abutting surface.
Inadequate squareness may cause inaccurate contact with the abutting surface.

④When designing the abutting surface, pay attention to the height and thickness of the abutting surface.
Inadequate thickness may lead to poor accuracy due to insufficient rigidity against transverse load or positioning with a lateral pressing bolt.



Recommended Dimensions of Abutting Surface Unit: mm

PRZ12	H1	H2
PRM2−φ8	2	0.5
PRM2−φ12	2	1.5

※Please note the interference of the plate.

Rigidity of Mounting (Securing Part)

Insufficient rigidity of the securing method and mounting of the product may hinder realization of the high rigidity and high accuracy of PICO RODLESS Ⅱ.
When designing, give sufficient consideration to the rigidity of equipment such as the mounting base.

Maximum Operating Pressure

The piston subjected to air pressure and the body on which to mount the load are connected together by magnetism of the magnet of the piston. Accordingly, operation at a pressure exceeding the maximum operating pressure 0.65MPa may disengage the connection and allows the body to move freely, which renders the unit uncontrollable. Ensure that the pressure does not exceed the maximum operating pressure.

Intermediate Stop

Avoid any intermediate stop in a pneumatic circuit using a closed center valve, etc. Forced stop of the piston alone may disengage the magnetic connection between the body and the piston because of the inertial force of the body and the mounted load, which renders the unit uncontrollable. Likewise, do not switch operation in the middle of a stroke.

Connection with Load

For connection with any load that has an external supporting mechanism, ensure sufficient centering.
Direct loading within the allowable range for operation is possible but insufficient centering of connection with load that has an external supporting mechanism may adversely affect operation, service life, etc. A longer stroke means a larger displacement of the axis. Consider a method of connection that tolerates the displacement.

Load Center of Gravity

Bring the load center of gravity as close to the table center as possible.
The load center of gravity distant from the body center may generate a large moment of force, adversely affecting the service life and rigidity.
Ensure that the load and the moment are within the allowable ranges for operation.

Stroke Adjustment

Adjust the stopper so that the body does not touch the plate.
Removal of the stopper or inappropriate stopper adjustment may cause the body to come in contact with the plate on both ends, leading to failure.
Pay particular attention when adjusting the stroke to the positive side.

Linear Guide Lubrication

Lubricant is enclosed in the guide table in advance but the performance will be deteriorated by a long operating time, operating conditions, environment, etc. Regular lubrication is necessary.
Using without lubrication may accelerate wear of the rolling part or cause earlier end of the service life.
After wiping the old grease off, apply lithium soap-based grease through the oil hole in the guide table.
Applying a different type of grease may cause malfunction or failure due to lubrication performance degradation or chemical change.
Turbine oil can be applied or drop-fed for use. Do not use spindle oil or machine oil because they adversely affect the packing.

Lubrication of Tube Outer Circumferential Surface

Apply the special grease on the tube outer circumferential surface at regular intervals (about 300 km).
Shortage of grease may adversely affect durability.
Use the special grease HG (PRM8) or HG (PRM12) separately offered.
Use of anything other than the special grease may cause malfunction.
Note that HG (PRM8) and HG (PRM12) are greases exclusively for the cylinder and different from those for the guide.
Note that HG (PRM8) and HG (PRM12) are different types of grease.

Lubrication of Compressed Air

The inside of the tube is initially lubricated with special grease. Use without regreasing.
When applying grease for repair, etc., use the cylinder repair grease HG (PRM8) or HG (PRM12) separately offered.

Play of Tube

The tube slightly moves in the axial (up to about 1.5 mm) and circumferential directions, which is due to the play provided for preventing galling with the guide and not an abnormality.

Linear guide of rust

For the linear guide table and rail, martensitic stainless steel is used for rustproofing and high rigidity as a linear guide. However, slight rust development may occur on the outside depending on the handling conditions (such as touching with the bare hand), operating environment, period of use, etc.

Rolling Feel in Linear Guide

When the product is moved by hand, rolling of balls inside the linear guide may cause slight feel of operation discontinuity or difference in the rolling resistance between products. This is due to preload of the linear guide and does not affect the performance.

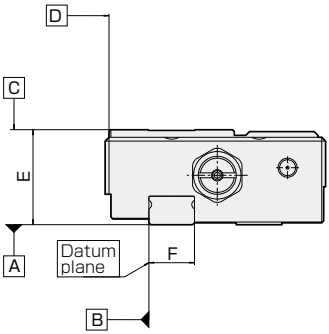
Projection and Stick-Slip

Magnetic rodless cylinders are subject to slight projection at the start of operation due to their structure.
In the middle of a stroke movement, a slight stick-slip phenomenon may occur.

Effect of Magnetic Force

The body and piston integrate a magnet. Do not bring close to them any product or part that may be affected by magnetic force.

ACCURACY AND DATUM PLANE



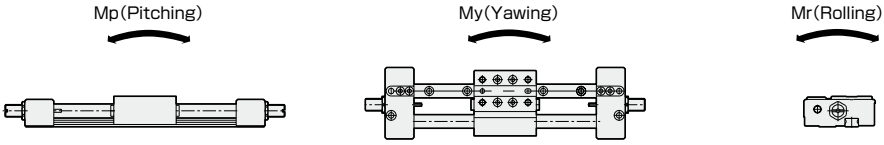
ACCURACY

Unit: mm

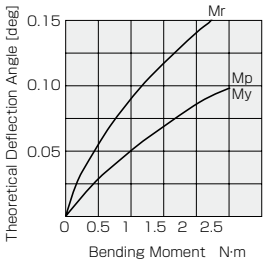
Model	PRM2−ϕ8	PRM2−ϕ12
Running parallelism of C with respect to A	0.03	0.03
Running parallelism of D with respect to B	0.03	0.03
Tolerance of dimension E	±0.12	±0.12
Tolerance of dimension F	0 −0.02	0 −0.02

THEORETICAL DEFLECTION OF BODY BY MOMENT

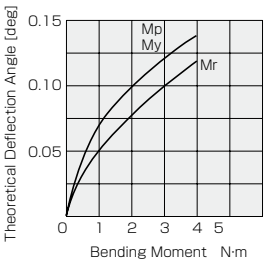
If the body is subjected to external force due to gravity or external force on the mounted load, a slight angular displacement occurs.
The displacement angles of the body according to moments in the respective directions are plotted in the graphs below.



PRM2−φ8



PRM2−φ12



ALLOWABLE MOUNTED LOAD MASS, ALLOWABLE LOAD FORCE AND ALLOWABLE MOMENT

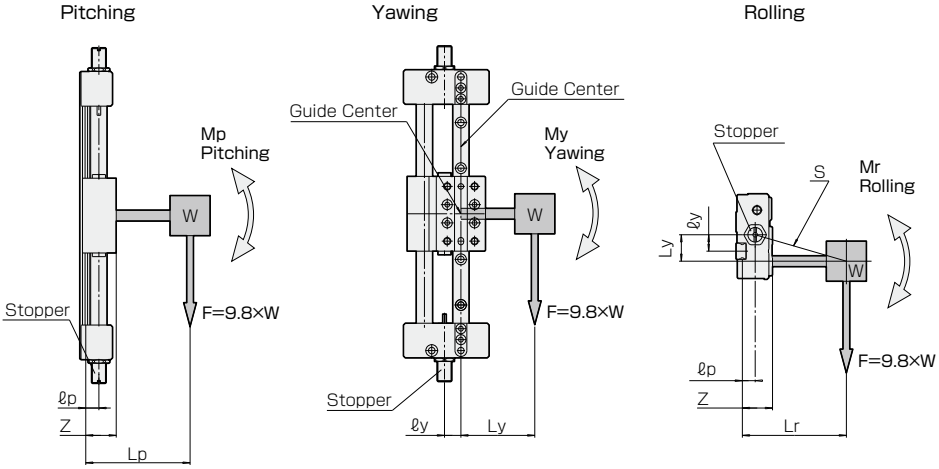
⚠ Caution

Before using this unit, check that the applied load is within the allowable load. Using out of allowable limit may cause bad influence for movement, accuracy and life. At the worst, the actuators would be broken.

Types of Load	Situation of Actuator	Situation of Load	Item to be confirmed
Mounted Load(W)	Operating	Continuously Acting	Allowable Mounted Load Mass, Allowable Mounted Load Moment, Allowable Inertia Mass, Allowable Absorber Collision Energy
External Force	Stopping	Temporarily Acting	Basic Static-load Rating, Allowable Static Moment

Direction of Moment and Guide Center Line and Stopper

The moment directions are classified into three types in accordance with the mounting condition of a load to the actuator.



Position of Guide, Stopper Unit: m

Model	Guide	Stopper	
	Z	ℓp	ℓy
PRM2−ϕ8	0.0166	0.0071	0.0090
PRM2−ϕ12	0.0197	0.0077	0.0120

W ····· Mounted load mass(kg)
F ····· Gravity applied on load(N)
Lp、Ly、Lr ····· Distance between guide center line and center of gravity of mounted load(m)
ℓp、ℓy ····· Distance between guide center line and center of Stopper bolt(m)
S ····· Distance between center of gravity of mounted load and stopper bolt(m)

■Allowable Mounted Load Mass, Allowable Mounted Load Moment, Allowable Inertia Mass

When the actuator is operated with mounted load, confirm that the following four values are within the allowable range.

①Allowable Load Mass Unit: kg

Model		PRM2−ϕ8	PRM2−ϕ12
Allowable Load Mass	Shock Absorber (QZ)	2	3
	Rubber Stopper (QT)	1	1.5

⚠ Caution

When operating in the vertical direction, even if mounted load mass is within the allowable range, there might be some cases the thrust are not enough to move or to get the expected speed depending on supplied air pressure. Besides, there might be some cases the thrust are not enough to push the rod of the shock absorber to end. In this case, please arrange the load mass less than 20% of theoretical thrust.
Theoretical thrust ☞page 587

②Allowable Mounted load Moment

There is the formula below to calculate three moments by the gravity. Please confirm they are within the allowable moments in the table bellow.

(Mounted load moment)=(Gravity applied on load:F)×(Distance between guide center line and center of gravity of mounted load:L)
=9.8×(Mounted load mass:W)×(Distance between guide center line and center of gravity of mounted load:L)

(Gravity applied on load: F)=9.8×(Mounted load mass: W)

Pitching…Mp(N·m)=9.8×W(kg)×Lp(m)
Yawning…My(N·m)=9.8×W(kg)×Ly(m)
Rolling…Mr(N·m)=9.8×W(kg)×Lr(m)

Allowable Mounted Load Moment

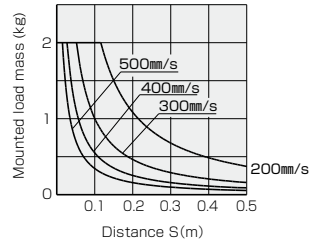
Model	Allowable Mounted Load Moment N·m		
	Mp	My	Mr
PRM2−φ8	0.27	0.33	0.42
PRM2−φ12	0.56	0.56	1.07

1N·m=0.102kgf·m

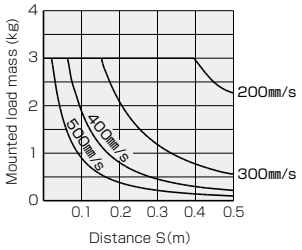
③Allowable Inertia Mass

When a actuator stops at the end of its stroke, a force is generated due to the inertia of the load. The value of this force depends on various conditions like the shape of load, mounting ways and operating pressure. Therefore, it is very difficult to formulate the allowable value.
The graphs below show theoretically relation between "the velocity at the stroke end", "mounted load mass" and "the distance between the center of the gravity of load and stopper".
These graphs can be used as reference to the allowable values of the load.
S: The distance between the center of the gravity of load and stopper. Please refer to the figures of rolling in the previous page.

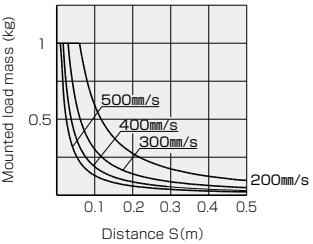
PRM2−φ8−QZ(With Shock Absorber)



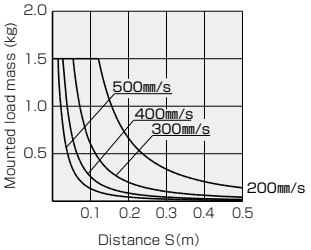
PRM2−φ12−QZ(With Shock Absorber)



PRM2−φ8−QT(With Rubber Stoppr)



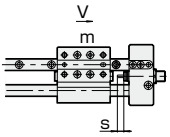
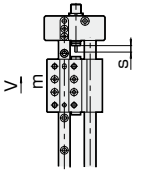
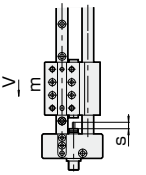
PRM2−φ12−QT(With Rubber Stoppr)



Note: When a metal stopper is used externally for stopping, it may generate extremely large impact force.
As a rule, consider 1/5 to 1/10 of the values in the graph above as the mounted load mass.

④Shock Absorber Collision Energy(Only QZ)

The energy that the shock absorber of the stopper must absorb consists of three element: kinetic energy, energy of cylinder thrust and energy due to gravity.
The collision energy is the total of three.
See the shock absorber specifications and energy absorption graphs below. Use the product within the shock absorber specifications.

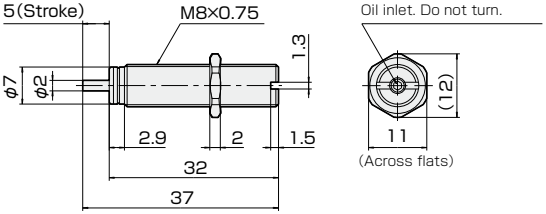
	Horizontal Use	Vertical Upward Use	Vertical Downward Use
Usage Condition Example			
Collision Energy E	$E=1/2(mV^2)+Fs$	$E=1/2(mV^2)+Fs-mgs$	$E=1/2(mV^2)+Fs+mgs$

E : Collision energy(J)
m : Colliding mass(kg)
V : Collision velocity(m/s)
F : Cylinder thrust(N)
s : Shock absorber stroke(m)
g : Gravity acceleration($9.8m/S^2$)

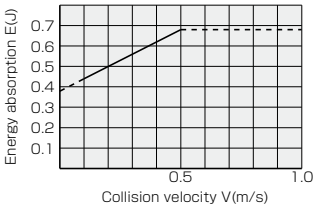
SHOCK ABSORBER SPECIFICATIONS

Model	ABK8	ABK10
Max Energy Absorption	0.68J	3J
Stroke	5㎜	10㎜
Energy Absorption Per Minute	22.8J/min	60.8J/min
Max. Collision Velocity	1m/s	
Usage Frequency	45c.p.m. or less	60c.p.m. or less
Operating Temperature Range	−5～70℃	
Piston Rod Return Force	4.9N	
Lock Nut Fastening Torque	3.9N·m	7.8N·m
Applied Model	PRM2−φ8	PRM2−φ12

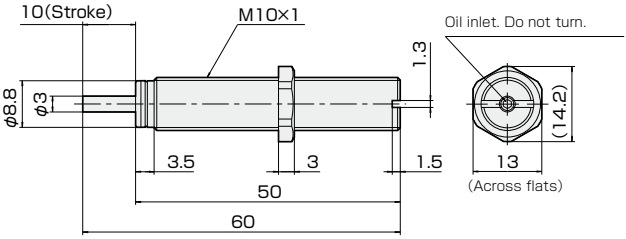
MODEL: ABK8／For PRM2−φ8



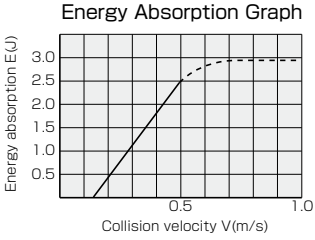
Energy Absorption Graph



MODEL: ABK10／For PRM2−φ12



Energy Absorption Graph



■Allowable Load and Allowable Moment for External Force (Motionless)

In the case that an external force is applied temporarily when the actuator stops at the stroke end or so, confirm that the following two values are within allowable range.

①External Force Value (Basic Static Load Rating)
②External Moment (Static Moment Rating)

Note: The arm length of a moment shall be length from the guide center and the point where an external force is applied.

If a guide table receives an excessive load or a large impact, permanent deformation is locally generated between the ball and the ball rolling surface. This deformation will prevent the actuator from smooth operation when it develops more than the allowable limit. The basic static load rating C_o, the static moment rating Mp_o, My_o and Mr_o mean such a static load and static moment of constant direction and the total of the permanent deformation values at the ball rolling surface is 0.0001 times of the ball diameter on the contact surface receiving the maximum stress.

The static moment applied to the table is limited under C_o, Mp_o, My_o and Mr_o with corsidering about static safty factor, fs.

$C_o \geqq f_s \cdot P$

Co: basic static load rating N
P : static load N
fs : static safety factor

$Mp_o \geqq f_s \cdot Mp_1$
$My_o \geqq f_s \cdot My_1$
$Mr_o \geqq f_s \cdot Mr_1$

Mp_o、My_o、Mr_o: Static moment rating N·m
Mp_1、My_1、Mr_1: Static moment N·m
fs: Static safety factor

STATIC SAFETY FACTOR fs

Load Conditions	Lower Limit of fs
Impact with Light Load	1.0～1.3
Impact with Heavy Load	2.0～3.0

BASIC STATIC LOAD RATING, STATIC MOMENT RATING

Model	Basic Static Load Rating N	Static Moment Rating N·m		
		Mp_o	My_o	Mr_o
PRM2−φ8	231	3.5	4.1	5.3
PRM2−φ12	353	6.0	6.0	11.5

1N·m=0.102kgf·m
1N=0.102kgf

DIMENSIONS(mm) PRM2-φ8

PRM2-SD8-(Stroke)-$\frac{QZ}{QT}$

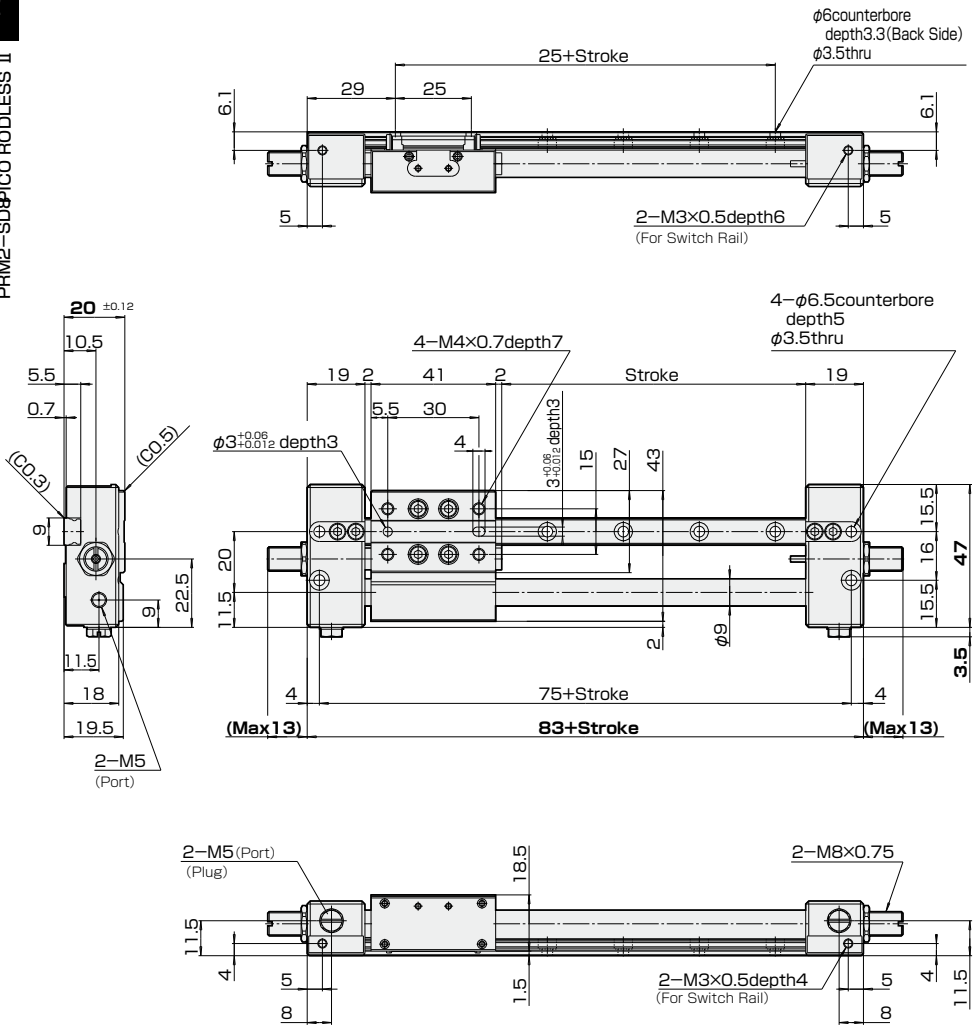
No Centralized Piping

Bore Size

Stopper
QZ:Both Side Shock Absorber
QT:Both Side Rubber Stopper
Stroke Adjustment Range···Single Side-11mm(Total-22mm)
Single Side+0.9mm(Total+1.8mm)

Standard Stroke ☞Page 586

Dimension of Shock Absorber ☞Page 600



With Magnet, Switch Rail

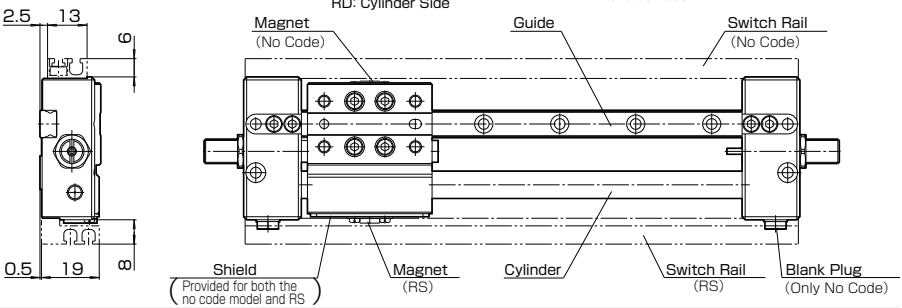
PRM2S−SD8−(Stroke)−$\frac{QZ}{QT}$ − RS

With Magnet, Switch Rail

Position of Magnet and Switch Rail
No Code: Guide Side
RD: Cylinder Side

Switch Setting Position ☞ Page 606

For PRM2-φ8, the dimensions and shape of the switch rail differ between the guide and cylinder sides.Make sure that they are correct.

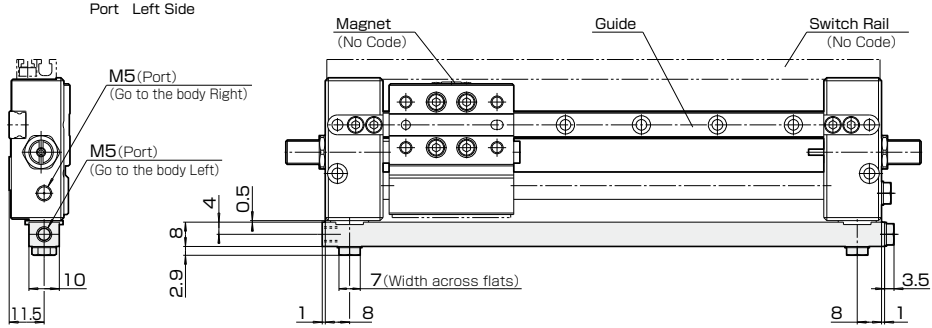


Centralized Piping Port Left Side

PRM2(S)−SL8−(Stroke)−$\frac{QZ}{QT}$

Centralized Piping
Port Left Side

The magnet switch rail mounting position is on the guide side (no option code).

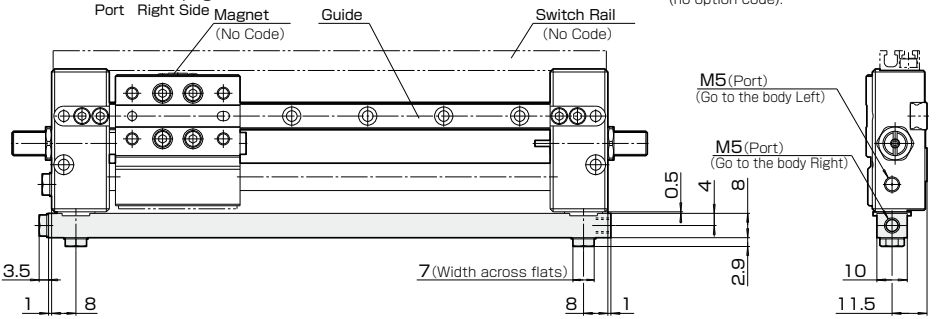


Centralized Piping Port Right Side

PRM2(S)−SR8−(Stroke)−$\frac{QZ}{QT}$

Centralized Piping
Port Right Side

The magnet switch rail mounting position is on the guide side (no option code).



DIMENSIONS(mm) PRM2-ϕ12

PRM2-SD12-(Stroke)- QZ / QT

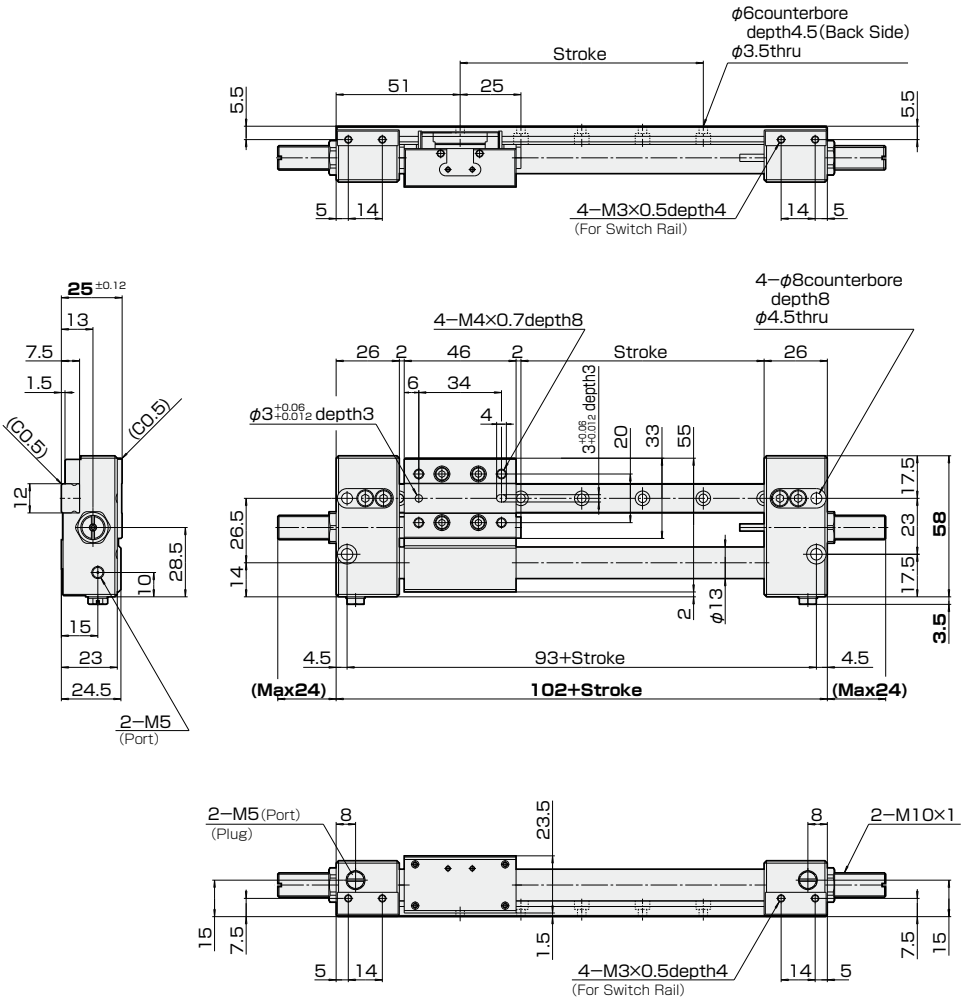
No Centralized Piping

Bore Size

Stopper
QZ:Both Side Shock Absorber
QT:Both Side Rubber Stopper
Stroke Adjustment Range…Single Side-21mm(Total-42mm)
Single Side+0.9mm(Total+1.8mm)

Standard Stroke ☞Page 586

Dimension of Shock Absorber ☞Page 600



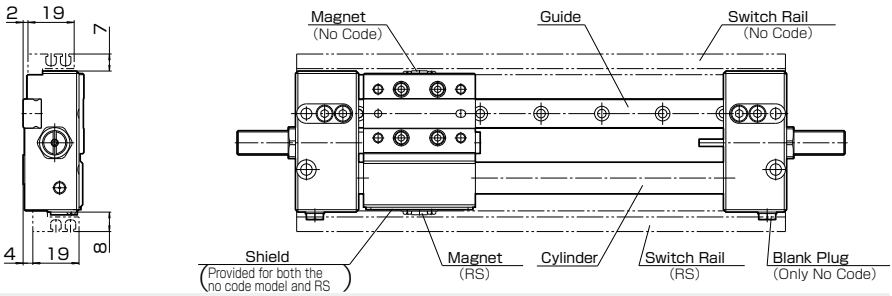
With Magnet, Switch Rail

PRM2S–SD12–(Stroke)– QZ / QT – RS

With Magnet, Switch Rail

Position of Magnet and Switch Rail
No Code: Guide Side
RD: Cylinder Side

Switch Setting Position ☞ Page 606

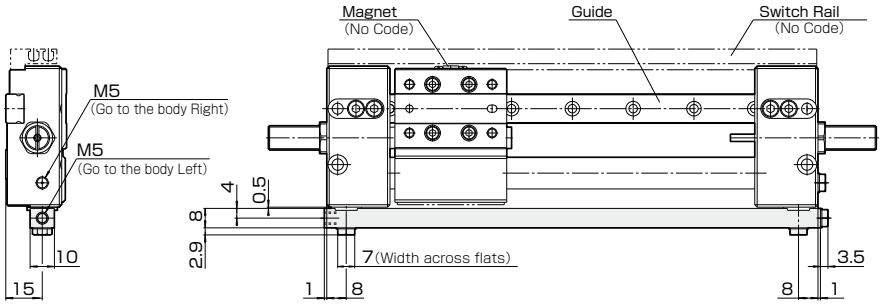


Centralized Piping Port Left Side

PRM2(S)–SL12–(Stroke)– QZ / QT

Centralized Piping
Port Left Side

The magnet switch rail mounting position is on the guide side (no option code).

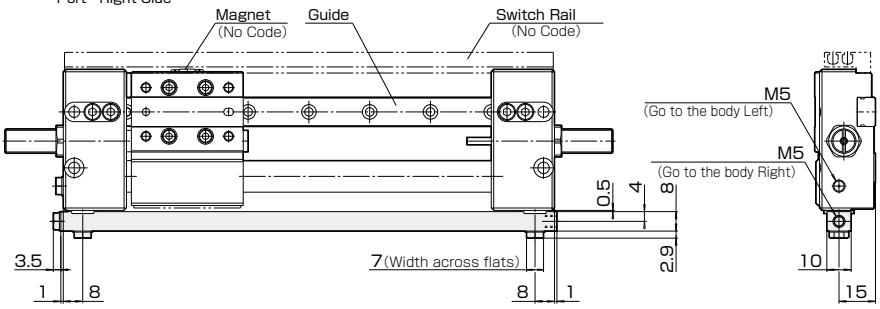


Centralized Piping Port Right Side

PRM2(S)–SR12–(Stroke)– QZ / QT

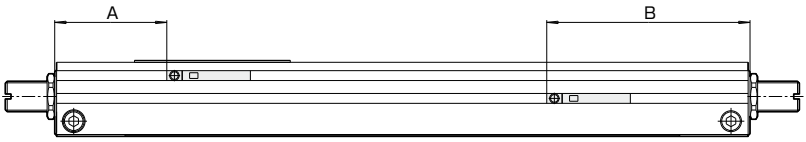
Centralized Piping
Port Right Side

The magnet switch rail mounting position is on the guide side (no option code).



INSTALLATION OF SWITCH

■Switch Setting Position



RB(RC)1, 2 Switch

Unit: mm

Model	Switch Setting Position		On hold distance (ℓ)	Hysteresis (c)
	A	B		
PRM2-φ8	29.5	53.5	6	1
PRM2-φ12	39	63		

RB(RC)4, 5 Switch

Unit: mm

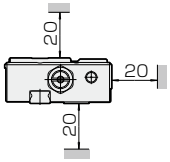
Model	Switch Setting Position		On hold distance (ℓ)	Hysteresis (c)
	A	B		
PRM2-φ8	31.5	51.5	2.5	1
PRM2-φ12	41	61		

Explanation of hysteresis and on hold distance. ☞see Switch Catalogue

■Installation of Other F Series Products

⚠ Caution

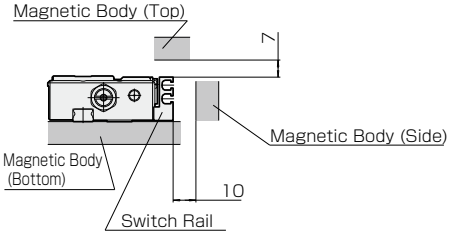
When installing any F Series product with a switch in the vicinity of PICO RODLESS Ⅱ, ensure that they are apart by the distances shown below.
This is intended for preventing faulty operation of the switch caused by the leakage field of the magnet inside PICO RODLESS Ⅱ.



■Mounting of Magnetic Bodies

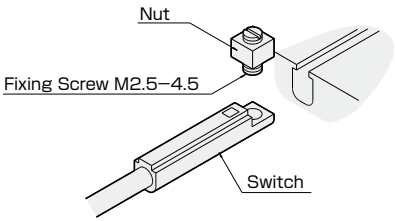
⚠ Caution

For preventing faulty operation of the switch, ensure that magnetic bodies on the top and side of the cylinder are away from the switch rail by the distances shown below. Avoid any structure in which the top, side and bottom of the switch are enclosed simultaneously.



■Installataion of Switch

Assemble the fixing screw with a nut to the switch.
Insert the switch into the groove.
After setting the position, fasten the screw by a screwdriver.
Fastening torgue of fixing screw must be 0.1 N·m.



Costom Made

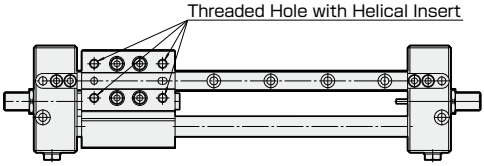
■Threaded Hole with Helical Insert

To each order, we will create a drawing of the product to be delivered based on the reference drawing shown below. Contact us for how to order, time to delivery and detailed specification.

Threaded Hole with Helical Insert·····Model with the threaded holes for mounting a load in the table top side provided with helical inserts.

Note: It is not possible to add helical inserts to an already purchased product.

Helical Insert Material: Stainless Steel



Size of Threaded Hole with Helical Insert

Model	Threaded Hole with Helical Insert
PRM2–ϕ8	M4 depth6
PRM2–ϕ12	M4 depth8

■To Change Grease

- Change the grease of bearing part to the other grease.
- There is a case might not be handled depends on kind of grease or request.
- Cylinder part is lithium soap grease or fluorine grease.
- Grease of purchased item can not be exchanged.

Please ask us for more detailed infomation.

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