PICO TABLE Clean Type

INDEX★

PPTN	Clean Type	249 Page
PPTNF	Clean Type With Floating Mechanism (Buffer Mechanism)	283 Page

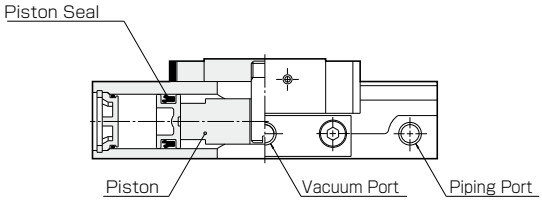
F SERIES CLEAN TYPE

PICO TABLE Clean room type (PPTN) and PICO TABLE Clean room type with floating (PPTNF) are available for use in clean room by holding the particles from the actuator.

■The Way of Holding Particles

PPTN Series

It has a relief port that open into bearings. By to evacuate the corpuscle (particles) generated from the rubbed parts through the relief port, which means exhaust particles to outside clean room, PPTN and PPTNF are available.



■Against Dust

PPTN Series

The material of the table and body is Stainless steel (SUS440C) that resists rust. Other metallic parts for PPTN, PPTNF is stainless steel or nickel plating carbon steel.

■Special Packaging

After assembly and inspection, the products are packaged by double-wrapping with anti-static bag. Before packaging, to execute the blow the products with high cleanliness air in clean bench.

Assembly, Inspection	→	Double-Wrapping	→	Packing, Delivery
General Work Environment		Clean Bench (Class 100)		General Work Environment

MEASUREMENT OF PARTICULATE FROM A PRODUCT

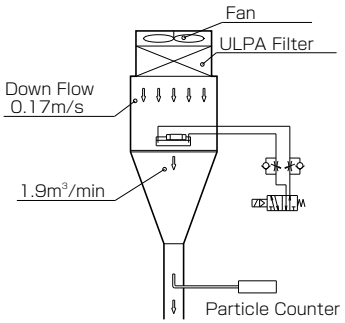
Generally the cleanliness classification levels are defined by Fed. Std. 209D, for instance Class 100 or Class 1000. That standard for clean room means the number of the particle, which the size is over 0.5 μm, in 1cf (0.0283m^3) as the concentration. For instance, Class 100 means that there are less 100 pieces of over 0.5 μm particle in 1 cf.
The graphs below show experimental results with testing condition. These values mean the numbers of particles generated from product at operating, not the density of particles. Make sure that how many PPTN are used or where PPTN is for application. Because these factors would effect the possibility of using PPTN in Clean room. Consider our results as reference to use.

■PPTN

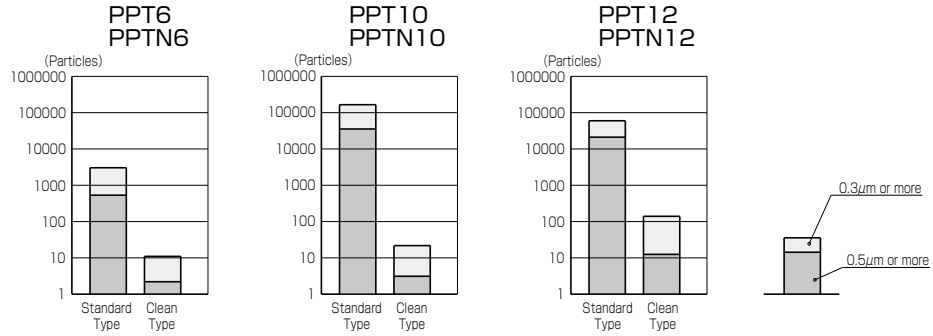
Testing Condition

Condition	Content		
Code	PPT-SD6-10-TP, PPTN-SD6-10-TP PPT-SD10-20-TP, PPTN-SD10-20-TP PPT-SD12-25-TP, PPTN-SD12-25-TP		
Qty.	4 units for each		
Operating Pressure	0.5MPa		
Operating Frequency	60c.p.m.		
Load	ϕ6	ϕ10	ϕ12
	0.3kg	0.8kg	1.2kg
Testing Machine	Vertical type based on JIS B 9926		
	See figure. 1		
Vaccum Flow of Particle Counter	3 l /min		

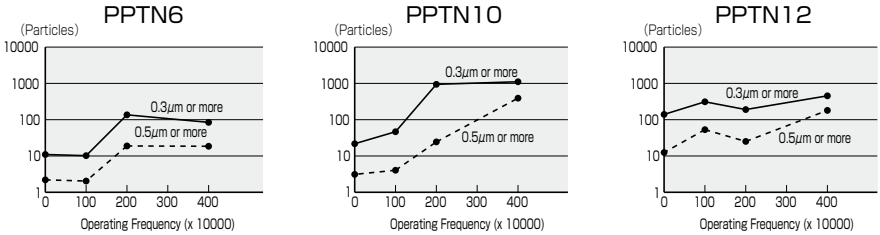
Testing Machine Outline



Average Number of Particles, with 1000 Cycles, for One Unit



Particles-Operating Frequency, for One Unit



CLEAN ROOM CLEANLINESS CLASSES

■Indication

Cleanliness levels are classified based on the particle concentration in the clean room.

■History of the Standard

The cleanliness class standard originated in the Federal Standard 209 issued in 1963.
The Standard has been revised to the current Fed. Std. 209E issued in 1992. In Japan, the Japanese Industrial Standard JIS B 9920 was established in 1989.

■Fed.Std.209D

Up to Fed. Std. 209D, cleanliness classes were indicated by using a British imperial unit ft (feet) as particle concentration in a volume of a cube with sides of one foot, or 1 cf (cubic feet). Generally, indications such as "class 100" and "class 1000" are based on this Standard. For example, "class 100" means that the number of particles of 0.5 μm in a volume of 1 cf is 100 or smaller.

■Fed.Std.209E

One item of revision for Fed. Std. 209E is the change of the British imperial unit-based cleanliness class indication into use of the metric system (SI unit).

■About the Unit

1ft=0.3048m　　1m=3.2803ft
$1ft^3=1cf=0.02832m^3$　　$1m^3=35.31ft^3$

■F Series Clean Type Dust Generation

For dust generation, see PPTN (p. 245) and JKXN (p. 935). The clean room cleanliness level indication shows the number of particles resulting from dust generation in a certain volume, or "concentration." The dust generation data of the clean type indicates the local "dust generation" during operation. Accordingly, whether or not a product can be used at a certain cleanliness level, or the impact of dust generation, depends on operating conditions such as the number of actuators used and the positions of actuators with reference to workpieces. Therefore, this result should be considered as a rough guide.

Cleanliness Level Classification

Fed. Std.		JIS B 9920	Class Upper Limit					
			0.3μm		0.5μm		5μm	
209E	209D		m^3	ft^3(cf)	m^3	ft^3(cf)	m^3	ft^3(cf)
		Class1	1		(0.35)		———	———
		Class2	10		(3.5)		———	———
M1			30.9	0.875	10.0	0.283	———	———
M1.5	Class 1	Class3	106	3.00	35.3	1.00	———	———
M2			309	8.75	100	2.83	———	———
M2.5	Class 10	Class4	1,060	30.0	353	10.0	———	———
M3			3,090	87.5	1,000	28.3	———	———
M3.5	Class 100	Class5	10,600	300	3,530	100	———	———
M4			35,000	875	10,000	283	———	———
M4.5	Class 1,000	Class6	———	———	35,300	1,000	247	7
M5			———	———	100,000	2,830	618	17.5
M5.5	Class 10,000	Class7	———	———	353,000	10,000	2,470	70
M6			———	———	1,000,000	28,300	6,180	175
M6.5	Class 100,000	Class8	———	———	3,530,000	100,000	24,700	700
M7			———	———	10,000,000	283,000	61,800	1,750

Note: Class upper limits for 0.1 μm and 0.2 μm particles are specified but they are omitted in this table.

DESCRIPTION OF TERMS

Terms	Description
Contamination Control	Planning, organization and implementation of requirements for maintaining the required cleanliness level of confined space or the inside or surface of a product or other object.
Clean Room	Space under contamination control. Space in which airborne particles are controlled under a limited cleanliness level, the required cleanliness level is maintained also for objects supplied into the space and environmental conditions such as temperature, humidity and pressure are also controlled.
Biological Clean Room	Space under contamination control against microbial contamination. Space in which the required cleanliness level is maintained for airborne microbes and objects supplied into the space and environmental conditions such as temperature, humidity and pressure are also controlled.
Clean Booth	Portable simplified clean room with curtain-type walls and vertical blowing filter provided.
Clean Work Station	Work bench built so that air controlled to the specified cleanliness level flows directly to the object.
High Efficiency Particulate Air Filter	Air filter with a particle capture rate of 99.97% or higher for particles of 0.3 μm in size.
Ultra Low Penetration Air Filter	Air filter with a particle capture rate of 99.9995% or higher for particles of 0.1 μm in size.
Down Flow	System in which air flows vertically in one direction into the room from the entire area of the ceiling and flows out from the entire area of the opposite floor.
Cross Flow	System in which air flows horizontally in one direction into the room from the entire area of one wall and flows out from the entire area of the opposite wall.
Air Shower Booth	Small chamber for removing particulate matters attached to operators and clothes by forcibly blowing them off.
Optical Particle Counter Method	A method of determining the size and number of particles by running specimens in a thin flow across a strong light beam and converting the light scattered by individual particles into an electric signal.
Cleanliness Level	The level of cleanliness rated based on the numbers of particles by the sizes that exist in a certain volume.
Cleanliness Class	Classification of cleanliness levels.

PICO TABLE Clean Type

PPTN Series



INDEX★

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PICO TABLE Clean Type

PPTN Series

Accommodation to clean room

Miniature Precision Linear Bearing with Integrated Air Cylinder

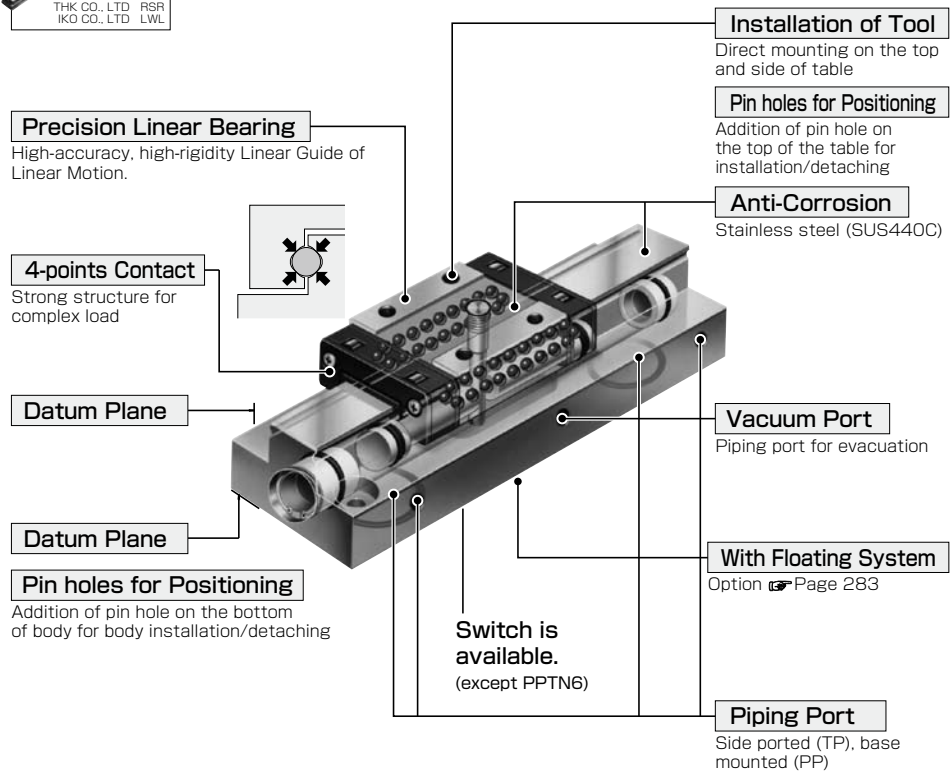
Running Parallelism 0.004㎜ (PPTN10, 12)

Mounting Parallelism 0.02㎜ (PPTN10, 12)

Linear Bearing



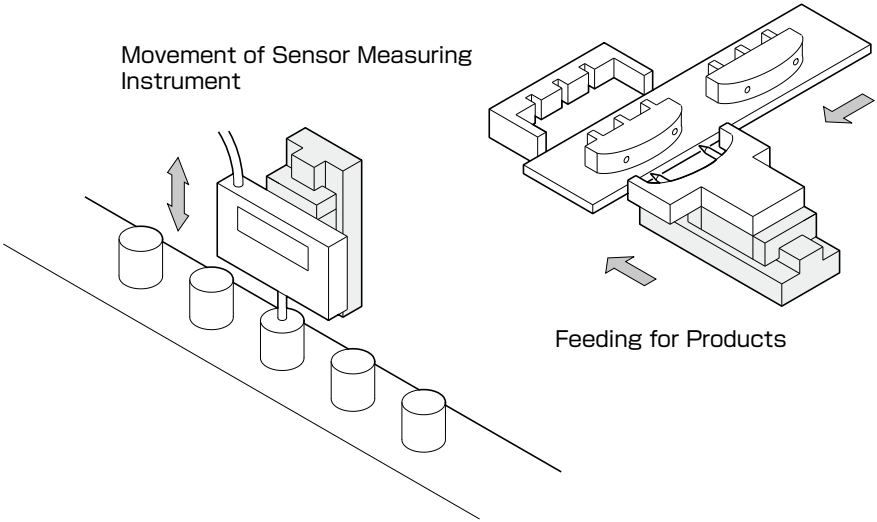
High Accuracy, High Rigidity Linear Guide is built-in.



Summary of the PICO TABLE Clean Type (PPTN) Series

"PICO TABLE" (PPT series) could achieve extraordinary small, high accuracy and rigidity which linear bearing guide has in kind. That is the reason why PICO TABLE is made by combination with air cylinder and precision linear bearing. The PPTN series has been developed for clean in PPT series.
While operating, the tiny dust or particles can be exhausted through vacuum port on the PPTN by evacuation. Because the vacuum port is designed between the slide part of piston and the linear bearing. And by that, particles generated at that part in PPTN can be exhausted surely.

■Application Examples : PICO TABLE Clean Type

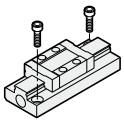


■MAIN BODY INSTALLATION

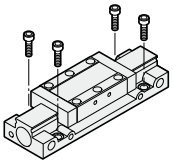
(Bolt as shown in the figure are not supplied with products)

Top Mounting (Thru Hole used)

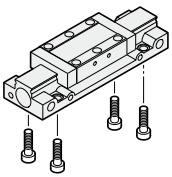
PPTN6



PPTN10, 12



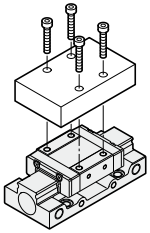
Bottom Mounting (Body Tap)



■MOUNTING

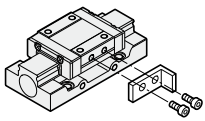
(Bolt as shown in the figure are not supplied with products)

Top Mounting



Side Mounting

PPTN10, 12 only



Floating Mechanism Type
PPTNF Series
283 Page

PICO TABLE Standard Type
PPT Series
35 Page

Model Code Example

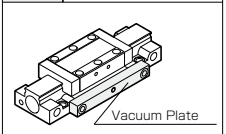
PPTNS-SD10-10-TP-RB12LA

Series Name ●

Clean Type ●

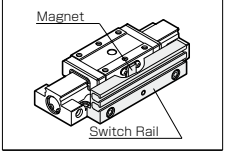
Magnet and Switch Rail ●

No Code	None



The figure shows TP

S	Magnet and Switch Rail



A magnet and switch rail is required when mountig switches.
For PPTN6,10 and 12, S is available.

● Bore Size

6	ϕ6
10	ϕ10
12	ϕ12

● Type

SD	Basic

Stroke ●

Model	Standard Stroke				
	5	10	15	20	25
PPTN6	●	●	—	—	—
PPTN10	—	●	—	●	—
PPTN12	—	—	●	—	●

Unit:㎜

● Cable Length

No Code	1m
LA	3m

● Number of Switches

1	1
2	2

● Switch

No Code	None		
RB1	Straight	DC12~24V 2 Wires Reed Switch	With Indicator Light
RC1	Angle		
RB2	Straight	DC12~24V 2 Wires Reed Switch	Without Indicator Light
RC2	Angle		
RB4	Straight	DC12~24V 2 Wires Solid State Switch	With Indicator Light
RC4	Angle		
RB5	Straight	DC5~24V 3 Wires Solid State Switch	With Indicator Light
RC5	Angle		

For details ☞Page 1066, 1067

Direction Of Cable Outlet

RB···· Straight Outlet Cable

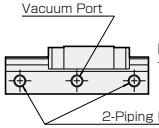


RC···· Angle Outlet Cable

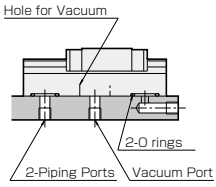


Piping ●

TP	Side Ported



PP	Base Mounted



Attachment : Two O-ring

By arranging the base, the air fittings can be mounted anywhere on it.

The surface roughness of the base for O-ring should be 1.6umRa (6.3umRy) at the maximum.

Vaccum port should be installed on the position which leads to hole for vaccum of bottom of the body.

Not available to shift the port position each other.

SPECIFICATIONS

Bore Size	φ6mm	φ10mm	φ12mm
Maximum Load Mass	0.3kg	0.8kg	1.2kg
Piping for Tp	M3×0.5	M5×0.8	
Guide Mechanism	Precision Linear Ball Bearing		
Type of Operation	Double Acting		
Fluid	Air		
Maximum Operating Pressure	0.7MPa		
Minimum Operating Pressure	0.15MPa		
Proof Pressure	1.05MPa		
Operating Temperature	5～60℃		
Minimum Operating Speed	50mm/s	30mm/s	
Maximum Operating Speed	60c.p.m.		
Lubrication	Prohibition		
Cushloning	None		

THE TYPE OF LINEAR BEARING

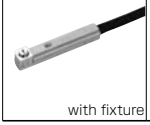
Model	Stroke	Type
PPTN6	5	THK RSR9C1
	10	THK RSR9C1
PPTN10	10	IKO LWL12
	20	IKO LWL12 long
PPTN12	15	IKO LWL15
	25	IKO LWL15 long

Pre-load:Zero or slightly pre-loaded

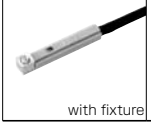
OPTIONAL PARTS CODES

Name	Switch Fixture
PARTS CODE Note PARTS CODE Note	BE(PPT) Screw, nut
Content	

Reed Switch(2 Wires, with Indicator Light)

Straight Outlet Cable	Angle Outlet Cable
RB1(PPT) Cable Length:1m	RC1(PPT) Cable Length:1m
RB1LA(PPT) Cable Length:3m	RC1LA(PPT) Cable Length:3m
 with fixture	 with fixture

Reed Switch(2 Wires, without Indicator Light)

Straight Outlet Cable	Angle Outlet Cable
RB2(PPT) Cable Length:1m	RC2(PPT) Cable Length:1m
RB2LA(PPT) Cable Length:3m	RC2LA(PPT) Cable Length:3m
 with fixture	 with fixture

●RB,RC Switch

Conventional RG1,RG2 switches can be replaced to RB,RC switch

Comparison with Old Type

Old type	Equivalent Current Type
RG1	RB1, RC1
	RB2, RC2
RG2	RB4, RC4
	RB5, RC5

Solid State Switch(2 Wires, with Indicator Light)

Straight Outlet Cable	Angle Outlet Cable
RB4(PPT) Cable Length:1m	RC4(PPT) Cable Length:1m
RB4LA(PPT) Cable Length:3m	RC4LA(PPT) Cable Length:3m
 with fixture	 with fixture

Solid State Switch(3 Wires, with Indicator Light)

Straight Outlet Cable	Angle Outlet Cable
RB5(PPT) Cable Length:1m	RC5(PPT) Cable Length:1m
RB5LA(PPT) Cable Length:3m	RC5LA(PPT) Cable Length:3m
 with fixture	 with fixture

Repair Parts Kit

HC(PPT□)
Fill in □ as bore size

For details
☞Page 256

Magnet

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


with fixing bolts

Switch Rail

RJ(PPTN(Stroke)—(Piping))
Fill in □ as bore size.
Ex) In case PPTN10 20stroke TP Piping Switch Rail :
RJ(PPTN10-20-TP)
Note: For Only PPTN10,12


with fixing bolts

O-ring for Base Mounted

HS(PPT)
For all size

CSφ1, IDφ10


10 O-rings

MASS

●Mass of PPTN

Unit:g

Model	Basic Mass	Additional Mass for Switch and Switch Rail (PPTNS)
PPTN–SD6–5	80	—
PPTN–SD6–10	100	—
PPTN–SD10–10–TP	140	10
PPTN–SD10–10–PP	135	15
PPTN–SD10–20–TP	220	15
PPTN–SD10–20–PP	210	25
PPTN–SD12–15–TP	225	10
PPTN–SD12–15–PP	215	20
PPTN–SD12–25–TP	335	15
PPTN–SD12–25–PP	320	30

●MASS OF SWITCH

Unit:g

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

METHOD TO CALCULATE THE MASS

Ex. PPTNS–SD12–15–TR–RC42

Basic Mass·····225g
Magnet, Switch Rail·····10g
Switch····· 35×2=70g

225+10+35×2=305g

THEORETICAL THRUST

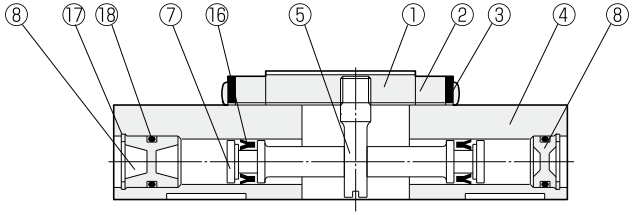
Unit:N

Bore size (mm)	Operating Pressure MPa					
	0.2	0.3	0.4	0.5	0.6	0.7
φ6	5.7	8.5	11	14	17	20
φ10	16	24	31	39	47	55
φ12	23	34	45	57	68	79

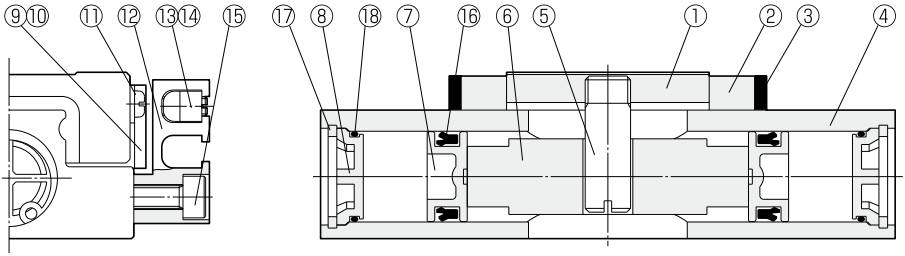
1MPa=10.2kgf/^{2}
1N=0.102kgf

STRUCTURE AND PRINCIPAL COMPONENTS

PPTN6



PPTN10, 12



COMPONENTS

No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Guide Table	Stainless Steel	Heat Treatment	9	Shield	Carbon Steel	Nickel Plating
2	Side Plate	Synthetic Resin		10	Magnet	Magnetic Material	
3	Dust Seal	NBR		11	Screw	Stainless Steel	
4	Body	Stainless Steel	Heat Treatment	12	Switch Rail	Aluminum Alloy	Anodic Oxide Coating
5	Center Pin	Stainless Steel		13	Switch	Synthetic Resin	
6	Center Piston	Synthetic Resin	Only PPTN10,12	14	Switch Fixture	Carbon Steel	Nickel Plating
7	Piston	Synthetic Resin		15	Fixing Bolt	Carbon Steel	Nickel Plating
8	End Cover	Synthetic Resin					

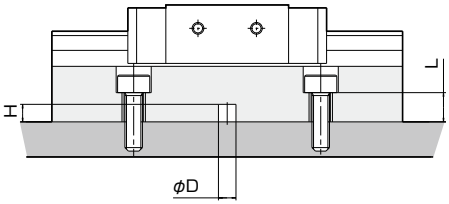
REPAIR PARTS

No.	Name	Material	Qty	Remarks	No.	Name	Material	Qty	Remarks
16	Piston Seal	NBR	2		18	O-ring	NBR	2	
17	Circlip	Stainless Steel(Note)	2						

(Note) PPTN6 : Carbon steel (Nickel plating)

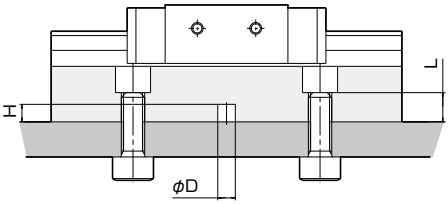
BODY INSTALLATION

Top Mounting(Thru Hole used)



Model	Bolt Size	Thru Hole Length L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕDxH(mm)
PPTN 6	M3	4.5	1.1	$\phi 3\ ^{+0.05}_{0}$ depth3
PPTN10	M3	5.0	1.1	$\phi 3\ ^{+0.05}_{0}$ depth3
PPTN12	M4	4.5	2.5	$\phi 3\ ^{+0.05}_{0}$ depth3

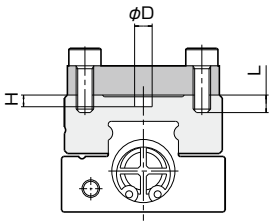
Bottom Mounting(Body Tap)



Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕDxH(mm)
PPTN 6	M4×0.7	4.5	2.5	$\phi 3\ ^{+0.05}_{0}$ depth3
PPTN10	M4×0.7	5.0	2.5	$\phi 3\ ^{+0.05}_{0}$ depth3
PPTN12	M5×0.8	4.5	5.1	$\phi 3\ ^{+0.05}_{0}$ depth3

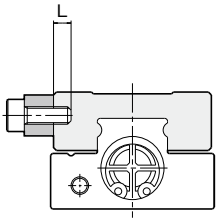
MOUNTING ON TABLE

Top Mounting



Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m	Pin Holes for Positioning ϕDxH(mm)
PPTN 6	M3×0.5	3	1.1	$\phi 3\ ^{+0.05}_{0}$ depth3
PPTN10	M3×0.5	3	1.1	$\phi 3\ ^{+0.05}_{0}$ depth2
PPTN12	M3×0.5	4	1.1	$\phi 3\ ^{+0.05}_{0}$ depth2.5

Side Mounting

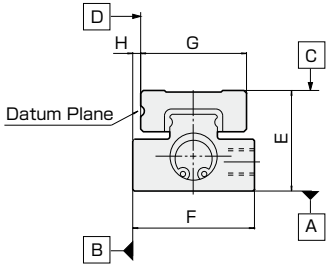


Model	Bolt Size	Screw Depth L(mm)	Fastening Torque N·m
PPTN 6	———	———	———
PPTN10	M3×0.5	3	1.1
PPTN12	M3×0.5	4	1.1

ACCURACY

■Linear Bearing Accuracy

SD

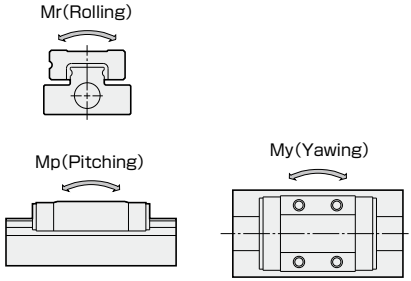


Unit:mm

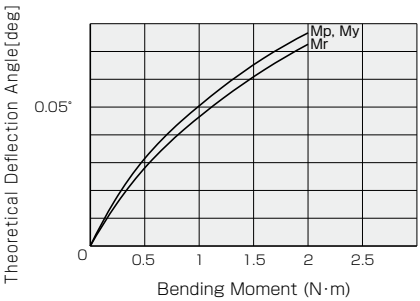
Model		PPTN6	PPTN10, 12
Parallelism	Plane C with respect to plane A	0.03	0.02
	Plane D with respect to plane B	0.03	0.02
Running Parallelism	Plane C with respect to plane A	0.005	0.004
	Plane D with respect to plane B	0.005	0.004
Tolerance of Dimension E		±0.05	±0.02
Tolerance of Dimension F		0～−0.2	±0.2
Tolerance of Dimension G		0～−0.05	±0.2
Tolerance of Dimension H		±0.1	±0.025

THEORETICAL DEFLECTION OF GUIDE TABLE BY MOMENT

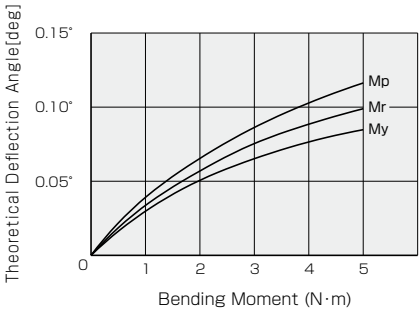
Linear bearings used for PPTN are pre loaded, however, the elastic deformation of bearing balls and races may occur due to the moment by external force. Graphs below show the theoretical deflection angle of the guide table in relation to each moment.



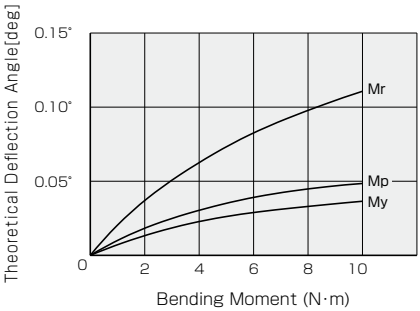
PPTN6



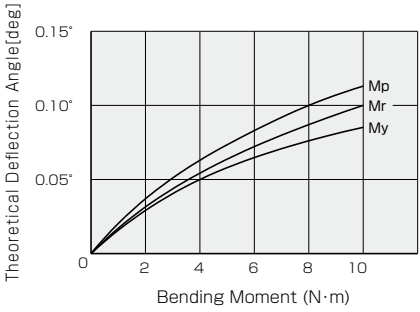
PPTN10−10



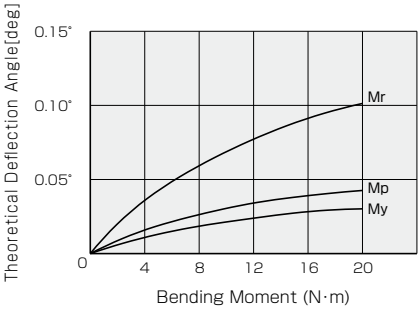
PPTN10−20



PPTN12−15



PPTN12−25

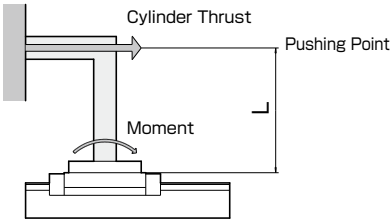


⚠ Caution

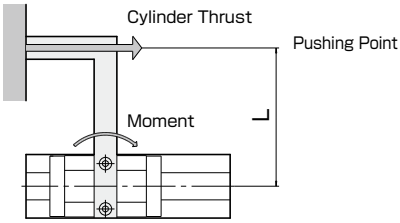
Moment by Thrust of Cylinder at Offset Pushing

As the following figure, if cylinder will push work or so at the offset point in the middle of stroke, a large moment will be generated by the thrust of cylinder itself.
Static moment rating ☞Page 263

Pitching Moment



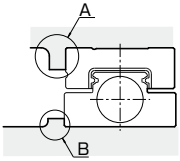
Yawing Moment

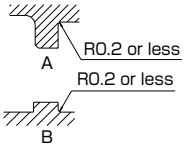


Mounting Surface Accuracy

①At the top, side of table and the bottom of body, the surfaces of PICO TABLE are ground up accurately. Stable and smooth movement highly accuracy can be obtained by proper installation to mounting surface machined high accurately. An irregular mounting surface or incorrect mounting may result in inaccurate movement, instability or poor service life.
Datum plane (body and guide table) ☞Page 258

②It is recommended to make relief at the corner of mating reference mounting surfaces. Besides, corner radius shown in the following figure can also be used. If the corner profile is curved smoothly, compared to the chamfer profile of the body and guide table, it may not closely contact its reference surface.





③Check the reference mounting corner to an exact right angle between the mounting surface and the surface against which body or table is pressed.
If the angle is not right-engled, they cannot contact the surface properly.





④When designing a reference surface, carefully examine the height and thickness of the section. If a reference section is too thin, precision may deteriorate, as a thin ridge lacks rigidity against lateral load due to the movement of the body or guide table and the force exerted by the lateral mounting bolts.

Rigidity of Mounting Base (Fixed Part)

If the method of fixing the body and the rigidity of the mounting base are not correct, high rigidity and the high accuracy PICO TABLE has in kind could not be effectire.
Consider it for design about also the rigidity of devices itself such as an attachment base.

Lubrication

Fluorine grease is applied on ball rolling surfaces before dispatch the unit. According to operation, time and condition for use, grease would be deteriorated and this cause the bearing to shorten its life because of wear on rolling surfaces.
Although the grease feeding interval depends on the service conditions and environment, as a rule, feeding should be performed every 100km of travel under normal usage or one month. Feed on raceway of the body as for Fluorine grease after wiping off old grease completely.
The chemical change and poor performance by feeding the different grease would cause defective operation and the breakdown.

Anticorrosive

The material of body and guide table is martensite stainless steal (SUS440C). That parts should not be treated with anticorrosive oil for use in clean room. By that, the surface of the each parts may cause a bit of rust according to the condition which the actuator is operated, for instance, use by hand or in environment or the period for use. However, the linear guide and cylinder inside actuator are applied with fluorine grease for smooth operation.

Feeling of Linear Guide Rolling

When the table is moved by hand without air pressure, discontinuous feeling of rolling balls on strange feeling of rolling resistance do not effect its performance.

Magnetization of Table and Body

Martensite stainless steel, as material of table and body, must be magnetized easily by contacting magnet and magnetic thing. Once that steel is magnetized, it keeps this state.
Note that there is a possibility that the switch might not work correctly by this magnetization.

Pin Hole of Table and Body for Positioning

Excessive load or transformation of raceway due to press-fitting the pin into the pin hole would cause the breakdown. Moreover, to press-fit would cause the crack and damage because of hardness of material by heat treated at the pin hole part.
Confirm the clearance between pin and pin hole.

ALLOWABLE MOUNTED LOAD MASS, ALLOWABLE LOAD FORCE AND ALLOWABLE MOMENT

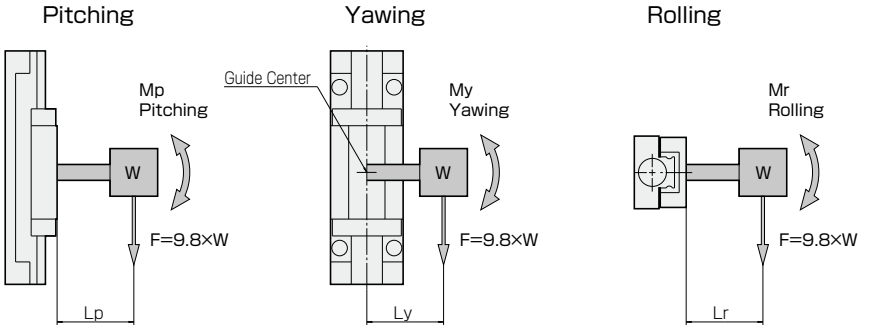
⚠ Caution

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

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

■Direction of Moment and Guide Center Line

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



W·····Mounted load mass(kg)
F·····Gravity applied on load(N)
Lp,Ly,Lr·····Distance between guide center line and center of gravity of mounted load(m)

■allowable Mounted Load Mass, Allowable Mounted Load Moment

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

①Allowable Load Mass

Unit: kg

Model	PPTN6	PPTN10	PPTN12
Allowable Load Mass	0.3	0.8	1.2

Allowable load of PPTNF is same as PPTN.

②Allowable Mounted Load Moment

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

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

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

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

Allowable Mounted Load Moment

Unit: N·m

Model	Stroke (mm)	Allowable Mounted Load Moment		
		Mp	My	Mr
PPTN6	5	0.42	0.42	0.87
	10			
PPTN10	10	1.2	1.4	2.3
	20	2.8	3.1	3.3
PPTN12	15	2.4	2.9	4.7
	25	6.5	7.7	7.3

Allowable mounted load mass of PPTNF is same as PPTN

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

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

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

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

If a guide table receives an excessive load or a large impact, permanent deformation is locally generated between the ball and the ball rolling surface. This deformation will prevent the actuator from smooth operation when it develops more than the allowable limit. The basic static load rating C_0, the static moment rating Mp_0, My_0 and Mr_0 mean such a static load and static moment of constant direction and value that the sum of the permanent deformation values at the ball rolling surface is 0.0001 times of the ball diameter on the contact surface receiving the maximum stress.

$C_0 \geqq fs \cdot P$ — C_0: basic static load rating N; P: static load N; fs: static safety factor

$Mp_0 \geqq fs \cdot Mp_1$, $My_0 \geqq fs \cdot My_1$, $Mr_0 \geqq fs \cdot Mr_1$ — Mp_0, My_0, Mr_0: Static moment rating N·m; Mp_1, My_1, Mr_1: Static momnet N·m; fs: Static safety factor

STATIC SAFETY FACTOR fs

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

BASIC STATIC LOAD RATING, STATIC MOMENT RATING

Model	Stroke (mm)	Basic Static Load Rating N	Static Moment Rating N·m		
			Mp_0	My_0	Mr_0
PPTN6	5	2260	5.10	5.10	10.4
	10				
PPTN10	10	3630	12.7	14.7	24.5
	20	6370	35.3	42.2	42.2
PPTN12	15	5880	25.5	30.4	49.0
	25	11080	83.3	99.0	92.9

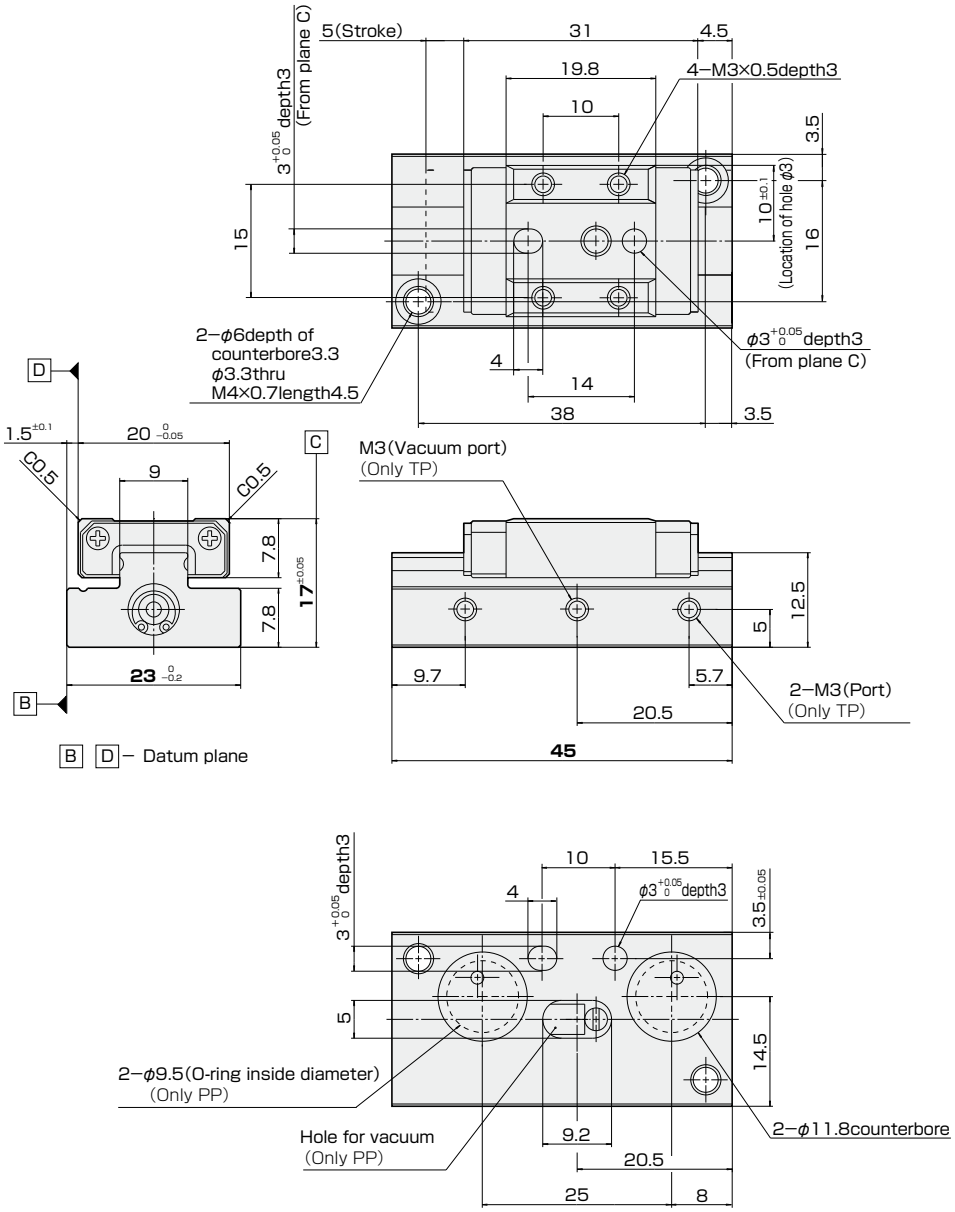
Basic static load rating and static moment rating of PPTNF are same as PPTN.

1N·m=0.102kgf·m
1N=0.102kgf

DIMENSIONS(mm) PPTN6−5 BASIC

PPTN−SD6−5− TP / PP

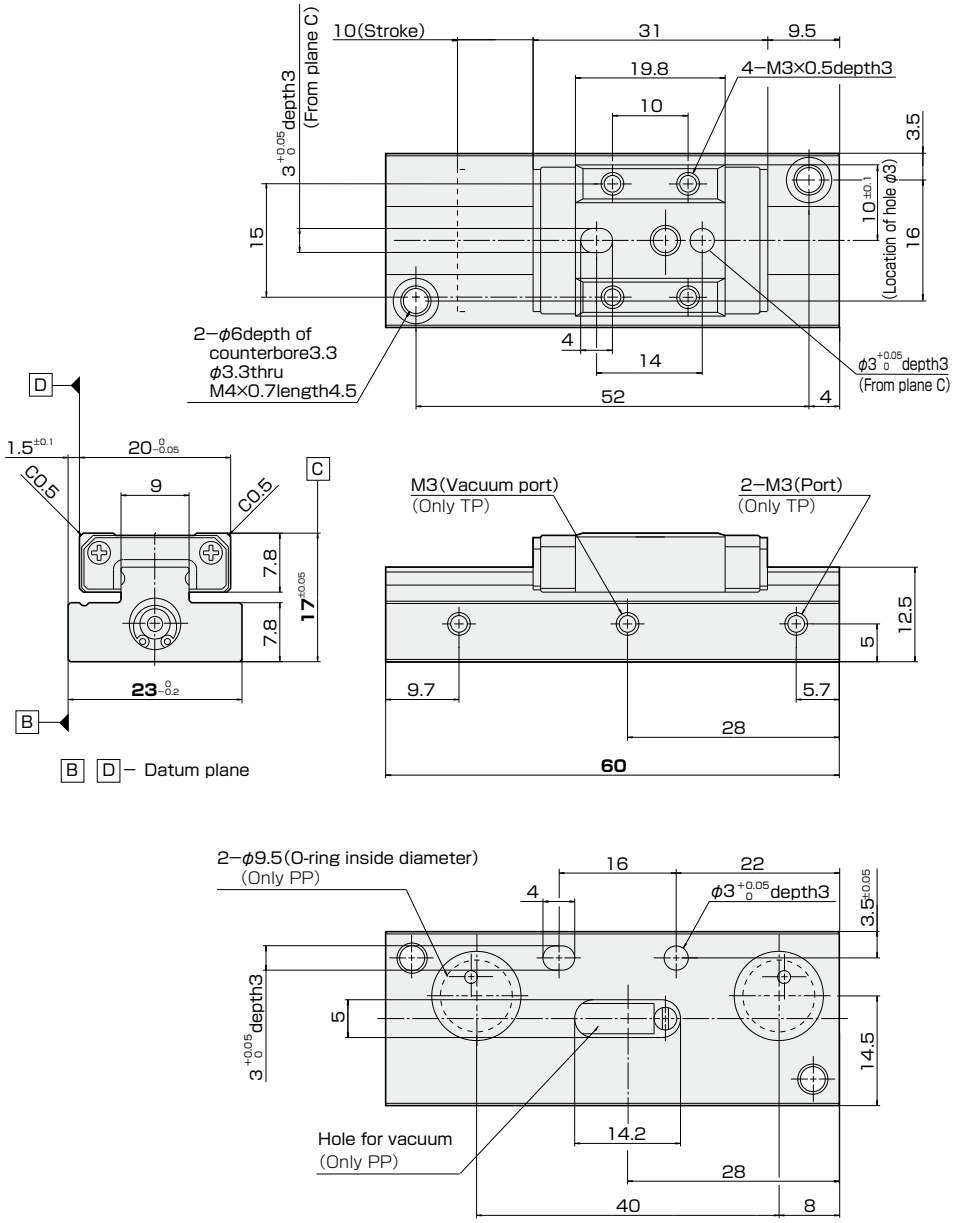
Clean Type
Stroke
Bore Size
Piping
TP·····Side Ported
PP·····Base Mounted



DIMENSIONS(mm) PPTN6−10 BASIC

PPTN−SD6−10− TP / PP

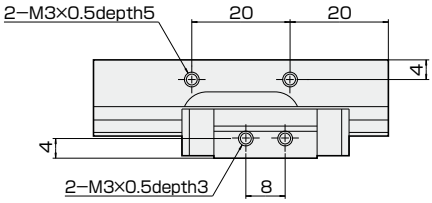
- Clean Type
- Bore Size
- Stroke
- Piping
  - TP·····Side Ported
  - PP·····Base Mounted

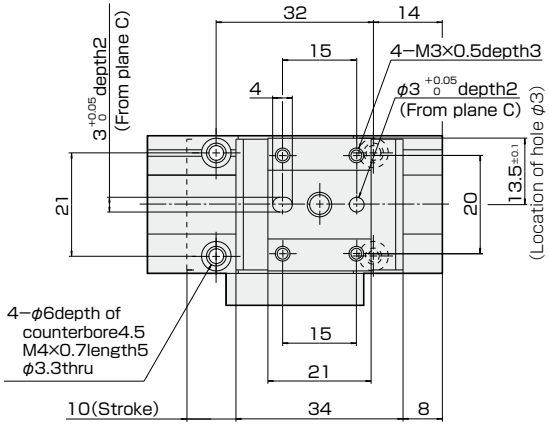


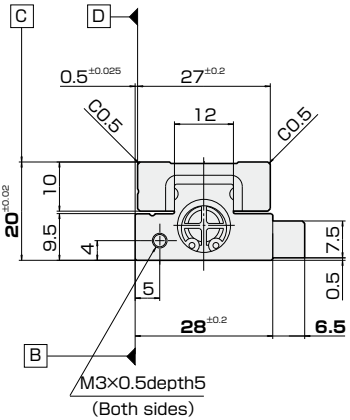
DIMENSIONS(mm) PPTN10–10–TP BASIC

PPTN–SD10–10–TP

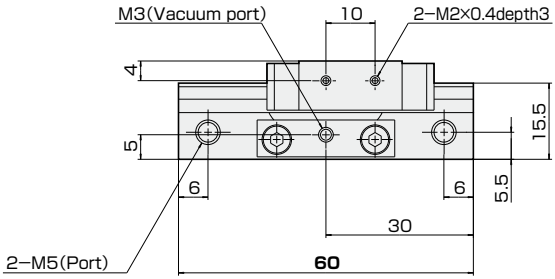
Clean Type
Bore Size
Stroke
Piping
Base Mounted

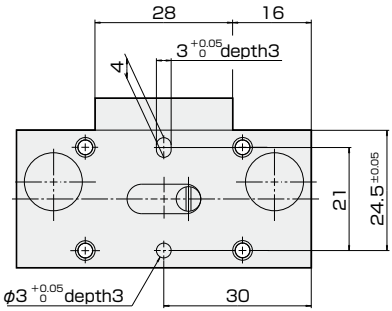






B D – Datum plane

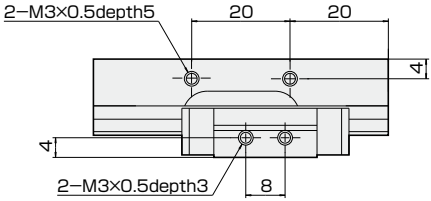


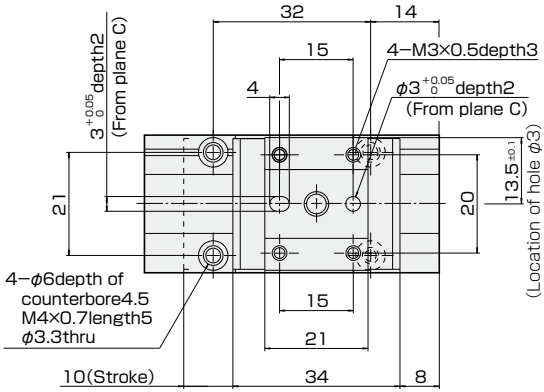


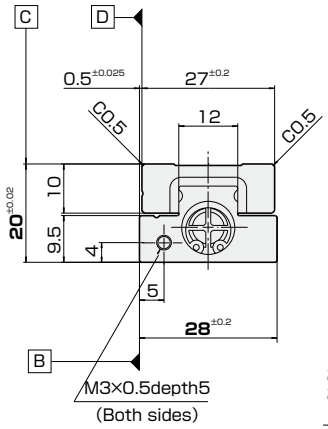
DIMENSIONS(mm) PPTN−10−10−PP BASIC

PPTN−SD10−10−PP

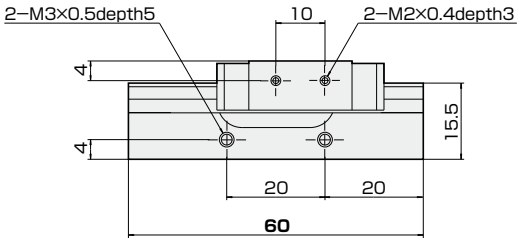
Clean Type
Bore Size
Stroke
Piping
Base Mounted

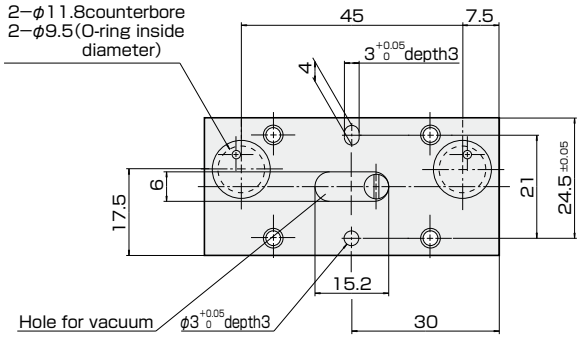






B D − Datum plane

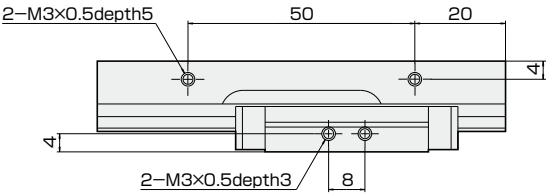


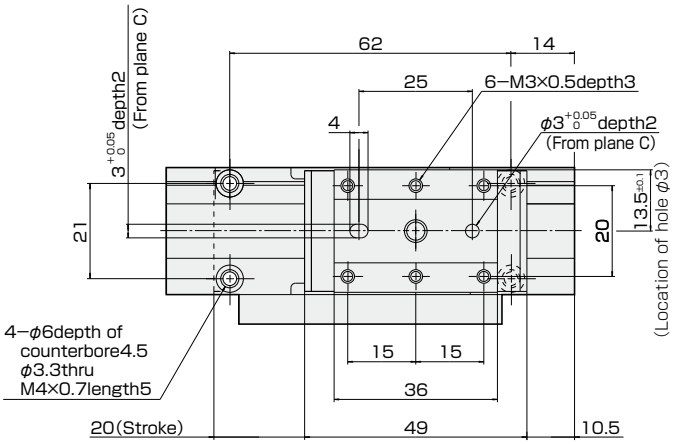


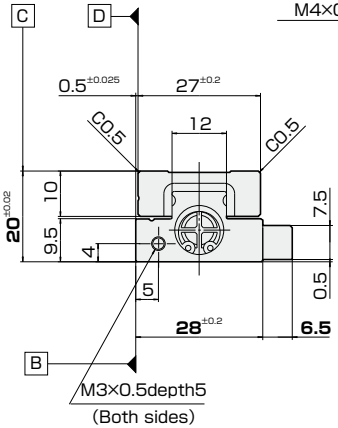
DIMENSIONS(mm) PPTN10–20–TP BASIC

PPTN–SD10–20–TP

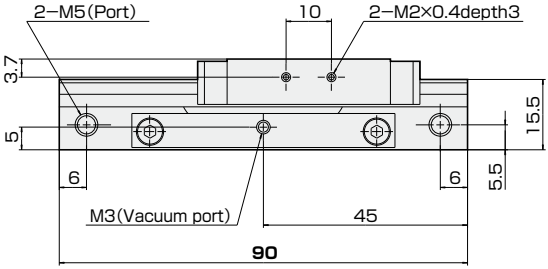
Clean Type
Bore Size
Stroke
Piping
Base Mounted

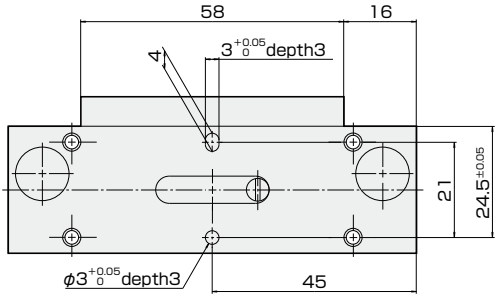






B D – Datum plane

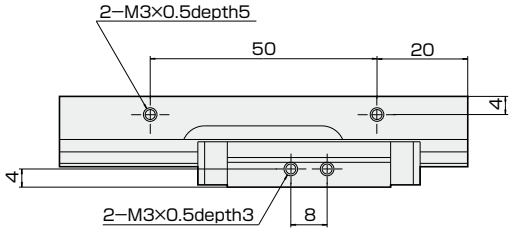


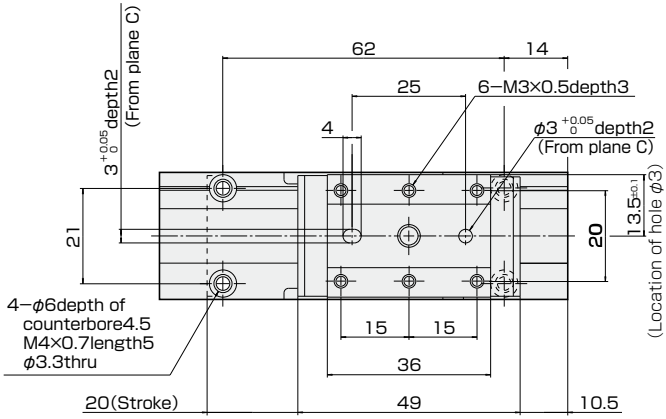


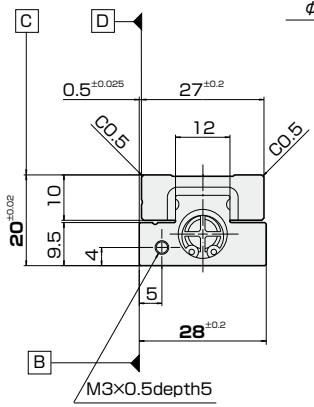
DIMENSIONS(mm) PPTN10−20−PP BASIC

PPTN−SD10−20−PP

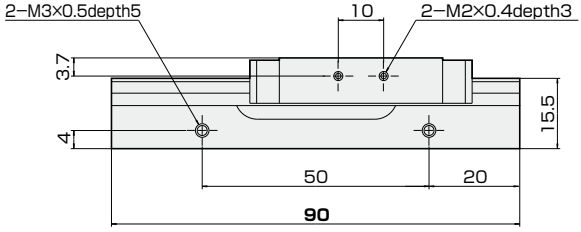
Clean Type
Bore Size
Stroke
Piping
Base Mounted

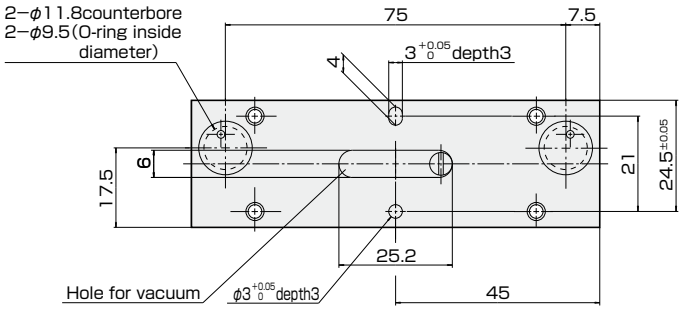






B D− Datum plane

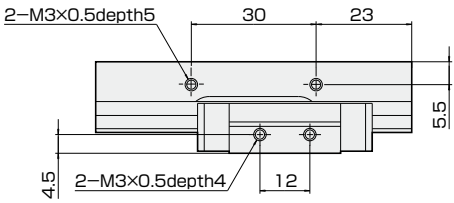


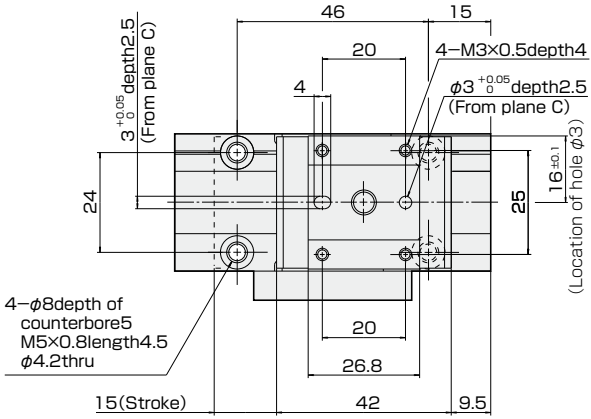


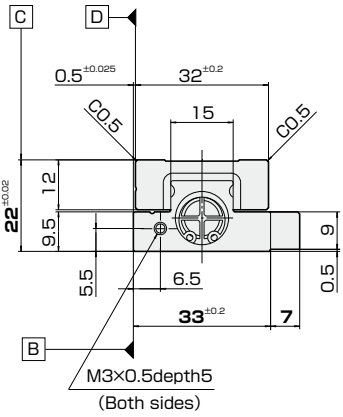
DIMENSIONS(mm) PPTN12–15–TP BASIC

PPTN–SD12–15–TP

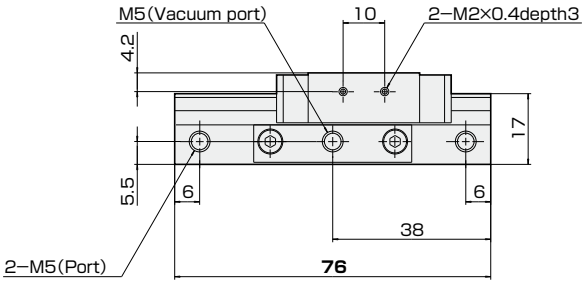
Clean Type
Bore Size
Stroke
Piping
Base Mounted

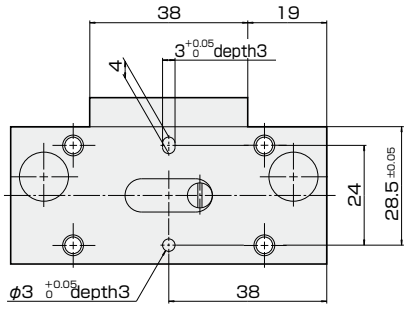






B D – Datum plane

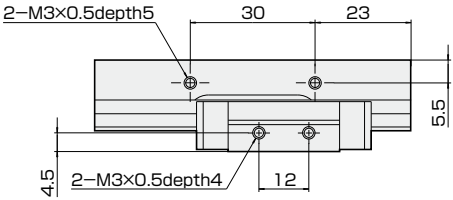


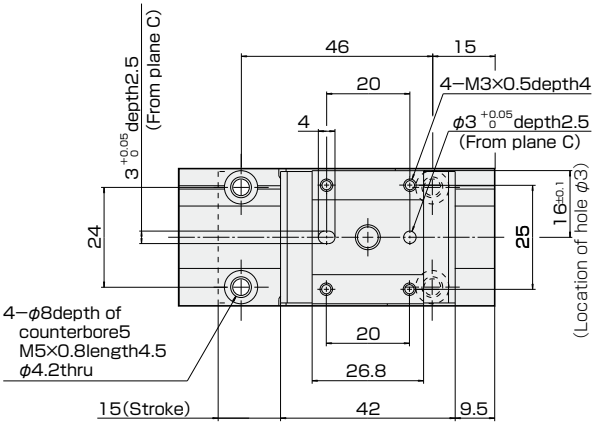


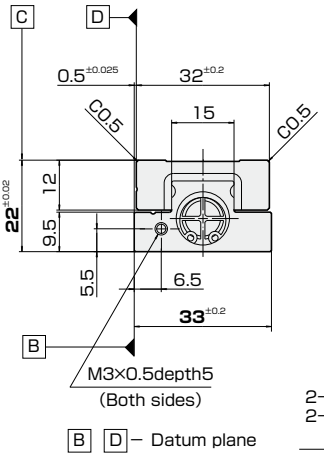
DIMENSIONS(mm) PPTN12−15−PP BASIC

PPTN−SD12−15−PP

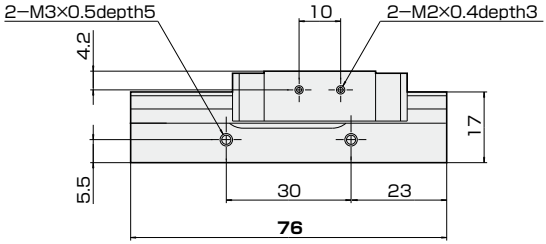
Clean Type
Stroke
Bore Size
Piping
Base Mounted

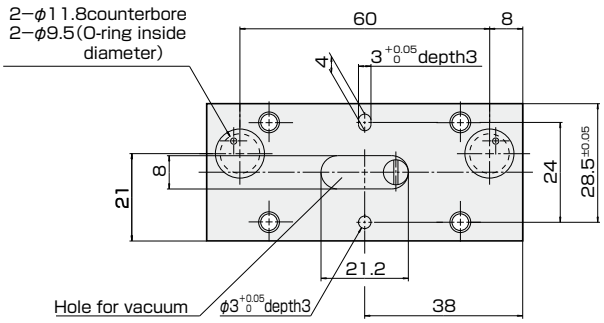






B D − Datum plane

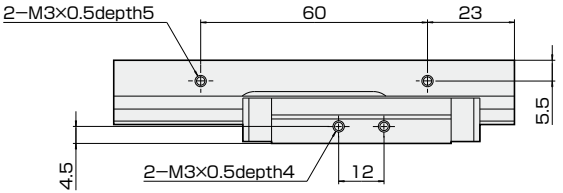


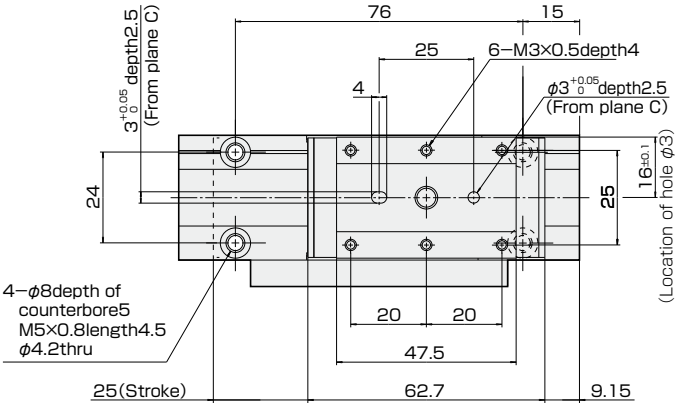


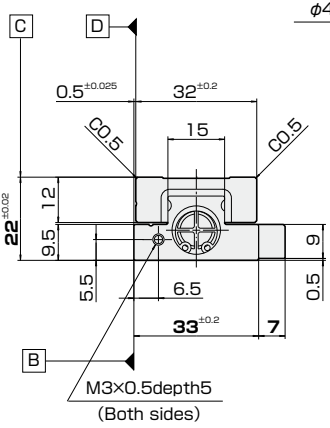
DIMENSIONS(mm) PPTN12-25-TP BASIC

PPTN-SD12-25-TP

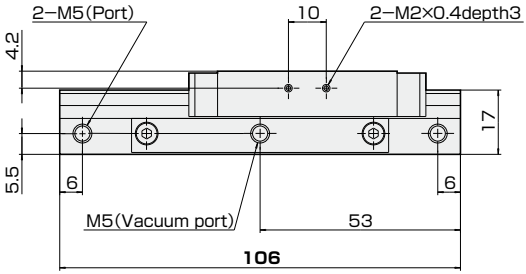
Clean Type
Bore Size
Stroke
Piping
Base Mounted

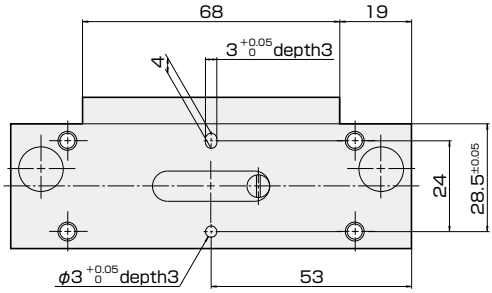






B D – Datum plane

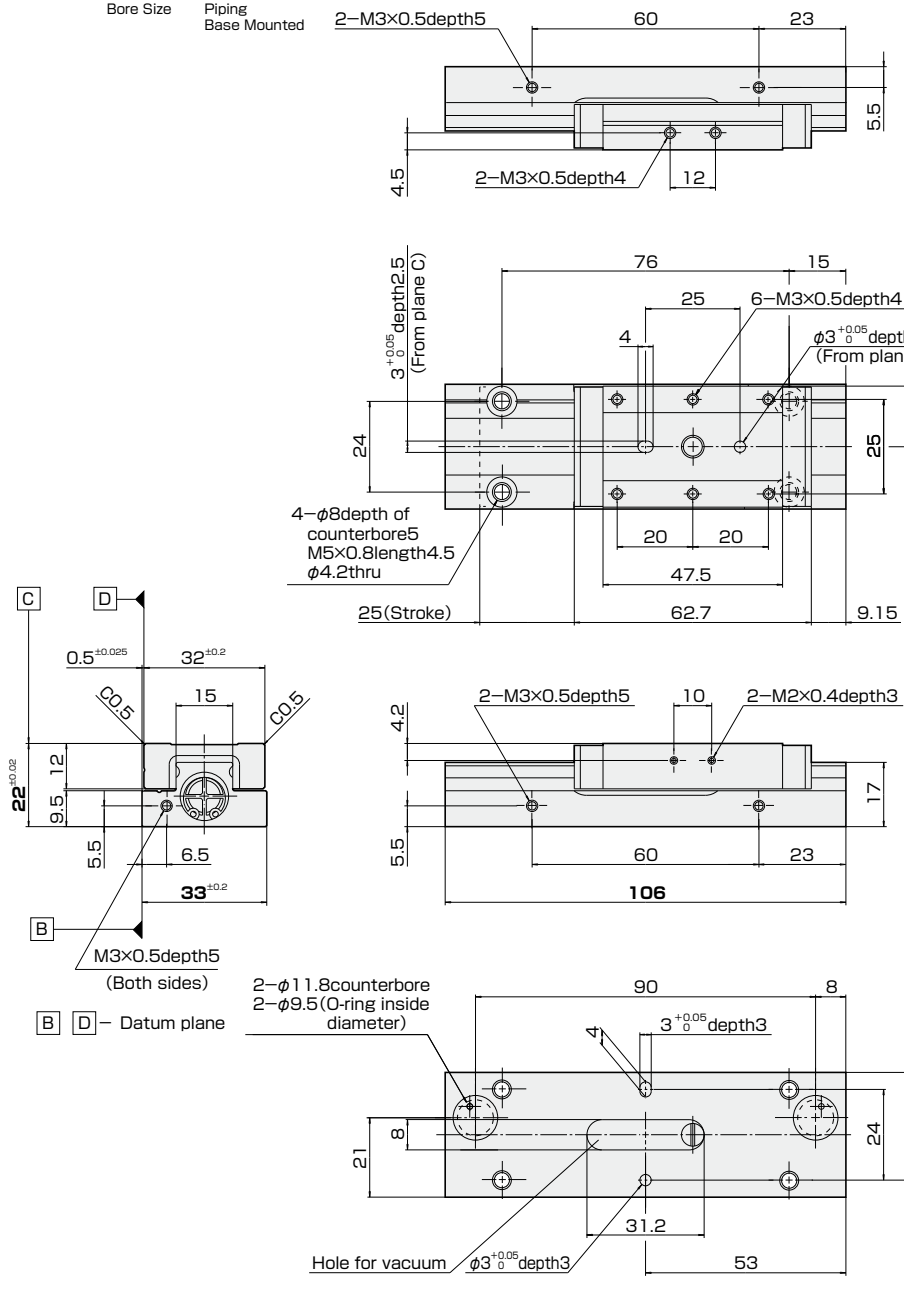




DIMENSIONS(mm) PPTN12−25−PP BASIC

PPTN−SD12−25−PP

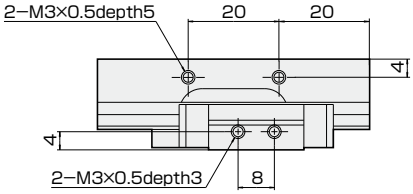
Clean Type
Bore Size
Stroke
Piping
Base Mounted

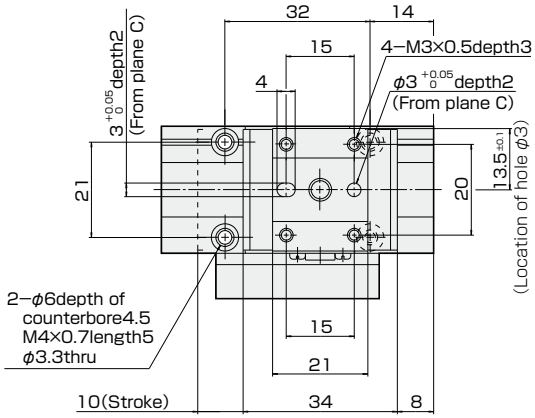


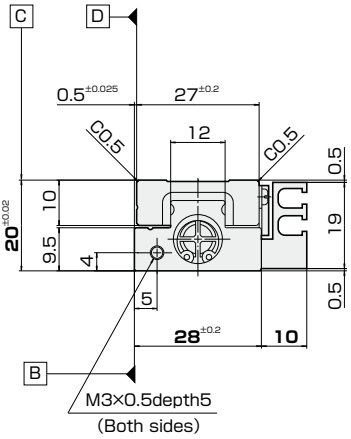
DIMENSIONS(mm) PPTNS10–10 With Magnet, Switch Rail

PPTNS–SD10–10– TP / PP

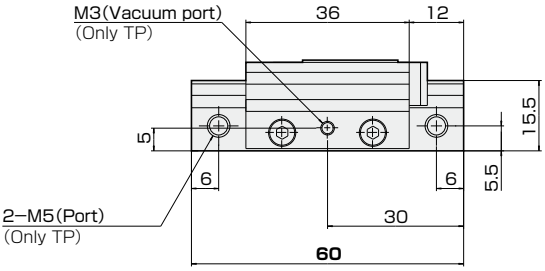
- Clean Type
- With Magnet, Switch Rail
- Bore Size
- Stroke
- Piping
  - TP·····Side Ported
  - PP·····Base Mounted

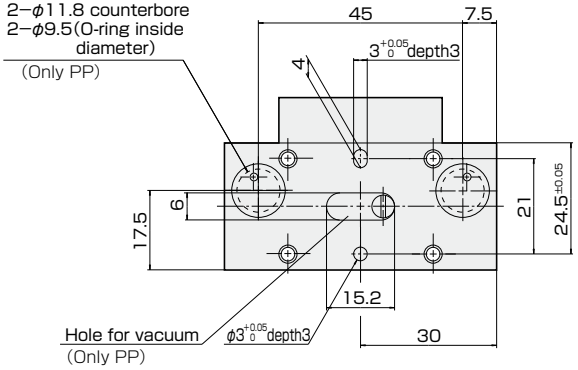






B D– Datum plane

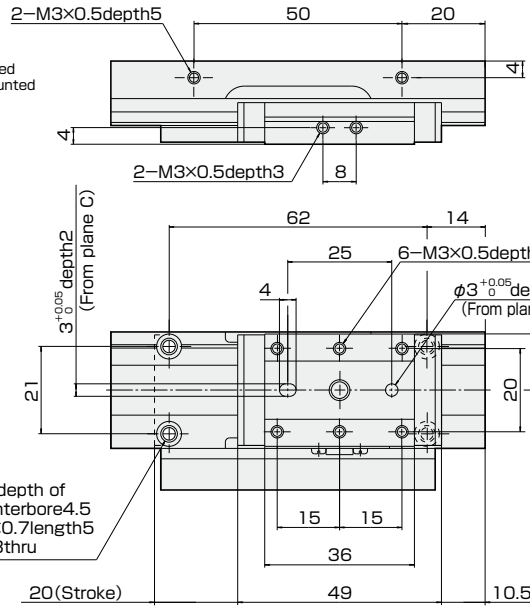


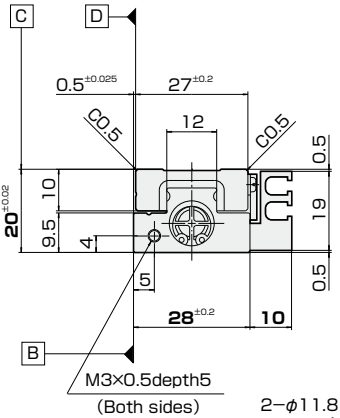


DIMENSIONS(mm) PPTNS10–20 With Magnet, Switch Rail

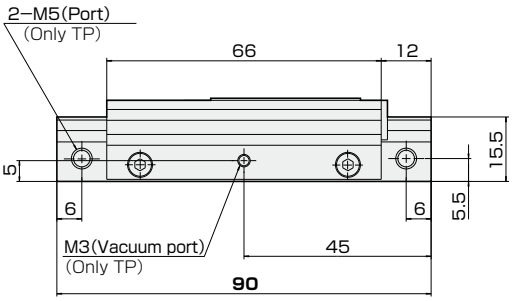
PPTNS–SD10–20– TP / PP

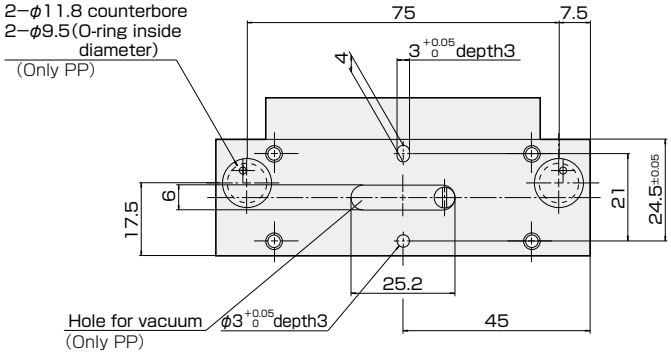
- Clean Type
- With Magnet, Switch Rail
- Stroke
- Bore Size
- Piping: TP·····Side Ported; PP·····Base Mounted





B D– Datum plane

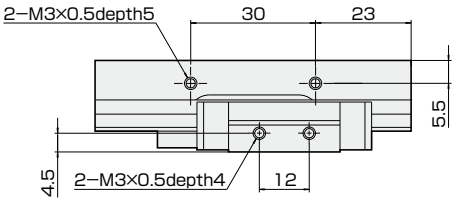


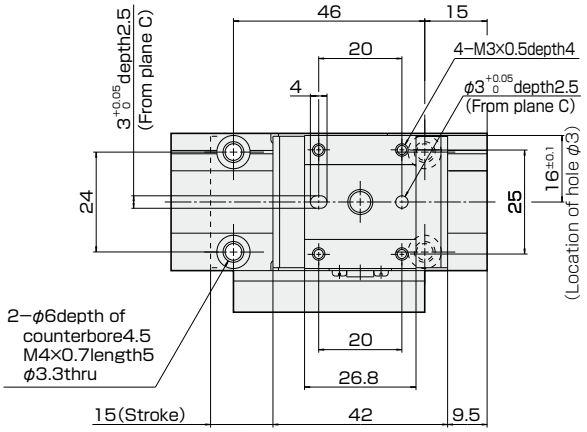


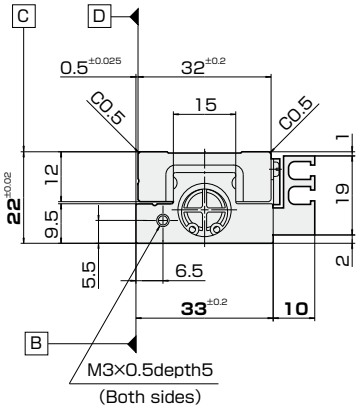
DIMENSIONS(mm) PPTNS12–15 With Magnet, Switch Rail

PPTNS–SD12–15– TP / PP

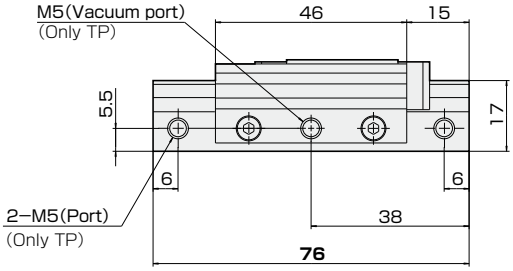
- Clean Type
- With Magnet, Switch Rail
- Bore Size
- Stroke
- Piping
  - TP·····Side Ported
  - PP·····Base Mounted

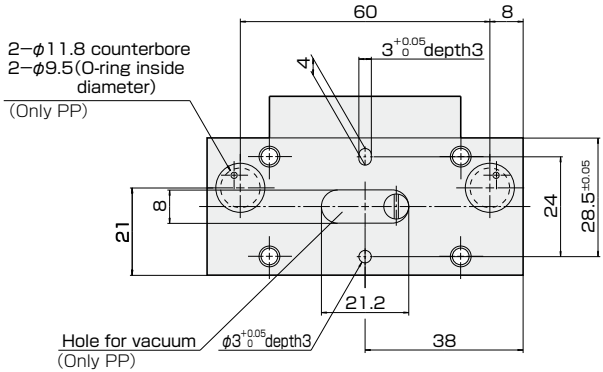






B D – Datum plane

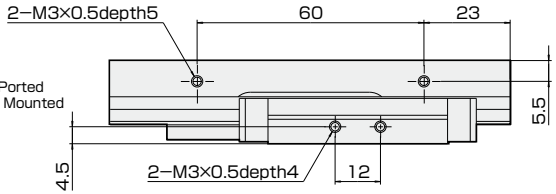


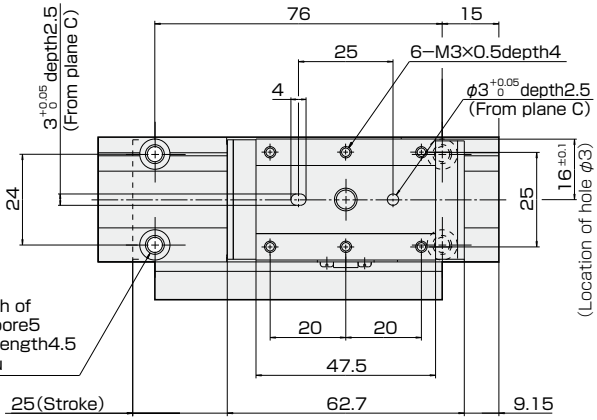


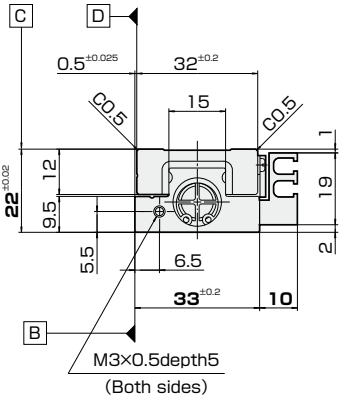
DIMENSIONS(mm) PPTNS12–25 With Magnet, Switch Rail

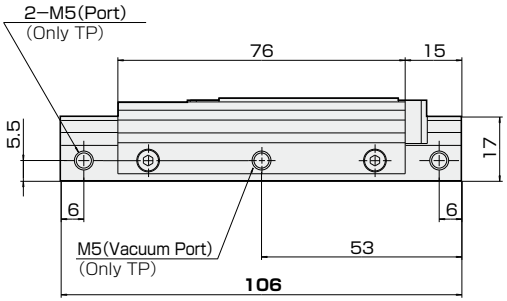
PPTNS–SD12–25– TP / PP

- Clean Type
- With Magnet, Switch Rail
- Bore Size
- Stroke
- Piping: TP·····Side Ported, PP·····Base Mounted

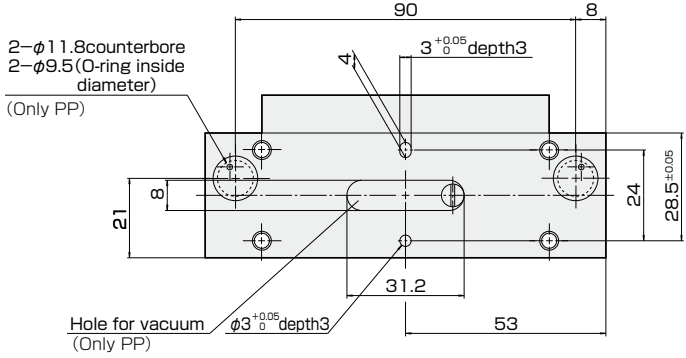






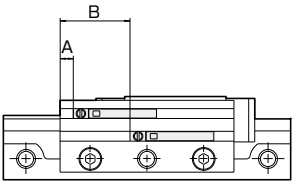


B D – Datum plane



INSTALLATION OF SWITCH

■Switch Setting Position



RB1, RC1, RB2, RC2 Switch

Unit: mm

Model	Switch Setting Position		On Hold Distance (ℓ)	Hysteresis (c)
	A	B		
PPTN10−10	1	11	6	1
PPTN10−20	11	31		
PPTN12−15	3.5	18.5		
PPTN12−25	13.5	38.5		

Explanation of hysteresis and on hold distance. ☞Page1084

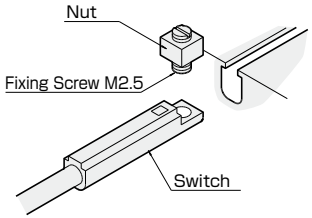
RB(RC)4, 5 Switch

Unit: mm

Model	Switch Setting Position		On Hold Distance (ℓ)	Hysteresis (c)
	A	B		
PPTN10−10	3	13	2.5	1
PPTN10−20	13	33		
PPTN12−15	5.5	20.5		
PPTN12−25	15.5	40.5		

■Installataion Of Switch

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



MEMO

MEMO

■MEMO■

MEMO