RoHS Compliant

New-Era®

Error Absorption Unit

PICO POSITIONER

PXY of the Sliding Function in the X-Y Plane

PXYQ with the Addition of the θ Angle of Rotation Direction X-Y

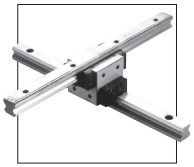
PICO POSITIONER

PXY Series (ϕ8・ϕ12・ϕ20・ϕ25)

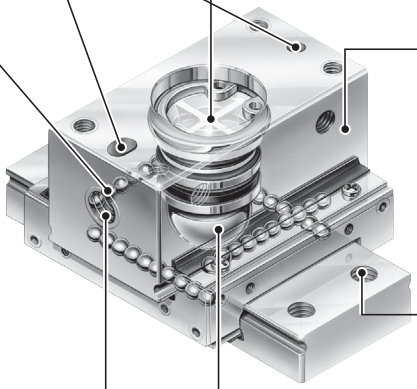
A Positioning Error Absorption Unit that Allows Light and Smooth Sliding Movement by Means of Cross Linear Guides, and can be Locked after Returning to the Center Position by Pressurizing

Center Position Repeatability ±0.05mm, (Standard Type) Mounting Parallelism 0.01mm

Cross Linear Guide



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



Positioning Pin Holes

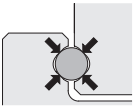
Pin holes for attaching / detaching reproducibility are provided on the top surface of the body and the side surface of the table.

Cross Linear Guide

Limited track type linear guides of high-accuracy and high-rigidity.

4-Point Contact

4-point contact guide which well endures fluctuating load and combined load, is adopted for the linear guide.



Piping Port

When air is supplied. the piston will make the positioning steel ball move towards the table.

Centering

The hole on the top of the body can be used for centering in relation to the hole on the table side surface.

Corrosion Resistance

Stainless steel is adopted.

Center Holding Type

Holding the center position by spring after exhausted.

Mounting of Workpiece

Workpiece can be mounted directly on the surface of the table.

Steel Ball for Positioning

This ball is for returning of the table to the center position and locking the table at its center position.

Lock-off Type

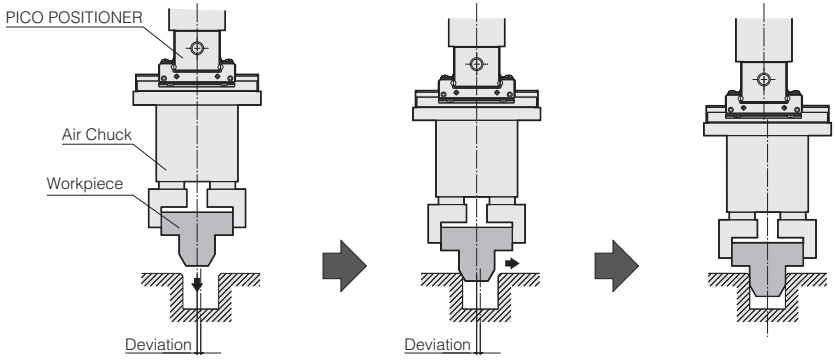
Lock is released by spring after exhausted.

Summary of The PICO POSITIONER

A device, which realizes light and smooth sliding movement on X-Y plane by means of the small-sized cross linear guides while maintaining high-accuracy and high-rigidity, and enables secure locking at center position with high repeatability by virtue of a built -in steel ball. This is “PICO POSITIONER”.
It can absorb a positioning error in the range of ϕ1mm to ϕ5mm (ϕ8 to ϕ25) around the center position.It can be returned from the deviated position to its center position and locked by air pressure.
It is best suited for the use at the tip of a robot because of its thin and lightweight construction.
We also have the 'Lock-off type' and the 'Center holding type' available.

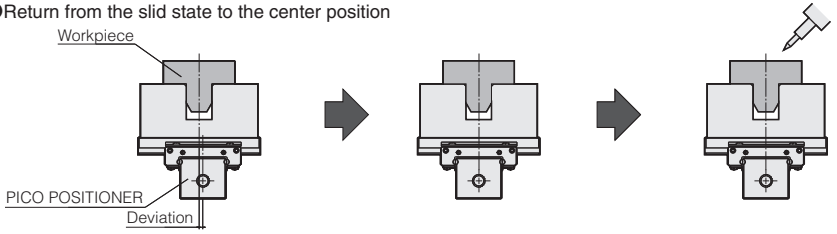
■ Application Examples : PICO POSITIONER

●Positioning error absorption at the insertion of a workpiece



●Start of Insertion ●Absorption of Deviation (error) ●End of Insertion

●Return from the slid state to the center position

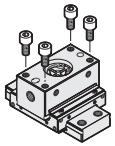


●End of Insertion ●The table returns to the center position and is locked when pressurized ●Finishing operation in locked state

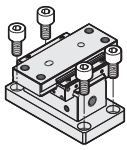
■ Main Body Installation

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

Top Mounting (Body Tap)



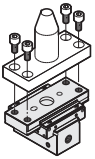
Top Mounting (By Means of LB Fixture) ϕ12 Only



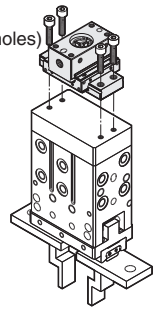
■ Mounting

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

Top Mounting (Table Tap)



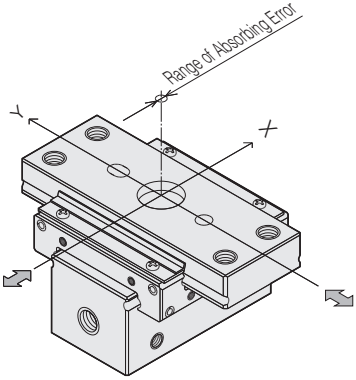
Bottom Mounting (Table Through-holes)



Operating Principle

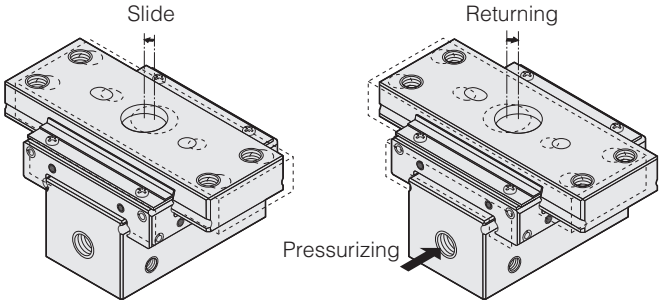
■ Range of Absorbing Error

The table can slide in the range of the circumference on the X-Y plane around the center position in the non-pressurized state.



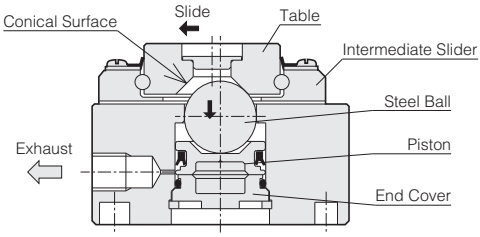
■ Standard Type [Compatible cylinder bore ϕ8, ϕ12, ϕ20]

When pressurized, the table will return to the center position and be locked.

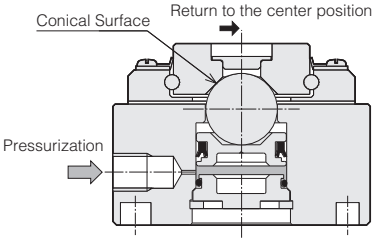


The state where the table is slid.
(The table is in a free state.)

When pressurized, the table will return to the center position and be locked.



When the table slides by external force in the non-pressurized state, the steel ball and the piston will be pushed down and the piston will be stopped by the end cover.Table is in the free state. The range that the table can slide is restricted by the contact of the steel ball with the conical surface of the table.

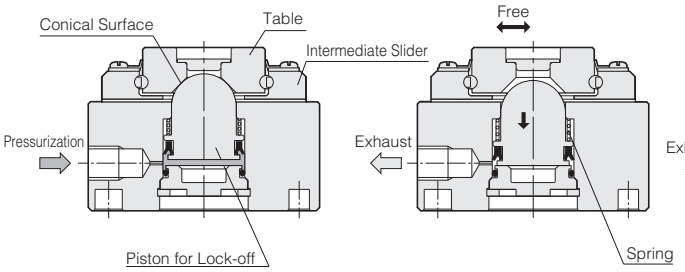


When pressurized, the piston will push up the steel ball. The table will return to the center position and be locked by the contact of the steel ball with the conical surface in the table.

■ Lock-off Type (LF) [Compatible cylinder bore φ8, φ12, φ20, φ25]

After the air is discharged, the lock is released by the spring, which allows the table to move freely.

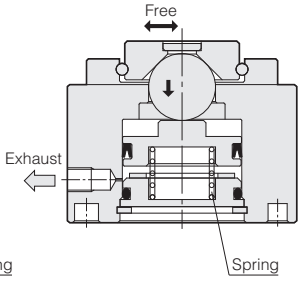
(PXY8, 12, 20)



When pressure is applied, the spherical surface of the piston end is pressed against the conical surface of the table, which returns the table to the center where it is locked.

When the air is discharged, the piston is returned to the original position by the spring and the lock is released, which allows the table to move freely.

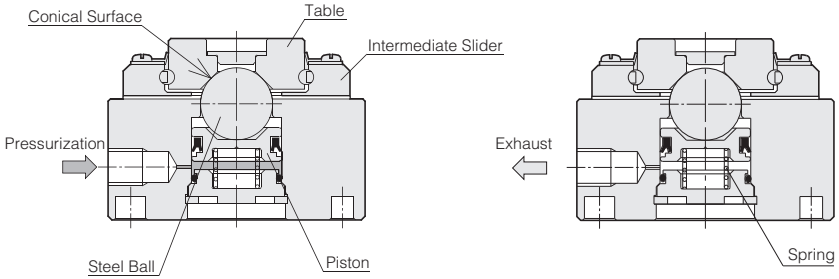
(PXY25)



When the air is discharged, the piston is returned to the original position by the spring and the lock is released, which allows the table to move freely. However, since the steel ball and the piston are not integrated, there is a possibility that the steel ball may remain on the conical surface.

■ Center Holding Type (BL, BM, BH) [Compatible cylinder bore φ8, φ12, φ20, φ25]

The table center position is maintained by the spring after the air is discharged.



When pressure is applied, the steel ball is pressed against the conical surface of the table, which returns the table to the center where it is locked.

Even if the air is discharged, the piston keeps pressing the steel ball against the conical surface of the table because of the spring, which locks the table at the center position.Note that the table locking force is only the force by the spring.

Model Code Example

PXY－SD 8－2－BL－CN

Series Name ●

● Bore Size

8	φ8
12	φ12
20	φ20
25	φ25

● Front Cover

No Code	With Front Cover
CN	Without Front Cover (φ8, φ25 Only)

Structural Explanation ☞Page 8

※Only φ8 and φ25 sizes cannot be used as positioning holes if they have covers.
Please refer to the dimensional specification diagram (Note 2)
☞ Page 21, ☞ Page 25.

● Additional Function

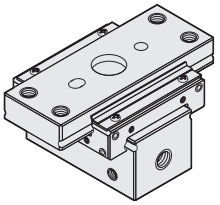
No Code	Standard Type (φ8, φ12, φ20 Only)	
LF	Lock-off Type	
BL	Center Holding Type	Holding Force Weak Type
BM		Holding Force Medium Type
BH		Holding Force Strong Type

Description of Additional Function ☞Page 5
Change of Additional Function ☞Page 12, 13
Holding Force of Center Holding Type ☞Page 10

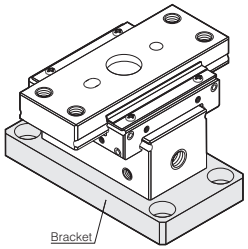
※The φ25 can only be selected from the lock-off type and the center holding type.

Mounting ●

SD	Basic



LB	With Bracket (PXY12 Only)



● Error Absorption Range (㎜)

Error Absorption Range / Model	φ1	φ2	φ3	φ4	φ5
PXY8	●	●	—	—	—
PXY12	●	●	—	—	—
PXY20	●	●	●	—	—
PXY25	—	—	●	●	●

Tolerance of Error Absorption Range ☞Page 7

Specifications

		PXY8	PXY12	PXY20	PXY25
Locking Area	Bore Size	φ8㎜	φ12㎜	φ20㎜	φ25㎜
	Pipe Diameter	M3×0.5	M5×0.8		
	Returning System	Air Returning			
	Locking Pattern	Center Position Locking			
	Working Fluid	Air			
	Maximum Service Pressure	0.7MPa			
	Minimum Service Pressure	0.1MPa(φ8-LF：0.2MPa)			
	Proof Pressure	1.05MPa			
	Service Temperature Range	5～60℃			
	Maximum Service Frequency	60c.p.m			
	Maximum Load Mass	0.5kg	1kg	3kg	8kg
	Effective Returning Force Note	12.2N	32N	91N	144N
	Effective Holding Force Note	29.4N	76N	175N	275N
	Lubrication	Not required			
Sliding Area	Guide Mechanism	Cross Linear Guide			
	Error Absorption Range	φ1 $^{+1.2}_{-0.3}$ / φ2 $^{+1.2}_{-0.3}$	φ1 $^{+0.9}_{-0.2}$ / φ2 $^{+0.9}_{-0.2}$	φ1 $^{+0.9}_{-0.2}$ / φ2 $^{+0.9}_{-0.2}$ / φ3 $^{+0.9}_{-0.2}$	φ3 $^{+0.9}_{-0.2}$ / φ4 $^{+0.9}_{-0.2}$ / φ5 $^{+0.9}_{-0.2}$
	Rated Static Load	1930N	2310N	6010N	5780N
	Rated Static Moment	4.95N·m	7.62N·m	33.8N·m	25.5N·m
	Rated Static Torque	4.95N·m	7.62N·m	40.3N·m	25.5N·m

Note: In the standard type, at an air pressure of 0.5 MPa, for PXY25, refer to the detailed graph regarding the lock-off type at the same air pressure of 0.5 MPa. ☞Page 10

Type of Linear Guide

Model	Type
PXY8	Wide Type Rail Size 7
PXY12	Wide Type Rail Size 9
PXY20	Wide Type Rail Size 12
PXY25	Wide Type Rail Size 12

Pressure: Zero or there is slight space. Radial space ☞ Page 17

Product Mass

Unit : g

Model	Main Body Mass	Mass added with Bracket
PXY8	70	Without Bracket
PXY12	130	25
PXY20	300	Without Bracket
PXY25	375	Without Bracket

Standard Type, Lock-off Type, Center Holding Type are same mass.

Optional Parts Codes

Name

PARTS CODE

Note

Content

Repair part set

HP(PXY□)

Bore Size

For details ☞ Page 8

Bracket (PXY12 Only)

LB(PXY12)

With mounting bolts and positioning pins

End Cover Kit (PXY12)

EC(PXY12−1)	EC(PXY12−2)
For Error Absorption Range φ1	For Error Absorption Range φ1
End Cover Color : Black	End Cover Color : White
	

Use when changing the error absorption range. ☞ Page 13

Lock-off Kit

LF(PXY□)

Bore Size

For details ☞ Page 9

Common to Error Absorption Ranges φ1, φ2, φ3, φ4 and φ5.

※PXY25 is spring only

Center Holding Spring

BL(PXY□)	BM(PXY□)	BH(PXY□)
Bore Size	Bore Size	Bore Size
		

Common to Error Absorption Ranges φ1, φ2, φ3, φ4 and φ5.

End Cover Kit (PXY8・20・25)

EC(PXY□−□)

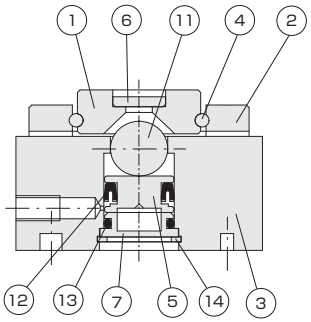
Bore Size

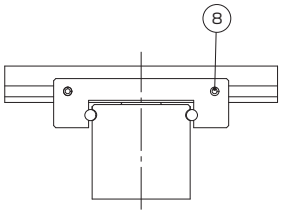
Error Absorption Range

For details ☞ Page 9

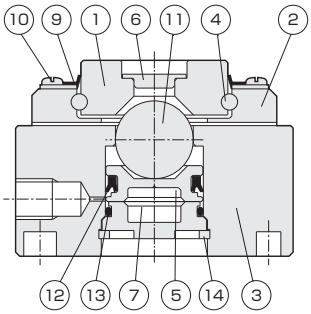
Structure and Principal Components

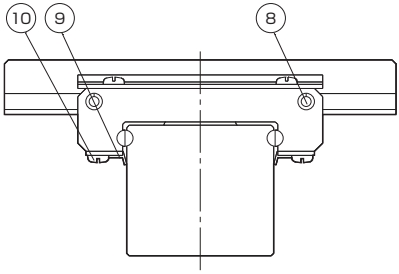
(PXY8)



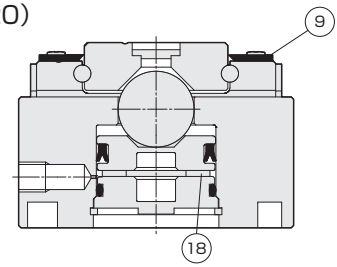


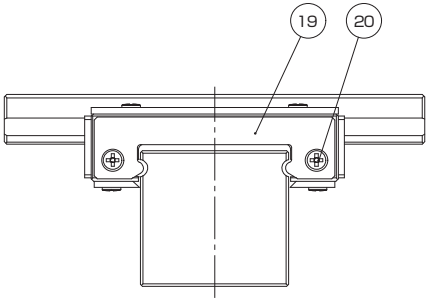
(PXY12)





(PXY20)





Principal Components

No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Table	Stainless Steel (Heat Treatment)		8	Spring Pin	Stainless Steel	w/o PXY20
2	Intermediate Slider	Stainless Steel (Heat Treatment)		9	Side Seals	Stainless Steel+NBR	(PXY12)
3	Body	Stainless Steel (Heat Treatment)				Synthetic Resin	(PXY20)
4	Ball	Stainless Steel (Heat Treatment)		10	Screw	Stainless Steel	w/o PXY8, 25
5	Piston	Steel (Heat Treatment)		18	Spacer	Stainless Steel	PXY8-ϕ1 PXY20-ϕ1, ϕ2 PXY25-ϕ3, ϕ4 Only
6	Front Cover	Aluminum Alloy	Anodized Finish (PXY8, 25)				
		Synthetic Resin	(PXY12, 20)	19	Plate	Stainless Steel	PXY20 Only
7	End Cover	Aluminum Alloy	Anodized Finish	20	Screw	Stainless Steel	PXY20 Only

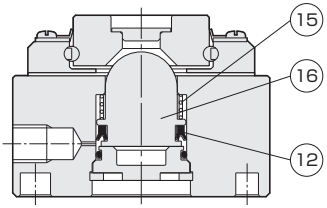
Repair Parts

No.	Name	Material	Qty	Remarks	No.	Name	Material	Qty	Remarks
11	Steel Ball	High carbon-chromium bearing steel	1		13	O-ring	NBR	1	
12	Piston Seal	NBR	1		14	Snap Ring	Steel	1	Nickel Plating

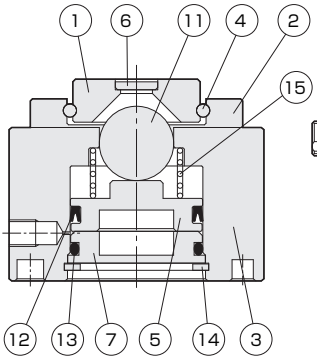
Structure and Principal Components

■ Lock-off Type

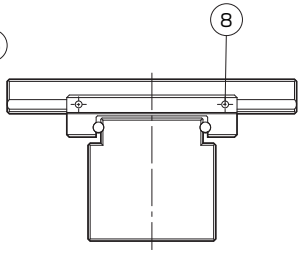
(PXY8, 12, 20)



(PXY25)

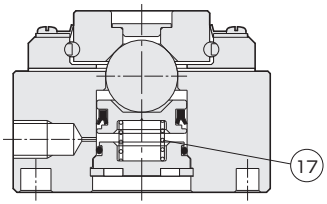


(PXY25)

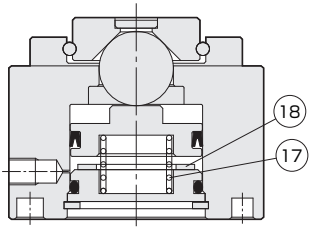


■ Center Holding Type

(PXY8, 12, 20)



(PXY25)



Lock-off Kit

No.	Name	Material	Qty	Remarks
12	Piston Seal	NBR	1	
15	Spring for Lock-off	Stainless Steel	1	PXY8, 12
		Piano Wire		PXY20, 25

No.	Name	Material	Qty	Remarks
16	Piston for Lock-off	Steel (Heat Treatment)	1	Hard Chromium Plated (w/o PXY8)

※PXY25 is only spring for lock-off.

Spring for Center Holding

No.	Name	Material	Qty	Remarks
17	Spring	Stainless Steel	1	PXY8, 12
		Piano Wire		PXY20, 25

End Cover Kit

No.	Name	Material	Qty	Remarks
7	End Cover	Aluminum Alloy	1	Anodized Finish
13	O-ring	NBR	1	
14	Snap Ring	Steel	1	Nickel Plating

No.	Name	Material	Qty	Remarks
18	Spacer	Stainless Steel	1	PXY8-ϕ1 PXY20-ϕ1, ϕ2 PXY25-ϕ3, ϕ4 Only

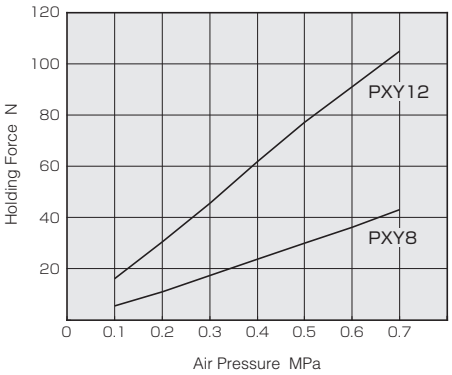
Holding Force

■ Effective Holding Force

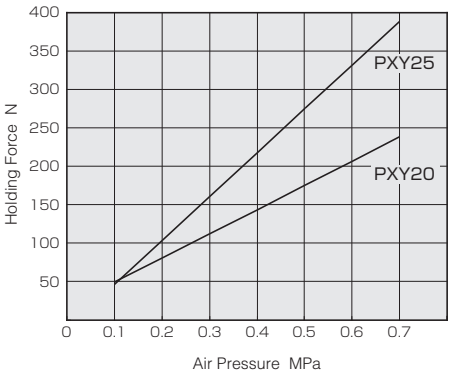
Holding force is the force with which the table is locked and held at its center position in the state where the table has returned to its center position and been locked by pressurization.

●Effective Holding Force when air pressurized (Standard Type, Lock-off Type, Center Holding Type)

PXY8, 12



PXY20, 25



●Effective Holding Force by Spring Force Only (Center Holding Type)

For the effective holding force by the force of the built-in spring alone without pressurizing the air, refer to the table below.
Note that the values are reference values. Be sure to allow for a margin.

PXY8

Option Code	Effective Holding Force (Reference Value)
BL	2～4.5N
BM	4.0～6.5N
BH	6.5～11N

PXY12

Option Code	Effective Holding Force (Reference Value)
BL	2～4N
BM	3.5～6.5N
BH	6.5～11N

PXY20

Option Code	Effective Holding Force (Reference Value)
BL	8～14N
BM	14～21N
BH	21～28N

PXY25

Option Code	Effective Holding Force (Reference Value)
BL	10～19N
BM	22～35N
BH	30～50N

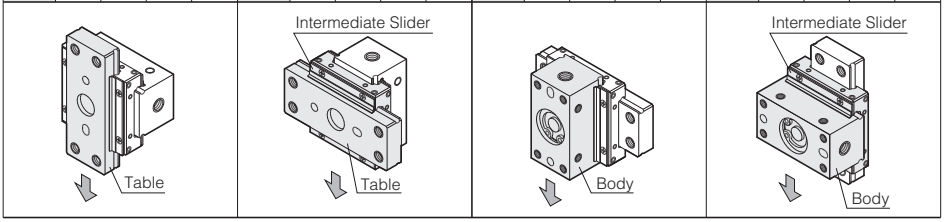
※The specifications for the standard type and the lock-off type may cause the intermediate slider, table, and body to descend rapidly due to their own weight and the workpiece mass when the unit is turned sideways, transitioning from an air pressurized state (center lock state) to an air exhaust state (table free state).
In such cases, please absorb the impact externally, or consider adopting the center hold type, and ensure that the design maintains a margin with the load mass below the implemented holding force of the spring.

	PXY8	PXY12	PXY20	PXY25
Table	20g	40g	90g	90g

	PXY8	PXY12	PXY20	PXY25
Table	20g	40g	90g	90g
Intermediate Slider	14g	25g	55g	40g

	PXY8	PXY12	PXY20	PXY25
Body	36g	65g	155g	245g

	PXY8	PXY12	PXY20	PXY25
Body	36g	65g	155g	245g
Intermediate Slider	14g	25g	55g	40g

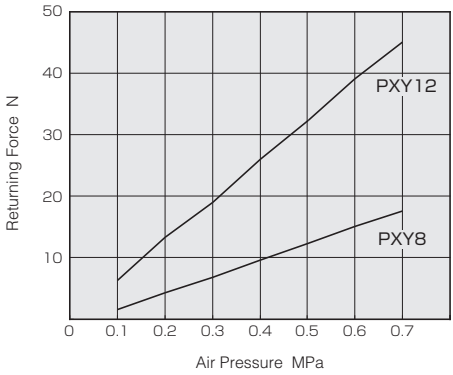


Returning Force

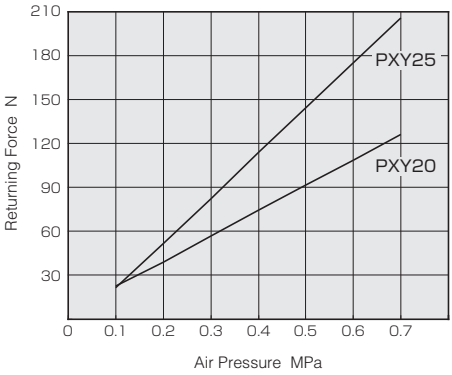
■ Effective Returning Force (Standard Type, Lock-off Type)

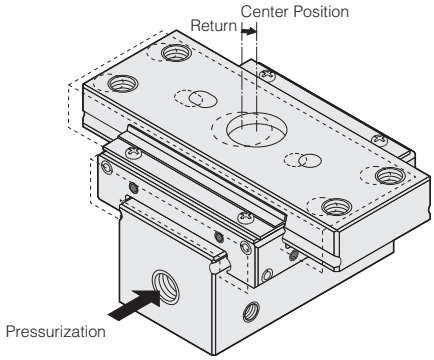
Returning force is the force with which the table returns to the center position when pressurized in the state where the table is deviated from its center position.

PXY8, 12



PXY20, 25

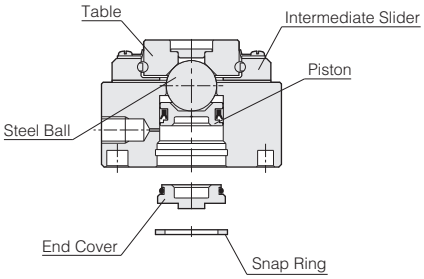


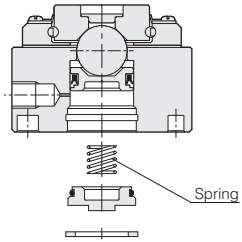


Change of Function

■ Change to Center Holding Type

The standard type can be changed to the center holding type by integrating a spring separately offered. Replacing with another spring separately offered allows the center holding force to be changed.
Details of Separately Offered Part ☞Page 7, 9





Disassembly Procedure

Step	1. Remove the retaining ring for hole. 2. Remove the end cover.
Note	When the end cover is removed, the piston and steel ball may easily fall off. Without the piston and the steel ball, the table and intermediate slider move freely and may fall off. Use caution when handling.

Assembly Procedure

Step	1. Mount the spring on the piston. 2. Mount the end cover and secure with the retaining ring for hole.
Note	Until the cover is secured with the retaining ring for hole, the end cover may be pushed away by the spring force. Use caution when handling.

For the design value of the spring used for the center holding type, refer to the table below.

For designing the spring, refer to the following JIS Standards.
JIS B 2702 Hot Formed Helical Springs
JIS B 2704 Helical Compression and Extension Springs -- Design Criteria
JIS B 2708 Cold Formed Helical Extension Springs

Model	Spring Outer Diameter (mm)	Spring Set Height (mm)	Set Load Value (N)	Stroke End Height (mm)
PXY8-BL	φ4.85	3.7	1.5	2.7
PXY8-BM	φ4.85	3.7	3	2.7
PXY8-BH	φ4.85	3.7	5.1	2.7
PXY12-BL	φ6	5.4	1.5	4.2
PXY12-BM	φ6	5.4	3	4.2
PXY12-BH	φ6	5.4	6	4.2
PXY20-BL	φ6	8.7	4.8	7.2
PXY20-BM	φ6	8.7	11.1	7.2
PXY20-BH	φ6	8.7	15	7.2
PXY25-BL	φ13.4	11	7.5	8.5
PXY25-BM	φ13.4	11	17.0	8.5
PXY25-BH	φ13.4	11	25.0	8.5

The value for the stroke end height given is for the error absorption range φ2(PXY8, 12) or φ3(PXY20) or φ5 (PXY25).

Item Descriptions and Precautions

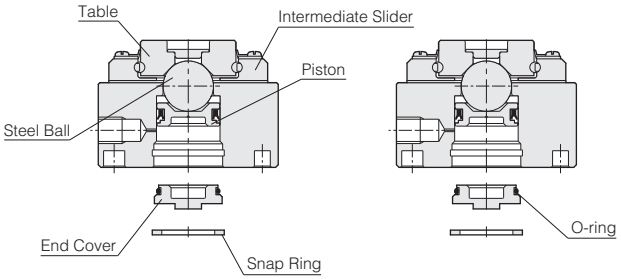
Item	Item Descriptions	Note
Spring Outer Diameter	Any value larger than those in the table hinders mounting on the piston and end cover.	Ensure that the value is that shown in the table or smaller.
Spring Set Height	Spring length as it is set.	Ensure that the value is that shown in the table.
Set Load Value	Spring load value as it is set.	———
Stroke End Height	Spring length with the piston directly touches the end cover.	Ensure that the value is that shown in the table.

Change of Function

The following shows how to make changes to the standard type to add other functions.
Refer to this explanation also for making changes to types other than the standard type to add other functions.

■ Change of Error Absorption Range

The error absorption range can be changed by replacing with the end cover kit separately offered. The end cover is common to the lock off, center holding and standard types.
(See Table on the Right) Details of Separately Offered Part ☞Page 7, 9



Error Absorption Range and Spacer Thickness (PXY8)

Error Absorption Range	Spacer Thickness
φ1	0.5mm
φ2	None

Error Absorption Range and End Cover Color (PXY12)

Error Absorption Range	End Cover Color
φ1	Black
φ2	White

Error Absorption Range and Spacer Thickness (PXY20)

Error Absorption Range	Spacer Thickness
φ1	1.0mm
φ2	0.5mm
φ3	None

Error Absorption Range and Spacer Thickness (PXY25)

Error Absorption Range	Spacer Thickness
φ3	1.0mm
φ4	0.5mm
φ5	None

Disassembly Procedure

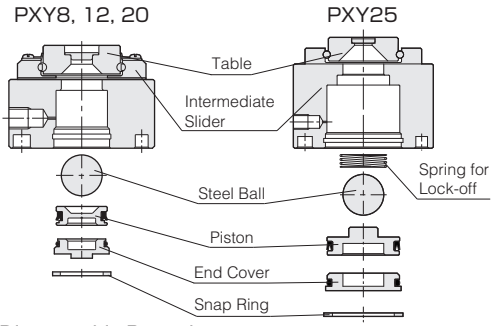
Step	1. Remove the retaining ring for hole. ※PXY8, 20, and 25 have spacers adhered to the end cover. 2. Remove the end cover.
Note	When the end cover is removed, the piston and steel ball may easily fall off. Without the piston and the steel ball, the table and intermediate slider move freely and may fall off. Use caution when handling.

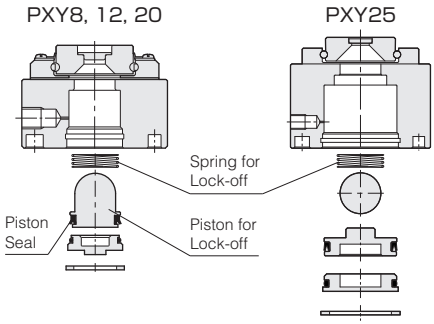
Assembly Procedure

Step	1. Mount the O-ring on the replacement end cover. 2. Mount the end cover and secure with the retaining ring for hole.
Note	Make sure that the retaining ring for hole is correctly mounted.

■ Change to Lock Off Type

The standard type can be changed to the lock off type by replacing with the lock off kit separately offered.
Regarding PXY25, it is possible to change from the spring-type to the lock-off type.
Details of Separately Offered Part ☞Page 7, 9





Disassembly Procedure

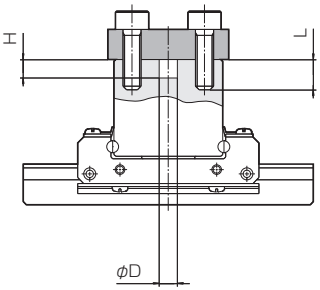
Step	1. Remove the retaining ring for hole. 2. Remove the end cover. 3. Remove the piston and the steel ball.
Note	When the end cover is removed, the piston and steel ball may easily fall off. Without the piston and the steel ball, the table and intermediate slider move freely and may fall off. Use caution when handling.

Assembly Procedure

Step	●PXY8, 12, 20 1. Mount the piston seal on the piston for lock off. 2. Assemble the spring for lock off and piston for lock off. 3. Mount the end cover and secure with the retaining ring for hole. ●PXY25 1. Assemble the spring for lock off. 2. Assemble the steel ball and piston. 3. Mount the end cover and secure with the retaining ring for hole.
Note	When the end cover is removed, the piston and steel ball may easily fall off. Without the piston and the steel ball, the table and intermediate slider move freely and may fall off. Use caution when handling.

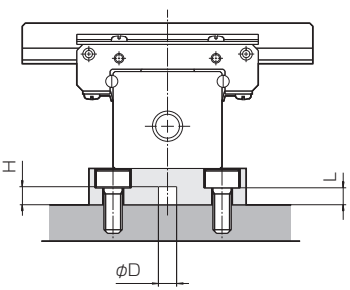
Body Installation

Top Mounting (Body Tap)



Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PXY8	M3×0.5	5	1.1	$\phi 1.5^{+0.05}_{0}$ Depth 1.5
PXY12	M3×0.5	5	1.1	$\phi 3^{+0.05}_{0}$ Depth 3
PXY20	M4×0.7	5	2.5	$\phi 4^{+0.05}_{0}$ Depth 4
PXY25	M5×0.8	6	5.1	$\phi 4^{+0.05}_{0}$ Depth 4

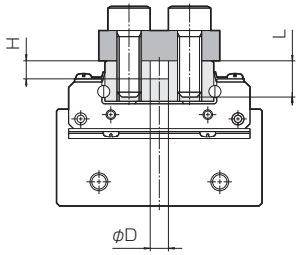
Mounting by Bracket (Through-hole)



Model	Bolt Size	Through-hole Length L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PXY8	None (Without bracket)			
PXY12	M3×0.5	2.8	1.1	$\phi 3^{+0.05}_{0}$ Depth 3
PXY20	None (Without bracket)			
PXY25	None (Without bracket)			

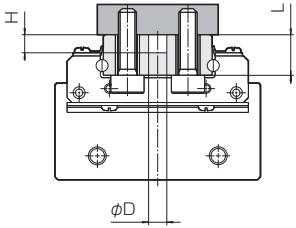
Mounting on Table

Top Mounting



Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PXY8	M3×0.5	5.2	1.1	$\phi 1.5^{+0.05}_{0}$ Depth 1.5
PXY12	M4×0.7	6.7	2.5	$\phi 3^{+0.05}_{0}$ Depth 3
PXY20	M5×0.8	8	5.1	$\phi 4^{+0.05}_{0}$ Depth 4
PXY25	M5×0.8	8.1	5.1	$\phi 4^{+0.05}_{0}$ Depth 4

Bottom Mounting



Model	Bolt Size	Through-hole Length L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PXY8	M2.5×0.45	5.2	0.57	$\phi 1.5^{+0.05}_{0}$ Depth 1.5
PXY12	M3×0.5	6.7	1.1	$\phi 3^{+0.05}_{0}$ Depth 3
PXY20	M4×0.7	8	2.5	$\phi 4^{+0.05}_{0}$ Depth 4
PXY25	M4×0.7	8.1	2.5	$\phi 4^{+0.05}_{0}$ Depth 4

⚠ Warning

Failure of Power Supply and Abnormal Condition of Supply Pressure

If supply pressure goes up/ down abnormally due to failure or other troubles of power sources such as electricity or air pressure. Returning and holding forces of PICO POSITIONER will also change accordingly and malfunction may occur. Take necessary measures against this situation not to hurt human or damage devices.

Range of Positioning Error Absorption

An error beyond this range will generate excessively large load or moment to cause failure of PICO POSITIONER or breakage of a workpiece.

Shock Absorption at Stopping

In the case PICO POSITIONER is moved straight or turned around by a robot or another actuator. and stopped suddenly. the lock may be unlatched or the linear guide may be broken due to excessively large inertia force. Shock absorption by cushioning, shock absorbers, etc. shall be considered on designing.

Resistance of Piping and Wiring

Smooth movement of PICO POSITIONER may be hindered by the resistance of piping or wiring. Consider the resistance against smooth operation in the design stage.

Removal of PICO POSITIONER

When the PICO POSITIONER is to be removed from a device for modification or maintenance, shut off the supply of compressed air and discharge the residual pressure.

At Operation

When actuator is in operation or power supply is not shut off. never put your fingers. hands. tools, etc. into the moving area of devices or PICO POSITIONER inadvertently to prevent injury or accident.

Setting of Covers

If water. oil, cutting fluid, dust. iron powder, spatter. etc. are deposited on the linear guides, damage, rust, etc. may occur to cause malfunction. Set covers on the linear guides to prevent such deposition.

Mounting and Adjustment

When mounting a workpiece on the guide table, support the workpiece with a wrench, etc. to prevent any load or impact applied to the table.

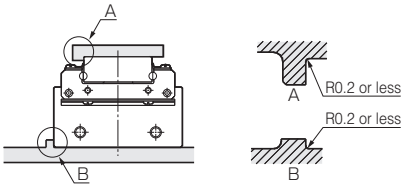
Rigidity of Mounting Base

If rigidity of mounting base or mounting method of PICO POSITIONER on the machinery is not adequate, it may be impossible for PICO POSITIONER to demonstrate its high-rigidity and high-accuracy.
On designing, due consideration shall be given to rigidity of machinery such as mounting base.

Mounting Surface Accuracy

①The table top side and the body bottom side of PICO POSITIONER are precision-ground. Ensure that the mating mounting surface of a machine, equipment, jig, etc. 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 Table and Body ☞ Page 17

②It is recommended to provide a recess in the corner of a mating mounting surface of the table and the body 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 table may cause inaccurate contact with the abutting surface.



③Ensure that there is no squareness error between the table or body 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.

Rolling Feel in Linear Guide

When the table is moved by hand without pressurizing the air, 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 radial clearance of the linear guide and does not affect the performance.

PICO POSITONER Movement

When moving the PICO POSITIONER with another actuator, etc., pressurize the air to lock the table.
Pressurize the air and lock the table also for the center holding type. If the table is not locked by the air, the inertial force of the mounted load may cause damage or injury to equipment or human body.

Positioning Pin Holes in Table and Body

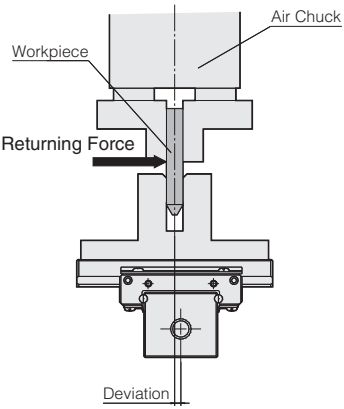
Press-fitting a pin into a positioning pin hole may cause failure due to deformation of the rolling surface of the linear guide or excessive load applied during press-fitting. The pin hole is hardened by heat treatment and crack or damage may occur. Ensure that the fit allows for a clearance between the hole and the pin (clearance fit: tolerance class position g max.).

⚠ Caution

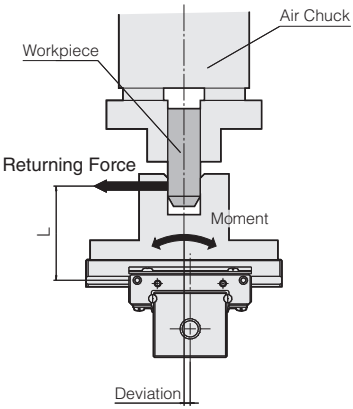
Moment by the Returning Force

In the case the table returns from the slid position after insertion of a workpiece to the center position as shown in the figure below. if the actuator is pressurized before the release of the workpiece, the workpiece and/or the linear guide may be damaged by the returning force and a large moment generated by it.
Rated static moment ☞Page 20

●Possibility of Damage of a Workpiece



●Generation of a Large Moment



Greasing

Bearing ball area is filled with grease before dispatch the actuator. During operation. depending on operating time, operating condition. environment and etc., grease deteriorate. And this cause the bearing to shorten its life because of wear of rolling area.
As this actuator has small amount of movement of table (slide amount), enough rolling of the ball of the linear guide cannot be obtained and loss of oil film may occur to generate local corrosion. ("fretting corrosion") Periodic regreasing is necessary to the ball rolling surfaces.
Greasing interval depends on the operating condition and environment. As a guide, perform greasing every one to three months in the ordinary operation.
For grease, please use lithium soap base one.

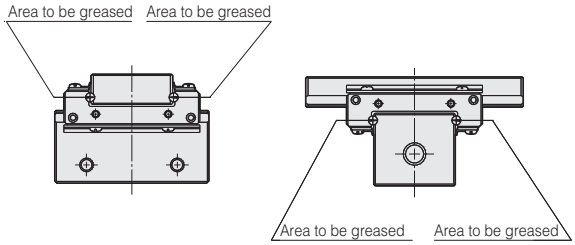
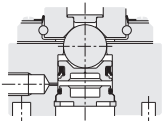


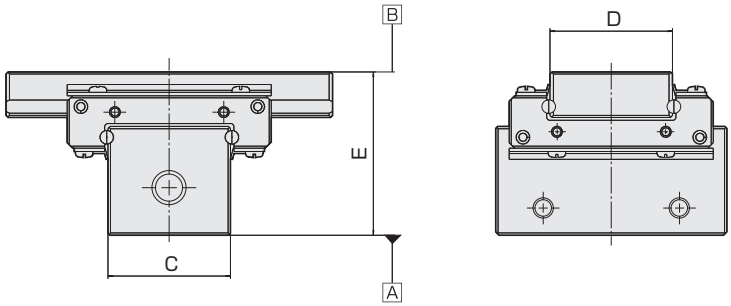
Table Slide Resistance (Standard Type)

When pressure is applied, the piston lifts up the steel ball and returns the table to the center position, where it is locked.
With the standard type, the piston and the steel ball stays at their positions even if the air is discharged.(Locking force is not generated.)
Accordingly, the force to move the piston and the steel ball to the end cover side required when the table is slid by external force after the air is discharged translates to the slide resistance. Use caution to prevent any damage to workpiece and jig. Use of the lock off type is recommended.



Accuracy

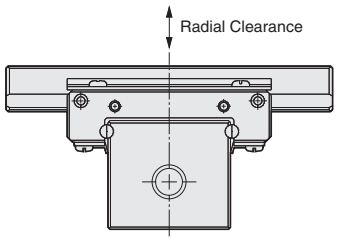
■ Bearing Accuracy



Unit : mm

Model	PXY8	PXY12	PXY20	PXY25
Parallelism of plane B against plane A	0.01	0.01	0.01	0.01
Running Parallelism of plane B against plane A	0.01	0.01	0.01	0.01
Dimensional tolerance of C	$^{0}_{-0.1}$	$^{0}_{-0.1}$	$^{0}_{-0.1}$	$^{0}_{-0.1}$
Dimensional tolerance of D	$^{0}_{-0.1}$	$^{0}_{-0.1}$	$^{0}_{-0.1}$	$^{0}_{-0.1}$
Dimensional tolerance of E	±0.05	±0.05	±0.08	±0.08

■ Radial Clearance



Unit : mm

Model	PXY
Radial Clearance	0～+0.004

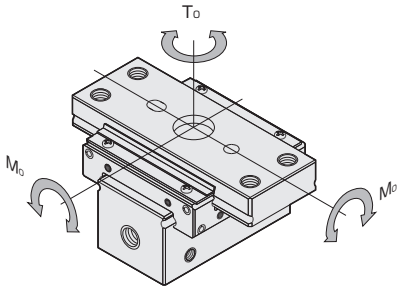
●Radial clearance is the numeric value of the movement of the center of the table when the guide table is moved up and down lightly by a constant force.

●PICO POSITIONER is not pre-loaded because it is so designed as to absorb positioning error by sliding lightly and smoothly.

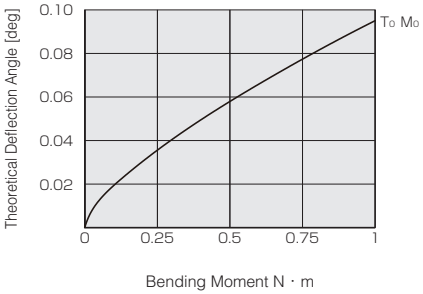
●Radial clearance indicated is the value for one unit of the linear guide.As PICO POSITIONER adopts the cross linear guides, having a structure in which two units of linear guide are combined. So. radial clearance for one PICO POSITIONER is twice the indicated value.

Theoretical Displacement of Table by Bending Moment

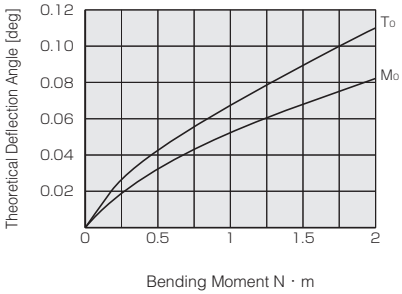
If an external force is applied to the table, the table inclines slightly because of elastic deformation of balls and races. Refer to the following graph of theoretical angular displacement of the guide table for each moment shown below.



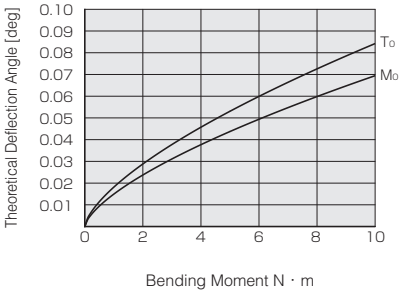
PXY8



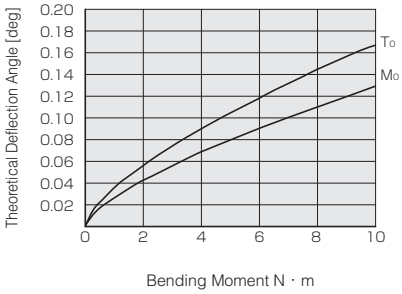
PXY12



PXY20



PXY25



Allowable Load Mass, Allowable Load and Allowable Moment

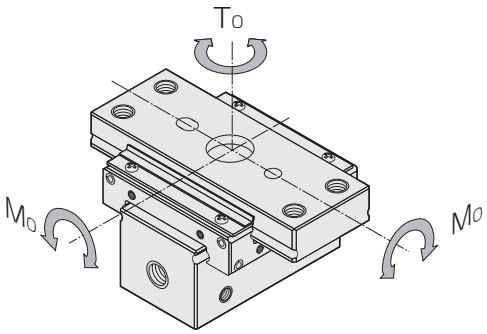
⚠ Caution

Use this unit after verifying that the applied load is within the allowable value.
Any service conditions exceeding the allowable values may affect operation, accuracy and life, and may even result in breakage.

Types of Load	Situation of Actuator	Situation of Load	Item to be confirmed
Mounted Load	Operating	Continuously Acting	Allowable Load Mass, Allowable Range of the Center of Gravity of Workpiece
External Force	Stopping	Temporarily Acting	Basic Rated Static Load, Rated Static Moment, Rated Static Torque

■ Direction of Moment

Direction of moment can be classified into the following three.



■ Allowable Load Mass and Allowable Range of the Center of Gravity of Workpiece

When PICO POSITIONER is operated with a load mounted, confirm that the following two items are respectively within the allowable values.

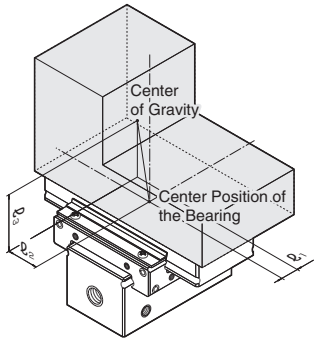
①Maximum Load Mass

PXY8	PXY12	PXY20	PXY25
0.5kg	1kg	3kg	8kg

②Allowable Range of the Center of Gravity of Workpiece 50㎜

In the case the unit with a workpiece is moved straight or turned around by a robot or other actuator, too large moment may be generated by the inertia force of the workpiece. The distance L between the center position of the bearing and the center of gravity shall be within the restricted range.

$\sqrt{\ell_1^2+\ell_2^2+\ell_3^2}=L\leqq 50$㎜



Allowable Load Mass, Allowable Load and Allowable Moment

■ Allowable Load Mass and Allowable Moment for External Force (under stopped state)

In the case that an external force is applied temporarily on the actuator under stopped state such as the stroke end, verify that each value in the following 2 items is within the allowable value.

①Magnitude of the External Force (Basic Rated Static Load)
②Moment of the External Force (Rated Static Moment and Rated Static torque)

Note: Calculate the moment by using the distance between the center position of guide and the position of external force as the length of arm of moment.

If an excessively large load or impact load is exerted on the table while it is standing still, permanent deformation is locally generated between the ball of the guide and the ball rolling surface. This permanent deformation will prevent the actuator from smooth operation when it develops more than the allowable limit.
The basic rated static load Co, the rated static moment Mo and the rated static torque To respectively mean such a static load, static moment and static torque of fixed direction and magnitude that the sum of the perma-nent deformation at the ball and the ball rolling surface is 0.0001 of times the ball diameter on the contact surface receiving the maximum stress.The static force applied to the table shall be within the range to meet the following formulas.

$C_0 \geqq fs \cdot P$

C_0 : Basic Rated Static Load N
P : Static Load N
fs : Static Safety Factor

$M_0 \geqq fs \cdot M_1$

M_0 : Rated Static Moment N · m
M_1 : Static Moment N · m
fs : Static Safety Factor

$T_0 \geqq fs \cdot T_1$

T_0 : Rated Static Torque N · m
T_1 : Rated Static Torque N · m
fs : Static Safety Factor

Static Safety Factor fs

Load Condition	Lower limit of fs
Light Load without Impact	1.0～1.3
Heavy Load with Impact	2.0～3.0

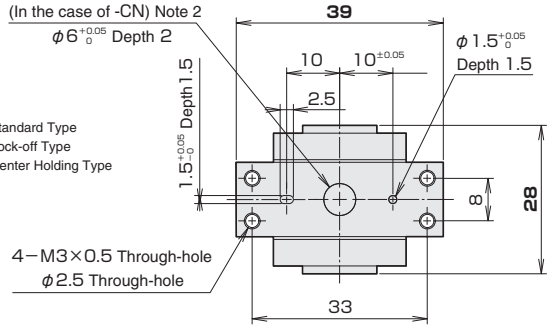
Basic Rated Static Load, Rated Static Moment And Rated Static Torque

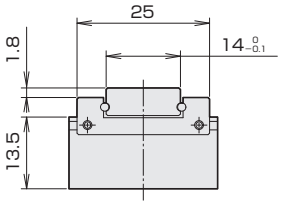
Model	Basic Rated Static Load C_0 N	Rated Static Moment M_0 N·m	Rated Static Torque T_0 N·m
PXY8	1930	4.95	4.95
PXY12	2310	7.62	7.62
PXY20	6010	33.8	40.3
PXY25	5780	25.5	25.5

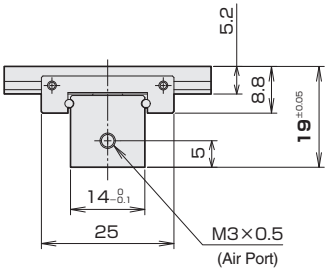
Dimensions PXY8 Basic

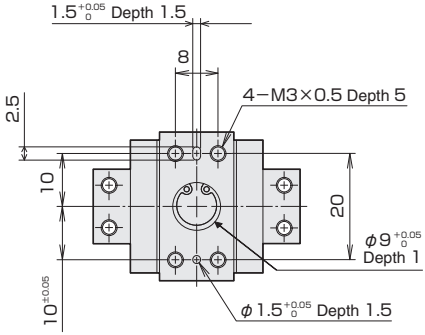
PXY−SD 8−$\frac{1}{2}$− LF / BL / BM / BH −CN

- Basic
- Bore Size
- Error Absorption Range
- Additional Function
  - No Code · · · · · · Standard Type
  - LF · · · · · · · · Lock-off Type
  - BL, BM, BH · · Center Holding Type
- Front cover
  - No Code · · · Available
  - CN · · · · · Not Available









Note 1
Figures show unit at the locked state on center position.

Note 2
If there is a cover, it cannot be used as a positioning hole.

Dimensions PXY12 Basic

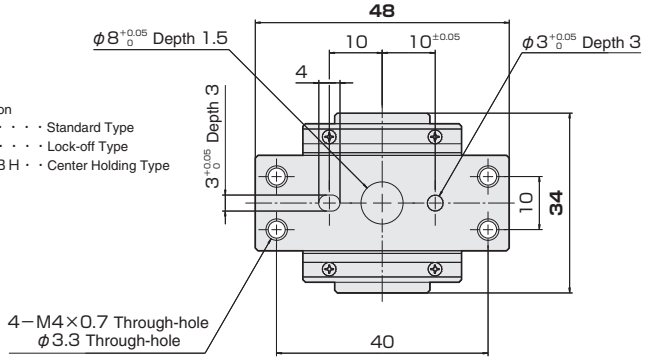
PXY−SD12−$\frac{1}{2}$−$\begin{matrix}\text{LF}\\\text{BL}\\\text{BM}\\\text{BH}\end{matrix}$

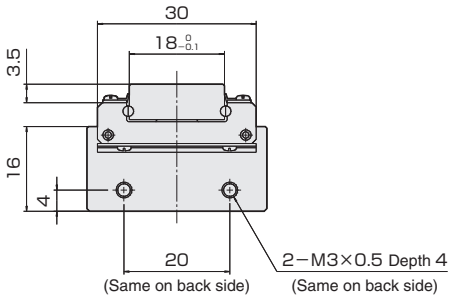
Basic

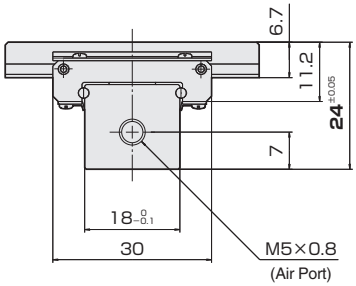
Bore Size

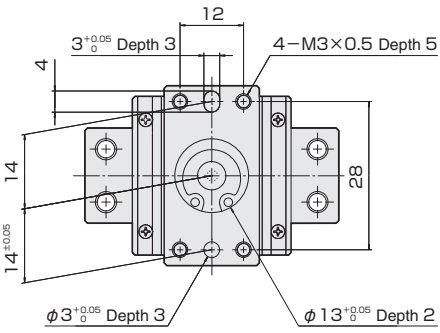
Error Absorption Range

Additional Function
No Code · · · · · · Standard Type
LF · · · · · · · · Lock-off Type
BL, BM, BH · · Center Holding Type







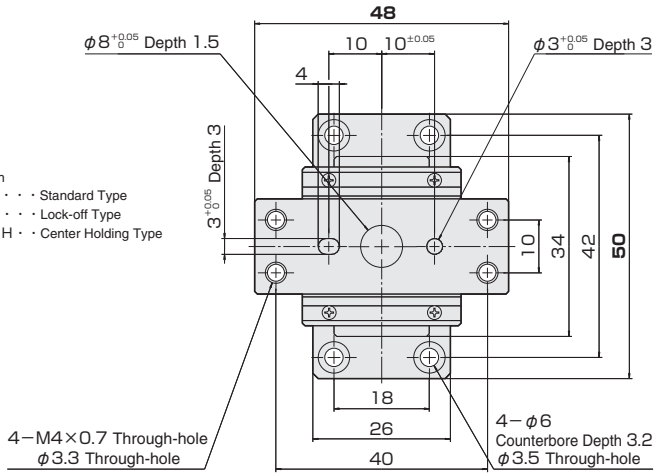


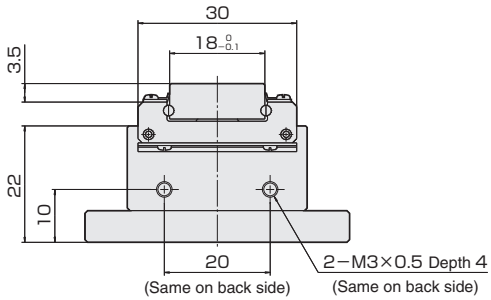
Note :
Figures show unit at the locked state on center position.

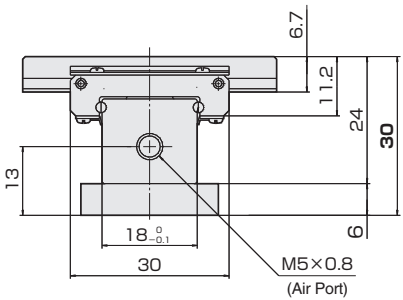
Dimensions PXY12 with Bracket

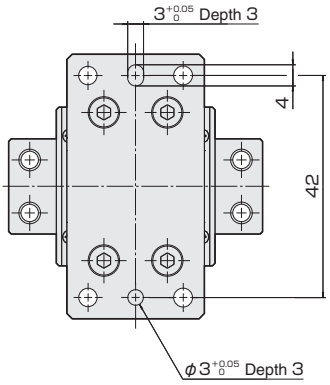
PXY−LB12−1−LF
2 BL
BM
BH

With Bracket
Bore Size
Error Absorption Range
Additional Function
No Code・・・・・・Standard Type
LF・・・・・・・・Lock-off Type
BL, BM, BH・・Center Holding Type







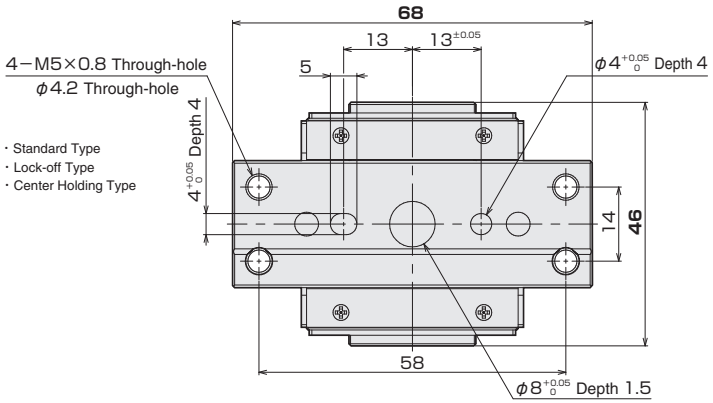


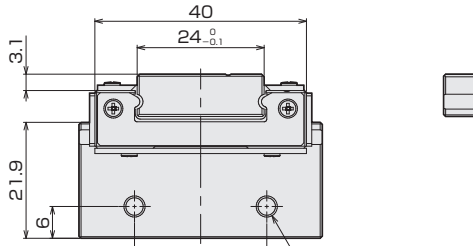
Note :
Figures show unit at the locked state on center position.

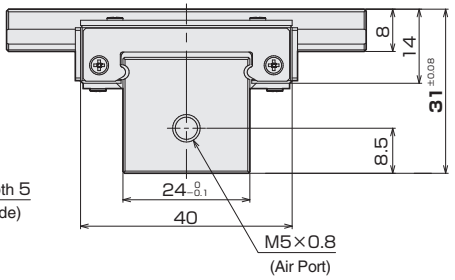
Dimensions PXY20 Basic

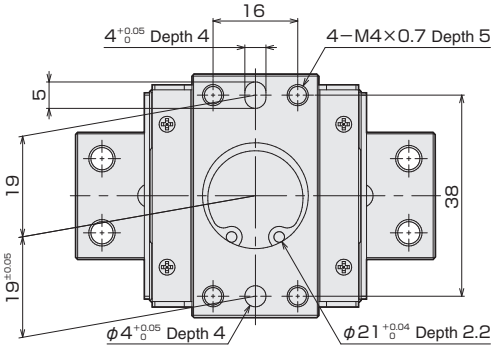
PXY−SD20−1 2 3 − LF BL BM BH

- Basic
- Bore Size
- Error Absorption Range
- Additional Function
  - No Code · · · · · · Standard Type
  - LF · · · · · · · · Lock-off Type
  - BL, BM, BH · · Center Holding Type







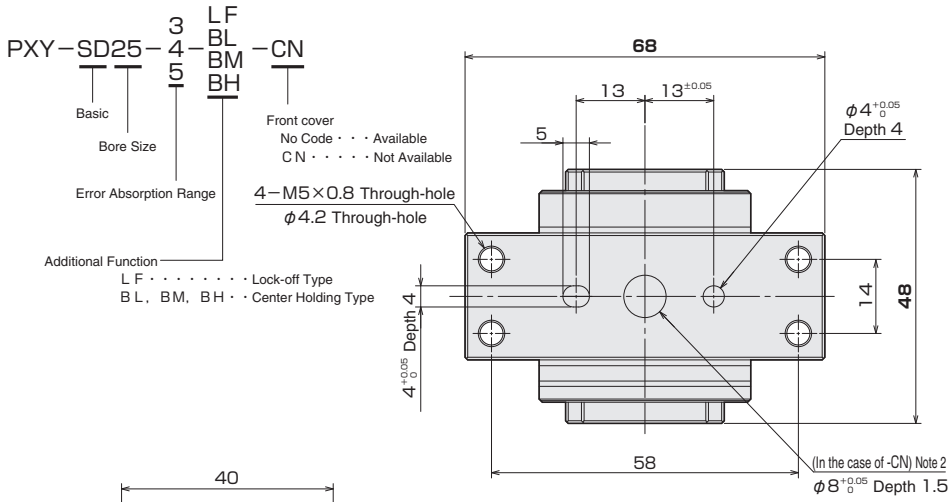


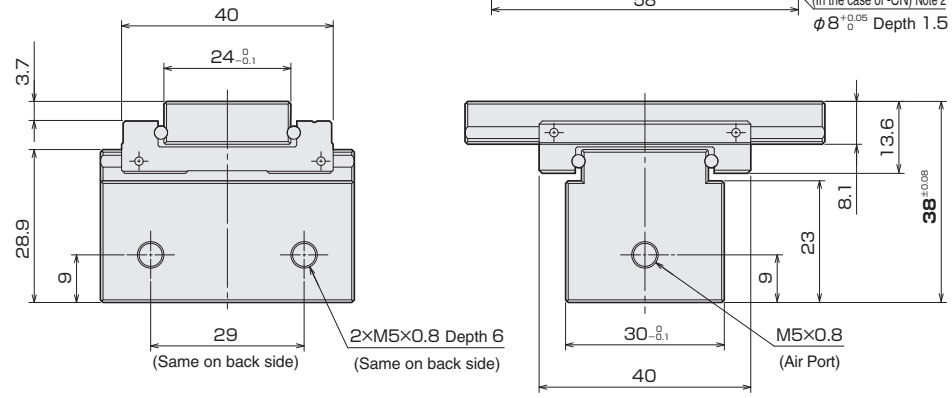
Note :
Figures show unit at the locked state on center position.

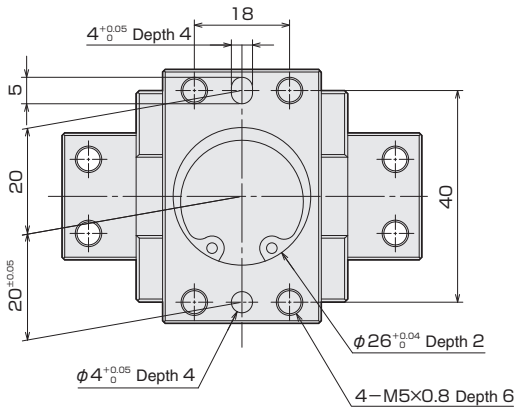
Dimensions PXY25 Basic

PXY−SD25−3/4/5−LF/BL/BM/BH−CN

- Basic
- Bore Size
- Error Absorption Range
- Additional Function
  - LF · · · · · · · · · Lock-off Type
  - BL, BM, BH · · Center Holding Type
- Front cover
  - No Code · · · Available
  - CN · · · · · Not Available







Note 1
Figures show unit at the locked state on center position.

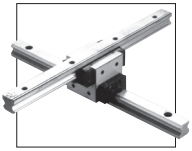
Note 2
If there is a cover, it cannot be used as a positioning hole.

PICO POSITIONER

PXYQ Series

The Cross-Linear Guide Enables Smooth and Effortless Sliding on the X-Y Plane, with the Added Functionality of Rotation in the θ Direction. A Precision Absorption Unit Allows for Re-centering and Locking after Applying Pressure.

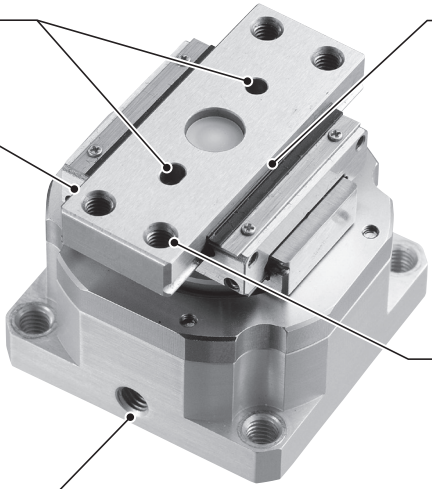
Cross Linear Guide



High Accuracy, High Rigidity Linear Guide is built-in.
(Part X−Y)

Roller Bearing

Using Roller Bearing
(Part θ)



Positioning Pin Holes

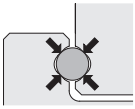
Pin holes for attaching / detaching reproducibility are provided on the top surface of the body and the side surface of the table.

Cross Linear Guide

Limited track type linear guides of high-accuracy and high-rigidity.

4-Point Contact

4-point contact guide which well endures fluctuating load and combined load, is adopted for the linear guide.



Piping Port

When air is supplied. the piston will make the positioning steel ball move towards the table.

Side Seals

Side seals are provided at four places to prevent the entry of dust.

Center Holding Type

Holding the center position by spring after exhausted.

Mounting of Workpiece

Workpiece can be mounted directly on the surface of the table.

Countermeasure for Copper Parts

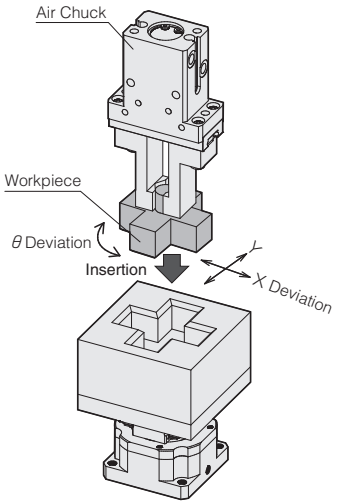
Copper parts are not used.

Summary of The PICO POSITIONER

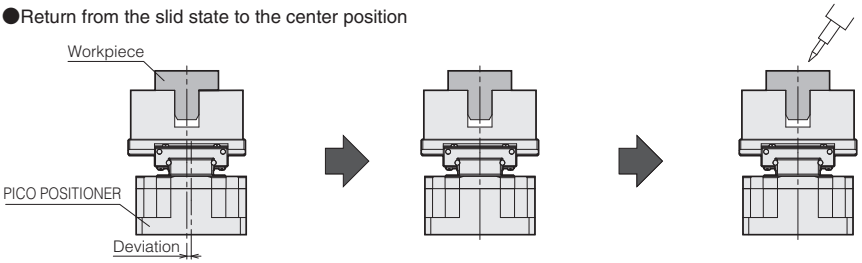
The 'Pico Positioner' achieves smooth and lightweight sliding in the X-Y plane while maintaining high precision and high rigidity through a compact cross-linear guide. It enables rotation in the θ direction using radial bearings, and ensures high repeatability and reliable locking at the center position thanks to the integrated steel balls.
The system can absorb errors within a range of ϕ2 mm and an angle of ±3.4° around the center position. Additionally, it is capable of returning to and locking in the center position from a shifted state due to air pressure.

■ Application Examples : PICO POSITIONER

●Positioning error absorption at the insertion of a workpiece



●Return from the slid state to the center position



●End of Insertion

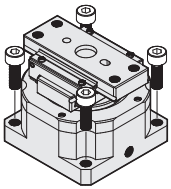
●The table returns to the center positionand is locked when air pressurized

●Finishing operation in locked state

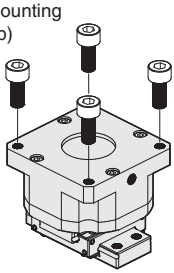
■ Main Body Installation

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

Top Mounting
(Body Through-holes)



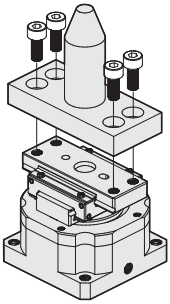
Bottom Mounting
(Body Tap)



■ Mounting

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

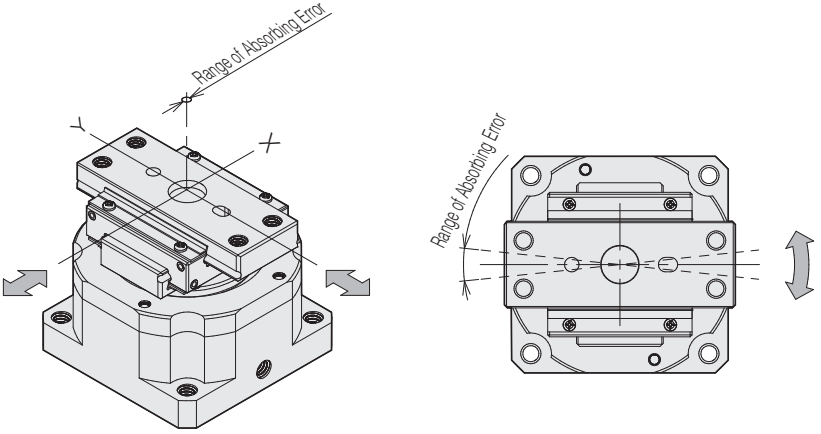
Top Mounting
(Table Tap)



Operating Principle

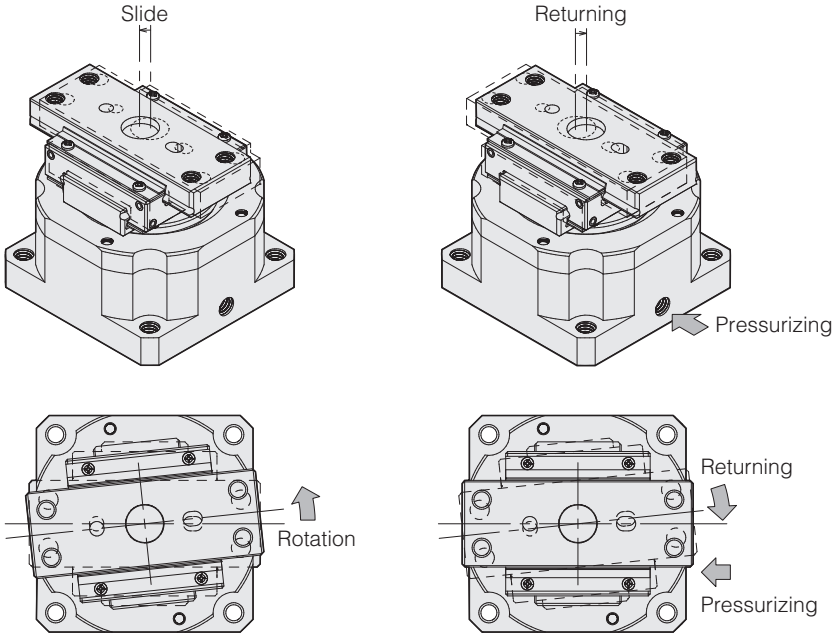
■ Range of Absorbing Error

The table slides within the range of the circumference on the X-Y plane centered at the center position without being pressurized, and also rotates in the θ direction.



■ Standard Type

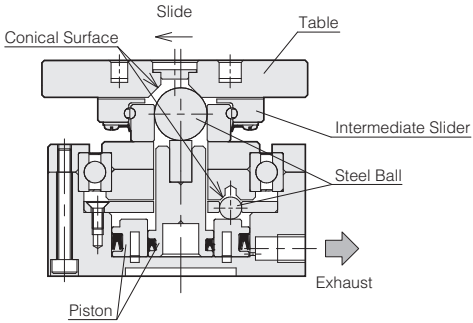
When pressurized, the table will return to the center position and be locked.



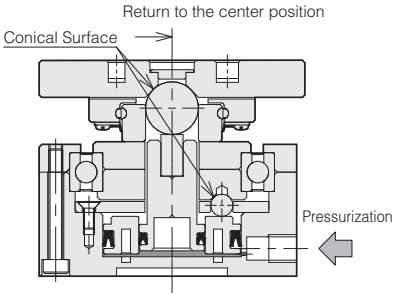
The state where the table is slid.
(The table is in a free state.)

When pressurized, the table will return
to the center position and be locked.

■ Standard Type



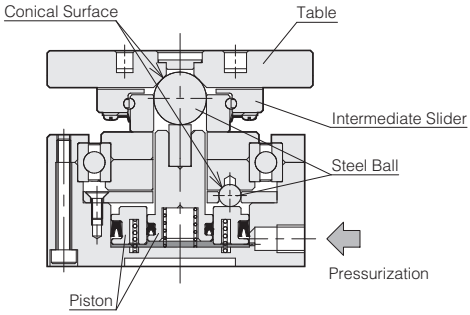
When the table slides and rotate by external force in the non-pressurized state, the steel ball and the piston will be pushed down and the piston will be stopped by the end cover.Table is in the free state. The range that the table can slide and rotate is restricted by the contact of the steel ball with the conical surface of the table.



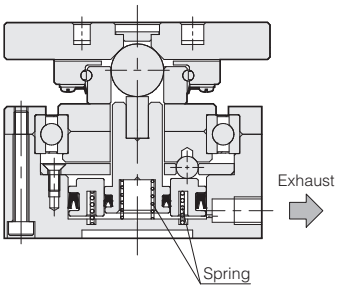
When pressurized, the piston will push up the steel ball. The table will return to the center position and be locked by the contact of the steel ball with the conical surface in the table.

■ Center Holding Type (BL, BM, BH)

The table center position is maintained by the spring after the air is discharged.



When pressure is applied, the steel ball is pressed against the conical surface of the table, which returns the table to the center where it is locked.



Even if the air is discharged, the piston keeps pressing the steel ball against the conical surface of the table because of the spring, which locks the table at the center position.Note that the table locking force is only the force by the spring.

■ Model Code Example

PXYQ-12-2-BL

Series Name ●

● Bore Size

12	Equivalent to ϕ12(XY)/ϕ20(θ)

● Additional Function

No Code	Standard Type	
BL	Center Holding Type	Holding Force Weak Type
BM		Holding Force Medium Type
BH		Holding Force Strong Type

Description of Additional Function ☞ Page 29
Holding Force of Center Holding Type ☞ Page 35

● Error Absorption Range

Code	Error Absorption Range (mm)(°)
2	ϕ2(XY)/±3.4°(θ)

Tolerance of Error Absorption Range ☞ Page 31

■ Specifications

			PXYQ12	
Locking Area	Bore Size	XY	φ12mm	
		θ	Equivalent to φ20mm	
	Pipe Diameter		M5×0.8	
	Returning System		Air Returning	
	Locking Pattern		Center Position Locking	
	Working Fluid		Air	
	Maximum Service Pressure		0.7MPa	
	Minimum Service Pressure		0.1MPa	
	Proof Pressure		1.05MPa	
	Service Temperature Range		5~60℃	
	Maximum Service Frequency		60c.p.m	
	Maximum Load Mass		1kg	
	Effective Returning Force	XY	42N	※1
		θ	1.2N·m	※1
	Effective Holding Force	XY	76N	※1
		θ	2N·m	※1
	Lubrication		Not required	
Sliding Area	Guide Mechanism	XY	Cross Linear Guide	
		θ	Deep groove ball bearing	
	Error Absorption Range	XY	φ2 (φ1.2~φ3.6) mm	※2
		θ	±3.4 (±2.35~6)°	※2
	Rated Static Load		2310N	

※1. Standard Type at the air pressure 0.5 MPa
※2. The error absorption range varies within the values in ( ) due to individual differences.

■ The Type of Linear Guide

Model	Type
PXYQ12	Wide Type Rail Size 9

Pressure: Zero or there is slight space.

■ The Type of Roller Bearing

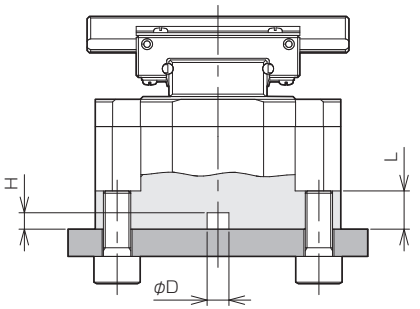
Model	Type
PXYQ12	6805ZZ

■ Product Mass

Model		Main Body Mass
PXYQ12	Standard	255g
	Center Holding	256g

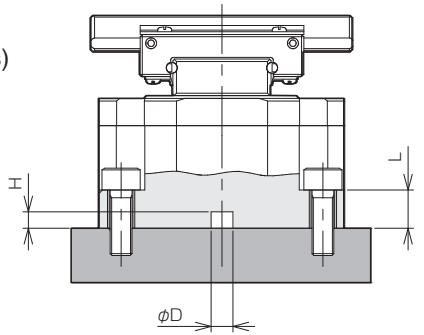
Body Installation

●Bottom Mounting
(Body Tap)



Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PXYQ12	M5×0.8	7	5.1	$\phi 4^{+0.05}_{0}$ Depth 3

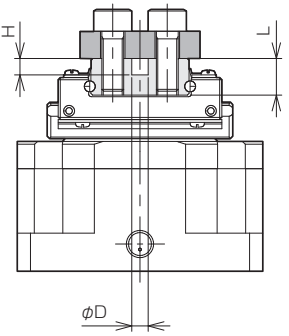
●Top Mounting
(Body Through-holes)



Model	Bolt Size	Through-hole Length L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PXYQ12	M4×0.7	7	2.5	$\phi 4^{+0.05}_{0}$ Depth 3

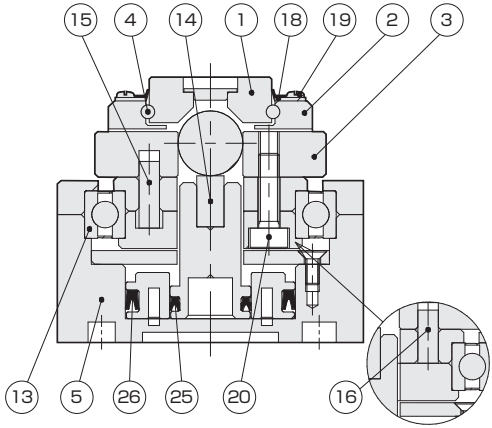
Mounting on Table

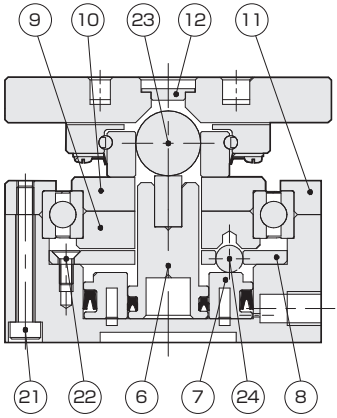
●Top Mounting
(Table Tap)

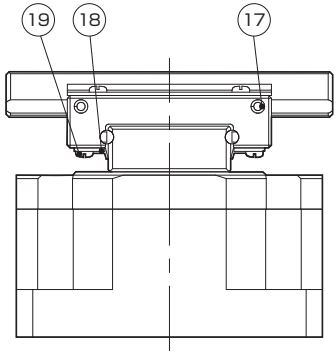


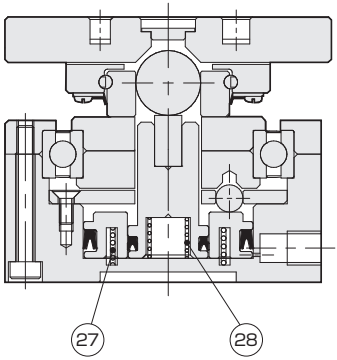
Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕD×H(mm)
PXYQ12	M4×0.7	6.7	2.5	$\phi 3^{+0.05}_{0}$ Depth 3

Structure and Principal Components









BL·BM・BH (Center Holding Type)

It cannot be disassembled.

⚠ Caution

Disassembling it will impair its original functionality.

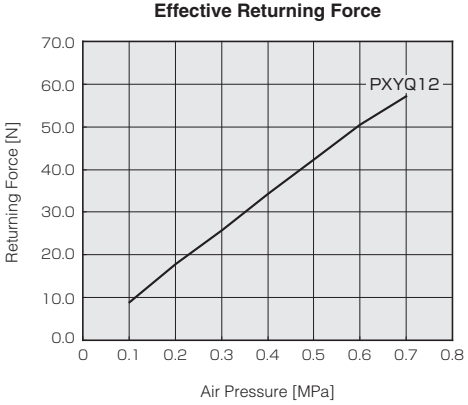
Principal Components

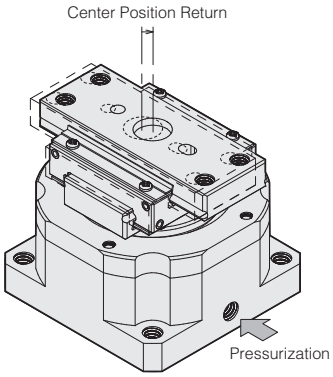
No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Table	Stainless Steel (Heat Treatment)		15	Press Fit Pin	Steel (Heat Treatment)	
2	Intermediate Slider	Stainless Steel (Heat Treatment)		16	Press Fit Pin	Steel (Heat Treatment)	
3	Rail	Stainless Steel (Heat Treatment)		17	Spring Pin	Stainless Steel	
4	Ball	Stainless Steel (Heat Treatment)		18	Side Seals	Stainless Steel+NBR	
5	Body	Aluminum Alloy	Anodized Finish	19	Cross-recessed screw	Stainless Steel	
6	Piston	Aluminum Alloy	Anodized Finish	20	Hexagon top bolt	Steel	Nickel Plating
7	Piston	Steel (Heat Treatment)		21	Hexagon top bolt	Steel	Nickel Plating
8	Plate	Steel (Heat Treatment)		22	Cross-recessed countersunk screw	Stainless Steel	
9	Stopper	Steel (Heat Treatment)		23	Steel Ball	Stainless Steel (Heat Treatment)	
10	Holder	Aluminum Alloy	Anodized Finish	24	Steel Ball	Stainless Steel (Heat Treatment)	
11	Holder	Stainless Steel		25	Piston Seal	NBR	
12	Front Cover	Synthetic Resin		26	Piston Seal	NBR	
13	Roller Ball Bearing	Steel		27	Spring	Stainless Steel	
14	Press Fit Pin	Steel (Heat Treatment)		28	Spring	Piano wire	

Effective Returning Force・Effective Returning Torque

■ Effective Returning Force (Standard Type)

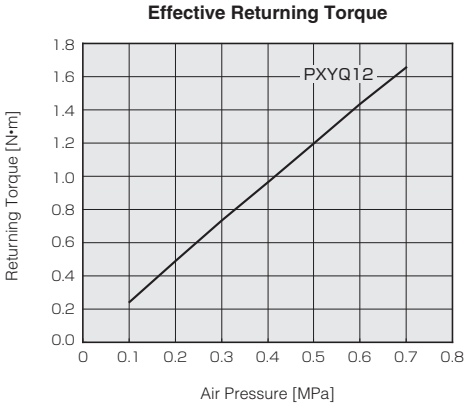
Returning force is the force with which the table returns to the center position when pressurized in the state where the table is deviated from its center position.

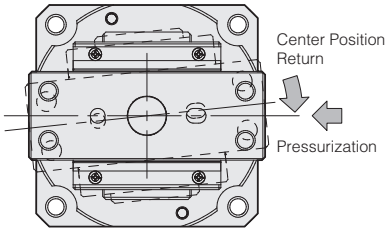




■ Effective Returning Torque (Standard Type)

Returning Torque is the force with which the table returns to the center position when pressurized in the state where the table is deviated from its center position.





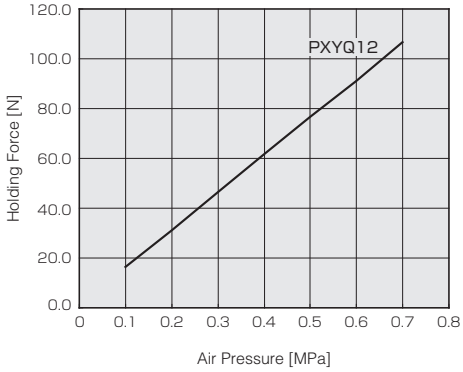
Effective Holding Force・Effective Holding Torque

■ Effective Holding Force・Effective Holding Torque (Standard Type)

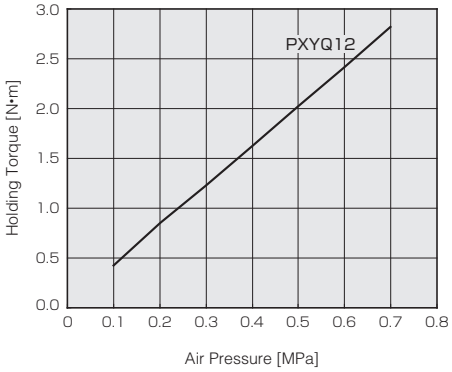
Holding force/holding torque are force/torque with which the table is locked and held at its center position in the state where the table has returned to its center position and been locked by pressurization.

●Effective Holding Force・Effective Holding Torque when air pressurized (Standard Type, Center Holding Type)

Effective Holding Force



Effective Holding Torque



●Effective Holding Force・Effective Holding Torque by Spring Force Only (Center Holding Type)

For the effective holding force・Effective Holding Torque by the force of the built-in spring alone without pressurizing the air, refer to the table below.

Note that the values are reference values. Be sure to allow for a margin.

Effective Holding Force (Reference Value)

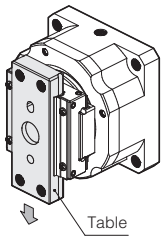
Option Code	PXYQ12
BL	3.9～6.3N
BM	5.8～9.0N
BH	10.6～22.7N

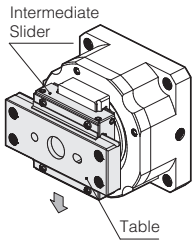
Effective Holding Torque (Reference Value)

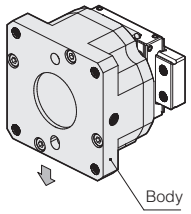
Option Code	PXYQ12
BL	0.006～0.124N·m
BM	0.025～0.185N·m
BH	0.047～0.440N·m

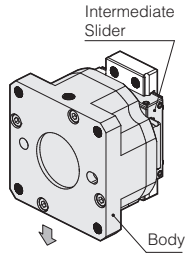
When the PICO POSITIONER is used as it is laid on the side as shown in the figures below, consider the mass of the table, intermediate slider and body in addition to the mass of the mounted load with reference to the effective return force and effective holding force.

	PXYQ12		PXYQ12		PXYQ12		PXYQ12
Table	40g	Table	40g	Body	191g	Body	191g
		Intermediate Slider	25g			Intermediate Slider	25g









Matters to be Noted for Designing and Operation

⚠ Warning

Failure of Power Supply and Abnormal Condition of Supply Pressure

If supply pressure goes up/ down abnormally due to failure or other troubles of power sources such as electricity or air pressure. Returning, returning torque, holding and holding torque forces of PICO POSITIONER will also change accordingly and malfunction may occur. Take necessary measures against this situation not to hurt human or damage devices.

Range of Positioning Error Absorption

An error beyond this range will generate excessively large load or moment to cause failure of PICO POSITIONER or breakage of a workpiece.

Shock Absorption at Stopping

In the case Pico Positioner is moved straight or turned around by a robot or another actuator. and stopped suddenly. the lock may be unlatched or the linear guide may be broken due to excessively large inertia force. Shock absorption by cushioning, shock absorbers, etc. shall be considered on designing.

Resistance of Piping and Wiring

Smooth movement of PICO POSITIONER may be hindered by the resistance of piping or wiring. Consider the resistance against smooth operation in the design stage.

Removal of PICO POSITONER

When the PICO POSITONER is to be removed from a device for modification or maintenance, shut off the supply of compressed air and discharge the residual pressure.

At Operation

When actuator is in operation or power supply is not shut off. never put your fingers. hands. tools, etc. into the moving area of devices or PICO POSITIONER inadvertently to prevent injury or accident.

Setting of Covers

If water. oil, cutting fluid, dust. iron powder, spatter. etc. are deposited on the linear guides, damage, rust, etc. may occur to cause malfunction. Set covers on the linear guides to prevent such deposition.

Mounting and Adjustment

When mounting a workpiece on the guide table, support the workpiece with a wrench, etc. to prevent any load or impact applied to the table.

Rigidity of Mounting Base

If rigidity of mounting base or mounting method of PICO POSITIONER on the machinery is not adequate, it may be impossible for PICO POSITIONER to demonstrate its high-rigidity and high-accuracy.
On designing, due consideration shall be given to rigidity of machinery such as mounting base.

Rolling Feel in Linear Guide

When the table is moved by hand without pressurizing the air, 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 radial clearance of the linear guide and does not affect the performance.

PICO POSITONER Movement

When moving the PICO POSITIONER with another actuator, etc., pressurize the air to lock the table.
Pressurize the air and lock the table also for the center holding type. If the table is not locked by the air, the inertial force of the mounted load may cause damage or injury to equipment or human body.

Positioning Pin Holes in Table and Body

Press-fitting a pin into a positioning pin hole may cause failure due to deformation of the rolling surface of the linear guide or excessive load applied during press-fitting. The pin hole is hardened by heat treatment and crack or damage may occur. Ensure that the fit allows for a clearance between the hole and the pin (clearance fit: tolerance class position g max.).

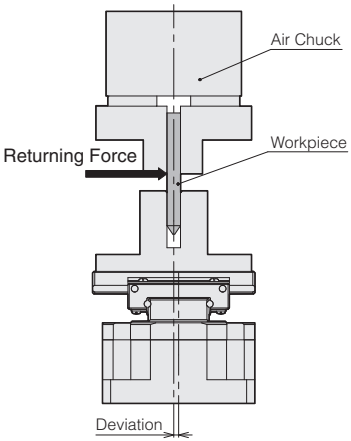
Matters to be Noted for Designing and Operation

⚠ Caution

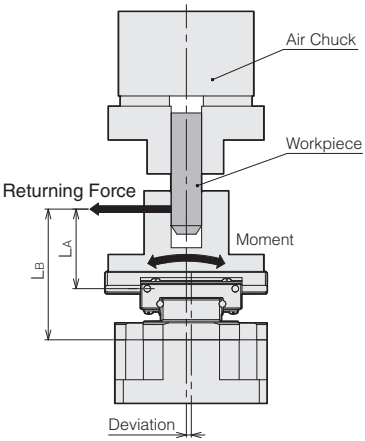
Moment by the Returning Force · Returning Torque

In the case the table returns from the slid position after in sertion of a workpiece to the center position as shown in the figure below. if the actuator is pressurized before the release of the workpiece, the workpiece and/or the linear guide and bearing may be damaged by the returning force/returning torque and a large moment generated by it.

●Possibility of Damage of a Workpiece



●Generation of a Large Moment



Greasing

Bearing ball area is filled with grease before dispatch the actuator. During operation. depending on operating time, operating condition. environment and etc., grease deteriorate. And this cause the bearing to shorten its life because of wear of rolling area.
As this actuator has small amount of movement of table (slide amount), enough rolling of the ball of the linear guide cannot be obtained and loss of oil film may occur to generate local corrosion. ("fretting corrosion") Periodic regreasing is necessary to the ball rolling surfaces.
Greasing interval depends on the operating condition and environment. As a guide, perform greasing every one to three months in the ordinary operation.
For grease, please use lithium soap base one.

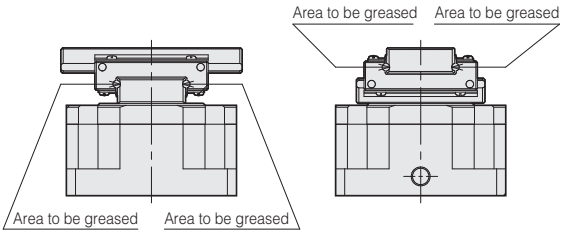
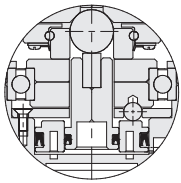


Table Slide Resistance (Standard Type)

When pressure is applied, the piston lifts up the steel ball and returns the table to the center position, where it is locked.
With the standard type, the piston and the steel ball stays at their positions even if the air is discharged. (Locking force is not generated.)
Accordingly, the force to move the piston and the steel ball to the end cover side required when the table is slid by external force after the air is discharged translates to the slide resistance. Use caution to prevent any damage to workpiece and jig.



Accuracy

■ Table Displacement Amount

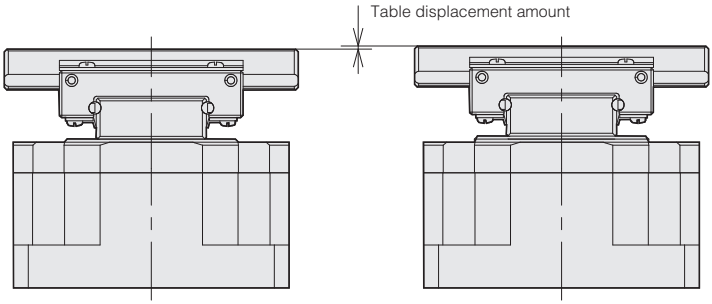


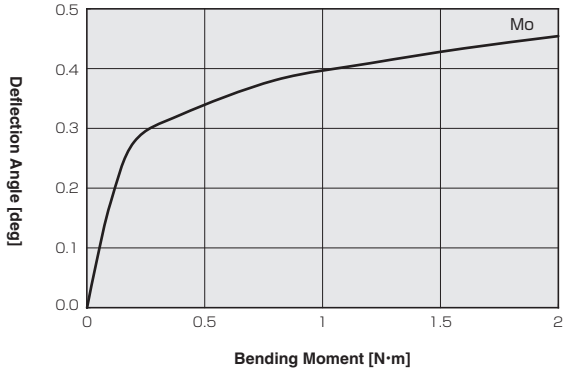
Table displacement amount (bearing clearance) Unit : mm

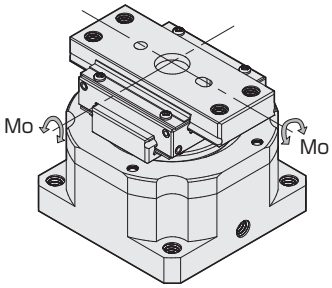
Model	PXYQ12
Table displacement amount	0.094~0.167

- The table displacement refers to the numerical value of the movement at the center of the table when the guide table is gently moved up and down with a certain force.
- Since the Pico Positioner is designed to slide lightly and smoothly to absorb errors, no preload is applied.

■ Displacement of the Table in Response to Bending Moment.

When bearings are subjected to external forces, the rolling elements undergo elastic deformation, resulting in a slight angular displacement. The following illustration provides a guideline for the displacement amount of the guide table in response to the bending moment indicated below.





Allowable Load Mass, Allowable Load and Allowable Moment

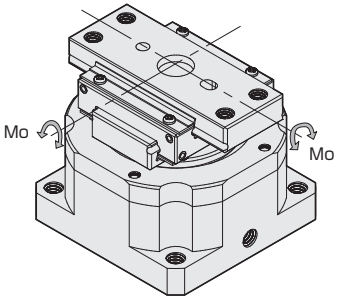
⚠ Caution

Use this unit after verifying that the applied load is within the allowable value.
Any service conditions exceeding the allowable values may affect operation, accuracy and life, and may even result in breakage.

Types of Load	Situation of Actuator	Situation of Load	Item to be confirmed
Mounted Load	Operating	Continuously Acting	Allowable Load Mass, Allowable Range of the Center of Gravity of Workpiece
External Force	Stopping	Temporarily Acting	Basic Rated Static Load

■ Direction of Moment

Direction of moment can be classified into the following three.



■ Allowable Load Mass and Allowable Range of the Center of Gravity of Workpiece

When PICO POSITIONER is operated with a load mounted, confirm that the following two items are respectively within the allowable values.

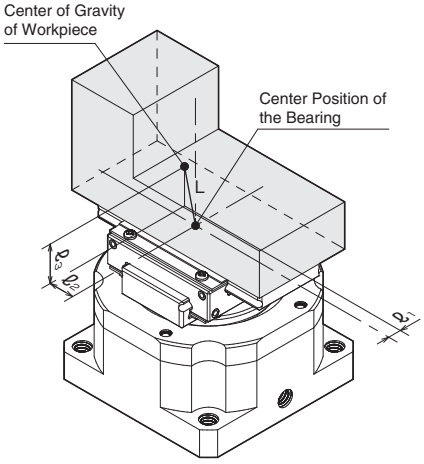
①Maximum Load Mass

PXYQ12
1kg

②Allowable Range of the Center of Gravity of Workpiece $\sqrt{\ell_1^2+\ell_2^2+\ell_3^2}=L\leqq 50$mm

$\ell_3=\leqq 20$mm

In the case the unit with a workpiece is moved straight or turned around by a robot or other actuator, too large moment may be generated by the inertia force of the workpiece. The distance L between the center position of the bearing and the center of gravity shall be within the restricted range.



Allowable Load Mass, Allowable Load

■ Allowable Load Mass for External Force (under stopped state)

In the case that an external force is applied temporarily on the actuator under stopped state such as the stroke end, verify that each value in the following 2 items is within the allowable value.

Magnitude of the External Force (Basic Rated Static Load)

If an excessively large load or impact load is exerted on the table while it is standing still, permanent deformation is locally generated between the ball of the guide and the ball rolling surface. This permanent deformation will prevent the actuator from smooth operation when it develops more than the allowable limit.
The basic rated static load Co mean such a static load of fixed direction and magnitude that the sum of the permanent deformation at the ball and the ball rolling surface is 0.0001 of times the ball diameter on the contact surface receiving the maximum stress.
The static force applied to the table shall be within the range to meet the following formulas.

$C_0 \geqq fs \cdot P$

C_0 : Basic Rated Static Load N
P : Static Load N
fs : Static Safety Factor

Static Safety Factor fs

Load Condition	Lower limit of fs
Light Load without Impact	1.0～1.3
Heavy Load without Impact	2.0～3.0

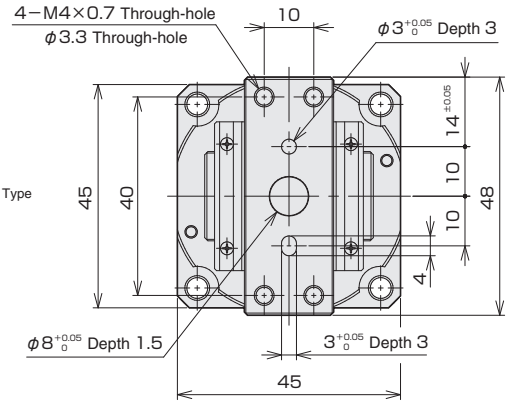
Basic Rated Static Load

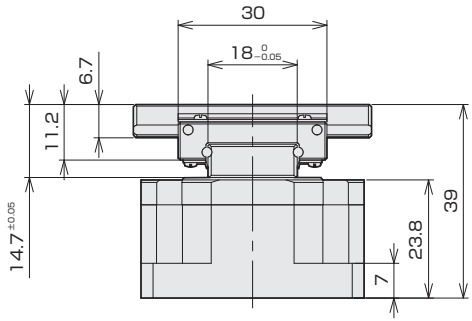
Model	Basic Rated Static Load C_0 N
PXYQ12	2310

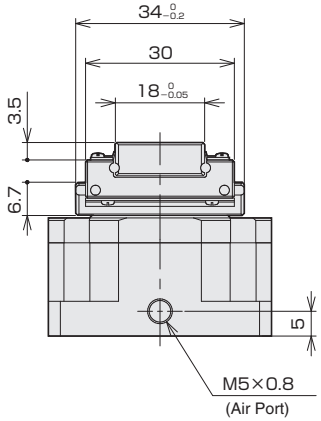
Dimensions

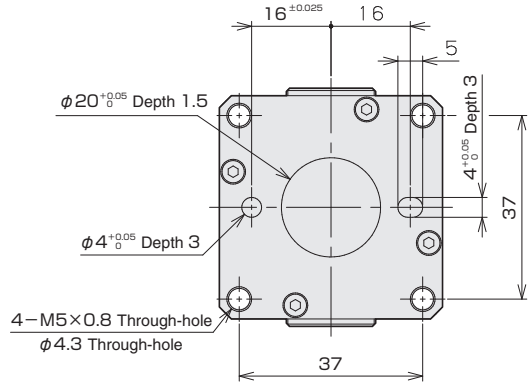
PXYQ−12−2−BL / BM / BH

- Bore Size
- Error Absorption Range
- Additional Function
  - No Code・・・・・・Standard Type
  - BL, BM, BH・・Center Holding Type









Note :
Figures show unit at the locked state on center position.

PXYQ

⚠ Notes on Safety in Use

Before using the product, be sure to read the“ Notes on Safety ”carefully for correct use. This catalog gives an explanation about the degrees of hazard and damage by classifying them by the details into three levels “Danger,” “Warning” and “Caution” in order to prevent any hazard to users or other individuals or loss of assets. Since all of these relate to safety, please ensure that you adhere to the following standards, in addition to ISO 4414, JIS B 8370, ISO 10218, JIS B 8433, ISO/TS 15066, and other safety regulations.

⚠ CAUTION	Failure to follow the instructions marked with this wording may lead to minor or medium level of injury or property damage.
⚠ WARNING	Failure to follow the instructions marked with this wording may lead to death or serious injury.
⚠ DANGER	Failure to follow the instructions marked with this wording may cause imminent danger leading to death or serious injury.

※1) ISO 4414：Pneumatic fluid power-Recommendations for the application of equipment to transmission and control systems.
JIS B 8370：General provisions for pneumatic systems　JIS B 8433：Safety of industrial robotic manipulators.
ISO 10218：Manipulating industrial robots-Safety.　ISO/TS15066：Robots and robotics devices.

⚠ WARNING

①The determination of the suitability of pneumatic equipment should be made by the designer of the pneumatic system or the individual responsible for specifying it.

The products listed here may be used under various conditions, therefore the determination of their compatibility with the system should be made by the designer of the pneumatic system or the individual who specifies it, following necessary analyses or tests. The initial performance and safety assurance of this system will be the responsibility of the individual who determined its compatibility. Please continue to refer to the latest product catalogs and materials to review all aspects of specifications, and configure the system considering the potential for equipment failure.

②Please ensure that this is handled by someone who possesses sufficient knowledge and experience.

Compressed air can be dangerous if mishandled. Please ensure that the assembly, operation, and maintenance of machines and equipment using air compressors are carried out by individuals with sufficient knowledge and experience.

③Please do not operate the machinery or equipment, or remove any devices until safety has been confirmed.

1. When inspecting or servicing machinery and equipment, please ensure that measures to prevent the falling of driven objects and to prevent runaway conditions have been implemented before proceeding.
2. When removing equipment, confirm that the aforementioned safety measures are in place and disconnect the supply air, which is the energy source, as well as the power supply to the relevant equipment, and exhaust the compressed air within the system before proceeding.
3. When restarting machinery or equipment, please confirm that measures to prevent ejection are in place and proceed with caution.

④When using under the conditions and environment as indicated below, we kindly ask for your consideration regarding safety measures and request that you contact us.

1. Conditions or environments other than those specified, and usage outdoors.
2. Use in nuclear, railway, aviation, automotive, medical devices, equipment in contact with beverages and food, entertainment devices, emergency shutdown circuits, press clutch and brake circuits, safety equipment, etc.
3. Use in applications where a significant impact on people and property is anticipated, particularly in areas requiring safety.

Actuator Precaution ①

Please read the following instructions before use.

Design and Selection

⚠WARNING

◆Abnormal action

Actuators may cause a kind of impact when force change occurs due to rattle in the sliding part of a machine.In this case, actuators may result in bodily damage (e.g. hands or legs being caught) or machine damage. Therefore, adjust actuators for smooth mechanical movement and design them to prevent bodily damage.

◆Protective cover

When there is a risk that a system or a product is harmful to human body during operation, install a protective cover.

◆Impact relaxation

When the driven object moves at a high speed or its mass is large, it is difficult to absorb impact using the cushion of the cylinder only. Therefore, install a circuit to reduce the speed before going to the cushion to release impact.In this case, consider the rigidity of the mechanical system fully.

◆Power source failures and supply pressure drop

If the power source (e.g. electric, pneumatic pressure, hydraulic source) has a failure or the air pressure drops due to troubles, cylinder power will drop, thus leading to load decrease. Take measures to prevent damage to human bodies and equipment.

◆Jumping prevention circuit

When the cylinder is driven by the exhaust center type directional control valve or one side of the piston is pressed under the condi t ion that ai r has been exhausted from the cylinder (such as when starting after the residual pressure has been exhausted from the circuit), driven objects will jump out at a high speed. Such situation may be harmful to the human body (e.g. hands or legs getting caught) or machine damage. Therefore, select equipment and design circuits to prevent driven objects from jumping.

◆Emergency stop, abnormal stop

Design actuators so that their motions do not damage human bodies or equipment even in case of emergency / abnormal stop of the system or when the system is re-started after stop.

◆Operating pressure range

If the system is used with the maximum working pressure or above, each part will be worn or damaged, thus resulting in breakage or operation failures. If the system is used with the minimum working pressure or less, the specified thrust force cannot be generated, thus causing malfunctions such as failure to move smoothly. Therefore, use products within the specified operating pressure range.
(See the specifications.)

◆Intermediate stop

When the 3-position closed center type directional control valve is used to stop the cylinder piston in the intermediate position, it cannot stop it correctly and accurately because it uses not hydraulic pressure but compressed air.
Also, it is not assured that valves and cylinders leak no air. Therefore, pistons may not be able to stop for a long time. Consult us if you need to realize long time stop position retention.

◆Fall Prevention

If the supply pressure decreases due to power outages or issues with air sources, there is a risk that gripping force will be reduced, which may cause the workpiece to fall.
Please implement safety measures, such as fall prevention, to ensure that no damage or injury is caused to people or equipment.

⚠CAUTION

◆Confirmation of Compliance

The compatibility of our products with the systems, devices, and robots used by the customer is to be confirmed at the customer's responsibility.

Mounting

⚠WARNING

◆Locking in mounting

Product fixing bolts and attachment/jig mounting bolts must have a locking. Mount bases must have a structure to prevent deformation and breakage due to thrust force or inertia force at stopping.

⚠CAUTION

◆Precautions in operating

Do not use the product until it is confirmed that equipment operate properly.
After mounting, repair or modification, connect compressed air and power and conduct appropriate functional tests and leak inspection to check if the mounting is appropriate.

◆Equipment operation check

After mounting the product to the system, do not start the system immediately but check if the product has been properly mounted for safety.

◆Product handling

Dropping or hitting the product or pinching the product with a tool will result in product deformation, thus causing accuracy deterioration and operational failure.

◆Speed adjustment

Adjust the cylinder drive speed gradually to the specified speed with a speed controller from the low speed side.

◆Precautions in magnetic products

Bringing magnetic products such as a magnetic disk, a magnetic guard and a magnetic tape close to the built-in switch sensing magnet type may result in data erase.
Also, do not bring them close to any equipment that may cause malfunction due to magnetism.

Actuator Precaution ②

Please read the following instructions before use.

Piping

⚠CAUTION

◆Seal tape winding

When you screw in pipes and joints, be careful not to make piping screw chips and sealing materials enter into the inside of the pipes.

When you use a seal tape, wind a screw with the tape so that 1.5 to 2 turns of the screw head is not winded.

Lubrication

⚠CAUTION

◆Use in lubrication circuit

If the system needs lubricating, use additive-free turbine oil class 1 ISO VG32 or ISO VG46. Do not use machine oil and spindle oil because they will damage packings, thus causing operation failures. Do not stop lubricating in the middle of lubricating because doing so will cause flowout of lubrication grease, thus accelerating damage of packings and other parts, resulting in operation failures.

Air Source

⚠CAUTION

◆Quality of compressed air

Compressed air containing drain (e.g. dust, water, salt, degraded compressor oil, oil carbon particles) and corrosive gas will damage packings and other parts, thus causing operation failures and damages. Therefore, use clean compressed air.

◆Drain removal measure

Compressed air containing a large amount of drain not only causes operation failures of the air compressor but also causes environmental contamination. Install equipment such as an after-cooler, an air dryer and an air filter (nominal filtration rating: 50μm or less).

The air cleaning system to drive actuators is recommended in JPAS005 "Guidelines for Use and Selection of Pneumatic Cylinders".

◆Temperature of compressed air

Hot compressed air will accelerate damage of packings and other parts.

Even when the environmental temperature is within the specified range, heat may transmit through jigs connected to the actuator and driven objects. When the environmental temperature is low, drain and moisture will become solidified or frozen, thus resulting in damaged packings and parts and operation failures. Therefore, measures to prevent freezing must be taken.

Usage Environment

⚠WARNING

◆Outdoor use

Do not use the product in places where the product is directly or indirectly exposed to wind and rain, is exposed to direct sunlight, or any outdoor place where the product is influenced by temperature or any other factors because this product is not resistant to weather.

◆Use in the corrosive environment

Do not use the product in water or places where the product is exposed to salt water, acid, alkaline fluid splash, iron powder or in their gases or moisture vapors.

◆Cover installation

Attachment of dust, water, oil, chips, iron powder, or spatter to the rod and the sliding parts will result in damaged shafts and packings, thus causing air leak and operation failures. Install a cover to prevent them from attaching.

◆Operating temperature range

Use with a temperature exceeding the maximum operating temperature will result in deterioration acceleration such as hardening of packings, thus causing operation failures. Even when the environmental temperature is within the specified range, heat may transmit through jigs and driven objects. When the product is working at a high speed, its sliding surfaces will locally overheat, thus causing similar problems, freezing due to adiabatic expansion or surface dew condensation.

When the temperature is lower than the minimum operating temperature, drain and moisture will become solidified or frozen, thus resulting in damaged packings and operation failures. Therefore, measures to prevent freezing must be taken.

Maintenance and Check

⚠WARNING

◆Removing equipment, and supplying and exhausting compressed air

Before removing equipment, make sure that driven object fall prevention measures and runaway prevention measures have been taken, cut off supply air, turn off the power of the equipment and exhaust compressed air from the system.

Before re-starting the equipment, make sure that the jumping prevention measures have been taken and do it carefully.

⚠CAUTION

◆Draining air filter

Operating the equipment without maintaining or draining the air dryer and the air filter will result in life shortening or equipment failures. Drain tends to increase in summer in particular, so drain them frequently in summer. Use of a type with an auto drain function is recommended.

Guarantee and Disclaimer

1 Warranty Period

The warranty period for our products is 12 months from the date of shipment.

2 Scope of Guarantee and Disclaimer

- In the event that a malfunction or damage attributable to our company becomes apparent during the warranty period, we will undertake repair or replacement free of charge.
- The warranty for our products applies solely to the individual product. We do not accept any responsibility for damages caused by malfunctions or reductions in functionality of our products, nor for any damages to other equipment that may arise as a result. Furthermore, we will not be responsible for any costs incurred for the repair or replacement of our products.
- We will not be held responsible for any damages caused due to modifications, alterations, or repairs made by the customer.
- We shall not be held responsible for any damages arising from usage, storage, or installation that exceeds the specifications outlined in the catalog and instruction manual.
- We accept no responsibility for any failures or damages caused by fire, earthquakes, lightning, or any other natural disasters.
- We accept no responsibility for any damages caused by the malfunction of the product due to handling errors or negligence.

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New-Era®

New-Era Co., Ltd.

Main Office: 1-7-21, Nakagawa-Higashi, Ikuno-ku, Osaka, 544-0006 Japan

TEL.+81-6-6754-8581　FAX.+81-6-6754-3036

● Home Page Address

http://www.newera.co.jp/en

● E-mail Address

pneumatic@newera.co.jp