HIGH PRECISION LINEAR GUIDE
ULTRA COMPACT SIZE

SC Series

Miniature guide cylinder of high precise and solidity

SC06, 10
SC08A, 10A, 16A
SC06D, 10D

Application

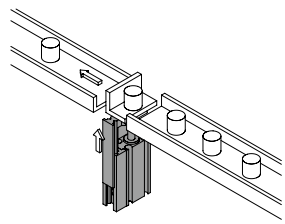
Applicable for up-down, clamping, stopper and feeding, pusher in automation and semiconductor field.

- Inventive patent registration: 1
- Design registration : 7

High Precision Guide

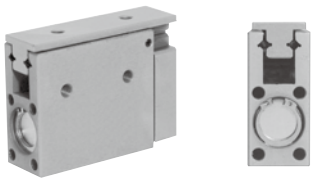
■ High precision and solidity, anti-rotate structure not required extra guide mounting.

Application



High solidity structure (SC series)

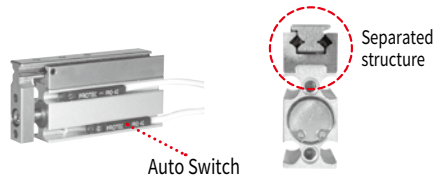
■ Heat treatment alloy steel linear guide and cylinder integrated in one body performed high solidity.



Auto Switch installation (SC-A series)

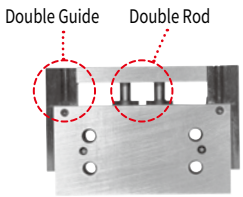
■ Separated guide and cylinder body
→ Lighten, compact

■ Auto switch seated internally without projection to improve side space utility.

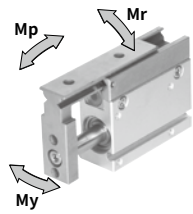


Double Thrust + Double Guide (SC-D series)

■ Integrated dual cylinders and widen dual linear guide in one body supplies double thrust and allowable moment.



Displacement against 3-directions

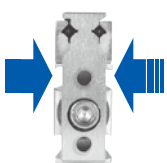


- Mp (Pitching moment) : 0.01 mm
- My (Yawing moment) : 0.01 mm
- Mr (Rolling moment) : 0.2°

※ Above displacement based on the end of plate of SC16A-05 model without any load applied.

Ultra Slim structure

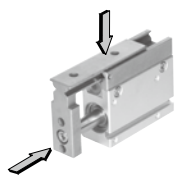
■ Applicable for multi-short pitch parallel align batches.
■ Superior side space utility.



Vacuum Pick Up

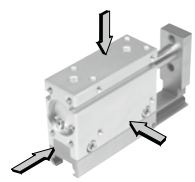
Various installation options

■ Table installation



2-Directions

■ Body installation



3-Directions

Features for models

Model	Shape	Features	CYL Bore (mm)	Stroke (mm)
SC		• Heat treated alloy steel guide and cylinder body unified in one structure. • High solidity guide structure for external load.	Ø6 Ø10	5 ~ 30
SC-A		• Separated guide and cylinder body for light weight and smallization. • No projection for auto switch mounting in the internal sensor slots on the body. • Excellent side space utilization.	Ø8 Ø10 Ø16	5 ~ 40
SC-D		• Twin cylinders and widen double linear guide applied. • Double thrust and allowable moment performed. • Possible to mount auto switch. (SC10D model)	Ø6 Ø10	5 ~ 30

⚠ Individual notes for SC Series ❶

⚠ Caution — Notes in Installation

■ **Be careful to protect "V" groove from damage which the cross roller is rubbed on slide rail and guide.**

■ **Keep away from any object that could be affected by a magnetic field.**

The piston of cylinder has a magnet, so keep it away from magnetic tape, magnetic disc, and etc., which could be affected by a magnetic field.

■ **Be careful not to cause scratch or shock on the cylinder body, mounting surfaces of slide and plate.**

Damage in mounting surfaces makes worse the flatness, and cause work failure due to the increased swing of guide unit and/or friction resistance.

■ **Install screw to the cylinder and tighten it to the specified torque.**

Otherwise, it may cause defect in working. Also, insufficient screw tightening may cause dislocation or work pieces to drop.

⚠ Caution — Notes in Selection

■ **Do not exceed the specified load when selecting the product.**

Select model based on the specified maximum load factor according to each Bore size. Otherwise, it may result in distorted load of the guide unit, which may cause swing to guide unit, deterioration, and adverse effects on cylinder life.

■ **Avoid excessive external force or shock.**

■ **For the selection of each series, refer to the specification in this catalogue.**

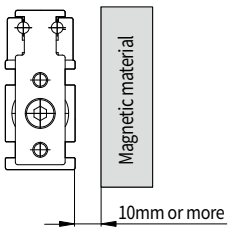
For the selection of each series, refer to the specification in this catalogue. Correct use for cylinder within the specified temperature and pressure range may result in reduction in malfunction and failure.

■ **At the backward position, slight clearance could be occurred between slider(table) and cylinder body. But, this is a phenomenon that occurs during normal operation, and there is no problem with product quality at all.**

⚠ Individual notes for SC Series ❷

⚠ Caution **Notes in operating Environment and Handling**

■ **When there are magnetic materials like steel plate near the switch of cylinder, most likely they may cause malfunction in the switch, therefore they need to be designed and installed with sufficient clearance from the surface of cylinder (maintain 10mm or more).**



■ **Always use stainless bolts when mounting auto switch to cylinder in order to prevent switch malfunction. If unavoidable, use commercial bolts after removing the magnetic properties.**

■ **Be careful of using in the place where vibration or shock occurs frequently, it may cause a failure.**

■ **When used around heat source of high temperature, product can be heated by radiant heat and cause failure. Therefore, install protective covers to block heat source.**

■ **Do not use in the environment that can be affected by foreign substances such as dust and chip, and cutting oil.**

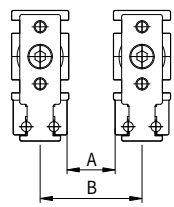
It may cause vibration, increase of frictional resistance, and air leakage. In such environment, please install appropriate protective covers after the consultation with our company.

■ **If two or more cylinders are installed close, auto switch might malfunction due to magnetic field interference. It is need to be installed with sufficient space.**

(In case of unavoidable use with less than the minimum free distance, please attach a steel plate or magnetic blocking plate to the opposite cylinder close to the auto switch. If magnetic blocking plate is not installed, it could be the reason of malfunction. For more details, please contact to office.)

[Minimum free distance by models for installation]

Model	A (mm)	B (mm)
SC08A	5	16
SC10A	5	19
SC16A	10	30
SC10D	5	18.7



■ **Do not put your hand or finger in between cylinder body and the plates.**

During it operating, there is some possibility to cause of the accident such as finger or hand jam.

■ **Be careful not to crash or create damage on the inside of cylinder & piston rod.**

Cylinder inner diameter is managed with precision allowance, and any small scratches or distortion may cause malfunction. In addition, any scratches of motion units such as piston rod may lead damage to packing and malfunction due to air leakage.

■ **Be care of corrosion resistance for the stability in cross roller guide unit.**

Be care of corrosion resistance in humid environment as water drop can be created in guide unit and it can get rusty in such environment.

■ **Add up lubricant at the frictional surface of cylinder regularly.**

Add up lubricant at the frictional surface of cylinder periodically. It may result in expanded life of cylinder.

PRECISION GUIDE CYLINDER / HIGH PRECISION GUIDE

SC Series

Features

- Miniature guide cylinder unified small cylinder and cross roller guide in one body.
- High precision performance cross roller guide integrated in the moving plate.
- High durability and high speed responsiveness.
- Suitable for using up & down, clamping, stopper and feeding, pusher in automation and semiconductor manufacturing field.
- Various installation and application.
- Auto Switch installation. (Optional, SC-A series and SC10D models only)

Order Form

SC 08A - 15 - E - A2N L S

① ② ③ ④ ⑤ ⑥ ⑦

① Series Name

② Cylinder Bore Size ③ Standard Strokes ⑤ Available Auto Switches

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))	Order							
			A2	A2C	A2N	A2V	B2	B2B	B3B	B3C
06	6	05, 10, 15								
10	10	05, 10, 15, 20, 30								
08A	8	05, 10, 15			○		○	○	○	○
10A	10	05, 10, 15, 20, 30			○		○	○	○	○
16A	16	05, 10, 20, 30, 40	○	○		○	○	○	○	○
06D	6	05, 10, 15								
10D	10	05, 10, 15, 20, 30	○	○		○	○	○	○	○

※ For "Blank", no Auto Switch is provided.

④ Special Option

Order	Special Option
Blank	Standard
E	Secondary battery field

⑥ Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

⑦ Auto Switch Quantity

Order	Quantity
Blank	2PCS
S	1PCS

※ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
A2	Magnetic Reed Switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2C	Magnetic Reed Switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2N	Magnetic Reed Switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic Reed Switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic Solid State	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic Solid State	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic Solid State	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic Solid State	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

Specification

Item Name		SC06	SC10	SC08A	SC10A	SC16A	SC06D	SC10D
CYL Bore Size(mm)		6	10	8	10	16	6	10
Rod Size(mm)		3	6	4	6	8	3	6
Standard Strokes(mm)		5 ~ 15	5 ~ 30	5 ~ 15	5 ~ 30	5 ~ 40	5 ~ 15	5 ~ 30
Theoretical Thrust(kgf)	Forward	0.28×P	0.78×P	0.5×P	0.78×P	2.01×P	0.57×P	1.57×P
P : Air Pressure(kgf/cm²) Note 3)	Backward	0.21×P	0.5×P	0.38×P	0.5×P	1.51×P	0.42×P	1.01×P
Fitting Size		M3	M5	M3	M5	M5	M3	M5
Fluid		Clean Air Note 1)						
Pressure Range(kgf/cm²)		1.5 ~ 7 (Guaranteed Resist Pressure : 10.5) Note 2)						
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)						
Temperature Range(°C)		5 ~ 60						
Moving Speed(mm/sec)		50 ~ 500						
Operation Type		Double Acting						
Position Accuracy(mm)		± 0.01						
Stroke Tolerance for Forward Position(mm)		0 ~ +0.8						

Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.
Note 3) SC06D, SC10D models performs double thrust by double cylinder inside.

Weight

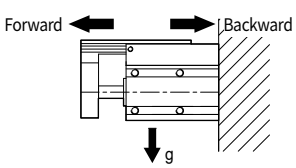
Unit : kgf

Model \ Stroke (mm)	05	10	15	20	25	30	40
SC06	0.035	0.045	0.055	-	-	-	-
SC06D	0.060	0.080	0.100	-	-	-	-
SC08A	0.045	0.060	0.075	-	-	-	-
SC10	0.095	0.110	0.125	0.140	0.155	0.170	-
SC10A	0.070	0.082	0.094	0.106	0.118	0.130	-
SC10D	0.130	0.154	0.178	0.202	0.226	0.249	-
SC16A	0.110	0.126	0.142	0.158	0.175	0.192	0.210

Theoretical Thrust

Unit : kgf

Model	Operating Direction (Ref. figure)	Pressured Surface (mm²)	Pressure Range (kgf/cm²)					
			2	3	4	5	6	7
SC06	Forward	28	0.56	0.84	1.12	1.4	1.68	1.96
	Backward	21	0.42	0.63	0.84	1.05	1.26	1.47
SC06D	Forward	57	1.14	1.71	2.28	2.85	3.42	3.99
	Backward	42	0.84	1.26	1.68	2.10	2.52	2.94
SC08A	Forward	50	1	1.5	2	2.5	3	3.5
	Backward	38	0.76	1.14	1.52	1.9	2.28	2.66
SC10	Forward	78	1.56	2.34	3.12	3.9	4.68	5.46
	Backward	50	1	1.5	2	2.5	3	3.5
SC10A	Forward	78	1.56	2.34	3.12	3.9	4.68	5.46
	Backward	50	1	1.5	2	2.5	3	3.5
SC10D	Forward	157	3.14	4.71	6.28	7.85	9.42	10.99
	Backward	101	2.02	3.03	4.04	5.05	6.06	7.07
SC16A	Forward	201	4.02	6.03	8.04	10	12	14
	Backward	151	3.02	4.53	6.04	7.55	9.06	10.5



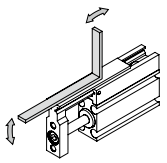
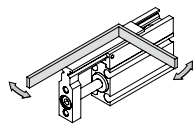
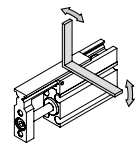
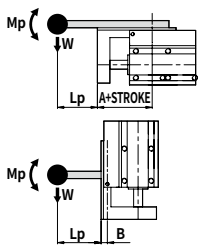
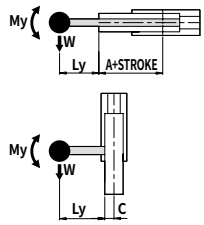
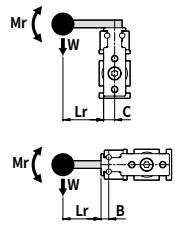
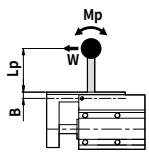
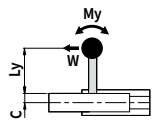
<Operating Direction>

SC Series Model Selection Guide

Technical Data by Model

■ Mp, My, Mr 3-directions moment calculation formula Figure 1

※ W : Work Weight (kgf), K_2 : Speed factor

	Pitch Moment (Mp)	Yawing Moment (My)	Rolling Moment (Mr)
Moment Direction			
Static Moment			
Static Moment Formula	Mp = W × (A + STROKE + Lp) Mp = W × (B + Lp)	My = W × (A + STROKE + Ly) My = W × (C + Ly)	Mr = W × (C + Lr) Mr = W × (B + Lr)
Dynamic Moment			
Dynamic Moment Formula	Mp = K_2 × W × (A + STROKE + Lp) Mp = K_2 × W × (B + Lp)	My = K_2 × W × (A + STROKE + Ly) My = K_2 × W × (C + Ly)	Mr = K_2 × W × (C + Lr) Mr = K_2 × W × (B + Lr)

■ Corrections from the central distance of moments Table 1

Unit : mm

Model \ Corrections	A	B	C
SC06	12.7	4.5	4
SC06D	12.7	24	4
SC08A	20	3.5	4
SC10	20	5	6
SC10A	21	3.5	5
SC10D	19.5	30	5
SC16A	24.5	5	7.5

■ Maximum allowable kinetic energy (Ea) Table 3

Unit : kgf·cm

Model	Allowable Kinetic Energy
SC06	0.11
SC06D	0.22
SC08A	0.17
SC10	0.23
SC10A	0.23
SC10D	0.47
SC16A	1.09

■ Maximum allowable moment Table 2

Unit : kgf·cm

Model \ Allowable Moment	Pitching Moment Mp	Yawing Moment My	Rolling Moment Mr
SC06	1.7	1.7	2.7
SC06D	3.39	3.39	5.43
SC08A	3.82	3.82	5.83
SC10	3.1	3.1	3.68
SC10A	3.82	3.82	7.21
SC10D	6.85	6.85	5.53
SC16A	12.3	12.3	15.8

■ Max. Allowable Load (Wa) Table 4

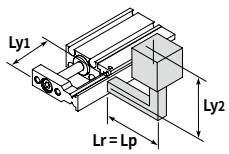
Unit : kgf

Model	Max. Allowable Load
SC06	0.3
SC06D	0.6
SC08A	0.54
SC10	0.72
SC10A	0.72
SC10D	1.43
SC16A	2.15

※ For vertical installation, maximum allowable load check is not required.
※ This table is only for reference value to calculate table load ratio.

SC Series Model Selection Guide

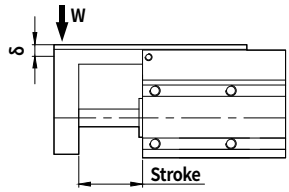
Example of Model Selection

		Applicable Formula	Selection Example
Condition Check		▪ Cylinder model selection ▪ Cushion type(Urethane / Absorber) ▪ Distance to the center of gravity in load ▪ Installation type Horizontal installation / Vertical installation  ▪ Average speed ▪ Load weight ▪ Load installation Plate installation / Table installation 	▪ Check for : SC10A-15 ▪ Table installation, horizontal installation ▪ Average speed : V = 300mm/sec ▪ Work weight W = 0.2kgf Ly1 = 10mm Ly2 = 20mm Lp, Lr = 15mm 
Kinetic Energy Check - The kinetic energy of load should be within the allowable kinetic energy range of cylinder.		Work kinetic energy(kgf·cm) $E = K_1 \times \frac{1}{2} \times \frac{W}{980} \times (\frac{1.4V}{10})^2$ W : Work weight(kgf) V : Average speed(mm/sec) K_1 : Installation Factor(Table installation : 1, Plate installation :1.6) Ea : Allowable kinetic energy(kgf·cm) Table 3 Applicable only if E < Ea	$E = 1 \times \frac{1}{2} \times \frac{0.2}{980} \times (\frac{1.4 \cdot 300}{10})^2 = 0.18$ kgf·cm Ea = 0.23 kgf·cm Applicable as E(0.18) < Ea(0.23)
Load Factor Check - Loading factor. - Static moment load factor. - Dynamic moment load factor. - Total sum of load factors should not exceed.	Loading Factor	Suitable load weight(kgf) $Wt = K_1 \times K_2 \times W$ Loading factor $\theta_1 = \frac{Wt}{Wa}$ W : Work weight(kgf) K_1 : Installation factor(Table installation : 1, Plate installation : 1.6) K_2 : Speed factor(300mm/sec or less : 1, Over 300mm/sec : 1.6) Wa : Allowable load weight(kgf) Table 4 ※ For vertical installation, maximum allowable load check is not required.	Wt = 1 × 1 × 0.2 = 0.2 kgf Wa = 0.72 kgf $\theta_1 = \frac{0.2}{0.72} = 0.28$
	Static Moment	Yawing moment(kgf·cm) $My = W \times (A + Stroke + Ly_1) / 10$ Rolling moment (kgf·cm) $Mr = W \times (C + Lr) / 10$ Yawing moment factor $\theta_2 = \frac{My}{Mya}$ Rolling moment factor $\theta_3 = \frac{Mr}{Mra}$ W : Work weight(kgf) A, C : Corrections from the center distance of moment(mm) Table 1 Ly1, Lr : Distance between end of table to center of load(mm) Figure 1 Mya : Allowable Yawing moment(kgf·cm) Table 2 Mra : Allowable rolling moment(kgf·cm) Table 2	$My = 0.2 \times \frac{(21 + 15 - 10)}{10} = 0.52$ kgf·cm Mya = 3.82 kgf·cm $\theta_2 = \frac{0.52}{3.82} = 0.14$ $Mr = 0.2 \times \frac{(3.5 + 15)}{10} = 0.37$ kgf·cm Mra = 7.21 kgf·cm $\theta_3 = \frac{0.37}{7.21} = 0.05$
	Dynamic Moment	Pitching moment(kgf·cm) $Mp = K_2 \times W \times (B + Lp) / 10$ Yawing moment(kgf·cm) $My = K_2 \times W \times (C + Ly_2) / 10$ Pitching moment factor $\theta_4 = \frac{Mp}{Mpa}$ Yawing moment factor $\theta_5 = \frac{My}{Mya}$ W : Work weight(kgf) K_2 : Speed factor(300mm/sec or less : 1, Over: 300mm/sec : 1.6) B, C : Corrections from the center distance of moments(mm) Table 1 Lp, Ly2 : Distance between end of table to center of load(mm) Figure 1 Mpa : Allowable pitching moment(kgf·cm) Table 2 Mya : Allowable Yawing moment(kgf·cm) Table 2	$Mp = 1 \times 0.2 \times \frac{(35 + 15)}{10} = 0.37$ kgf·cm Mpa = 3.82 kgf·cm $\theta_4 = \frac{0.37}{3.82} = 0.1$ $My = 1 \times 0.2 \times \frac{(5 + 20)}{10} = 0.5$ kgf·cm Mya = 3.82 kgf·cm $\theta_5 = \frac{0.5}{3.82} = 0.13$
Total Load Factor		$\theta_t = \theta_1 + \theta_2 + \theta_3 + \theta_4 + \theta_5 \leqq 1$	$\theta_t = 0.28 + 0.14 + 0.05 + 0.1 + 0.13 = 0.7 \leqq 1$ SC10A-15 is applicable

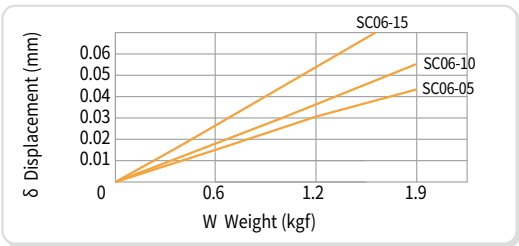
SC Series Model Selection Guide

Table Deflection

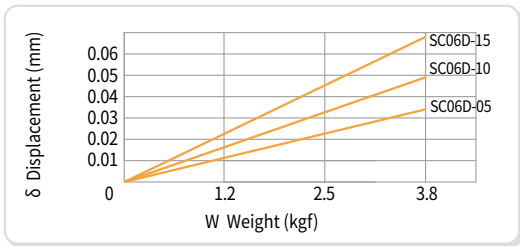
- The graph represents the deflection if any static load is applied at the end of table when moved forward as much as the corresponding stroke.
- The deflections below mentioned are only for a reference. (Please note that they are NOT maximum value).



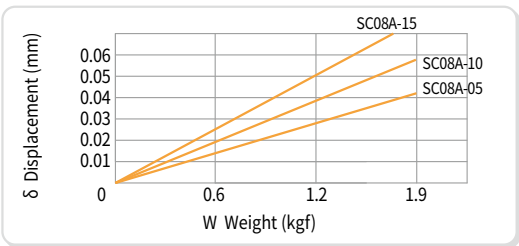
▶ SC06



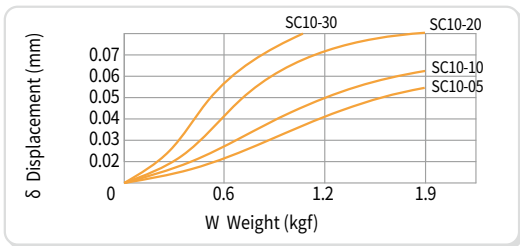
▶ SC06D



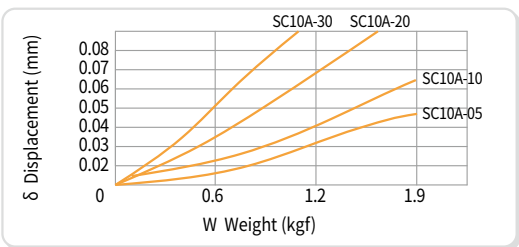
▶ SC08A



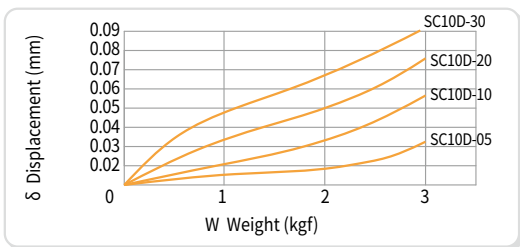
▶ SC10



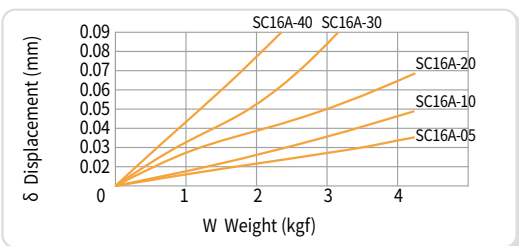
▶ SC10A



▶ SC10D

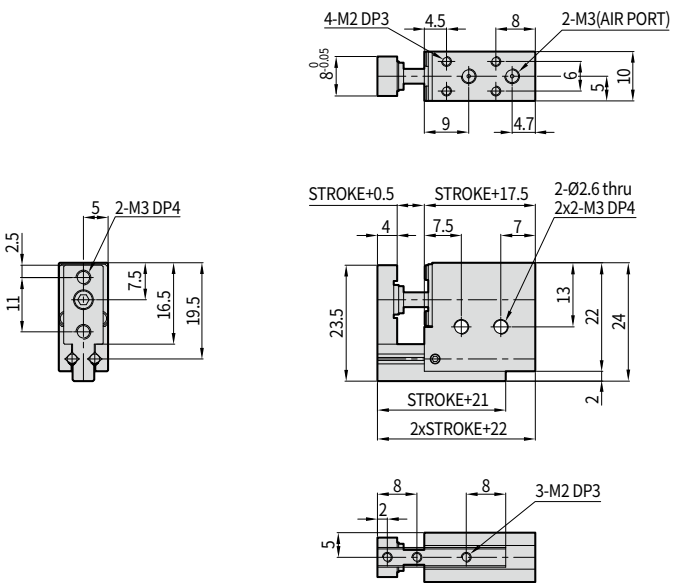


▶ SC16A

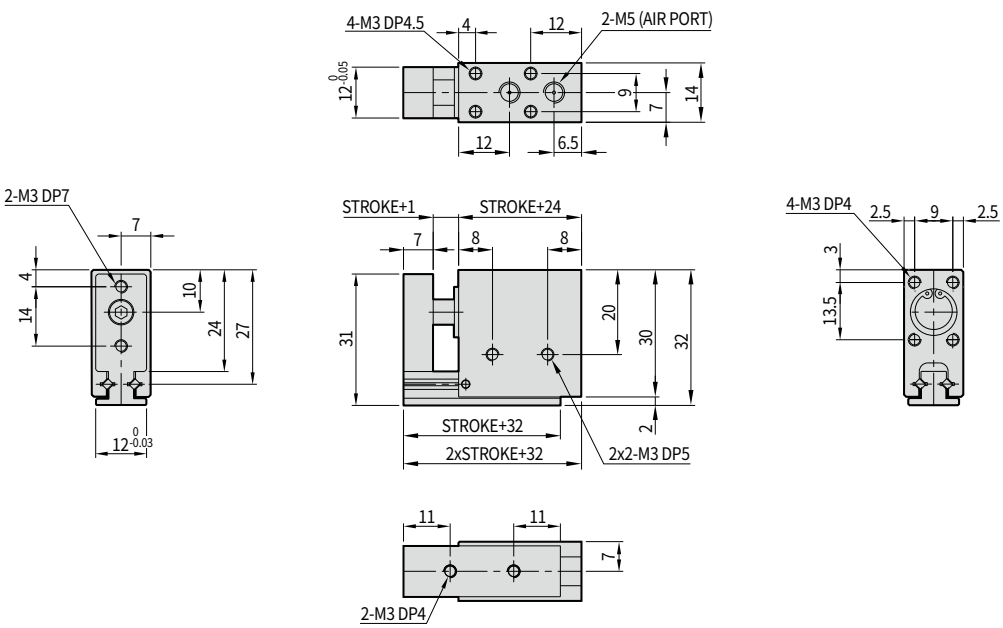


SC Series

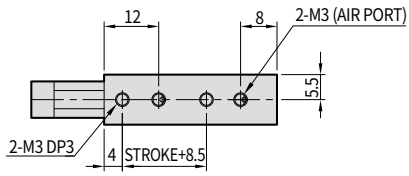
SC06

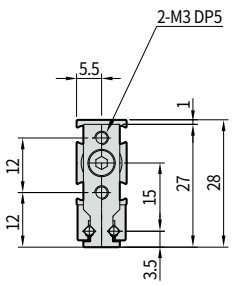


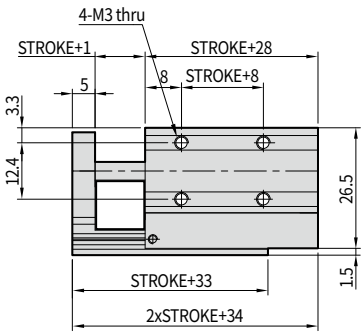
SC10

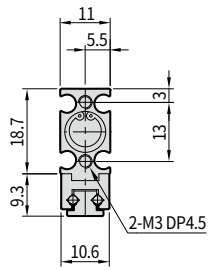


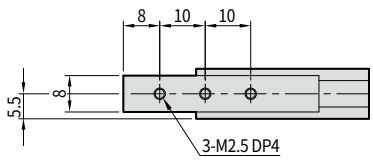
SC08A



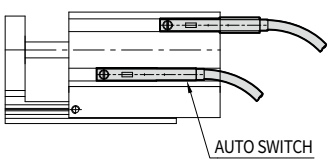


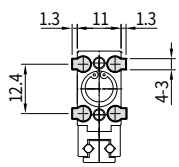




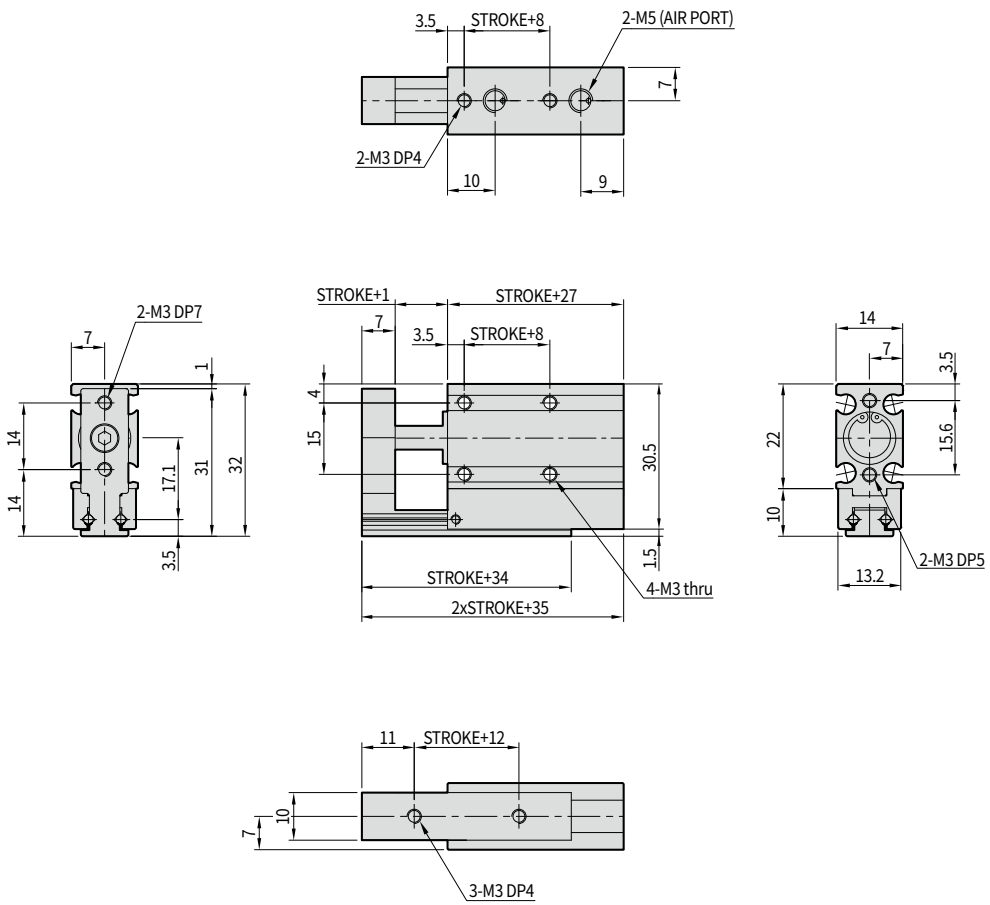


SC08A Example of Auto Switch installation

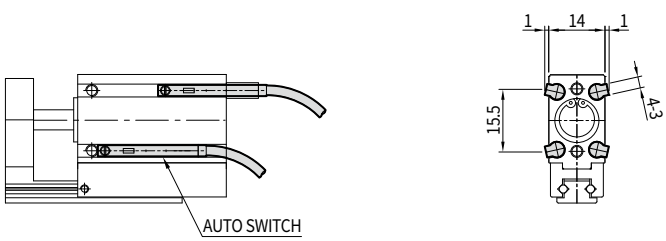




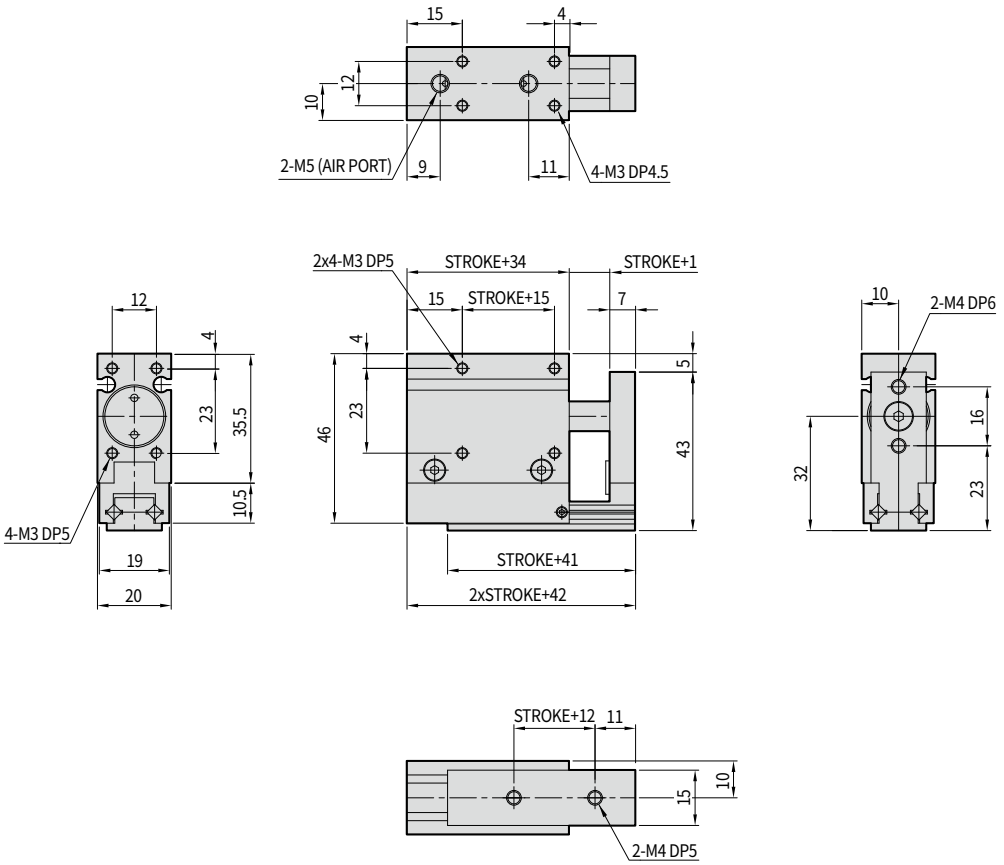
SC10A



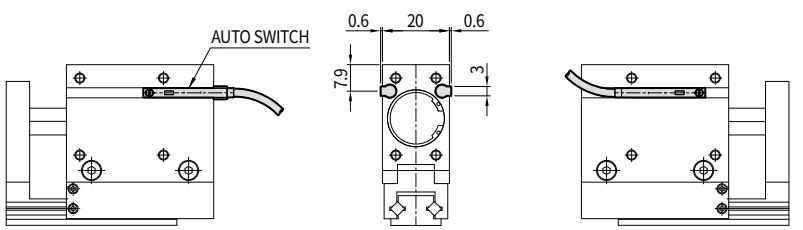
SC10A Example of Auto Switch installation



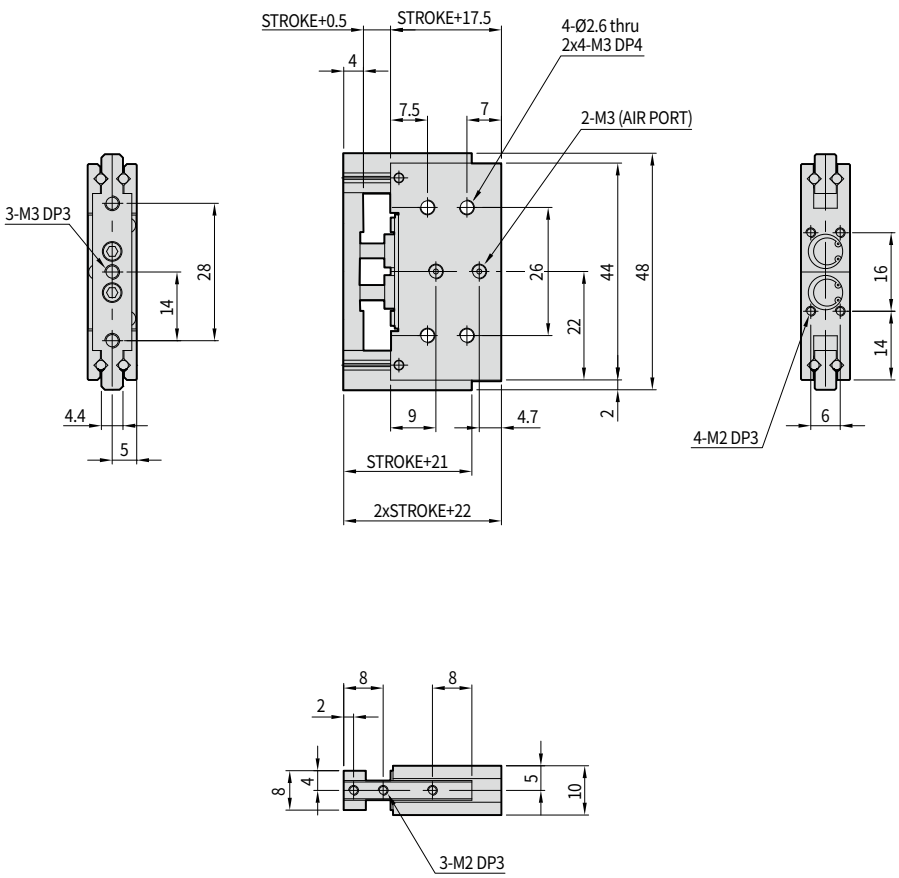
SC16A



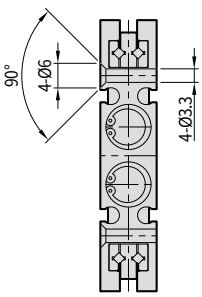
SC16A Example of Auto Switch installation

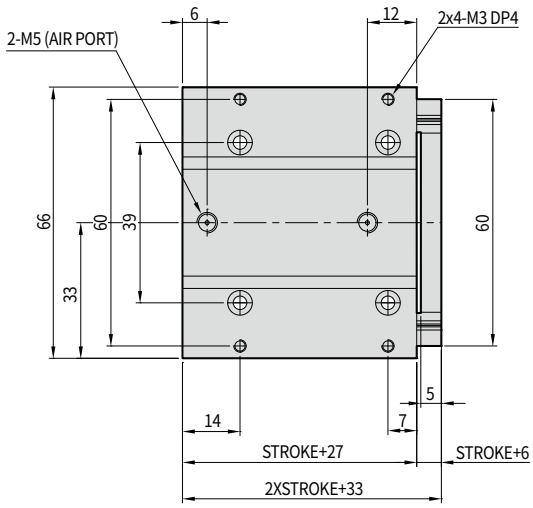


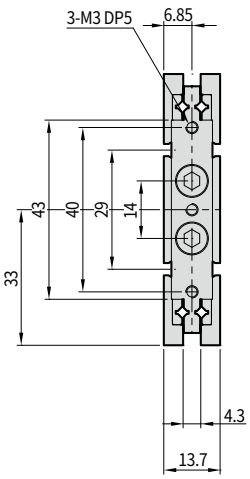
SC06D

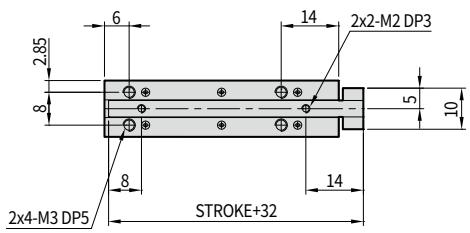

STROKE+0.5
STROKE+17.5
4-Ø2.6 thru
2x4-M3 DP4
2-M3 (AIR PORT)
3-M3 DP3
4-M2 DP3
STROKE+21
2xSTROKE+22

SC10D

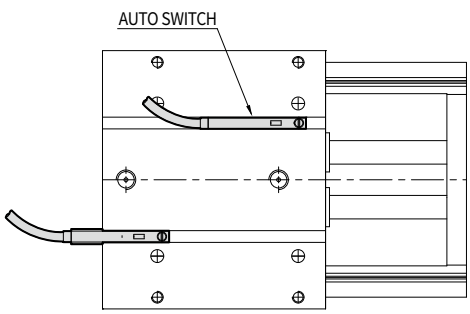


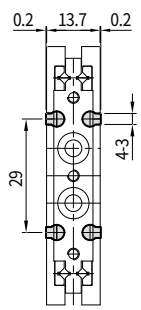






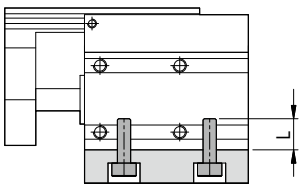
SC10D Example of Auto Switch installation





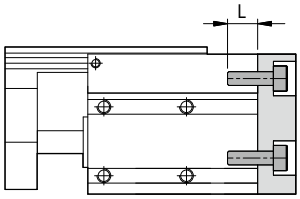
Installation Information

1. Installation by body tap holes



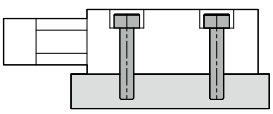
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SC06	M2×P0.4	1.5	3
SC10	M3×P0.5	11	4.5
SC08A	M3×P0.5	11	3
SC10A	M3×P0.5	11	4
SC16A	M3×P0.5	11	4.5
SC06D	Not usable		
SC10D	Not usable		

2. Installation by body tap holes



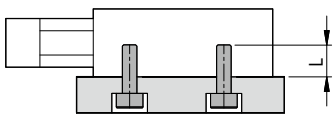
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SC06	M2×P0.4	1.5	3
SC10	M3×P0.5	11	4
SC08A	M3×P0.5	11	4.5
SC10A	M3×P0.5	11	5
SC16A	M3×P0.5	11	5
SC06D	M2×P0.4	1.5	3
SC10D	Not usable		

3. Installation by body through holes



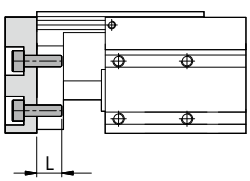
Item	Fastening Bolt	Max Torque (kgf·cm)
SC06	M2.5×P0.45	4.9
SC10	Not usable	
SC08A	Not usable	
SC10A	Not usable	
SC16A	Not usable	
SC06D	M2.5×P0.45	4.9
SC10D	M3×P0.5	11

4. Installation by body tap holes



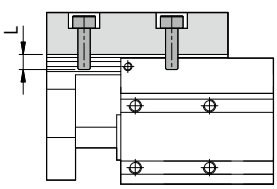
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SC06	M3×P0.5	11	4
SC10	M3×P0.5	11	5
SC08A	M3×P0.5	11	4
SC10A	M3×P0.5	11	4
SC16A	M3×P0.5	11	5
SC06D	M3×P0.5	11	4
SC10D	Not usable		

5. Installation by table tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SC06	M3×P0.5	11	4
SC10	M3×P0.5	11	7
SC08A	M3×P0.5	11	5
SC10A	M3×P0.5	11	7
SC16A	M4×P0.7	25	6
SC06D	M3×P0.5	11	4
SC10D	M3×P0.5	11	5

6. Installation by table tap holes

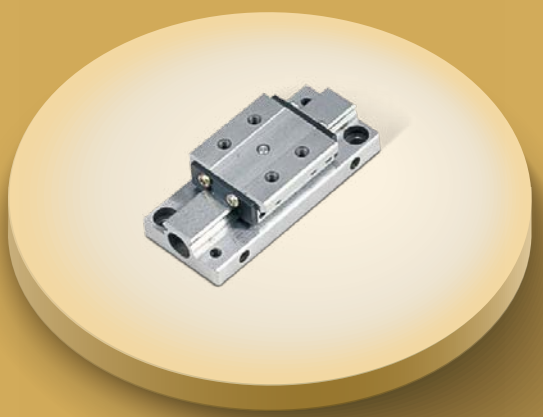


Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SC06	M2×P0.4	1.5	3
SC10	M3×P0.5	11	4
SC08A	M2.5×P0.45	4.9	4
SC10A	M3×P0.5	11	4
SC16A	M4×P0.7	25	5
SC06D	M2×P0.4	1.5	3
SC10D	M3×P0.5	11	5

CROSS ROLLER GUIDE HIGH PRECISION

ST Series

Miniature and high precise table type cylinder



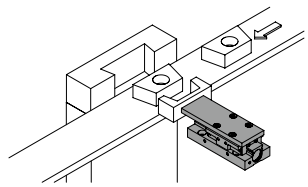
ST06S
ST06L, 10L, 12L

Application

Suitable for automation and semiconductor field for feeding of small work-piece and up-down working.

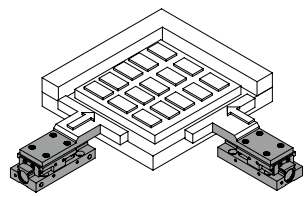
Application 1

Assembling



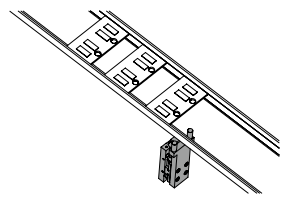
Application 2

PCB Align



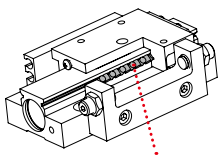
Application 3

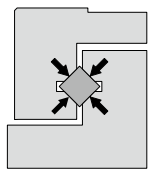
Position Determination



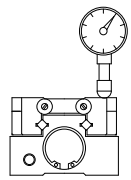
Cross Roller Guide

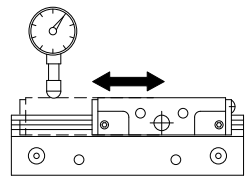
■ Roller bearing crossed aligned guide structure.
■ High solidity of 4-direction surface contact.





Superior accuracy of table





■ Table parallelism : 0.02mm

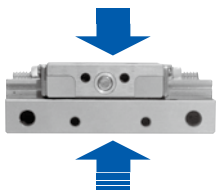
■ Table moving parallelism : 0.005mm

Minimized size

■ Small linear guide applied.
■ Superior space utility.

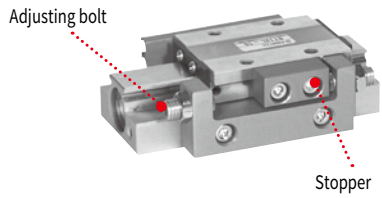
	Height	Width
ST06S	12	14.8
ST06L	14.5	24
ST10L	20	28
ST12L	22	33

Unit : mm



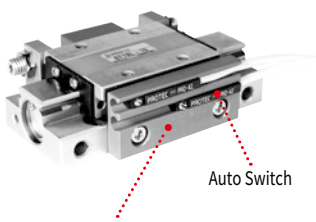
Stopper for adjusting stroke (Optional)

■ 0~5mm stroke adjustment with stopper mounting.



Auto Switch installation (Optional)

■ Auto Switch installation.



※ Bracket for auto switch mounting. (Optional)

※ To mounting auto switch, auto switch mounting bracket option is needed to be selected.

⚠ Individual notes for ST Series ❶

⚠ Caution — Notes in Installation

■ **Be careful to protect "V" groove from damage which the cross roller is rubbed on slide rail and guide.**

■ **Keep away from any object that could be affected by a magnetic field.**

The piston of cylinder has a magnet, so keep it away from magnetic tape, magnetic disc, and etc., which could be affected by a magnetic field.

■ **Be careful not to cause scratch or shock on the cylinder body, mounting surfaces of slide and plate.**

Damage in mounting surfaces makes worse the flatness, and cause work failure due to the increased swing of guide unit and/or friction resistance.

■ **Install screw to the cylinder and tighten it to the specified torque.**

Otherwise, it may cause defect in working. Also, insufficient screw tightening may cause dislocation or work pieces to drop.

⚠ Caution — Notes in Selection

■ **Do not exceed the specified load when selecting the product.**

Select model based on the specified maximum load factor according to each Bore size. Otherwise, it may result in distorted load of the guide unit, which may cause swing to guide unit, deterioration, and adverse effects on cylinder life.

■ **Avoid excessive external force or shock.**

■ **For the selection of each series, refer to the specification in this catalogue.**

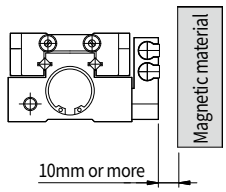
For the selection of each series, refer to the specification in this catalogue. Correct use for cylinder within the specified temperature and pressure range may result in reduction in malfunction and failure.

■ **At the backward position, slight clearance could be occurred between slider(table) and cylinder body. But this is a phenomenon that occurs during normal operation, and there is no problem with product quality at all.**

⚠ Individual notes for ST Series ❷

⚠ Caution **Notes in operating Environment and Handling**

■ **When there are magnetic materials like steel plate near the switch of cylinder, most likely they may cause malfunction in the switch, therefore they need to be designed and installed with sufficient clearance from the surface of cylinder (maintain 10mm or more).**



■ **Always use stainless bolts when mounting auto switch to cylinder in order to prevent switch malfunction. If unavoidable, use commercial bolts after removing the magnetic properties.**

■ **Be careful of using in the place where vibration or shock occurs frequently, it may cause a failure.**

Do not use the cylinder as a buffer of shock or vibration for mechanical equipment. Such use may create injury or damage to mechanical equipment.

■ **When used around heat source of high temperature, product can be heated by radiant heat and cause failure. Therefore, install protective covers to block heat source.**

■ **Do not use in the environment that can be affected by foreign substances such as dust and chip, and cutting oil.**

It may cause vibration, increase of frictional resistance, and air leakage. In such environment, please install appropriate protective covers after the consultation with our company.

■ **Be care of corrosion resistance for the stability in cross roller guide unit.**

Be care of corrosion resistance in humid environment as water drop can be created in guide unit and it can get rusty in such environment.

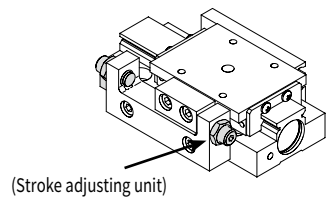
■ **Add up lubricant at the frictional surface of cylinder regularly.**

Add up lubricant at the frictional surface of cylinder periodically. It may result in expanded life of cylinder.

■ **Can select various stroke adjustment unit. Check it before model selection.**

When controlling the cylinder stroke, three different types of cushions can be used according to the intended use.

1. Urethane Stopper : Generalized stroke adjusting unit. (Allowable speed 50~500mm/sec)
2. Metal Stopper : It may improve the precise control of stroke, but doesn't have cushion function, so it is used only for light load and low-speed. As it is special ordering specification, please contact us. (Allowable speed 50~200mm/sec)
3. Shock Absorber : Soft stop by absorbing the shock at the end of stroke. As it is special ordering specification, please contact us.



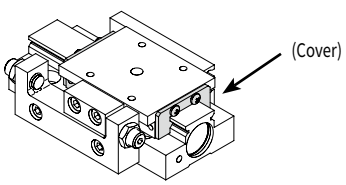
■ **To maintain the quality of compressed air, exhaust drains in filter periodically.**

■ **To control the operation speed of cylinder, please use speed controller.**

For operation speed control, increase it from low-speed to required speed gradually.

■ **Do not dissemble the cover from cylinder.**

Do not disassemble the cover from the both side of cylinder. It takes a role of protecting "V" groove of rail from dusts or chips.



PRECISION GUIDE CYLINDER / CROSS ROLLER GUIDE

ST Series

Features

- Sliding table type miniature cylinder unified air cylinder into the guide block.
- High solidity and moving performance by cross roller bearing inside the sliding table.
- Big allowable moment although small size body.
- Possible to adjust of stroke → adjustment stopper. (Optional)
- Suitable for automation and semiconductor field for feeding of small work-piece and up-down working.
- Auto Switch installation. (Optional, not for ST06S model)

Order Form

ST	12L	-	15	-	E	-	W	-	A2	L	S	-	ST2
①	②		③		④		⑤		⑥	⑦	⑧		⑨

① Series Name

② Cylinder Bore Size / ③ Standard Strokes

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))
06S	6	05
06L	6	05, 10
10L	10	10, 20
12L	12	15, 25

④ Special Option

Order	Special Option
Blank	Standard
E	Secondary battery field

⑤ Auto Switch mounting bracket

Order	Models	Bracket	Num of Applicable Auto Switches
Blank	-	Non-Mounted	None
W2	ST06L	Mounted	2PCS
W	ST06L		1PCS
	ST10L ST12L		2PCS

* 2 auto switches can be installed in one auto switch bracket from ST10L size model.

⑦ Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

⑧ Auto Switch Quantity

Order	Quantity
Blank	2PCS
S	1PCS

⑨ Stopper Options

Order	Stopper
Blank	Non-Mounted
ST2	Mounted

* Stopper option for ST06L series model, please contact to office.

※ Reference Table for Options

Options for	Auto Swtich Options		Stopper Options
Models	Bracket	Auto Switch	
ST06S	-	-	-
ST06L	W	1PCS	-
	W2	2PCS	-
ST10L	W	2PCS	O
ST12L	W	2PCS	O

⑥ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
A2	Magnetic Reed Switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2C	Magnetic Reed Switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic Reed Switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic Solid State	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic Solid State	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic Solid State	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic Solid State	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

Accessory Order Form

(1) Auto Switch Mounting Bracket

ST 06L - 10 - W - ASSY
① ② ③ ④ ⑤

① Series Name

② Cylinder Bore Size

③ Standard Strokes

④ Auto Switch mounting bracket

⑤ Order Name for Accessory
- Based for only one set for single side of product.

(2) Stopper

ST 10L - 10 - ST2 - ASSY
① ② ③ ④ ⑤

① Series Name

② Cylinder Bore Size

③ Standard Strokes

④ Stopper

⑤ Order Name for Accessory
- Based for 1 piece of product.

Specification

Item Name		ST06S	ST06L		ST10L		ST12L	
CYL Bore Size(mm)		6	6		10		12	
Standard Strokes(mm)		5	5	10	10	20	15	25
Theoretical Thrust(kgf) P : Air Pressure(kgf/㎠)	Forward	0.28×P	0.28×P		0.78×P		1.13×P	
	Backward							
Fitting Size		M3			M5			
Weight(kgf)		0.04	0.08	0.1	0.12	0.19	0.21	0.3
Fluid		Clean Air Note 1)						
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 10.5) Note 2)						
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)						
Temperature Range(℃)		5 ~ 60						
Operation Type		Double Acting						
Accuracy(mm)		± 0.01						

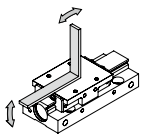
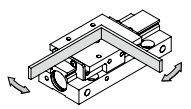
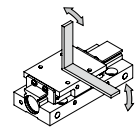
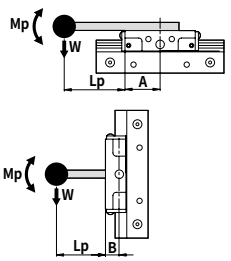
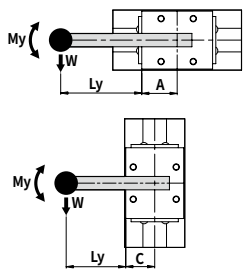
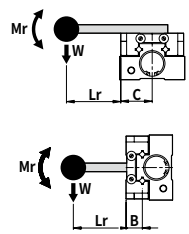
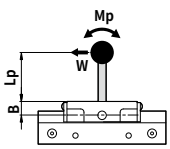
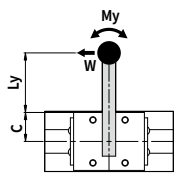
Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

ST Series Model Selection Guide

Technical Data by Model

■ Mp, My, Mr 3-directions moment calculation formula Figure 1

※ W : Work Weight (kgf), K_2 : Speed factor, K_3 : Shock factor

	Pitch Moment (Mp)	Yawing Moment (My)	Rolling Moment (Mr)
Moment Direction			
Static Moment			
Static Moment Formula	Mp = W × (A + STROKE + Lp) Mp = W × (B + Lp)	My = W × (A + STROKE + Ly) My = W × (C + Ly)	Mr = W × (C + Lr) Mr = W × (B + Lr)
Dynamic Moment			
Dynamic Moment Formula	Mp = K × W × (A + Lp) Mp = K × W × (B + Lp)	My = K × W × (A + Ly) My = K × W × (C + Ly)	Mr = K × W × (C + Lr) Mr = K × W × (B + Lr)

■ Corrections from the central distance of moments Table 1

Unit : mm

Model \ Corrections	A	B	C
ST06S-05	15	4.5	7.1
ST06L-05	12.7	6	12
ST06L-10	12.7	6	12
ST10L-10	16.5	7	13.5
ST10L-20	23.5	7	13.5
ST12L-15	21.5	7.3	16.3
ST12L-25	30	7.3	16.3

■ Maximum allowable moment Table 2

Unit : kgf·cm

Model \ Allowable Moment	Pitching Moment Mp	Yawing Moment My	Rolling Moment Mr
ST06S-05	2.39	2.39	3.94
ST06L-05	1.79	1.79	3.45
ST06L-10	1.79	1.79	3.45
ST10L-10	2.39	2.39	5.06
ST10L-20	3.58	3.58	7.08
ST12L-15	10	10	38
ST12L-25	15	15	55

■ Maximum allowable kinetic energy (Ea) Table 3

Unit : kgf·cm

Model	Allowable Kinetic Energy
ST06S	0.08
ST06L	0.08
ST10L	0.26
ST12L	0.51

■ Max. Allowable Load (Wa) Table 4

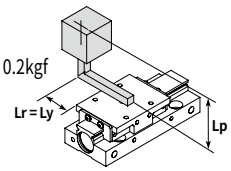
Unit : kgf

Model	Max. Allowable Load
ST06S	0.4
ST06L	0.4
ST10L	1.1
ST12L	1.6

※ For vertical installation, maximum allowable load check is not required.
※ This table is only for reference value to calculate table load ratio.

ST Series Model Selection Guide

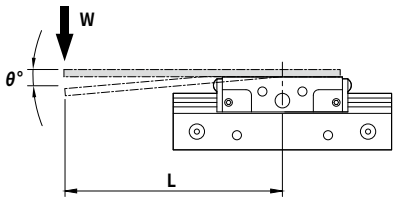
Example of Model Selection

		Applicable Formula	Selection Example
Condition Check		▪ Cylinder model selection ▪ Load weight ▪ Installation type ▪ Average speed ▪ Distance to the center of gravity in load Horizontal installation / Vertical installation 	▪ Check for : ST10L-10 ▪ Horizontal installation ▪ Average speed : V = 300mm/sec ▪ Work weight W = 0.2kgf Lp = 30mm Ly, Lr = 20mm 
Kinetic Energy Check - The kinetic energy of load should be within the allowable kinetic energy range of cylinder.		Work kinetic energy(kgf·cm) $E = \frac{1}{2} \times \frac{W}{980} \times (\frac{1.4V}{10})^2$ W : Work weight(kgf) V : Average speed(mm/sec) Ea : Allowable kinetic energy(kgf·cm) Table 3 Applicable only if E < Ea	$E = \frac{1}{2} \times \frac{0.2}{980} \times (\frac{1.4 \cdot 300}{10})^2 = 0.18$ kgf·cm Ea = 0.26 kgf·cm Applicable as E(0.18) < Ea(0.26)
Load Factor Check - Loading factor. - Static moment load factor. - Dynamic moment load factor. - Total sum of load factors should not exceed.	Loading Factor	Suitable load weight(kgf) Wt = K × W Loading factor $\theta_1 = \frac{Wt}{Wa}$ W : Work weight(kgf) K : Speed factor(300mm/sec or less : 1, Over 300mm/sec : 1.6) Wa : Allowable load weight(kgf) Table 4 ∗ For vertical installation, maximum allowable load check is not required.	Wt = 1 × 0.2 = 0.2 kgf Wa = 1.1 kgf $\theta_1 = \frac{0.2}{1.1} = 0.18$
	Static Moment	Rolling moment(kgf·cm) Mr = W × (C + Lr) / 10 Rolling moment factor $\theta_2 = \frac{Mr}{Mra}$ W : Work weight(kgf) C : Corrections from the center distance of moment(mm) Table 1 Lr : Distance between end of table to center of load(mm) Figure 1 Mra : Allowable rolling moment(kgf·cm) Table 2	$Mr = \frac{0.2 \times (13.5 + 20)}{10} = 0.67$ kgf·cm Mra = 5.06 kgf $\theta_2 = \frac{0.67}{5.06} = 0.13$
	Dynamic Moment	Pitching moment(kgf·cm) Mp = K × W × (B + Lp) / 10 Yawing moment(kgf·cm) My = K × W × (C + Ly) / 10 Pitching moment factor $\theta_3 = \frac{Mp}{Mpa}$ Yawing moment factor $\theta_4 = \frac{My}{Mya}$ W : Work weight(kgf) K : Speed factor(300mm/sec or less : 1, Over: 300mm/sec : 1.6) B, C : Corrections from the center distance of moments(mm) Table 1 Lp, Ly : Distance between end of table to center of load(mm) Figure 1 Mpa : Allowable pitching moment(kgf·cm) Table 2 Mya : Allowable Yawing moment(kgf·cm) Table 2	$Mp = \frac{1 \times 0.2 \times (7 + 30)}{10} = 0.74$ kgf·cm Mpa = 2.39 kgf $\theta_3 = \frac{0.74}{2.39} = 0.31$ $My = \frac{1 \times 0.2 \times (13.5 + 20)}{10} = 0.67$ kgf·cm Mya = 2.39 kgf $\theta_4 = \frac{0.67}{2.39} = 0.28$
Total Load Factor		$\theta_t = \theta_1 + \theta_2 + \theta_3 + \theta_4 \leqq 1$	$\theta_t = 0.18 + 0.13 + 0.31 + 0.28 = 0.9 \leqq 1$ ST10L-10 is applicable

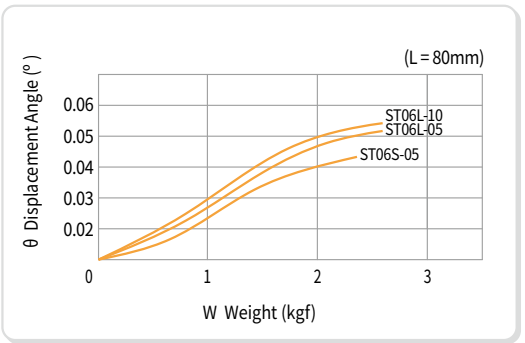
ST Series Model Selection Guide

Table Deflection

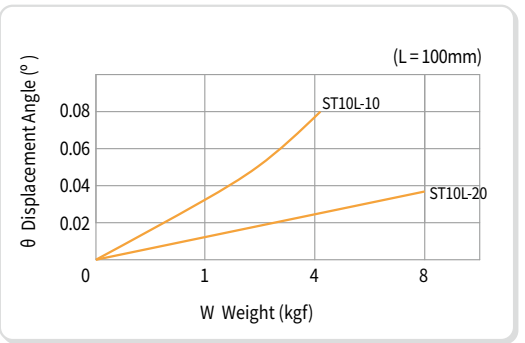
- The graph represents the deflection angle if any static load is applied at the end of table when moved forward as much as the corresponding stroke.
- The deflection angle below mentioned are only for a reference. (Please note that they are NOT maximum value)



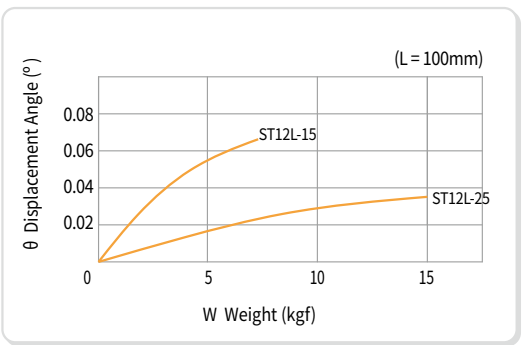
▶ ST06S, ST06L



▶ ST10L

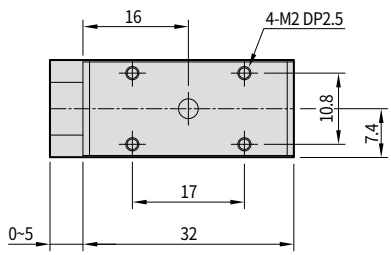


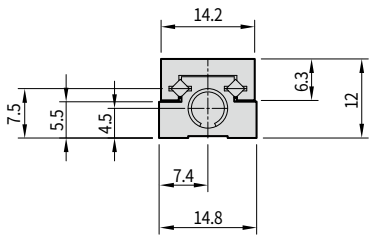
▶ ST12L

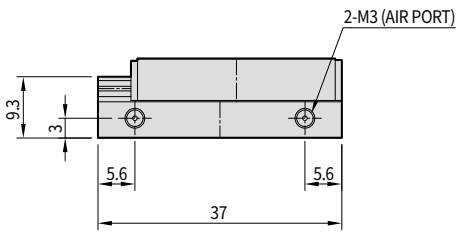


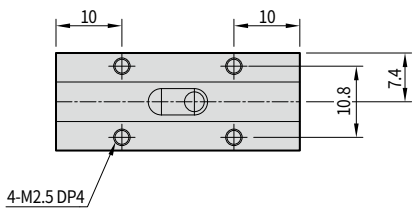
ST Series

ST06S-05







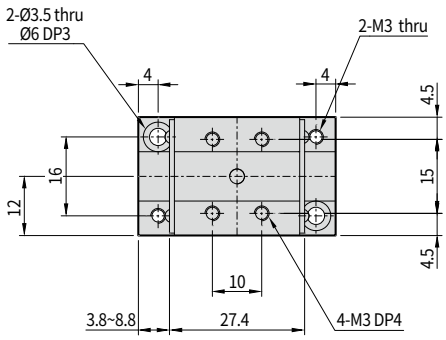


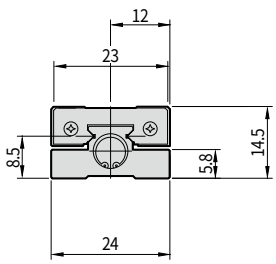
ST Series

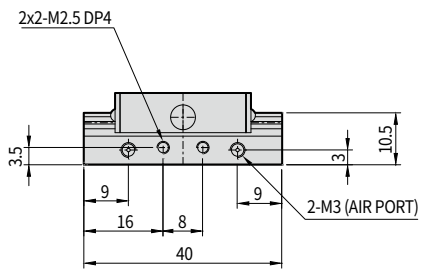
06S 06L 10L 12L

05 10

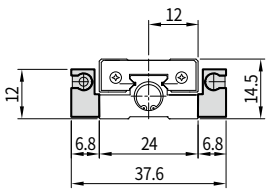
ST06L-05

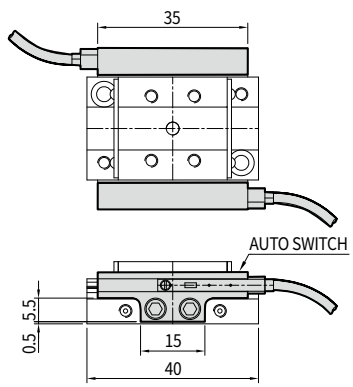




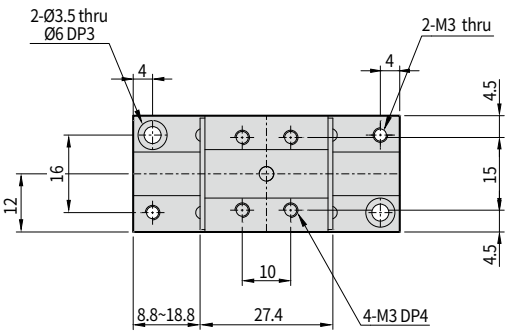


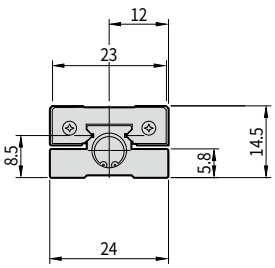
ST06L-05 Example of Auto Switch installation

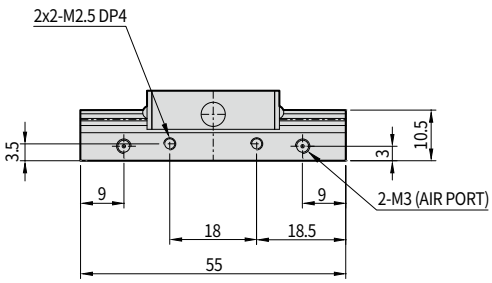




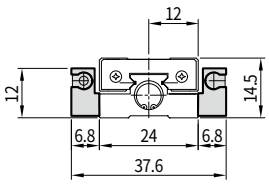
ST06L-10

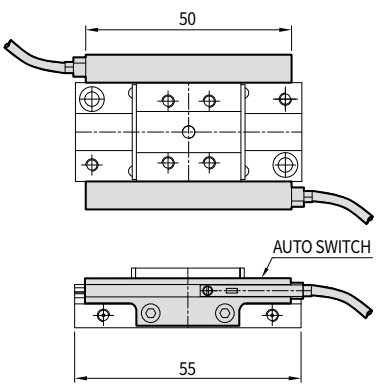






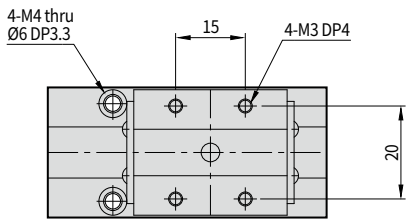
ST06L-10 Example of Auto Switch installation

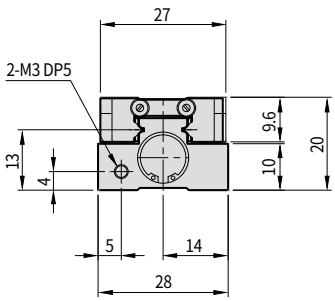


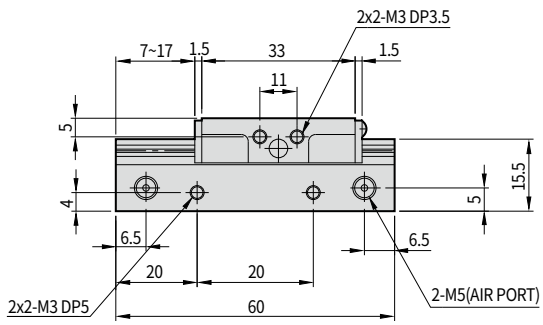


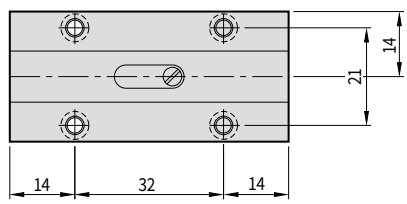
ST Series

ST10L-10

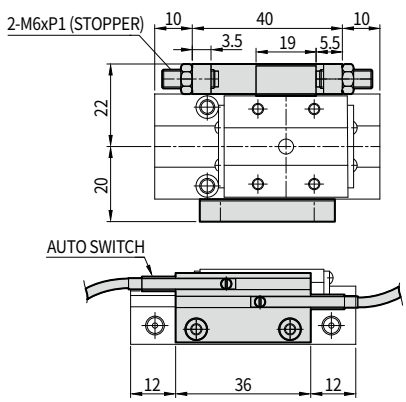


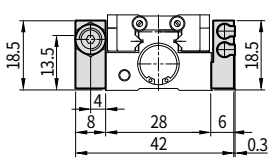




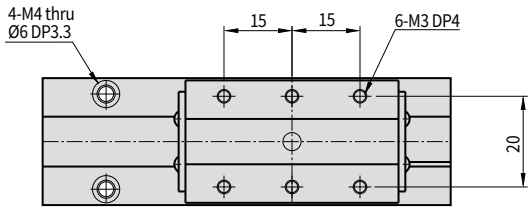


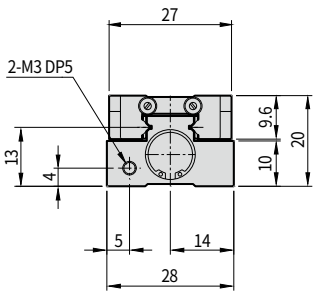
ST10L-10 Example of Auto Switch and stopper installation

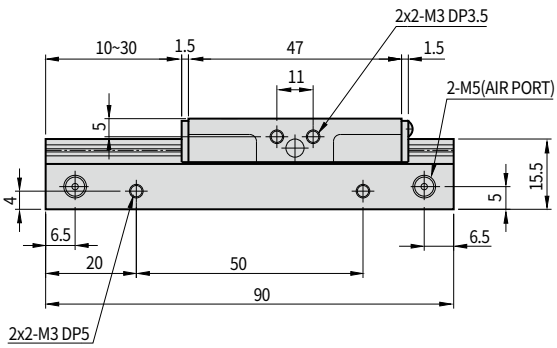


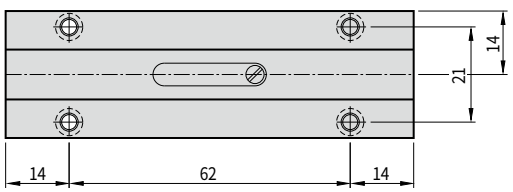


ST10L-20

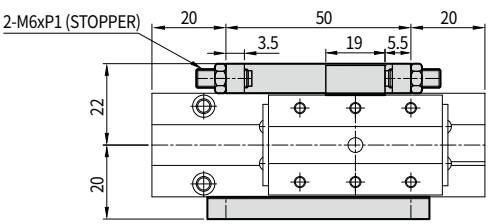


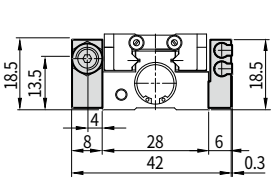


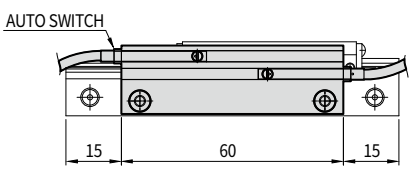




ST10L-20 Example of Auto Switch and stopper installation



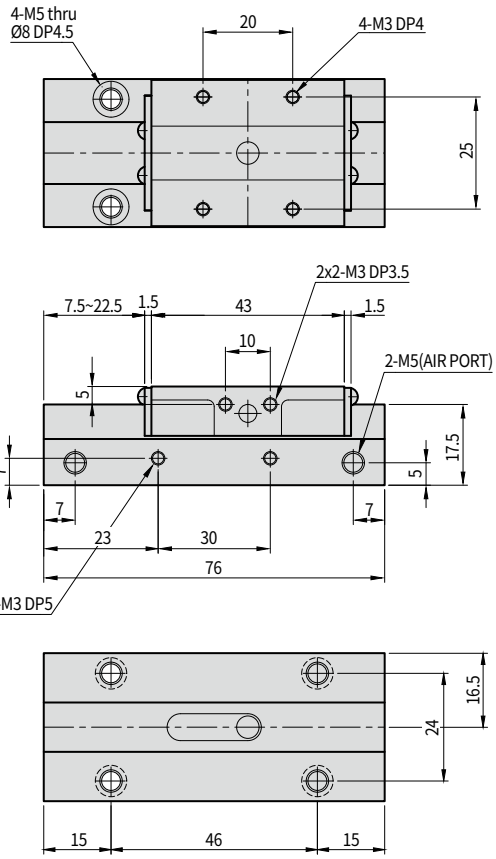


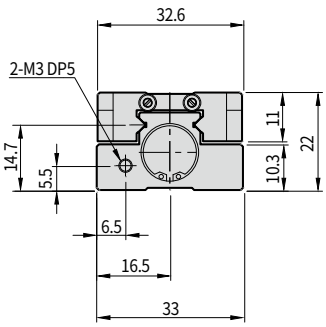


ST Series

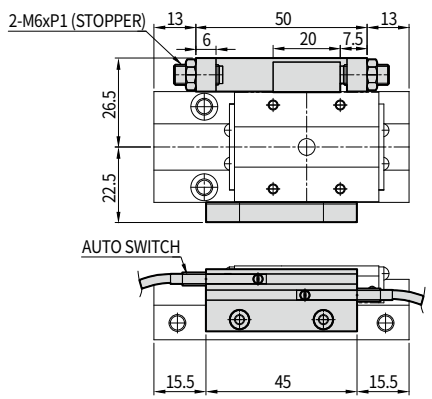
06S 06L 10L 12L 15 25

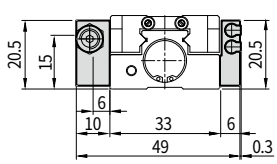
ST12L-15



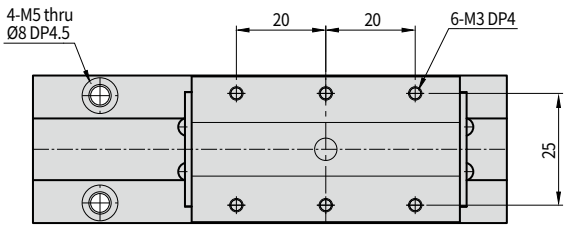


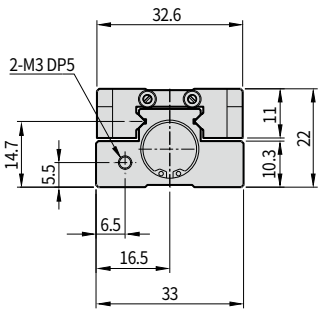
ST12L-15 Example of Auto Switch and stopper installation

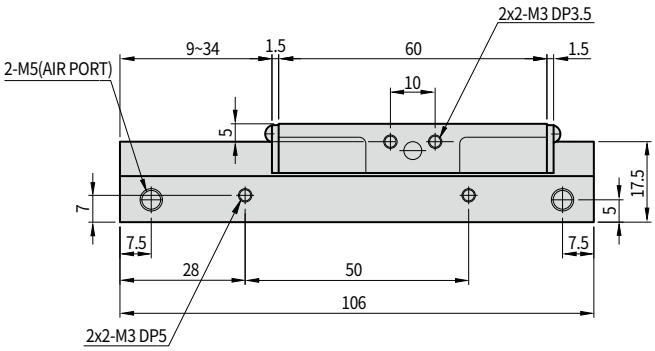


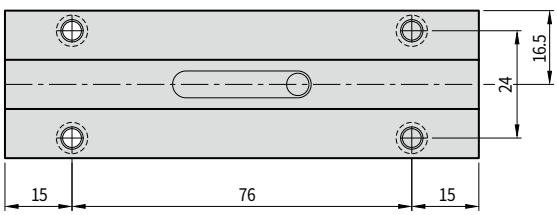


ST12L-25

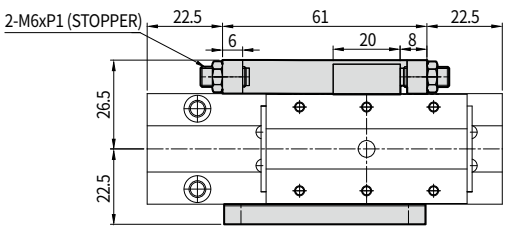


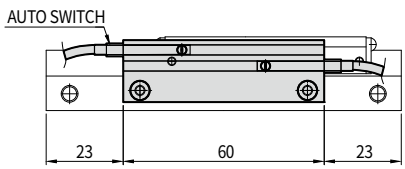


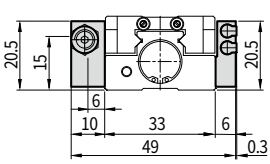




ST12L-25 Example of Auto Switch and stopper installation

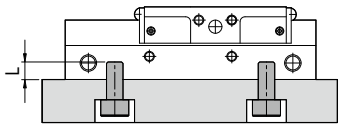






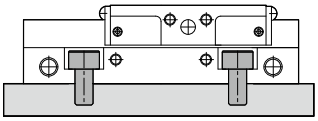
Installation Information

1. Installation by body tap holes



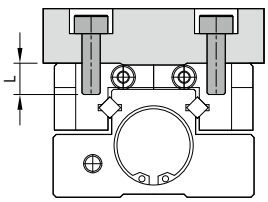
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
ST06S	M2.5×P0.45	4.9	4
ST06L	M3×P0.5	11	5.5
ST10L	M4×P0.7	25	6.5
ST12L	M5×P0.8	51	5.5

2. Installation by body through holes



Item	Fastening Bolt	Max Torque (kgf·cm)
ST06L	M3×P0.5	11
ST10L	M3×P0.5	11
ST12L	M4×P0.7	25

3. Installation by table tap holes



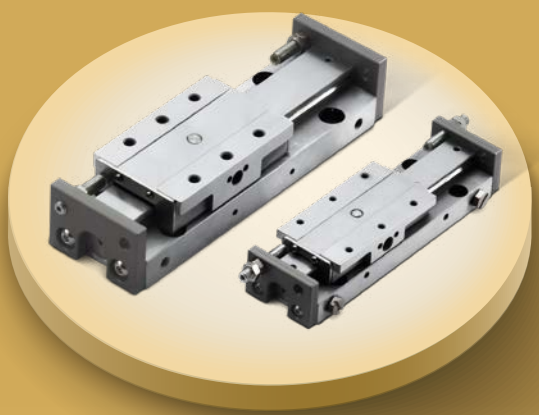
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
ST06S	M2×P0.4	1.5	3
ST06L	M3×P0.5	11	4
ST10L	M3×P0.5	11	4
ST12L	M3×P0.5	11	4

MEMO

CROSS ROLLER GUIDE HIGH PRECISION

STS-L Series

Miniature and high precise table type cylinder



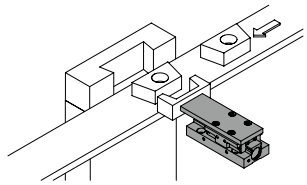
STS06L, 10L, 12L, 16L

Application

Suitable for automation and semiconductor field for feeding of small work-piece and up-down working.

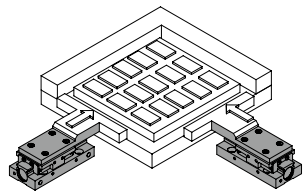
Application 1

Assembling



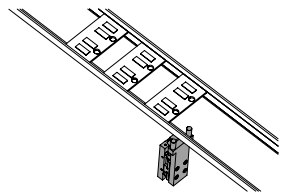
Application 2

PCB Align



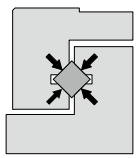
Application 3

Position determination



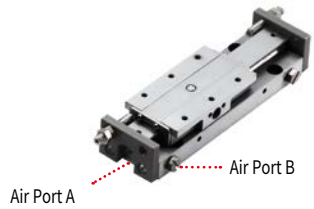
Cross Roller Guide

- Roller bearing crossed aligned guide structure.
- High solidity of 4-direction surface contact.
- High accuracy and high solidity structure not needed extra guide installation.



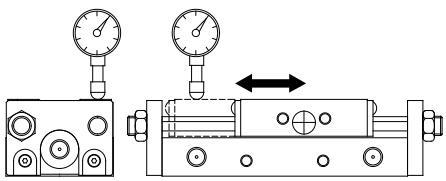
Convenience of air tube piping

- 2 position air ports as standard.



※ Air Port B : closed by plug as initial.

Superior accuracy of table



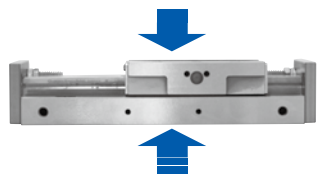
- Table parallelism : 0.03mm
- Table moving parallelism : 0.005mm

Minimized size

- Small linear guide applied.
- Superior space utility.

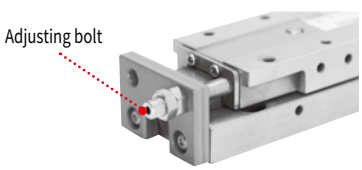
	Height	Width
STS06L	14.5	24
STS10L	20	28
STS12L	22	33
STS16L	32	47

Unit : mm



Stopper for adjust stroke as standard

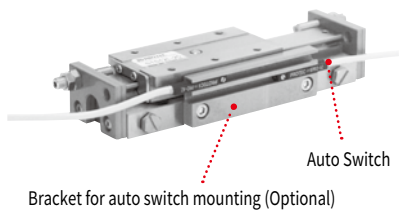
- Easy stroke adjustment by stroke adjust stopper as standard option.



※ Bracket for auto switch mounting. (Optional) : 0~5mm

Auto Switch installation (Optional)

- Auto Switch installation.



※ To mounting auto switch, auto switch mounting bracket option is needed to be selected.

⚠ Individual notes for STS Series ❶

⚠ Caution — Notes in Installation

■ **Be careful to protect "V" groove from damage which the cross roller is rubbed on slide rail and guide.**

■ **Keep away from any object that could be affected by a magnetic field.**

The piston of cylinder has a magnet, so keep it away from magnetic tape, magnetic disc, and etc., which could be affected by a magnetic field.

■ **Be careful not to cause scratch or shock on the cylinder body, mounting surfaces of slide and plate.**

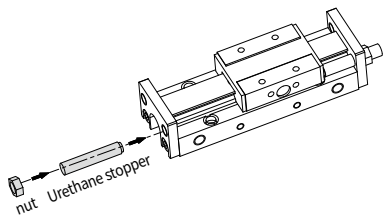
Damage in mounting surfaces makes worse the flatness, and cause work failure due to the increased swing of guide unit and/or friction resistance.

■ **Install screw to the cylinder and tighten it to the specified torque.**

Otherwise, it may cause defect in working. Also, insufficient screw tightening may cause dislocation or work pieces to drop.

■ **To adjust cylinder stroke, perform as follows.**

Loosen the nut for urethane stopper, adjust it to the desired stroke and then tighten it using fixing nut again.



⚠ Caution — Notes in Selection

■ **Do not exceed the specified load when selecting the product.**

Select model based on the specified maximum load factor according to each Bore size. Otherwise, it may result in distorted load of the guide unit, which may cause swing to guide unit, deterioration, and adverse effects on cylinder life.

■ **Avoid excessive external force or shock.**

■ **For the selection of each series, refer to the specification in this catalogue.**

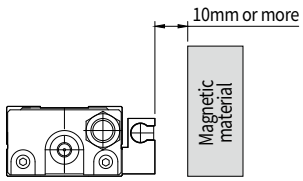
For the selection of each series, refer to the specification in this catalogue. Correct use for cylinder within the specified temperature and pressure range may result in reduction in malfunction and failure.

Please read it before use, with individual notes for each series as well, for your safe use.

⚠ Individual notes for STS Series ❷

⚠ Caution **Notes in operating Environment and Handling**

■ **When there are magnetic materials like steel plate near the switch of cylinder, most likely they may cause malfunction in the switch, therefore they need to be designed and installed with sufficient clearance from the surface of cylinder (maintain 10mm or more).**

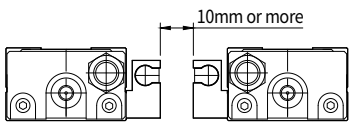


■ **Be careful of using in the place where vibration or shock occurs frequently, it may cause a failure.**

Do not use air cylinder for the purpose of shock or vibration absorbing. It may cause of human injury or damage on the machine parts.

■ **If two or more cylinders are installed close, auto switch might malfunction due to magnetic field interference. It is need to be installed with sufficient space.**

(In case of unavoidable use with less than the minimum free distance, please attach a steel plate or magnetic blocking plate to the opposite cylinder close to the auto switch. If magnetic blocking plate is not installed, it could be the reason of malfunction. For more details, please contact to office.)



Clearance between cylinder can be smaller by installing of magnetic shield

■ **Do not use in the environment that can be affected by foreign substances such as dust and chip, and cutting oil.**

It may cause vibration, increase of frictional resistance, and air leakage. In such environment, please install appropriate protective covers after the consultation with our company.

■ **When used around heat source of high temperature, product can be heated by radiant heat and cause failure. Therefore, install protective covers to block heat source.**

■ **Be care of corrosion resistance for the stability in cross roller guide unit.**

Be care of corrosion resistance in humid environment as water drop can be created in guide unit and it can get rusty in such environment.

■ **Add up lubricant at the frictional surface of cylinder regularly.**

Add up lubricant at the frictional surface of cylinder periodically. It may result in expanded life of cylinder.

■ **To control the moving speed of cylinder, please use speed controller.**

When controlling of moving speed, increase it from low-speed to required speed gradually.

■ **Make sure to connect fixing or connection unit of cylinder firmly.**

Make sure that the cylinder is connected firmly, in particular, if used in the place where vibration and shock occur frequently.

■ **Can select various stroke adjustment unit. Check it before model selection.**

When controlling the cylinder stroke, three different types of cushions can be used according to the intended use.

1. Urethane Stopper : Generalized stroke adjusting unit. (Allowable speed 50~500mm/sec)
2. Metal Stopper : It may improve the precise control of stroke, but doesn't have cushion function, so it is used only for light load and low-speed. As it is special ordering specification, please contact us. (Allowable speed 50~200mm/sec)
3. Shock Absorber : Soft stop by absorbing the shock at the end of stroke. As it is special ordering specification, please contact us.

■ **To maintain the quality of compressed air, exhaust drains in filter periodically.**

■ **If it is needed to remove cylinder from installation, stop supplying of compressed air first and remove it.**

■ **Be careful not to damage on the cable line of auto switch.**

Over bending or scar, damage on the cable of auto switch will cause of current leakage or defect on connection may lead electric shock and/or fire, abnormal motion.

STS-L Series

Features

- Sliding table type miniature cylinder unified air cylinder into the guide block.
- Two ways of air port direction. (Freely air tube connection)
- Big allowable moment although small size body.
- High solidity and moving performance by cross roller bearing inside the sliding table.
- Basically mounted stroke adjust stopper. (Urethane)
- Suitable for automation and semiconductor field for feeding of small work-piece and up-down working.

Order Form

STS 10L - 15 - W - A2 L S

① ② ③ ④ ⑤ ⑥ ⑦

① Series Name

② Cylinder Bore Size

③ Standard Strokes

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))
06L	6	05, 10
10L	10	10, 15, 20
12L	12	15, 20, 25
16L	16	20, 25, 30, 35

④ Auto Switch Mounting Bracket

Order	Models	Bracket	Num of Applicable Auto Switches
Blank	-	Non-Mounted	None
W2	STS06L	Mounted	2PCS
W	STS06L		1PCS
	STS10L STS12L STS12L		2PCS

* 2 auto switches can be installed in one auto switch bracket from STS10L size model.

⑥ Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

⑦ Auto Switch Quantity

Order	Quantity
Blank	2PCS
S	1PCS

※ Reference Table for Options

Options for	Auto Swtich Options		Stopper Options
Models	Bracket	Auto Switch	
STS06L	W	1PCS	Basically Mounted
	W2	2PCS	
STS10L STS12L STS16L	W	2PCS	

⑤ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
A2	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2C	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic reed switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic solid state	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic solid state	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic solid state	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic solid state	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

Accessory Order Form

(1) Auto Switch Mounting Bracket

STS 06L - 10 - W - ASSY
① ② ③ ④ ⑤

① Series Name

② Cylinder Bore Size

③ Standard Strokes

④ Auto Switch mounting bracket

⑤ Order Name for Accessory
- Based for only one set for single side of product.

(2) Stopper

STS 10L - ST - ASSY
① ② ③ ④

① Series Name

② Cylinder Bore Size

③ Stopper

④ Order Name for Accessory
- Based for only one set for single side of product.

Specification

Item Name		STS06L		STS10L			STS12L			STS16L			
CYL Bore Size(mm)		6		10			12			16			
Standard Strokes(mm)		5	10	10	15	20	15	20	25	20	25	30	35
Theoretical Thrust(kgf) P : Air Pressure(kgf/㎠)	Forward	0.28×P		0.78×P			1.13×P			2.01×P			
	Backward												
Fitting Size		M3		M5									
Weight(kgf)		0.1	0.14	0.18	0.23	0.27	0.28	0.33	0.38	0.73	0.85	0.93	1.13
Fluid		Clean Air Note 1)											
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 10.5) Note 2)											
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)											
Temperature Range(℃)		5 ~ 60											
Operation Type		Double Acting											
Accuracy(mm)		± 0.01											

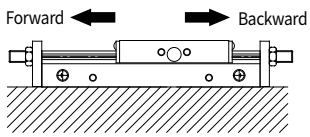
Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

STS-L Series Model Selection Guide

Theoretical Thrust

Unit : kgf

Model	Operating Direction (Ref. figure)	Pressured Surface (mm^2)	Pressure Range (kgf/cm^2)					
			2	3	4	5	6	7
STS06L	Forward	28	0.56	0.84	1.12	1.4	1.68	1.96
	Backward							
STS10L	Forward	78	1.56	2.34	3.12	3.9	4.68	5.46
	Backward							
STS12L	Forward	113	2.26	3.39	4.52	5.65	6.78	7.91
	Backward							
STS16L	Forward	201	4.02	6.03	8.04	10.05	12.06	14.07
	Backward							

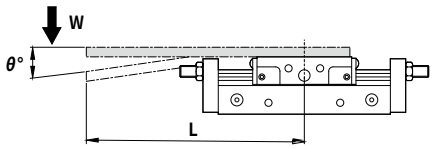


<Operating Direction>

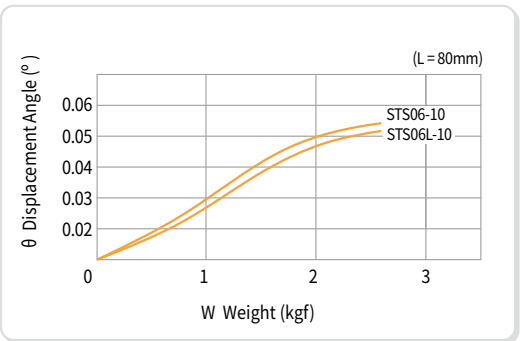
STS-L Series Model Selection Guide

Table Deflection

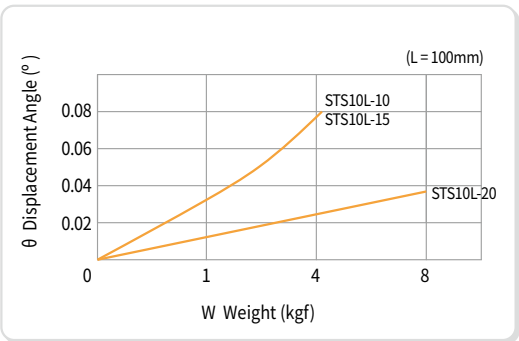
- The graph represents the deflection angle if any static load is applied at the end of table when moved forward as much as the corresponding stroke.
- The deflection angle below mentioned are only for a reference. (Please note that they are NOT maximum value).



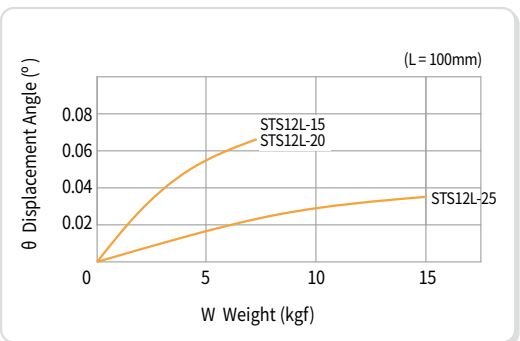
▶ STS06L



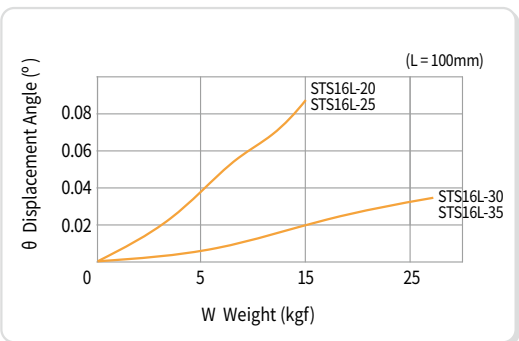
▶ STS10L



▶ STS12L



▶ STS16L

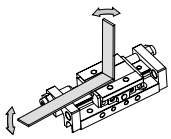
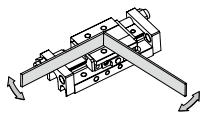
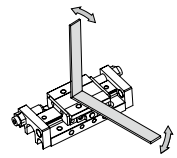
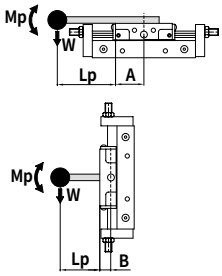
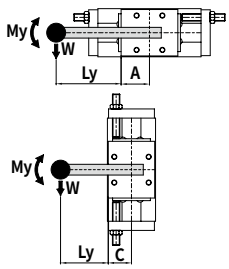
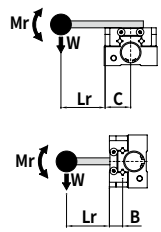
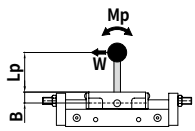
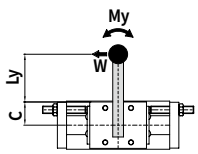


STS-L Series Model Selection Guide

Technical Data by Model

■ Mp, My, Mr 3-directions moment calculation formula Figure 1

※ W : Work Weight (kgf), K : Speed factor

	Pitch Moment (Mp)	Yawing Moment (My)	Rolling Moment (Mr)
Moment Direction			
Static Moment			
Static Moment Formula	Mp = W × (A + STROKE + Lp) Mp = W × (B + Lp)	My = W × (A + STROKE + Ly) My = W × (C + Ly)	Mr = W × (C + Lr) Mr = W × (B + Lr)
Dynamic Moment			
Dynamic Moment Formula	Mp = K × W × (A + Lp) Mp = K × W × (B + Lp)	My = K × W × (A + Ly) My = K × W × (C + Ly)	Mr = K × W × (C + Lr) Mr = K × W × (B + Lr)

■ Corrections from the central distance of moments Table 1

Unit : mm

Model \ Corrections	A	B	C
STS06L-05	12.7	6	12
STS06L-10	12.7	6	12
STS10L-10	16.5	7	13.5
STS10L-15	16.5	7	13.5
STS10L-20	23.5	7	13.5
STS12L-15	21.5	7.3	16.3
STS12L-20	21.5	7.3	16.3
STS12L-25	30	7.3	16.3
STS16L-20	25	12.5	23
STS16L-25	25	12.5	23
STS16L-30	35	12.5	23
STS16L-35	35	12.5	23

■ Maximum allowable moment Table 2

Unit : kgf·cm

Model \ Allowable Moment	Pitching Moment Mp	Yawing Moment My	Rolling Moment Mr
STS06L-05	1.79	1.79	3.45
STS06L-10	1.79	1.79	3.45
STS10L-10	2.39	2.39	5.06
STS10L-15	2.39	2.39	5.06
STS10L-20	3.58	3.58	7.08
STS12L-15	10	10	38
STS12L-20	10	10	38
STS12L-25	15	15	55
STS16L-20	17.2	17.2	58
STS16L-25	17.2	17.2	58
STS16L-30	23.8	23.8	62
STS16L-35	23.8	23.8	62

STS-L Series Model Selection Guide

■ Maximum allowable kinetic energy (Ea) Table 3

Unit : kgf·cm

Model	Allowable Kinetic Energy
STS06L	0.08
STS10L	0.26
STS12L	0.51
STS16L	0.9

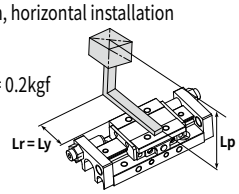
■ Max. Allowable Load (Wa) Table 4

Unit : kgf

Model	Max. Allowable Load
STS06L	0.4
STS10L	1.1
STS12L	1.6
STS16L	2.8

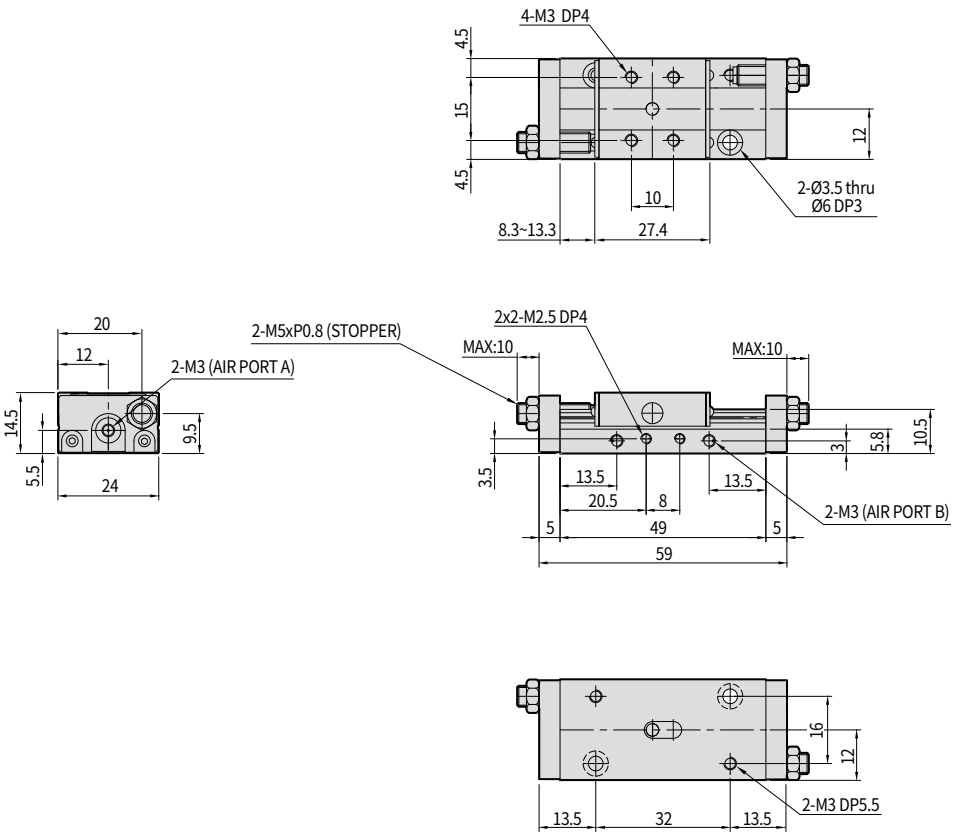
※ For vertical installation, maximum allowable load check is not required.
※ This table is only for reference value to calculate table load ratio.

Example of Model Selection

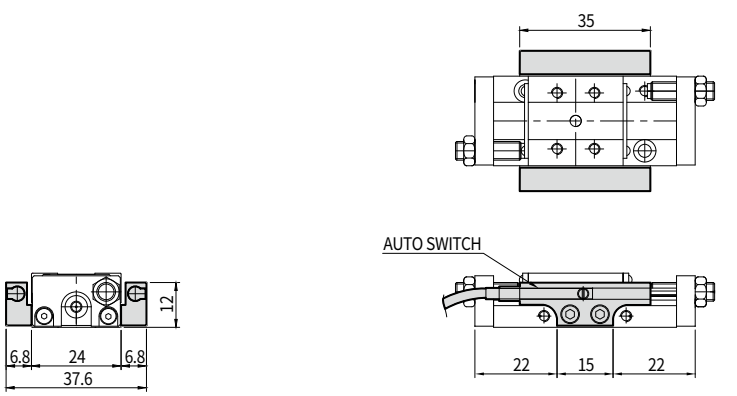
		Applicable Formula	Selection Example
Condition Check		▪ Cylinder model selection ▪ Load weight ▪ Average speed ▪ Distance to the center of gravity in load ▪ Installation type Horizontal installation / Vertical installation 	▪ Check for : STS10L-10 ▪ Table installation, horizontal installation ▪ Average speed : V = 300mm/sec ▪ Work weight W = 0.2kgf Lp = 30mm Ly, Lr = 20mm 
Kinetic Energy Check - The kinetic energy of load should be within the allowable kinetic energy range of cylinder.		Work kinetic energy(kgf·cm) $E = \frac{1}{2} \times \frac{W}{980} \times (\frac{1.4V}{10})^2$ W : Work weight(kgf) V : Average speed(mm/sec) K_1 : Installation Factor(Table installation : 1, Plate installation :1.6) Ea : Allowable kinetic energy(kgf·cm) Table 3 Applicable only if E < Ea	$E = \frac{1}{2} \times \frac{0.2}{980} \times (\frac{1.4 \cdot 300}{10})^2 = 0.18$ kgf·cm Ea = 0.26 kgf·cm Applicable as E(0.18) < Ea(0.26)
Load Factor Check - Loading factor. - Static moment load factor. - Dynamic moment load factor. - Total sum of load factors should not exceed.	Loading Factor	Suitable load weight(kgf) Wt = K × W Loading factor $\theta_1 = \frac{Wt}{Wa}$ W : Work weight(kgf) K : Speed factor(300mm/sec or less : 1, Over 300mm/sec : 1.6) Wa : Allowable load weight(kgf) Table 4 ∗ For vertical installation, maximum allowable load check is not required.	Wt = 1 × 0.2 = 0.2 kgf Wa = 1.1 kgf $\theta_1 = \frac{0.2}{1.1} = 0.18$
	Static Moment	Rolling moment(kgf·cm) Mr = W × (C + Lr) / 10 Rolling moment factor $\theta_2 = \frac{Mr}{Mra}$ W : Work weight(kgf) C : Corrections from the center distance of moment(mm) Table 1 Lr : Distance between end of table to center of load(mm) Figure 1 Mra : Allowable rolling moment(kgf·cm) Table 2	$Mr = \frac{0.2 \times (13.5 + 20)}{10} = 0.67$ kgf·cm Mra = 5.06 kgf $\theta_2 = \frac{0.67}{5.06} = 0.13$
	Dynamic Moment	Pitching moment(kgf·cm) Mp = K × W × (B + Lp) / 10 Yawing moment(kgf·cm) My = K × W × (C + Ly) / 10 Pitching moment factor $\theta_3 = \frac{Mp}{Mpa}$ Yawing moment factor $\theta_4 = \frac{My}{Mya}$ W : Work weight(kgf) K : Speed factor(300mm/sec or less : 1, Over: 300mm/sec : 1.6) B, C : Corrections from the center distance of moments(mm) Table 1 Lp, Ly : Distance between end of table to center of load(mm) Figure 1 Mpa : Allowable pitching moment(kgf·cm) Table 2 Mya : Allowable Yawing moment(kgf·cm) Table 2	$Mp = \frac{1 \times 0.2 \times (7 + 30)}{10} = 0.74$ kgf·cm Mpa = 2.39 kgf $\theta_3 = \frac{0.74}{2.39} = 0.31$ $My = \frac{1 \times 0.2 \times (13.5 + 20)}{10} = 0.67$ kgf·cm Mya = 2.39 kgf $\theta_4 = \frac{0.67}{2.39} = 0.28$
Total Load Factor		$\theta_t = \theta_1 + \theta_2 + \theta_3 + \theta_4 \leqq 1$	$\theta_t = 0.18 + 0.13 + 0.31 + 0.28 = 0.9 \leqq 1$ STS10L-10 is applicable

STS-L Series

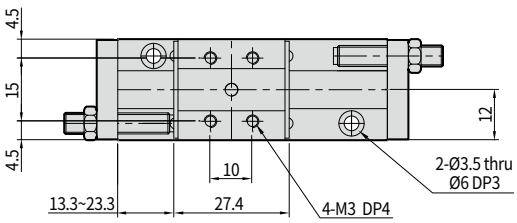
STS06L-05

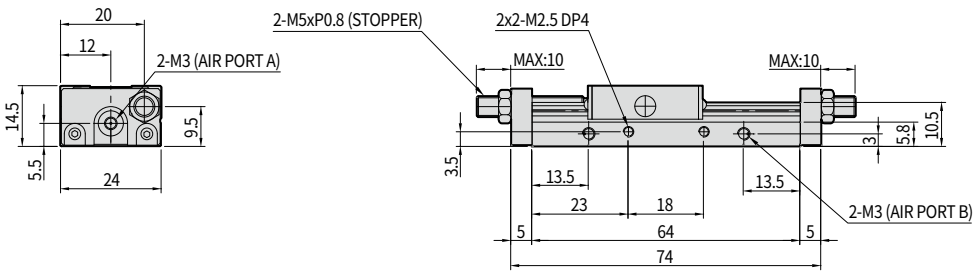


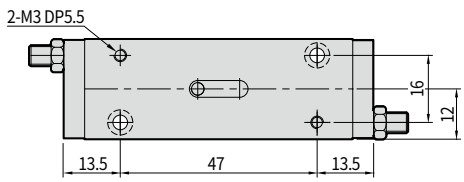
STS06L-05 Example of Auto Switch installation



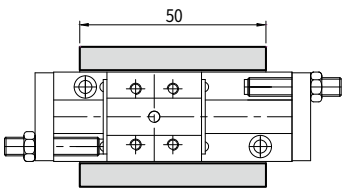
STS06L-10

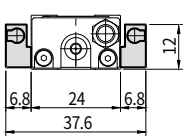


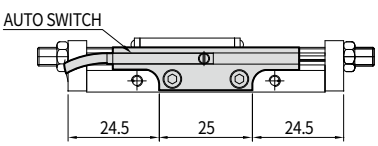




STS06L-10 Example of Auto Switch installation





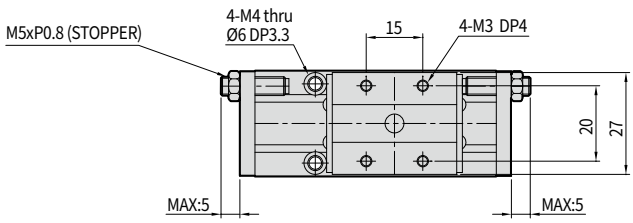


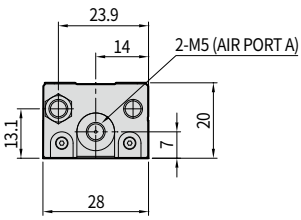
STS-L Series

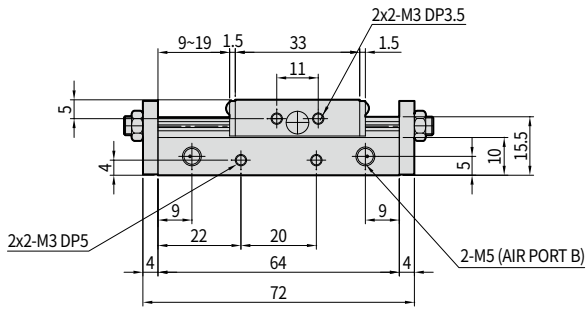
06L 10L 12L 16L

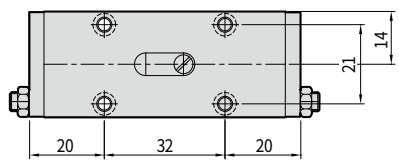
10 15 20

STS10L-10

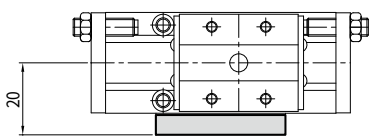


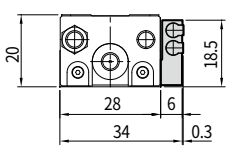


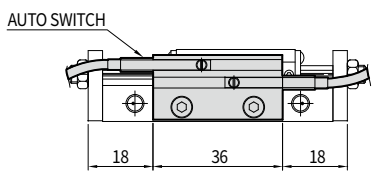




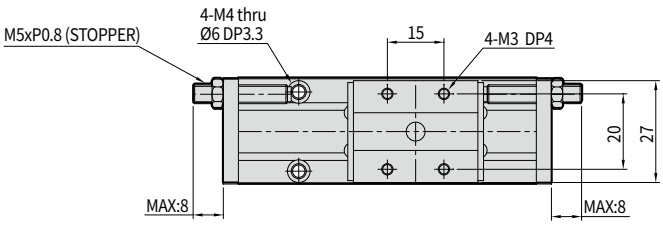
STS10L-10 Example of Auto Switch installation

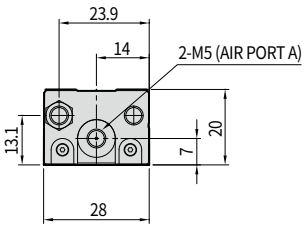


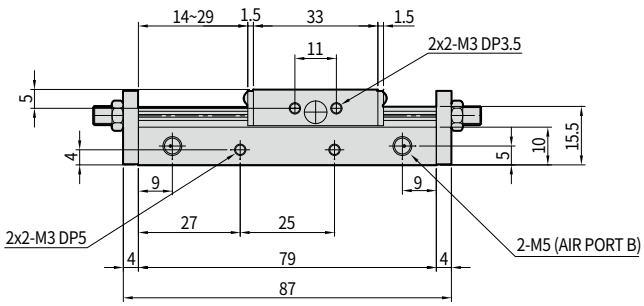


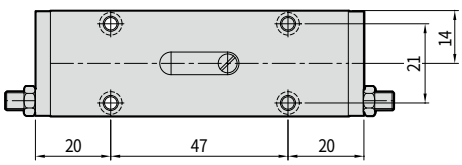


STS10L-15

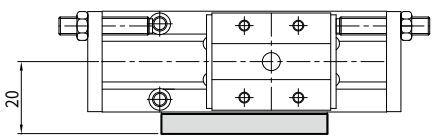


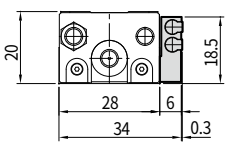


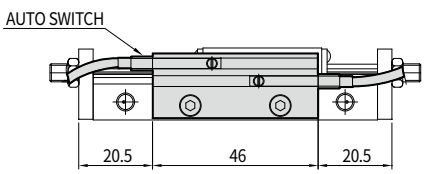




STS10L-15 Example of Auto Switch installation





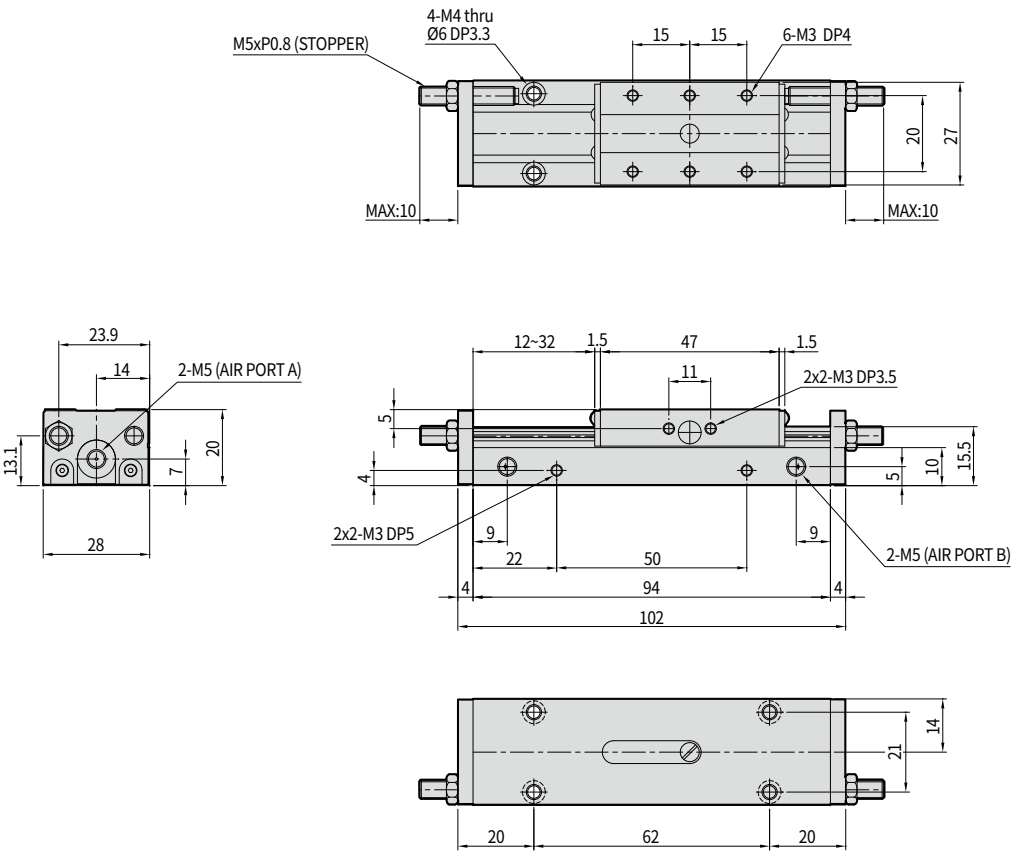


STS-L Series

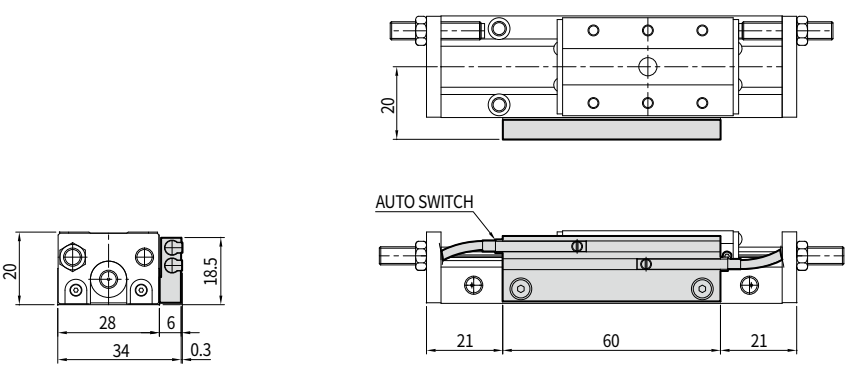
06L 10L 12L 16L

10 15 20

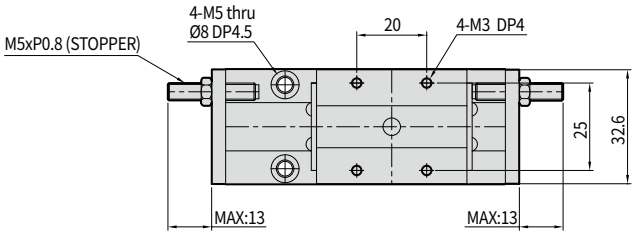
STS10L-20

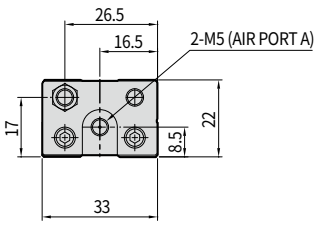


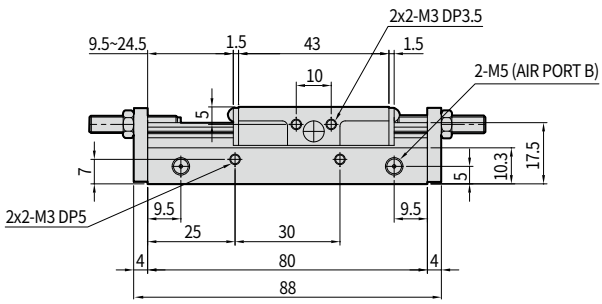
STS10L-20 Example of Auto Switch installation

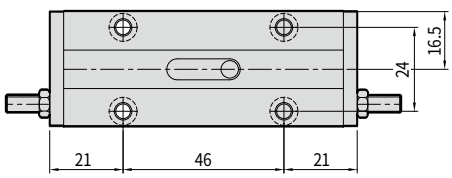


STS12L-15

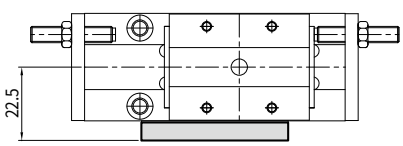


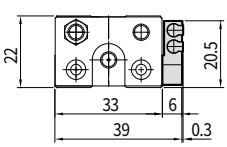


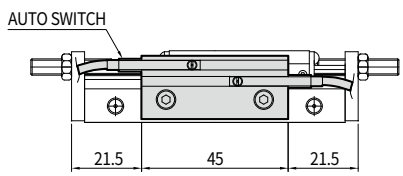




STS12L-15 Example of Auto Switch installation



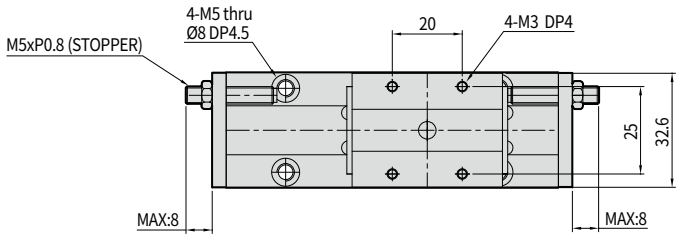


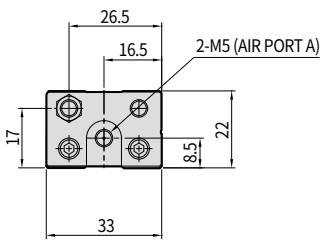


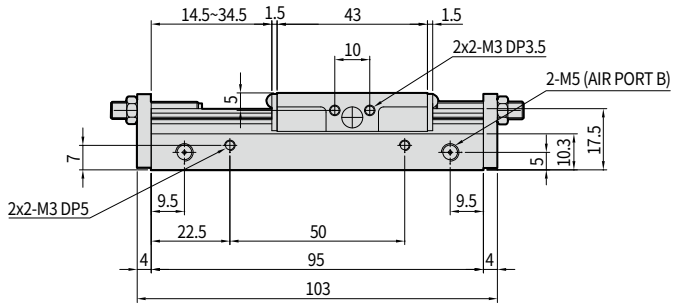
STS-L Series

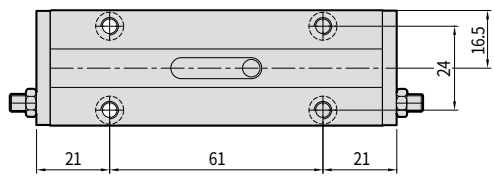
06L 10L 12L 16L
15 20 25

STS12L-20

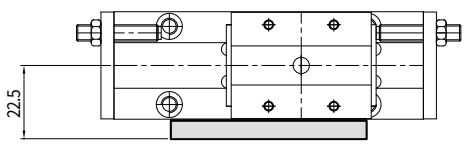


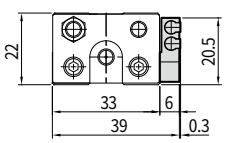


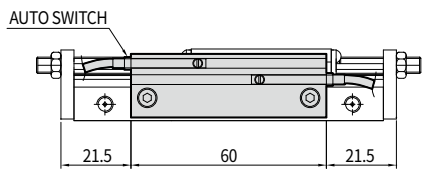




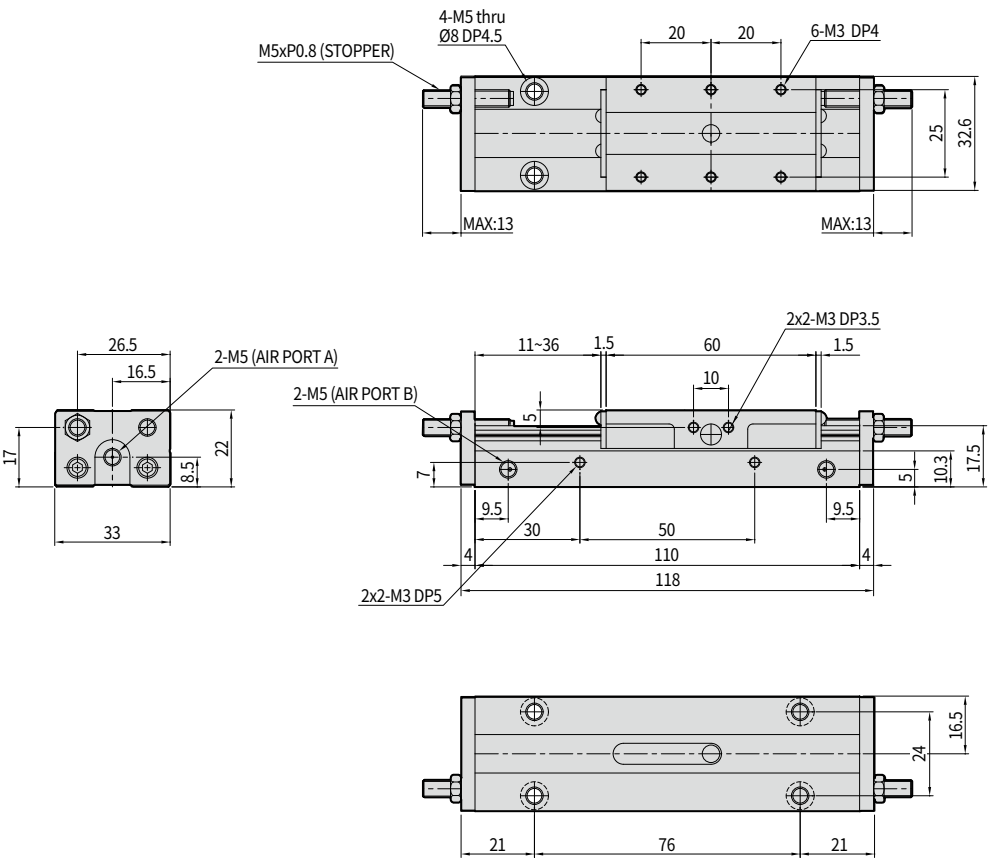
STS12L-20 Example of Auto Switch installation



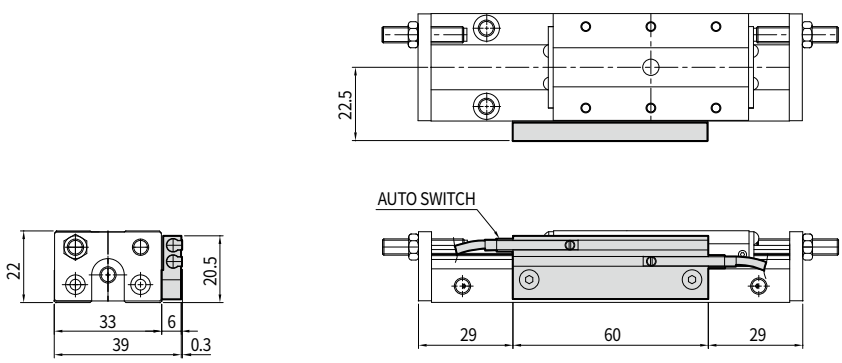




STS12L-25



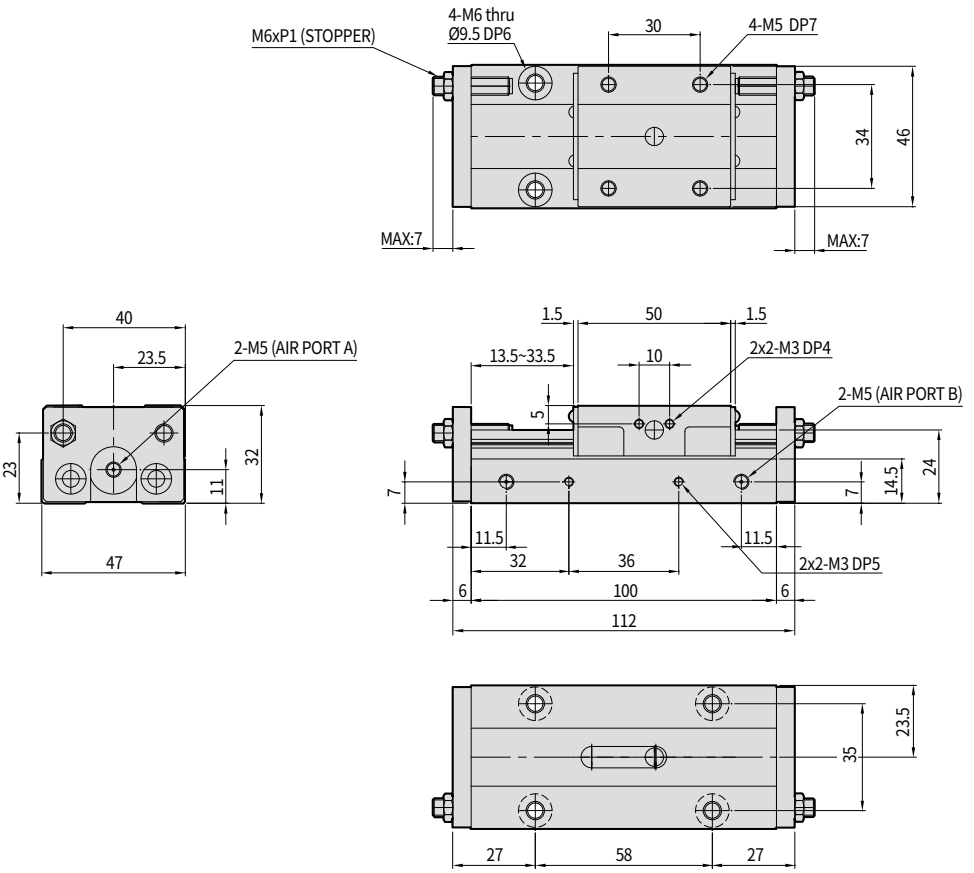
STS12L-25 Example of Auto Switch installation



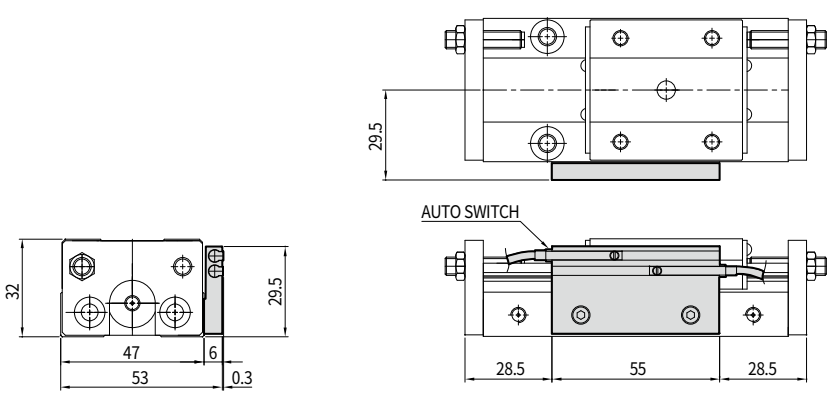
STS-L Series

06L 10L 12L 16L
20 25 30 35

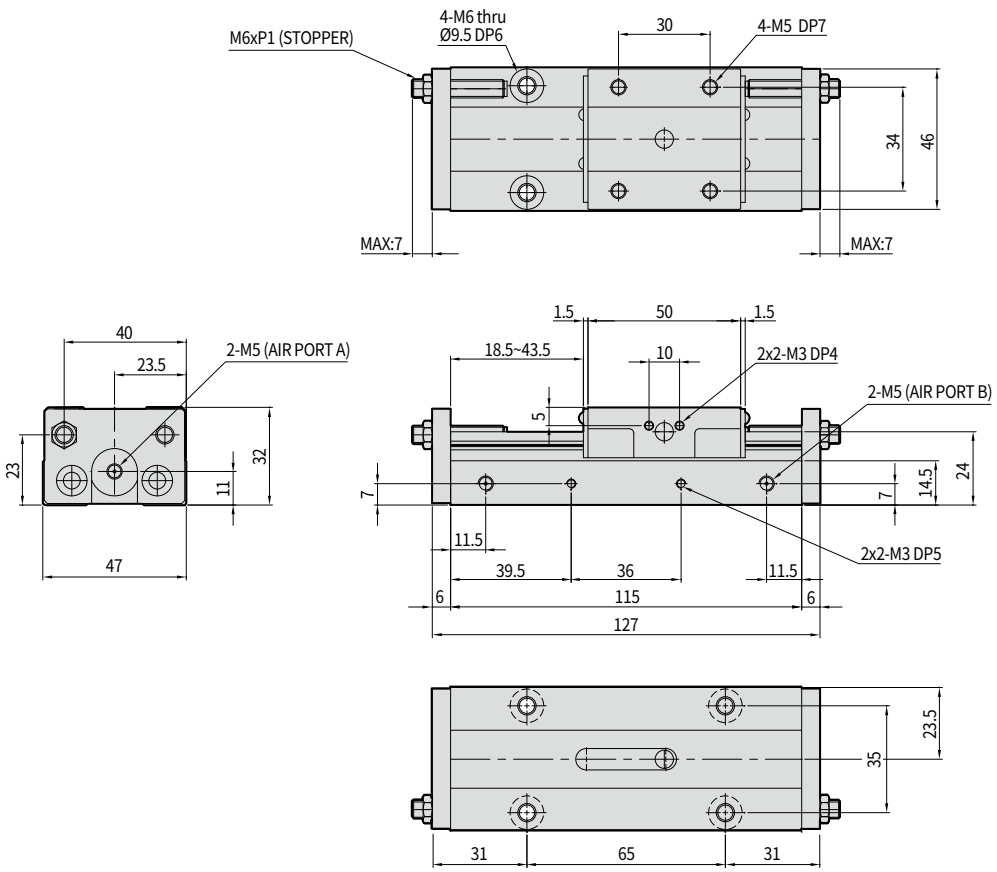
STS16L-20



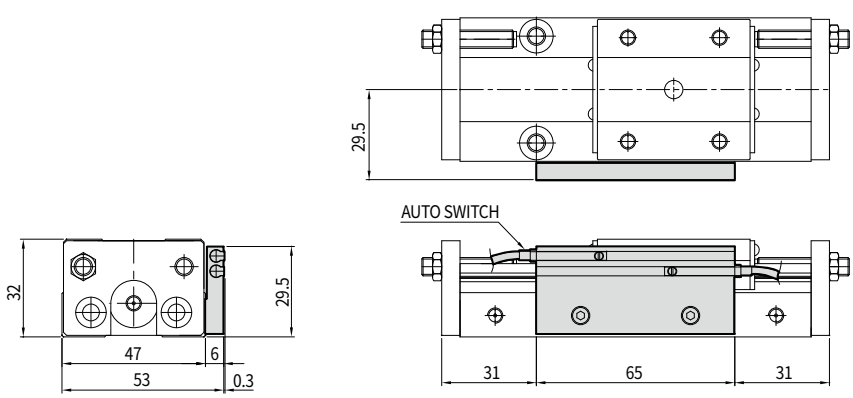
STS16L-20 Example of Auto Switch installation



STS16L-25



STS16L-25 Example of Auto Switch installation

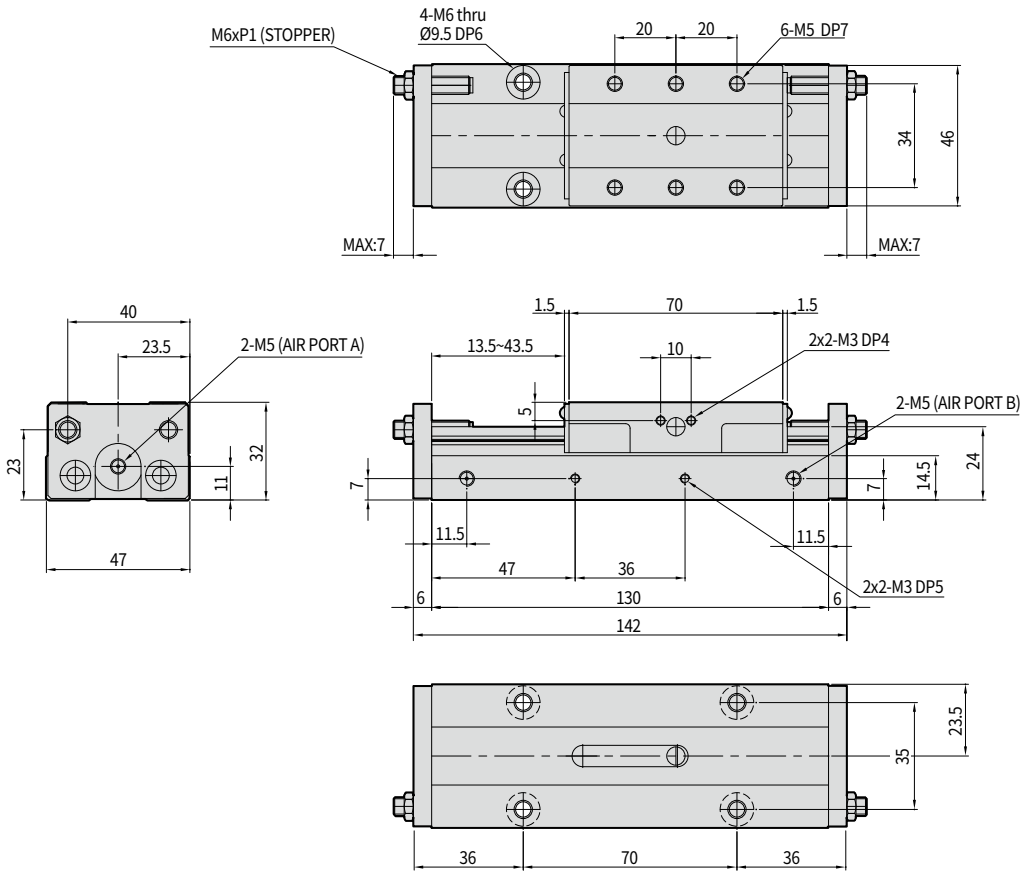


STS-L Series

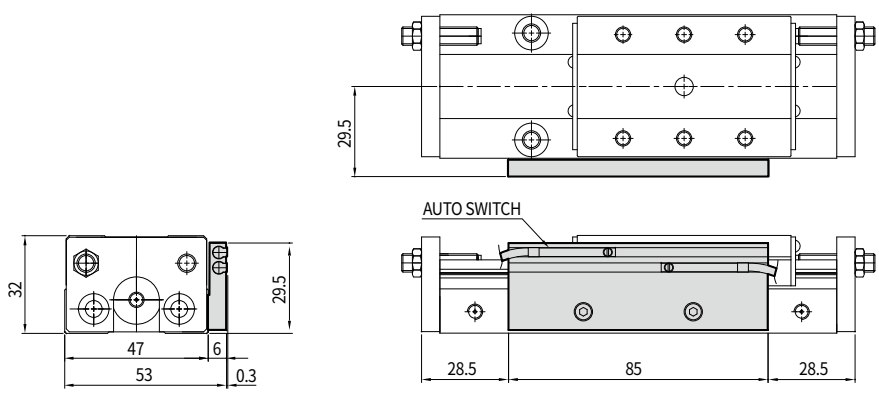
06L 10L 12L **16L**

20 25 **30** 35

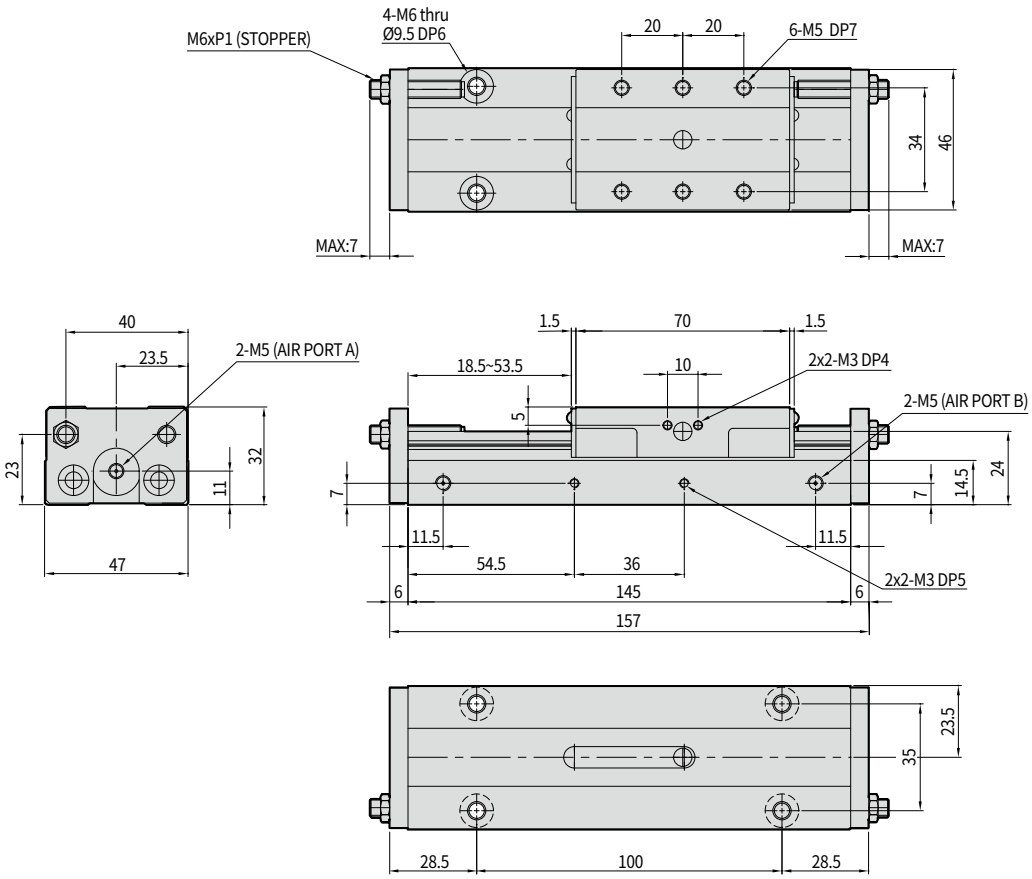
STS16L-30



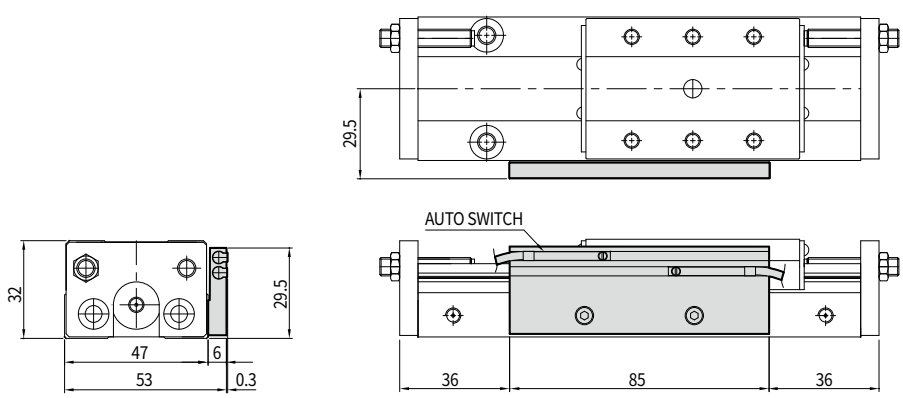
STS16L-30 Example of Auto Switch installation



STS16L-35

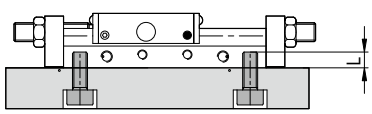


STS16L-35 Example of Auto Switch installation



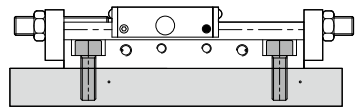
Installation Information

1. Installation by body tap holes



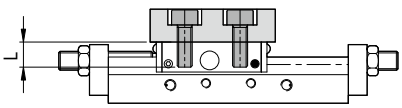
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
STS06L	M3×P0.5	11	5.5
STS10L	M4×P0.7	25	6.5
STS12L	M5×P0.8	51	5.5
STS16L	M6×P1.0	81	7

2. Installation by body through holes



Item	Fastening Bolt	Max Torque (kgf·cm)
STS06L	M3×P0.5	11
STS10L	M3×P0.5	11
STS12L	M3×P0.5	11
STS16L	M5×P0.8	51

3. Installation by table tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
STS06L	M3×P0.5	11	4
STS10L	M3×P0.5	11	4
STS12L	M3×P0.5	11	4
STS16L	M5×P0.8	51	7

MEMO

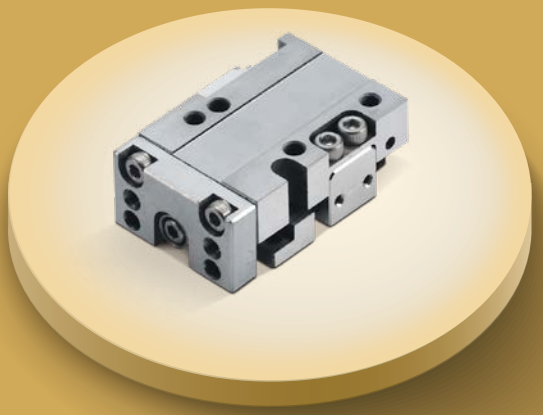
Application

Suitable for precise moving of small components and IC chips, precise pressing, position reversing in semiconductor, LCD manufacturing and SMT line.

CROSS ROLLER GUIDE HIGH PRECISION

SD Series

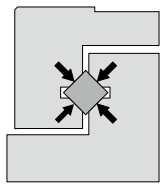
Miniature and high precise table type cylinder



SD05, 06, 08, 12

Cross Roller Guide

- Roller bearing crossed aligned guide structure.
- High solidity of 4-direction surface contact.
- High accuracy and high solidity structure not needed extra guide installation.

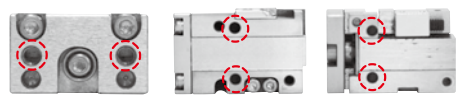


Strong Steel Body against external shock

Positioning holes for reproducibility of installation

- Three positioning holes are supplied for reproduci- bility in install and uninstall.

Plate Table Block

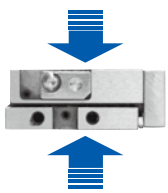


Slim and simple, compact appearance

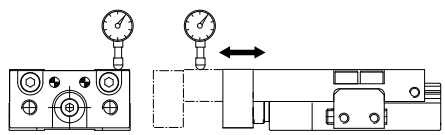
- Small linear guide applied.
- Superior space utility.

	Height	Width
SD05	11	22
SD06	12	24
SD08	14	28
SD12	19	33

Unit : mm



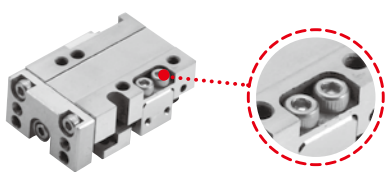
Superior accuracy of table



- Table parallelism : 0.03mm
- Table moving parallelism : 0.005mm

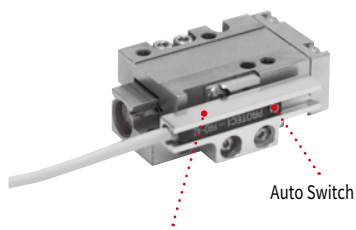
Side stopper inside

- No projection of stopper as positioning forward stroke stopper inside of body, improved space utility.
- For forward working, supplies stable linear motion by minimize the shock moment effect on the guide part.



Auto Switch installation (Optional)

- Auto Switch installation.



※ Bracket for auto switch mounting. (Optional)

※ To mounting auto switch, auto switch mounting bracket option is needed to be selected.

⚠ Individual notes for SD Series ❶

⚠ Caution — Notes in Installation

■ **Be careful to protect "V" groove from damage which the cross roller is rubbed on slide rail and guide.**

■ **Keep away from any object that could be affected by a magnetic field.**

The piston of cylinder has a magnet, so keep it away from magnetic tape, magnetic disc, and etc., which could be affected by a magnetic field.

■ **Be careful not to cause scratch or shock on the cylinder body, mounting surfaces of slide and plate.**

Damage in mounting surfaces makes worse the flatness, and cause work failure due to the increased swing of guide unit and/or friction resistance.

■ **Install screw to the cylinder and tighten it to the specified torque.**

Otherwise, it may cause defect in working. Also, insufficient screw tightening may cause dislocation or work pieces to drop.

⚠ Caution — Notes in Selection

■ **Do not exceed the specified load when selecting the product.**

Select model based on the specified maximum load factor according to each Bore size. Otherwise, it may result in distorted load of the guide unit, which may cause swing to guide unit, deterioration, and adverse effects on cylinder life.

■ **Avoid excessive external force or shock.**

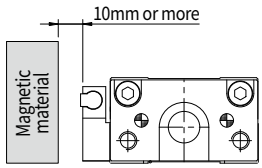
■ **For the selection of each series, refer to the specification in this catalogue.**

For the selection of each series, refer to the specification in this catalogue. Correct use for cylinder within the specified temperature and pressure range may result in reduction in malfunction and failure.

⚠ Individual notes for SD Series ❷

⚠ Caution **Notes in operating Environment and Handling**

■ **When there are magnetic materials like steel plate near the switch of cylinder, most likely they may cause malfunction in the switch, therefore they need to be designed and installed with sufficient clearance from the surface of cylinder (maintain 10mm or more).**

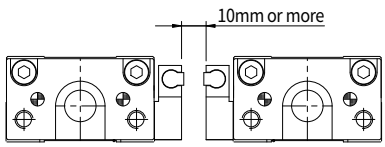


■ **Be careful of using in the place where vibration or shock occurs frequently, it may cause a failure.**

Do not use air cylinder for the purpose of shock or vibration absorbing. It may cause of human injury or damage on the machine parts.

■ **If two or more cylinders are installed close, auto switch might malfunction due to magnetic field interference. It is need to be installed with sufficient space.**

(In case of unavoidable use with less than the minimum free distance, please attach a steel plate or magnetic blocking plate to the opposite cylinder close to the auto switch. If magnetic blocking plate is not installed, it could be the reason of malfunction. For more details, please contact to office.)



Clearance between cylinder can be smaller by installing of magnetic shield

■ **Do not use in the environment that can be affected by foreign substances such as dust and chip, and cutting oil.**

It may cause vibration, increase of frictional resistance, and air leakage. In such environment, please install appropriate protective covers after the consultation with our company.

■ **When used around heat source of high temperature, product can be heated by radiant heat and cause failure. Therefore, install protective covers to block heat source.**

■ **Be care of corrosion resistance for the stability in cross roller guide unit.**

Be care of corrosion resistance in humid environment as water drop can be created in guide unit and it can get rusty in such environment.

■ **Add up lubricant at the frictional surface of cylinder regularly.**

Add up lubricant at the frictional surface of cylinder periodically. It may result in expanded life of cylinder.

■ **To control the moving speed of cylinder, please use speed controller.**

When controlling of moving speed, increase it from low-speed to required speed gradually.

■ **Make sure to connect fixing or connection unit of cylinder firmly.**

Make sure that the cylinder is connected firmly, in particular, if used in the place where vibration and shock occur frequently.

■ **Can select various stroke adjustment unit. Check it before model selection.**

When controlling the cylinder stroke, three different types of cushions can be used according to the intended use.

1. Urethane Stopper : Generalized stroke adjusting unit. (Allowable speed 50~500mm/sec)
2. Metal Stopper : It may improve the precise control of stroke, but doesn't have cushion function, so it is used only for light load and low-speed. As it is special ordering specification, please contact us. (Allowable speed 50~200mm/sec)
3. Shock Absorber : Soft stop by absorbing the shock at the end of stroke. As it is special ordering specification, please contact us.

■ **To maintain the quality of compressed air, exhaust drains in filter periodically.**

■ **If it is needed to remove cylinder from installation, stop supplying of compressed air first and remove it.**

■ **Be careful not to damage on the cable line of auto switch.**

Over bending or scar, damage on the cable of auto switch will cause of current leakage or defect on connection may lead electric shock and/or fire, abnormal motion.

SD Series

Features

- High precise cross roller guide applied.
- Suitable for assembling precise component and feeding, pusher, up & down, positioning for semiconductor field.
- Superior table moving parallelism by steel alloy body strong against external shock.
- Slim and simple, compact appearance.
- Basically mounted stroke adjusting stopper.
- Big allowable moment although small size body. (Improved allowable moment by 4-surface contact)
- Diversity of installation and application.
- Auto Switch installation. (Optional, needed auto switch mounting bracket)

Order Form

SD 08 - 15 - E - W - A2 L S - U

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series Name

② Cylinder Bore Size / ③ Standard Strokes

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))
05	5	05, 10
06	6	05, 10, 15
08	8	05, 10, 15, 20
12	12	10, 20, 30

④ Special Option

Order	Special Option
Blank	Standard
E	Secondary battery field

⑤ Auto Switch Mounting Bracket

Order	Bracket
Blank	Non-Mounted
W	Mounted

⑦ Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

⑧ Auto Switch Quantity

Order	Quantity
S	1PCS

* Only one auto switch can be mounted for SD model.

⑨ Stopper

Order	Types of Stopper
U	Urethane Stopper
ME	Metal Stopper

⑥ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
A2	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2C	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic reed switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic solid state	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic solid state	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic solid state	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic solid state	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

Accessory Order Form

(1) Auto Switch Mounting Bracket

SD 08 - 15 - W - ASSY
① ② ③ ④ ⑤

① Series Name

② Cylinder Bore Size

③ Standard Strokes

④ Auto Switch mounting bracket

⑤ Order Name for Accessory
- Based for only one set for single side of product.

Specification

Item Name		SD05		SD06			SD08				SD12		
CYL Bore Size(mm)		6		6			10				12		
Rod Size(mm)		3		3			4				6		
Standard Strokes(mm)		5	10	5	10	15	5	10	15	20	10	20	30
Theoretical Thrust(kgf)	Forward	0.28×P		0.28×P			0.5×P				1.13×P		
P : Air Pressure(kgf/㎠)	Backward	0.21×P		0.21×P			0.37×P				0.85×P		
Fitting Size		M3									M5		
Weight(kgf)		0.06	0.07	0.08	0.09	0.10	0.12	0.14	0.17	0.20	0.20	0.25	0.3
Fluid		Clean Air Note 1)											
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 10.5) Note 2)											
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)											
Stopper Sptions		Urethane Stopper Metal Stopper - No cushion function											
Temperature Range(℃)		5 ~ 60											
Moving Speed(mm/sec)		50 ~ 500 mm/sec (For Metal Stopper, 50 ~ 200 mm/sec)											
Stroke Tolerance for Forward Position (mm)		0 ~ +1											
Operation Type		Double Acting											
Accuracy(mm)		± 0.01											

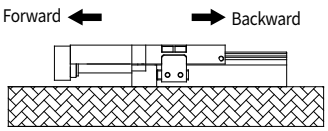
Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

SD Series Model Selection Guide

Theoretical Thrust

Unit : kgf

Model	Operating Direction (Ref. figure)	Pressured Surface (mm^2)	Pressure Range (kgf/cm^2)					
			2	3	4	5	6	7
SD05	Forward	28	0.56	0.84	1.12	1.4	1.68	1.96
	Backward	21	0.42	0.63	0.84	1.05	1.26	1.47
SD06	Forward	28	0.56	0.84	1.12	1.4	1.68	1.96
	Backward	21	0.42	0.63	0.84	1.05	1.26	1.47
SD08	Forward	50	1	1.5	2	2.5	3	3.5
	Backward	37	0.74	1.11	1.48	1.85	2.22	2.59
SD12	Forward	113	2.26	3.39	4.52	5.65	6.78	7.91
	Backward	85	1.7	2.55	3.4	4.25	5.1	5.95

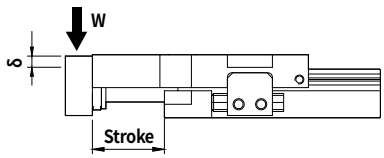


<Operating Direction>

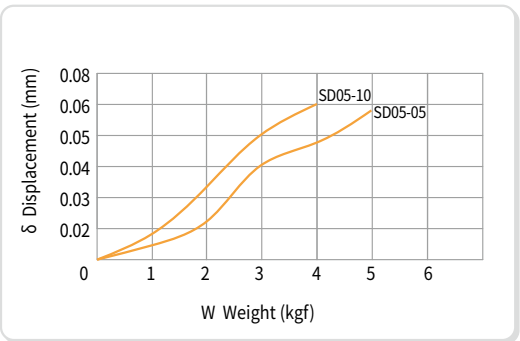
SD Series Model Selection Guide

Table Deflection

- The graph represents the deflection if any static load is applied at the end of table when moved forward as much as the corresponding stroke.
- The deflection below mentioned are only for a reference. (Please note that they are NOT maximum value)



▶ SD05



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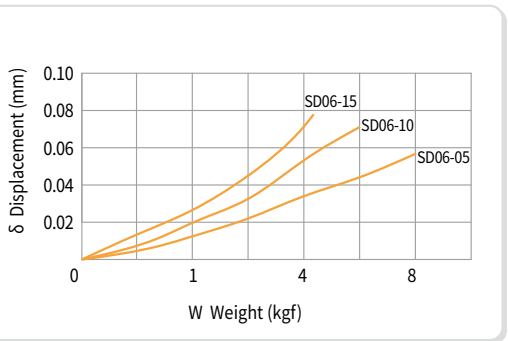
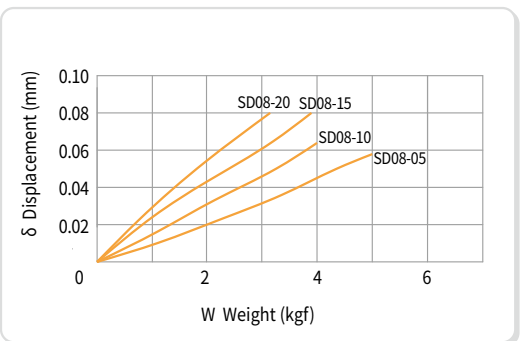
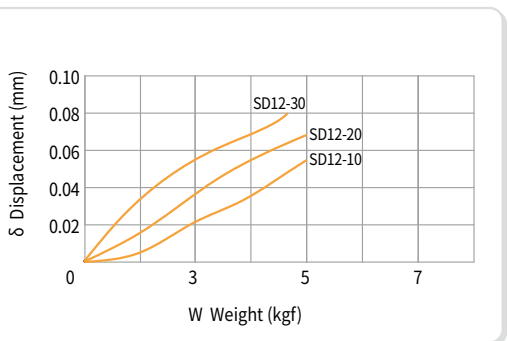


▶ SD08



▶ SD12

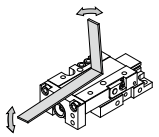
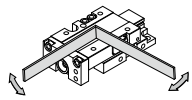
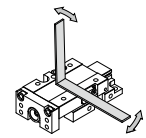
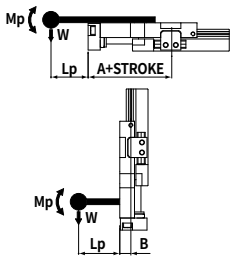
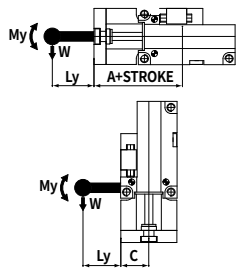
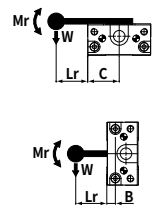
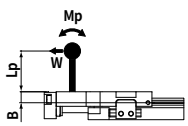
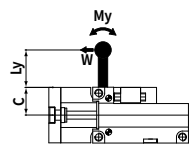


SD Series Model Selection Guide

Technical Data by Model

■ Mp, My, Mr 3-directions moment calculation formula Figure 1

※ W : Work Weight (kgf), K_2 : Speed factor, K_3 : Shock factor

	Pitch Moment (Mp)	Yawing Moment (My)	Rolling Moment (Mr)
Moment Direction			
Static Moment			
Static Moment Formula	Mp = W × (A + STROKE + Lp) Mp = W × (B + Lp)	My = W × (A + STROKE + Ly) My = W × (C + Ly)	Mr = W × (C + Lr) Mr = W × (B + Lr)
Dynamic Moment			
Dynamic Moment Formula	Mp = K_2 × K_3 × W × (A + STROKE + Lp) Mp = K_2 × K_3 × W × (B + Lp)	My = K_2 × K_3 × W × (A + STROKE + Ly) My = K_2 × K_3 × W × (C + Ly)	Mr = K_2 × K_3 × W × (C + Lr) Mr = K_2 × K_3 × W × (B + Lr)

■ Corrections from the central distance of moments Table 1

Unit : mm

Model \ Corrections	A	B	C
SD05-05	21	3.7	11
SD05-10	21	3.7	11
SD06-05	21	4.5	12
SD06-10	21	4.5	12
SD06-15	23	4.5	12
SD08-05	23	5.5	14
SD08-10	23	5.5	14
SD08-15	24	5.5	14
SD08-20	25	5.5	14
SD12-10	26.5	5.8	16.5
SD12-20	30	5.8	16.5
SD12-30	33	5.8	16.5

■ Maximum allowable moment Table 2

Unit : kgf·cm

Model \ Allowable Moment	Pitching Moment Mp	Yawing Moment My	Rolling Moment Mr
SD05-05	2.02	2.02	7.43
SD05-10	2.02	2.02	7.43
SD06-05	4.14	4.14	7.59
SD06-10	4.14	4.14	7.59
SD06-15	4.97	4.97	8.86
SD08-05	4.97	4.97	10.58
SD08-10	4.97	4.97	10.58
SD08-15	4.97	4.97	10.58
SD08-20	5.80	5.80	12.10
SD12-10	10.00	10.00	35.23
SD12-20	14.28	14.28	48.44
SD12-30	17.14	17.14	57.24

■ Maximum allowable kinetic energy (Ea) Table 3

※ Allowable value for Urethane Stopper

Unit : kgf·cm

Model	Allowable Kinetic Energy
SD05	0.08
SD06	0.11
SD08	0.16
SD12	0.55

■ Max. Allowable Load (Wa) Table 4

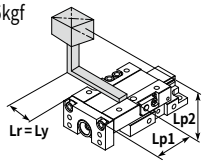
Unit : kgf

Model	Max. Allowable Load
SD05	0.15
SD06	0.25
SD08	0.4
SD12	1.2

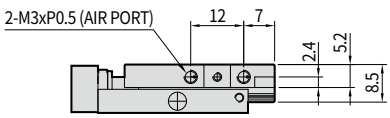
※ For vertical installation, maximum allowable load check is not required.
※ This table is only for reference value to calculate table load ratio.

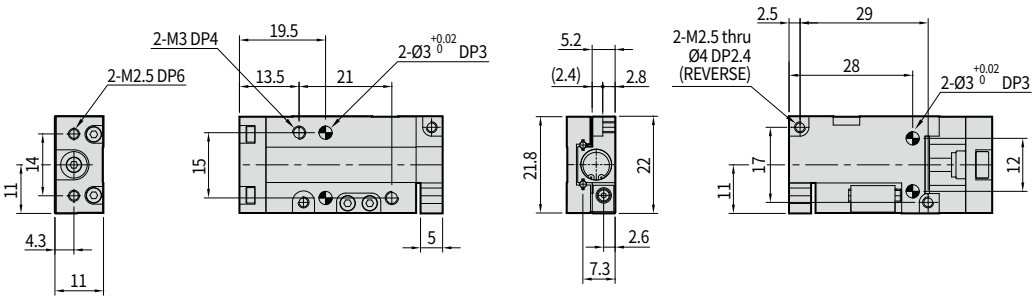
SD Series Model Selection Guide

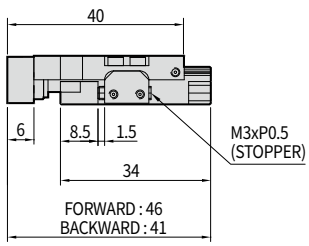
Example of Model Selection

		Applicable Formula	Selection Example
Condition Check		▪ Cylinder model selection ▪ Load weight ▪ Cushion type(Urethane / Metal) ▪ Installation type Horizontal installation / Vertical installation ▪ Average speed ▪ Distance to the center of gravity in load ▪ Load installation Plate installation / Table installation	▪ Check for : SD12-30 ▪ Table installation, Horizontal use ▪ Urethane cushion ▪ Average speed : V = 300mm/sec ▪ Work weight W = 0.5kgf Lp1 = 30mm Lp2 = 30mm Ly, Lr = 20mm 
Kinetic Energy Check - The kinetic energy of load should be within the allowable kinetic energy range of cylinder.		Work kinetic energy(kgf·cm) $E = K_1 \times \frac{1}{2} \times \frac{W}{980} \times (\frac{1.4V}{10})^2$ W : Work weight(kgf) V : Average speed(mm/sec) K_1 : Installation Factor(Table installation : 1, Plate installation :1.6) Ea : Allowable kinetic energy(kgf·cm) Table 3 Applicable only if E < Ea	$E = 1 \times \frac{1}{2} \times \frac{0.5}{980} \times (\frac{1.4 \cdot 300}{10})^2 = 0.45$ kgf·cm Ea = 0.55 kgf·cm Applicable as E(0.45) < Ea(0.55)
Load Factor Check - Loading factor. - Static moment load factor. - Dynamic moment load factor. - Total sum of load factors should not exceed.	Loading Factor	Suitable load weight(kgf) $Wt = K_1 \times K_2 \times W$ Loading factor $\theta_1 = \frac{Wt}{Wa}$ W : Work weight(kgf) K_1 : Installation Factor (Table installation : 1, Plate installation :1.6) K_2 : Speed factor(300mm/sec or less : 1, Over: 300mm/sec : 1.6) Wa : Allowable load weight(kgf) Table 4 ∗ For vertical installation, maximum allowable load check is not required.	$Wt = 1 \times 1 \times 0.5 = 0.5$ kgf Wa = 1.2 kgf $\theta_1 = \frac{0.5}{1.2} = 0.41$
	Static Moment	Pitching moment(kgf·cm) $Mp = W \times (A + Stroke + Lp_1) / 10$ Rolling moment(kgf·cm) $Mr = W \times (C + Lr) / 10$ Pitching moment factor $\theta_2 = \frac{Mp}{Mpa}$ Rolling moment factor $\theta_3 = \frac{Mr}{Mra}$ W : Work weight(kgf) A, C : Corrections from the center distance of moment(mm) Table 1 Lp, Lr : Distance between end of table to center of load(mm) Figure 1 Mpa : Allowable pitching moment(kgf·cm) Table 2 Mra : Allowable rolling moment(kgf·cm) Table 2	$Mp = \frac{0.5 \times (33 + 30 - 30)}{10} = 1.65$ kgf·cm $\theta_2 = \frac{1.65}{17.14} = 0.1$ $Mr = \frac{0.5 \times (16.5 + 20)}{10} = 1.82$ kgf·cm $\theta_3 = \frac{1.82}{57.24} = 0.03$
	Dynamic Moment	Pitching moment(kgf·cm) $Mp = K_2 \times K_3 \times W \times (B + Lp_2) / 10$ Yawing moment(kgf·cm) $My = K_2 \times K_3 \times W \times (C + Ly) / 10$ Pitching moment factor $\theta_4 = \frac{Mp}{Mpa}$ Yawing moment factor $\theta_5 = \frac{My}{Mya}$ W : Work weight(kgf) K_2 : Speed factor(300mm/sec or less : 1, Over: 300mm/sec : 1.6) K_3 : Shock factor(Urethane : 1, shock absorber : 0.25) B, C : Corrections from the center distance of moments(mm) Table 1 Lp, Ly : Distance between end of table to center of load(mm) Figure 1 Mpa : Allowable pitching moment(kgf·cm) Table 2 Mya : Allowable Yawing moment(kgf·cm) Table 2	$Mp = \frac{1 \times 1 \times 0.5 \times (5.8 + 30)}{10} = 1.79$ kgf·cm $\theta_4 = \frac{1.79}{17.14} = 0.1$ $My = \frac{1 \times 1 \times 0.5 \times (16.5 + 20)}{10} = 1.82$ kgf·cm $\theta_5 = \frac{1.82}{17.14} = 0.11$
Total Load Factor		$\theta_t = \theta_1 + \theta_2 + \theta_3 + \theta_4 + \theta_5 \leqq 1$	$\theta_t = 0.41 + 0.1 + 0.03 + 0.1 + 0.11 = 0.75 \leqq 1$ SD12-30 is applicable

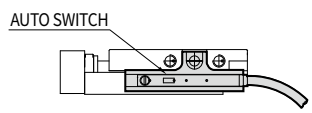
SD05-05

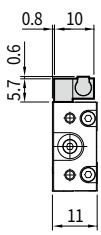


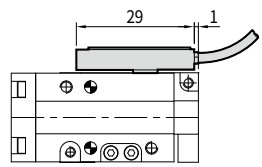




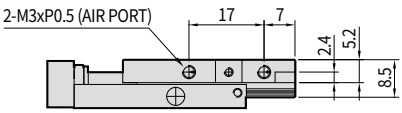
SD05-05 Example of Auto Switch installation

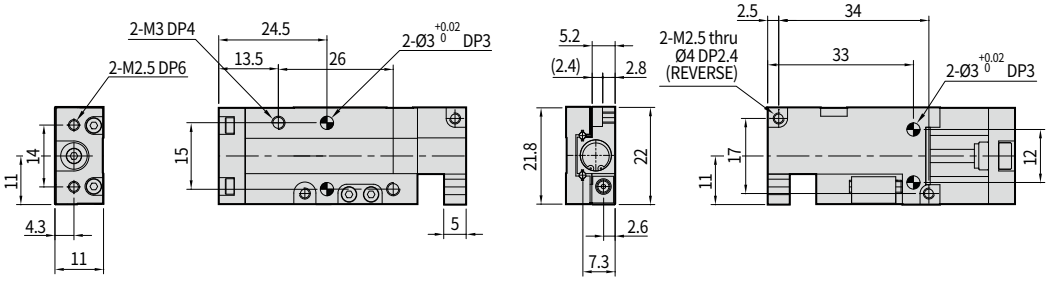


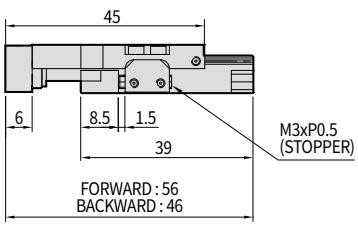




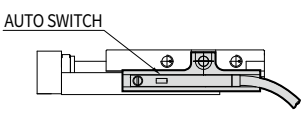
SD05-10

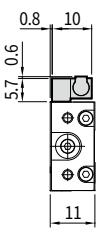


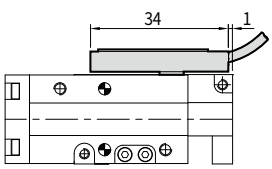




SD05-10 Example of Auto Switch installation



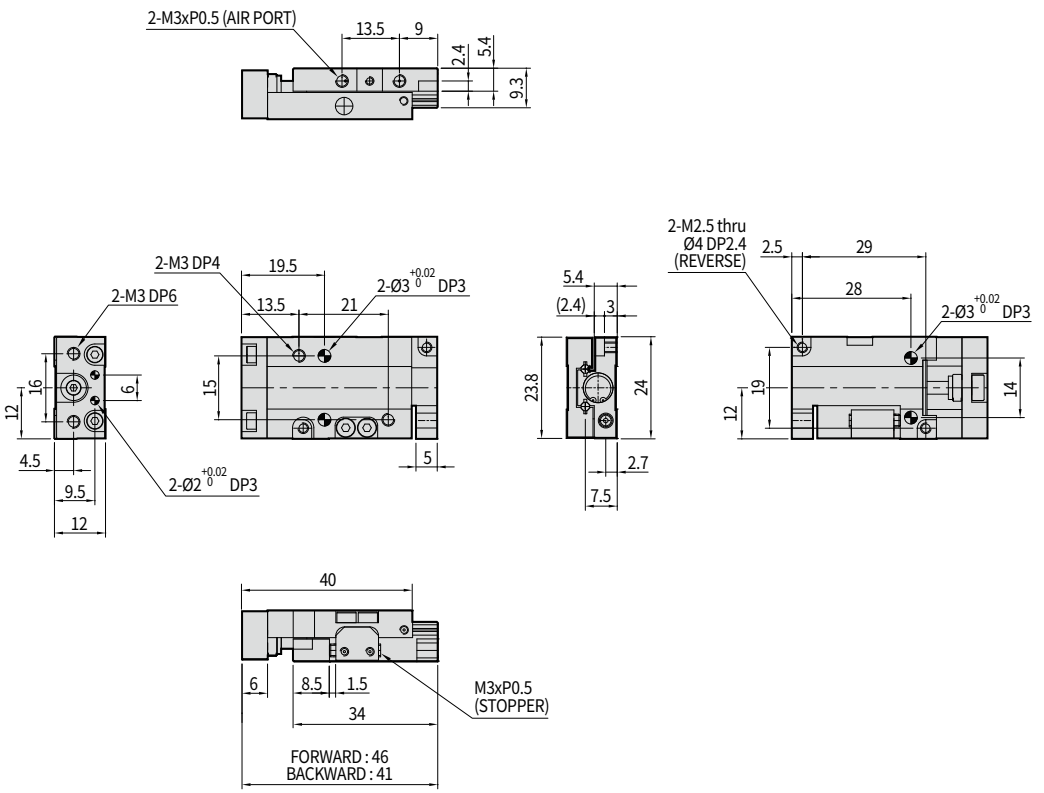




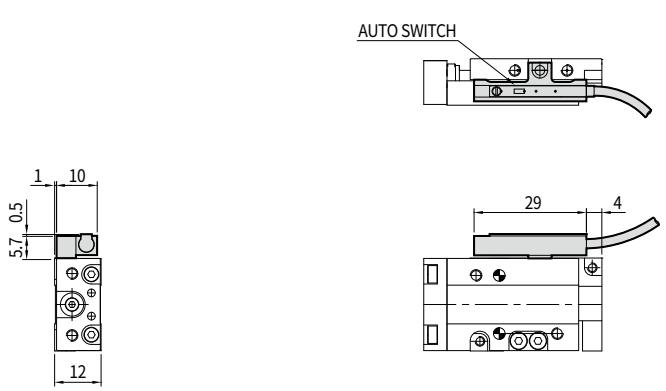
SD Series

05 06 08 12
05 10 15

SD06-05



SD06-05 Example of Auto Switch installation



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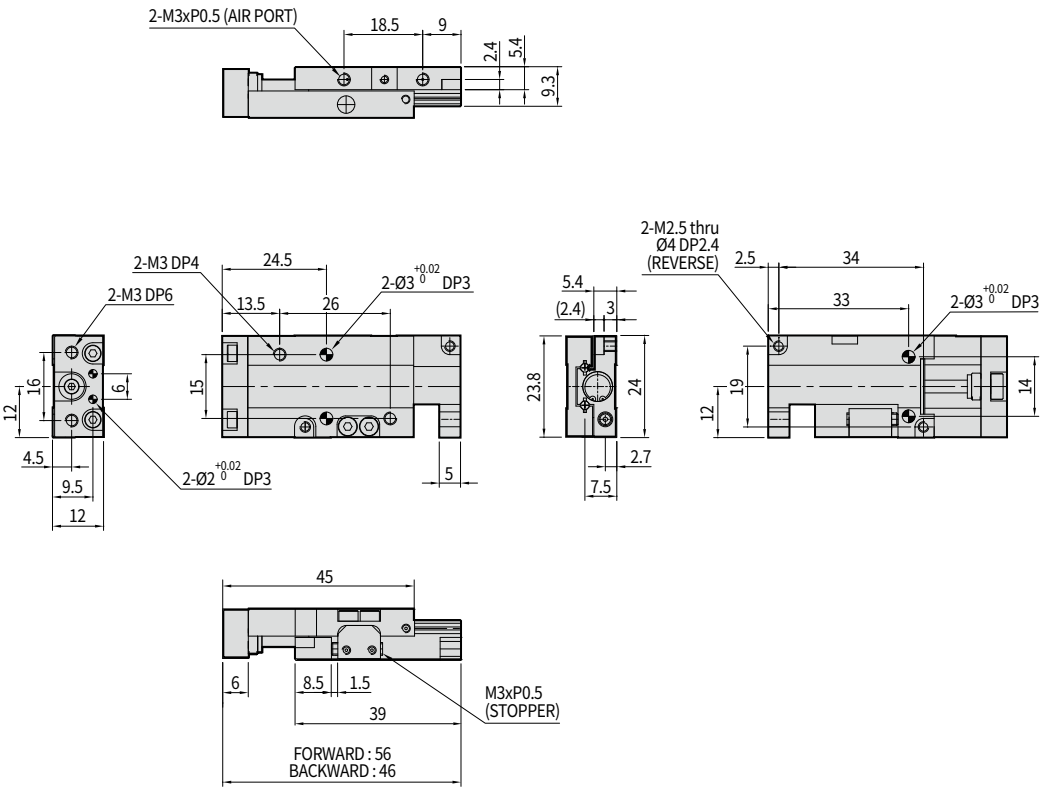
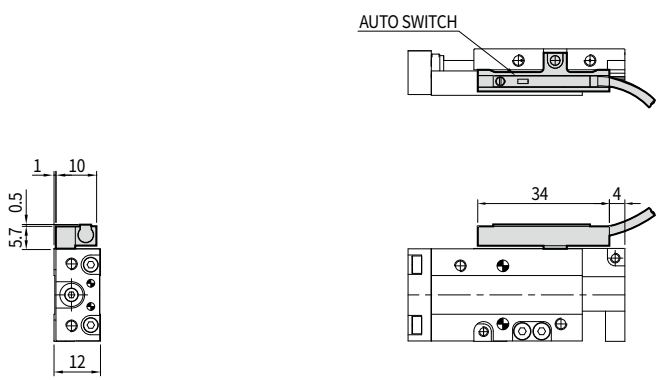


SD06-10 Example of Auto Switch installation



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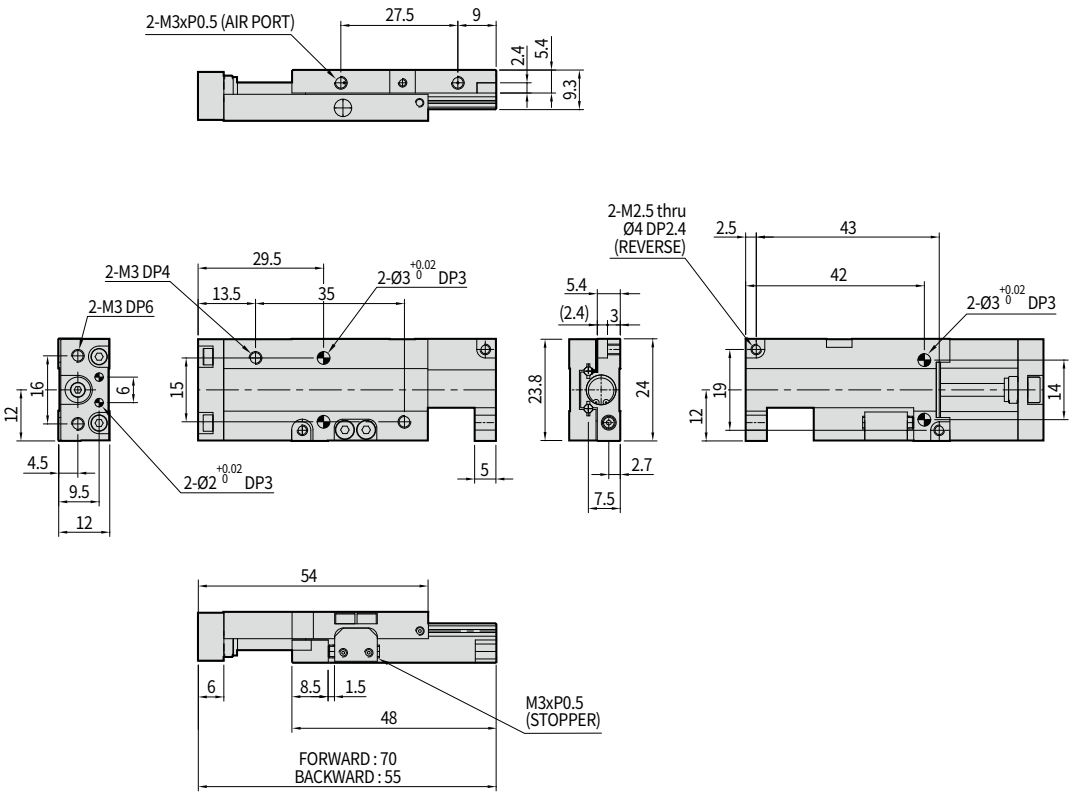
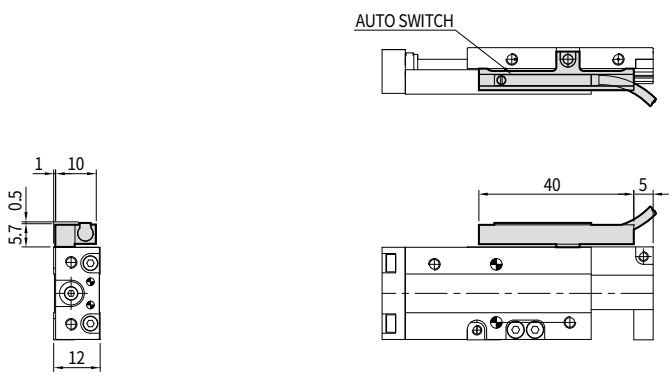
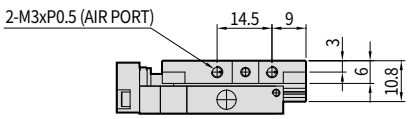
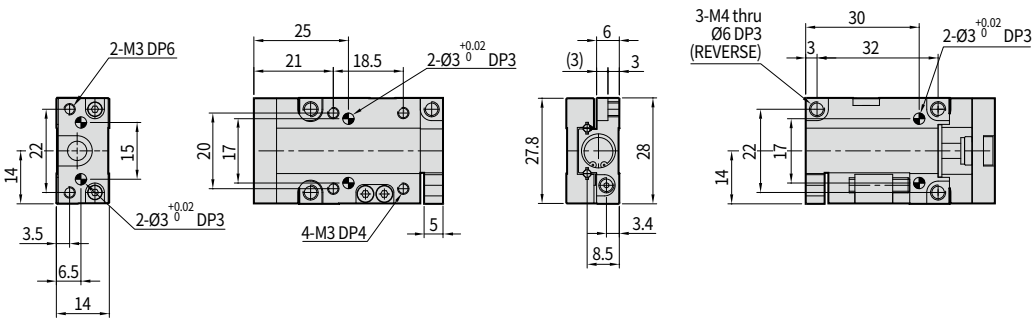


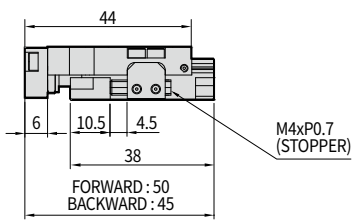
SD06-15 Example of Auto Switch installation



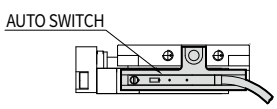
SD08-05

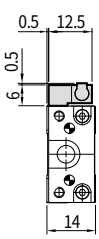


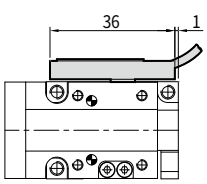




SD08-05 Example of Auto Switch installation

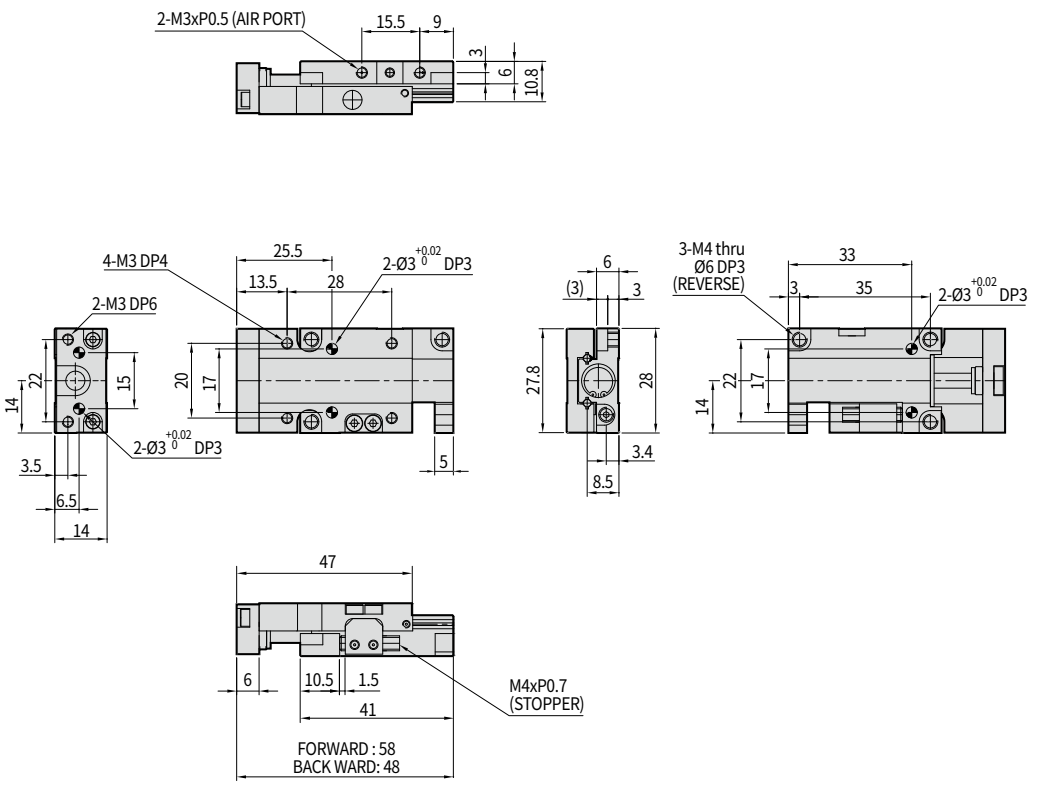




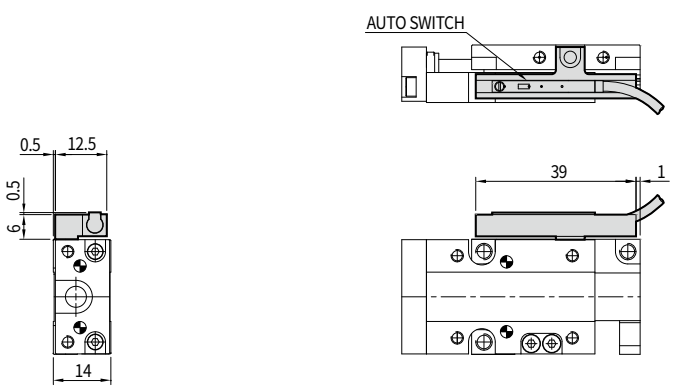


SD Series

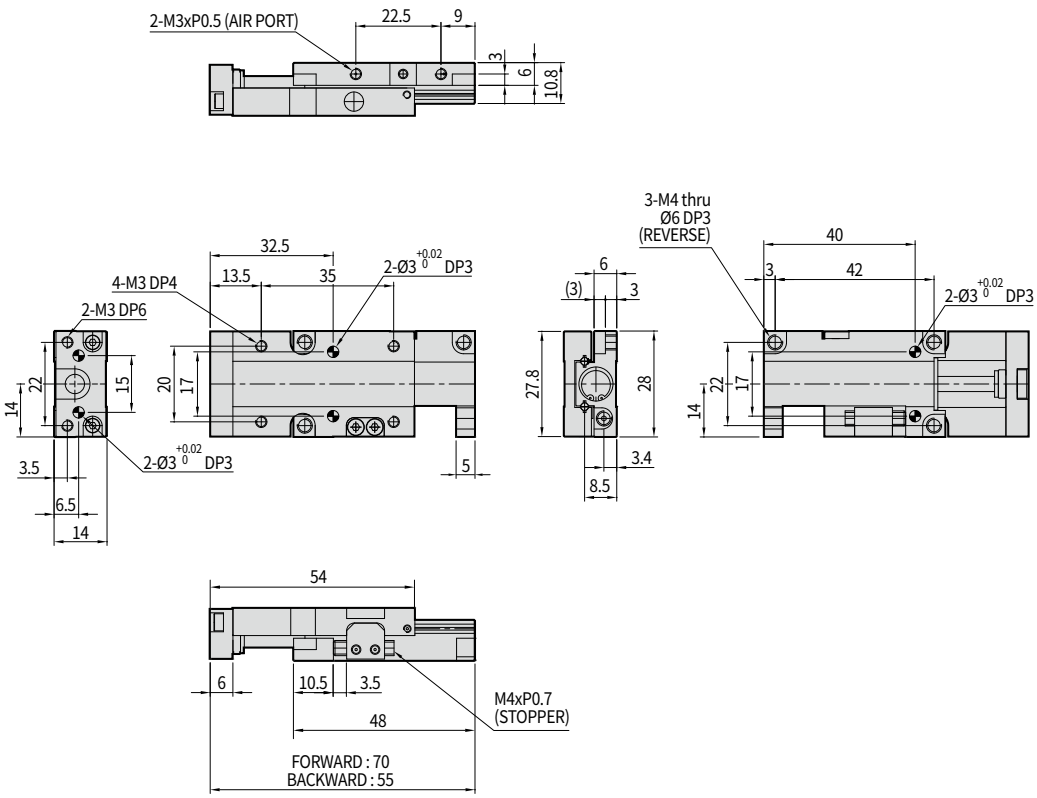
SD08-10



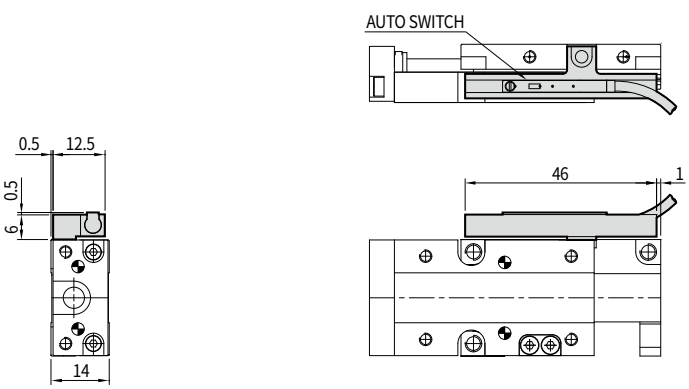
SD08-10 Example of Auto Switch installation



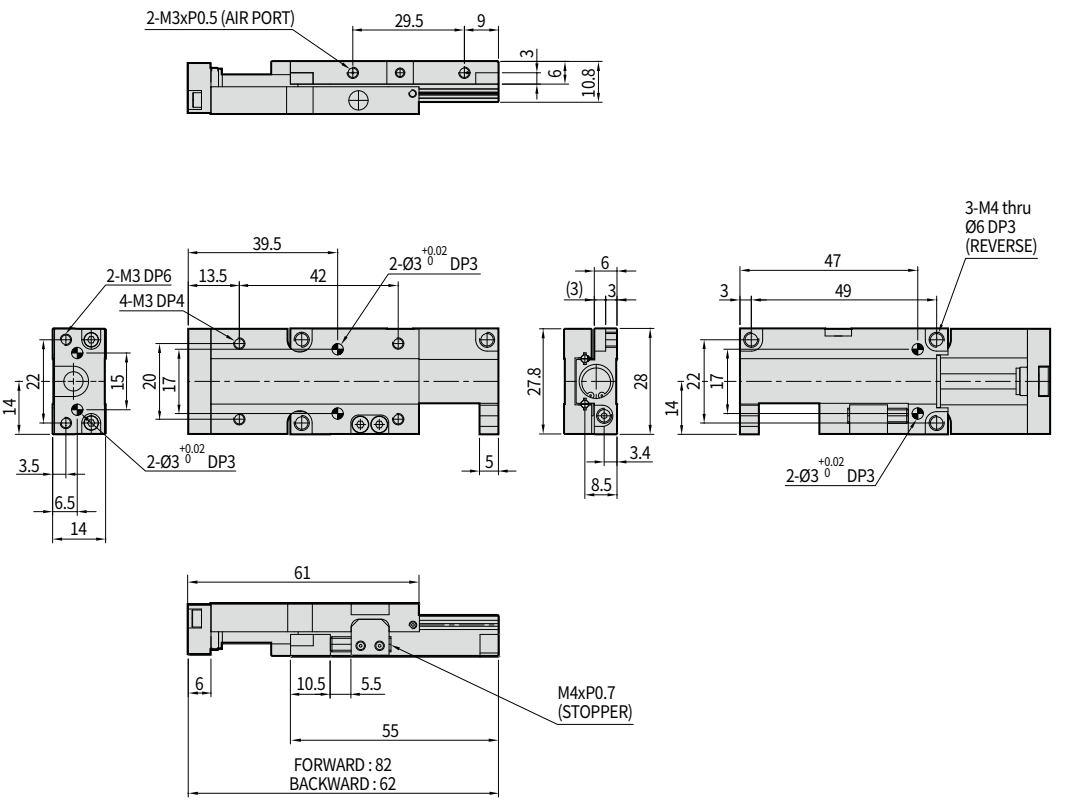
SD08-15



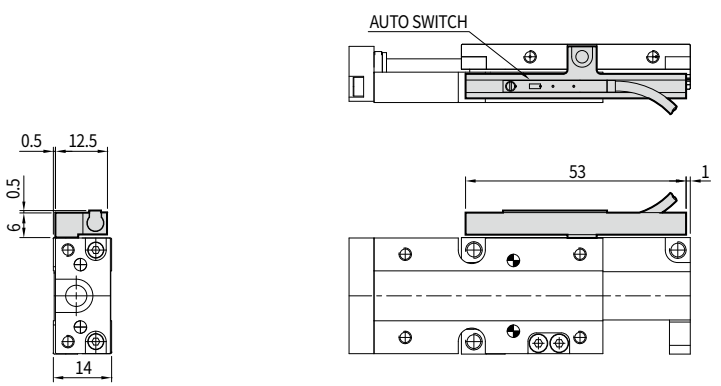
SD08-15 Example of Auto Switch installation



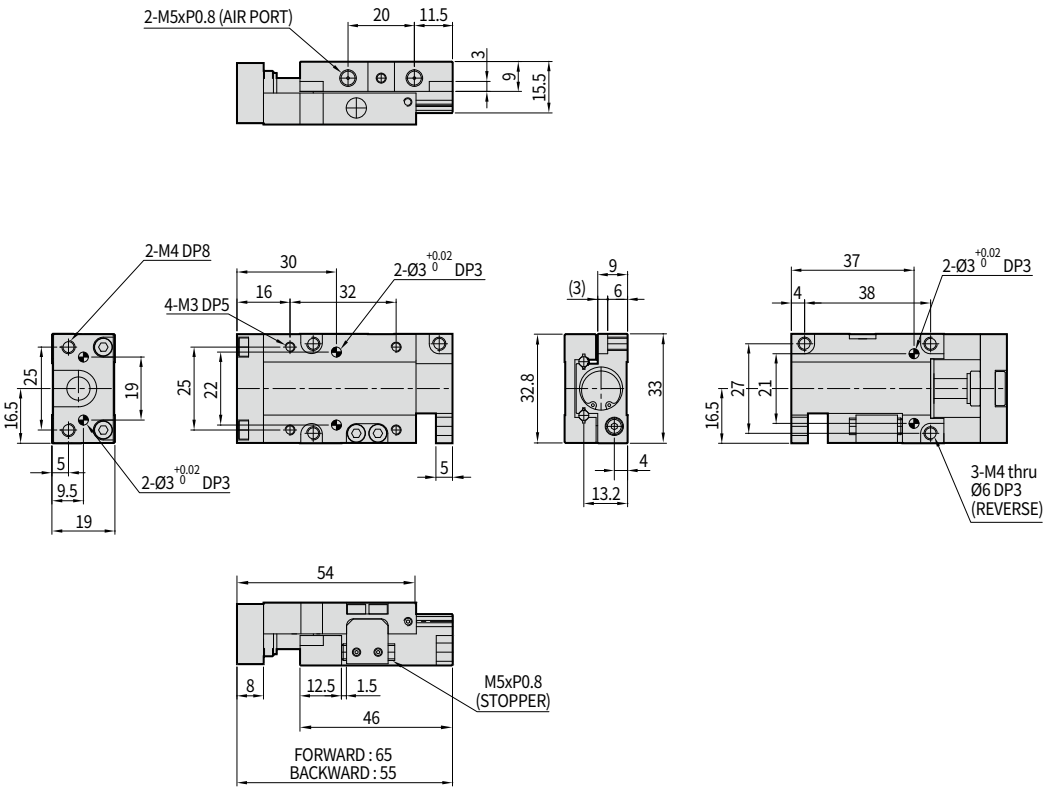
SD08-20



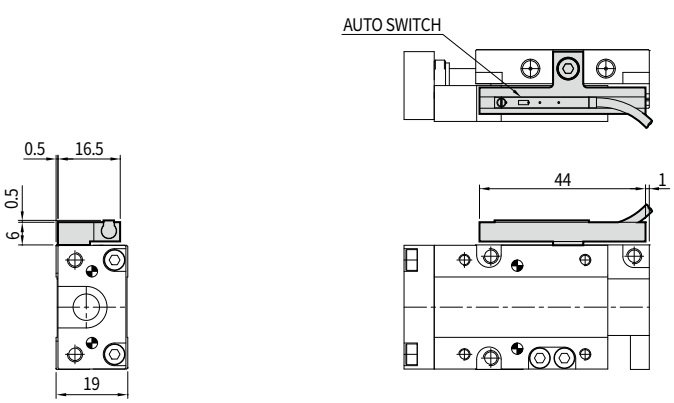
SD08-20 Example of Auto Switch installation



SD12-10

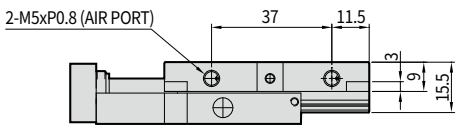


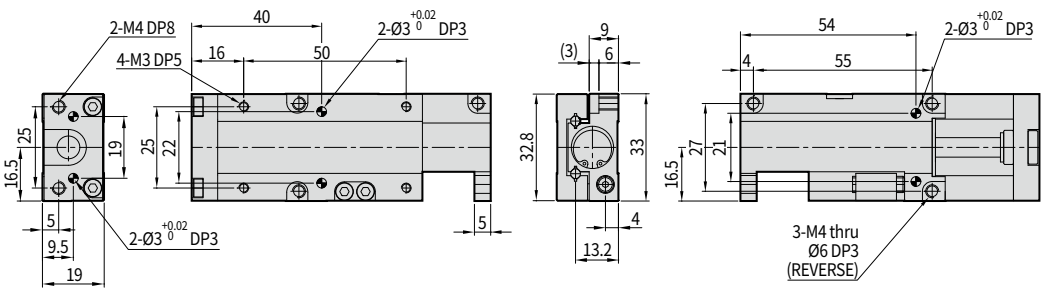
SD12-10 Example of Auto Switch installation

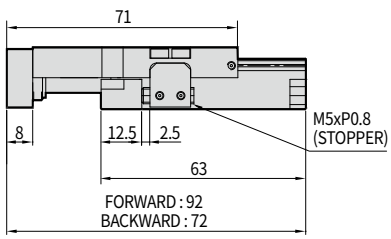


SD Series

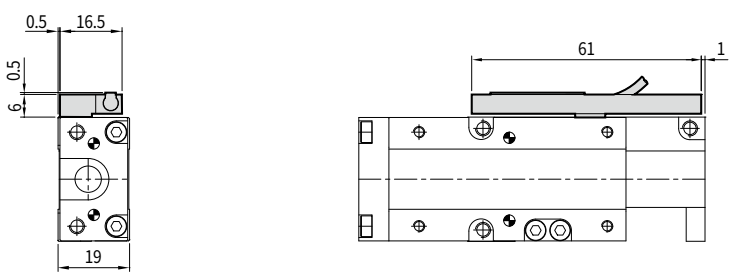
SD12-20



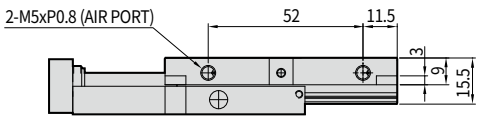


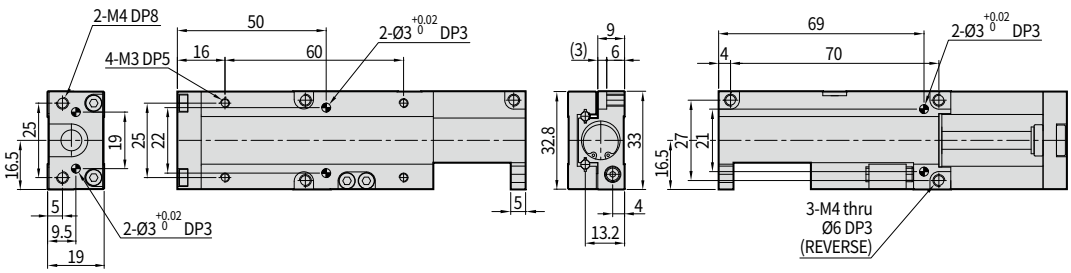


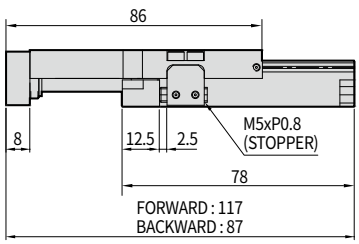
SD12-20 Example of Auto Switch installation



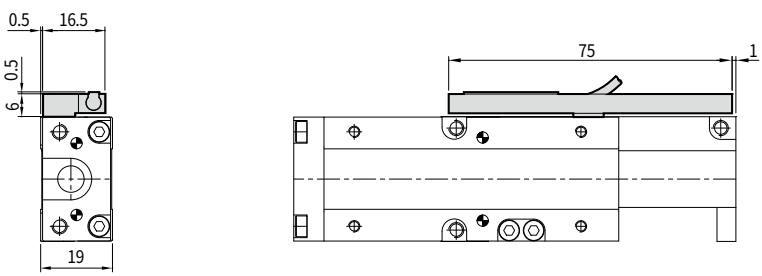
SD12-30





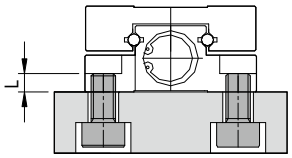


SD12-30 Example of Auto Switch installation



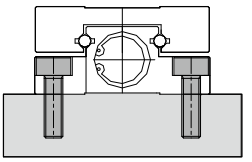
Installation Information

1. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SD05	M2.5×P0.45	4.9	2.8
SD06	M2.5×P0.45	4.9	3
SD08	M4×P0.7	25	3
SD12	M4×P0.7	25	6

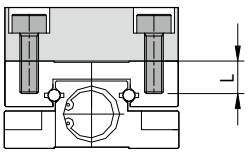
2. Installation by body through holes



Item	Fastening Bolt	Max Torque (kgf·cm)
SD05	M2×P0.4	1.5
SD06	M2×P0.4	1.5
SD08	M3×P0.5	11
SD12	M3×P0.5	11

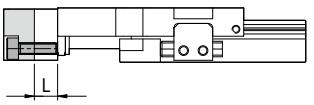
* For stable installation, please make sure sufficient screw length over than minimal screw depth.

3. Installation by table tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SD05	M3×P0.5	11	4
SD06	M3×P0.5	11	4
SD08	M3×P0.5	11	4
SD12	M3×P0.5	11	5

4. Installation by plate tap holes



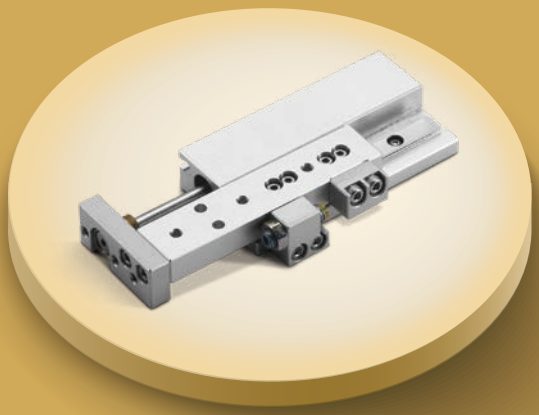
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
SD05	M2.5×P0.45	4.9	6
SD06	M3×P0.5	11	6
SD08	M3×P0.5	11	6
SD12	M4×P0.7	25	8

MEMO

CROSS ROLLER GUIDE
HIGH PRECISION

PSW Series

Ultra Slim type table type cylinder with reduced height



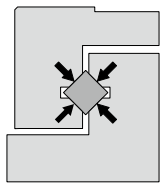
PSW06, 08, 12

Application

Suitable for assembling precise component and feeding, pusher, up & down for semiconductor field.

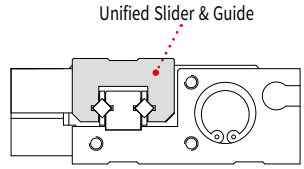
Cross Roller Guide

- Roller bearing crossed aligned guide structure.
- High solidity of 4-direction surface contact.
- High accuracy and high solidity structure not needed extra guide installation.



Unified Table & Slider

- High solidity structure by using steel guide as table.
- Superior table moving parallelism by slider working as table.

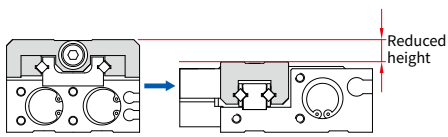


High solidty structure of steel table

Slim and simple, compact appearance

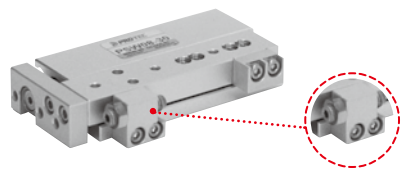
- Ultra Slim type table type cylinder with reduced height.
- Superior space utility.

CYL Bore	Height (mm)	
	PST-NS	PSW
Ø6	18	14.5
Ø8	22.5	15.5
Ø12	27	21



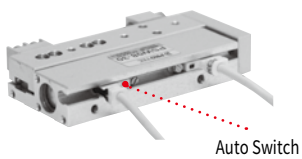
Basically mounted stroke adjusting stopper

- Easy adjustment of stroke by basically supplied forward stroke stopper.



Auto Switch installation (Optional)

- Auto Switch could install in the switch slot of cylinder block.



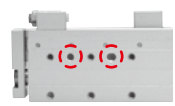
Positioning holes for reproducibility of installation

- Three positioning holes are supplied for reproducibility in install and uninstall.

Plate

Table

Block



⚠ Individual notes for PSW Series ❶

⚠ Caution — Notes in Installation

■ **Be careful to protect "V" groove from damage which the cross roller is rubbed on slide rail and guide.**

■ **Be careful to avoid any finger or human body jam when cylinder is in operation.**

■ **Keep away from any object that could be affected by a magnetic field.**

■ **Be careful not to cause scratch or shock on the cylinder body, mounting surfaces of slide and plate.**

Damage in mounting surfaces makes worse the flatness, and cause work failure due to the increased swing of guide unit and/or friction resistance.

■ **Install screw to the cylinder and tighten it to the specified torque.**

Otherwise, it may cause defect in working. Also, insufficient screw tightening may cause dislocation or work pieces to drop.

⚠ Caution — Notes in Selection

■ **Do not exceed the specified load when selecting the product.**

Select model based on the specified maximum load factor according to each Bore size. Otherwise, it may result in distorted load of the guide unit, which may cause swing to guide unit, deterioration, and adverse effects on cylinder life.

■ **Avoid excessive external force or shock.**

■ **For the selection of each series, refer to the specification in this catalogue.**

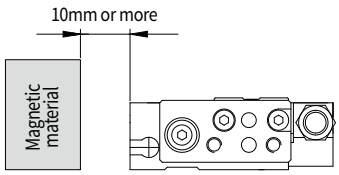
For the selection of each series, refer to the specification in this catalogue. Correct use for cylinder within the specified temperature and pressure range may result in reduction in malfunction and failure.

■ **At the backward position, slight clearance could be occurred between slider(table) and cylinder body. But this is a phenomenon that occurs during normal operation, and there is no problem with product quality at all.**

⚠ Individual notes for PSW Series ❷

⚠ Caution **Notes in operating Environment and Handling**

■ **When there are magnetic materials like steel plate near the switch of cylinder, most likely they may cause malfunction in the switch, therefore they need to be designed and installed with sufficient clearance from the surface of cylinder (maintain 10mm or more).**

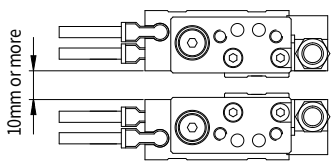


■ **Be careful of using in the place where vibration or shock occurs frequently, it may cause a failure.**

Do not use air cylinder for the purpose of shock or vibration absorbing. It may cause of human injury or damage on the machine parts.

■ **If two or more cylinders are installed close, auto switch might malfunction due to magnetic field interference. It is need to be installed with sufficient space.**

(In case of unavoidable use with less than the minimum free distance, please attach a steel plate or magnetic blocking plate to the opposite cylinder close to the auto switch. If magnetic blocking plate is not installed, it could be the reason of malfunction. For more details, please contact to office.)



Clearance between cylinder can be smaller by installing of magnetic shield

■ **Do not use in the environment that can be affected by foreign substances such as dust and chip, and cutting oil.**

It may cause vibration, increase of frictional resistance, and air leakage. In such environment, please install appropriate protective covers after the consultation with our company.

■ **When used around heat source of high temperature, product can be heated by radiant heat and cause failure. Therefore, install protective covers to block heat source.**

■ **Be care of corrosion resistance for the stability in cross roller guide unit.**

Be care of corrosion resistance in humid environment as water drop can be created in guide unit and it can get rusty in such environment.

■ **Add up lubricant at the frictional surface of cylinder regularly.**

Add up lubricant at the frictional surface of cylinder periodically. It may result in expanded life of cylinder.

■ **To control the moving speed of cylinder, please use speed controller.**

When controlling of moving speed, increase it from low-speed to required speed gradually.

■ **Make sure to connect fixing or connection unit of cylinder firmly.**

Make sure that the cylinder is connected firmly, in particular, if used in the place where vibration and shock occur frequently.

■ **Can select various stroke adjustment unit. Check it before model selection.**

When controlling the cylinder stroke, three different types of cushions can be used according to the intended use.

1. Urethane Stopper : Generalized stroke adjusting unit. (Allowable speed 50~500mm/sec)
2. Metal Stopper : It may improve the precise control of stroke, but doesn't have cushion function, so it is used only for light load and low-speed. As it is special ordering specification, please contact us. (Allowable speed 50~200mm/sec)
3. Shock Absorber : Soft stop by absorbing the shock at the end of stroke. As it is special ordering specification, please contact us.

■ **To maintain the quality of compressed air, exhaust drains in filter periodically.**

■ **If it is needed to remove cylinder from installation, stop supplying of compressed air first and remove it.**

■ **Be careful not to damage on the cable line of auto switch.**

Over bending or scar, damage on the cable of auto switch will cause of current leakage or defect on connection may lead electric shock and/or fire, abnormal motion.

PRECISION GUIDE CYLINDER / CROSS ROLLER GUIDE

PSW Series

Features

- Ultra Slim type table type cylinder with high precise cross roller guide application.
- Suitable for assembling precise component and feeding, pusher, up & down for semiconductor field.
- Three positioning holes are supplied for reproducibility in install and uninstall.
- Slim and simple, compact appearance by locating guide part and cylinder in parallelism.
- Big allowable moment although small size body.
  (Improved allowable moment by 4-surface contact)
- Diversity of installation and application.

Order Form

PSW 08 - 10 - B3C L S

① ② ③ ④ ⑤ ⑥

① Series Name

② Cylinder Bore Size ③ Standard Strokes

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))
06	6	05, 10, 15, 20
08	8	05, 10, 20, 30
12	12	10, 20, 30, 40, 50

④ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
B3B	Magnetic solid state	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic solid state	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

⑤ Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

⑥ Auto Switch Quantity

Order	Quantity
Blank	2PCS
S	1PCS

Specification

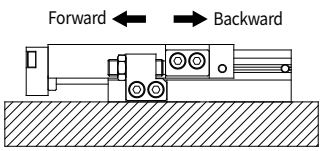
Item Name		PSW06				PSW08				PSW12				
CYL Bore Size(mm)		6				8				12				
Rod Size(mm)		3				4				6				
Standard Strokes(mm)		5	10	15	20	5	10	20	30	10	20	30	40	50
Theoretical Thrust(kgf)	Forward	0.28 × P				0.5 × P				1.13 × P				
P : Air Pressure(kgf/㎠)	Backward	0.21 × P				0.37 × P				0.84 × P				
Fitting Size		M3				M3				M5				
Weight(kgf)		0.11	0.12	0.13	0.14	0.13	0.14	0.16	0.17	0.27	0.31	0.37	0.41	0.47
Fluid		Clean Air Note 1)												
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 10.5) Note 2)												
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)												
Stopper Sptions		Urethane Stopper												
Temperature Range(°C)		5 ~ 60												
Moving Speed(mm/sec)		50 ~ 500												
Stroke Tolerance for Forward Position(mm)		0 ~ + 1												
Operation Type		Double Acting												
Accuracy(mm)		± 0.01												

Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

Theoretical Thrust

Unit : kgf

Model	Operating Direction (Ref. figure)	Pressured Surface (mm²)	Pressure Range (kgf/㎠)					
			2	3	4	5	6	7
PSW06	Forward	28	0.56	0.84	1.12	1.40	1.68	1.96
	Backward	21	0.42	0.63	0.84	1.05	1.26	1.47
PSW08	Forward	50	1.00	1.50	2.00	2.50	3.00	3.50
	Backward	37	0.74	1.11	1.48	1.85	2.22	2.59
PSW12	Forward	113	2.26	3.39	4.52	5.65	6.78	7.91
	Backward	84	1.68	2.52	3.36	4.20	5.04	5.88



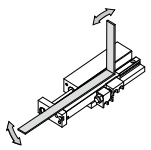
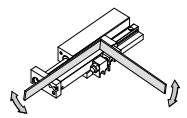
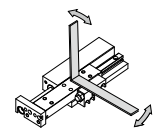
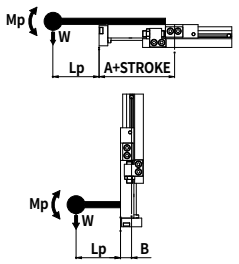
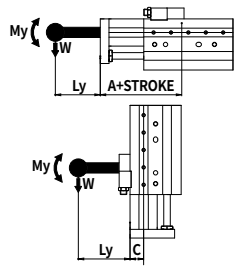
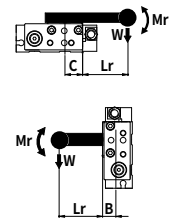
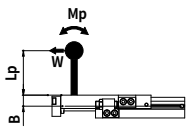
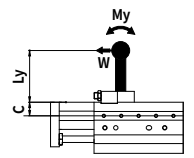
<Operating Direction>

PSW Series Model Selection Guide

Technical Data by Model

■ Mp, My, Mr 3-directions moment calculation formula Figure 1

※ W : Work Weight (kgf), K_2 : Speed factor

	Pitch Moment (Mp)	Yawing Moment (My)	Rolling Moment (Mr)
Moment Direction			
Static Moment			
Static Moment Formula	Mp = W × (A + STROKE + Lp) Mp = W × (B + Lp)	My = W × (A + STROKE + Ly) My = W × (C + Ly)	Mr = W × (C + Lr) Mr = W × (B + Lr)
Dynamic Moment			
Dynamic Moment Formula	Mp = K_2 × W × (A + STROKE + Lp) Mp = K_2 × W × (B + Lp)	My = K_2 × W × (A + STROKE + Ly) My = K_2 × W × (C + Ly)	Mr = K_2 × W × (C + Lr) Mr = K_2 × W × (B + Lr)

■ Corrections from the central distance of moments Table 1

Unit : mm

Model \ Corrections	A	B	C
PSW06-05	22.5	6.8	7.5
PSW06-10	22.5	6.8	7.5
PSW06-15	25.5	6.8	7.5
PSW06-20	25.5	6.8	7.5
PSW08-05	25	7.3	7.5
PSW08-10	25	7.3	7.5
PSW08-20	28	7.3	7.5
PSW08-30	28	7.3	7.5
PSW12-10	33	8.8	12.5
PSW12-20	33	8.8	12.5
PSW12-30	36	8.8	12.5
PSW12-40	36	8.8	12.5
PSW12-50	38	8.8	12.5

■ Maximum allowable moment Table 2

Unit : kgf·cm

Model \ Allowable Moment	Pitching Moment Mp	Yawing Moment My	Rolling Moment Mr
PSW06-05	3.08	3.08	3.68
PSW06-10	3.08	3.08	3.68
PSW06-15	3.58	3.58	4.18
PSW06-20	3.58	3.58	4.18
PSW08-05	3.78	3.78	4.48
PSW08-10	3.78	3.78	4.48
PSW08-20	4.18	4.18	4.78
PSW08-30	4.18	4.18	4.78
PSW12-10	10.92	10.92	17.58
PSW12-20	10.92	10.92	17.58
PSW12-30	12.74	12.74	20.09
PSW12-40	12.74	12.74	20.09
PSW12-50	14.56	14.56	22.61

■ Maximum allowable kinetic energy (Ea) Table 3

Unit : kgf·cm

Model \ Allowable Kinetic Energy	Allowable Kinetic Energy
PSW06	0.16
PSW08	0.16
PSW12	0.55

■ Max. Allowable Load (Wa) Table 4

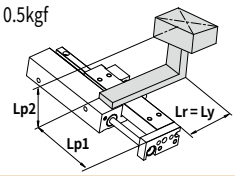
Unit : kgf

Model	Max. Allowable Load
PSW06	0.3
PSW08	0.5
PSW12	1.2

※ For vertical installation, maximum allowable load check is not required.
※ This table is only for reference value to calculate table load ratio.

PSW Series Model Selection Guide

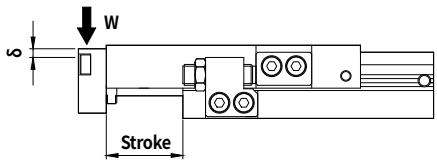
Example of Model Selection

		Applicable Formula	Selection Example
Condition Check		▪ Cylinder model selection ▪ Load weight ▪ Average speed ▪ Distance to the center of gravity in load ▪ Cushion type(Urethane / Absorber) ▪ Installation type ▪ Load installation Horizontal installation / Vertical installation / Plate installation / Table installation 	▪ Check for : PSW12-30 ▪ Table installation, horizontal installation ▪ Average speed : V = 300mm/sec ▪ Work weight ▪ Work weight W = 0.5kgf Lp1 = 30mm Lp2 = 30mm Ly, Lr = 20mm 
Kinetic Energy Check - The kinetic energy of load should be within the allowable kinetic energy range of cylinder.		Work kinetic energy(kgf·cm) $E = K_1 \times \frac{1}{2} \times \frac{W}{980} \times (\frac{1.4V}{10})^2$ W : Work weight(kgf) V : Average speed(mm/sec) K_1 : Installation Factor(Table installation : 1, Plate installation :1.6) Ea : Allowable kinetic energy(kgf·cm) Table 3 Applicable only if E < Ea	$E = 1 \times \frac{1}{2} \times \frac{0.5}{980} \times (\frac{1.4 \cdot 300}{10})^2 = 0.45$ kgf·cm Ea = 0.55 kgf·cm Applicable as E(0.45) < Ea(0.55)
Load Factor Check - Loading factor. - Static moment load factor. - Dynamic moment load factor. - Total sum of load factors should not exceed.	Loading Factor	Suitable load weight(kgf) $Wt = K_1 \times K_2 \times W$ Loading factor $\theta_1 = \frac{Wt}{Wa}$ W : Work weight(kgf) K_1 : Installation factor(Table installation : 1, Plate installation : 1.6) K_2 : Speed factor(300mm/sec or less : 1, Over 300mm/sec : 1.6) Wa : Allowable load weight(kgf) Table 4 ※ For vertical installation, maximum allowable load check is not required.	Wt = 1 × 1 × 0.5 = 0.5 kgf Wa = 1.2 kgf $\theta_1 = \frac{0.5}{1.2} = 0.41$
	Static Moment	Pitching moment(kgf·cm) $My = W \times (A + Stroke + Ly_1) / 10$ Rolling moment (kgf·cm) $Mr = W \times (C + Lr) / 10$ Pitching moment factor $\theta_2 = \frac{My}{Mya}$ Rolling moment factor $\theta_3 = \frac{Mr}{Mra}$ W : Work weight(kgf) A, C : Corrections from the center distance of moment(mm) Table 1 Ly_1, Lr : Distance between end of table to center of load(mm) Figure 1 Mya : Allowable Yawing moment(kgf·cm) Table 2 Mra : Allowable rolling moment(kgf·cm) Table 2	$Mp = \frac{0.5 \times (36 + 30 - 30)}{10} = 1.8$ kgf·cm $\theta_2 = \frac{1.8}{12.74} = 0.14$ $Mr = \frac{0.5 \times (12.5 + 20)}{10} = 1.62$ kgf·cm $\theta_3 = \frac{1.62}{20.09} = 0.08$
	Dynamic Moment	Pitching moment(kgf·cm) $Mp = K_2 \times W \times (B + Lp) / 10$ Yawing moment(kgf·cm) $My = K_2 \times W \times (C + Ly_2) / 10$ Pitching moment factor $\theta_4 = \frac{Mp}{Mpa}$ Yawing moment factor $\theta_5 = \frac{My}{Mya}$ W : Work weight(kgf) K_2 : Speed factor(300mm/sec or less : 1, Over: 300mm/sec : 1.6) B, C : Corrections from the center distance of moments(mm) Table 1 Lp, Ly_2 : Distance between end of table to center of load(mm) Figure 1 Mpa : Allowable pitching moment(kgf·cm) Table 2 Mya : Allowable Yawing moment(kgf·cm) Table 2	$Mp = \frac{1 \times 1 \times 0.5 \times (8.8 + 30)}{10} = 1.94$ kgf·cm $\theta_4 = \frac{1.94}{12.74} = 0.15$ $My = \frac{1 \times 1 \times 0.5 \times (12.5 + 20)}{10} = 1.62$ kgf·cm $\theta_5 = \frac{1.62}{12.74} = 0.13$
Total Load Factor		$\theta_t = \theta_1 + \theta_2 + \theta_3 + \theta_4 + \theta_5 \leqq 1$	$\theta_t = 0.41 + 0.14 + 0.08 + 0.15 + 0.13 = 0.91 \leqq 1$ PSW12-30 is applicable

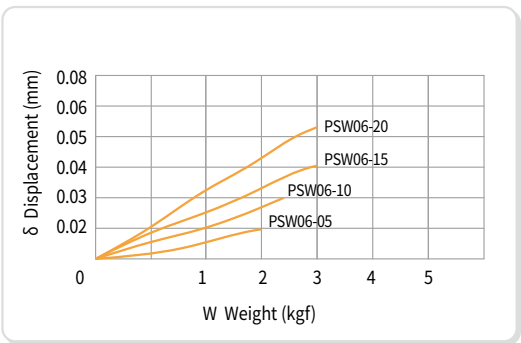
PSW Series Model Selection Guide

Table Deflection

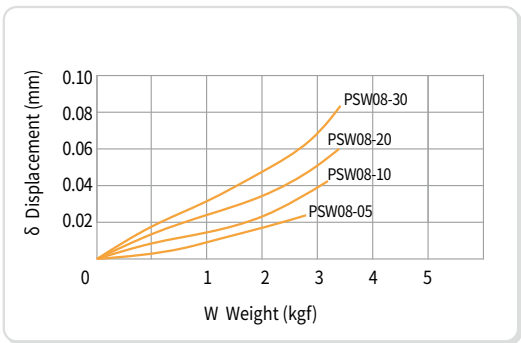
- The graph represents the deflection if any static load is applied at the end of table when moved forward as much as the corresponding stroke.
- The deflection below mentioned are only for a reference. (Please note that they are NOT maximum value)



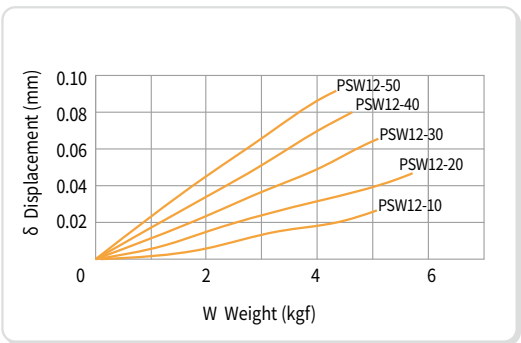
▶ PSW06



▶ PSW08

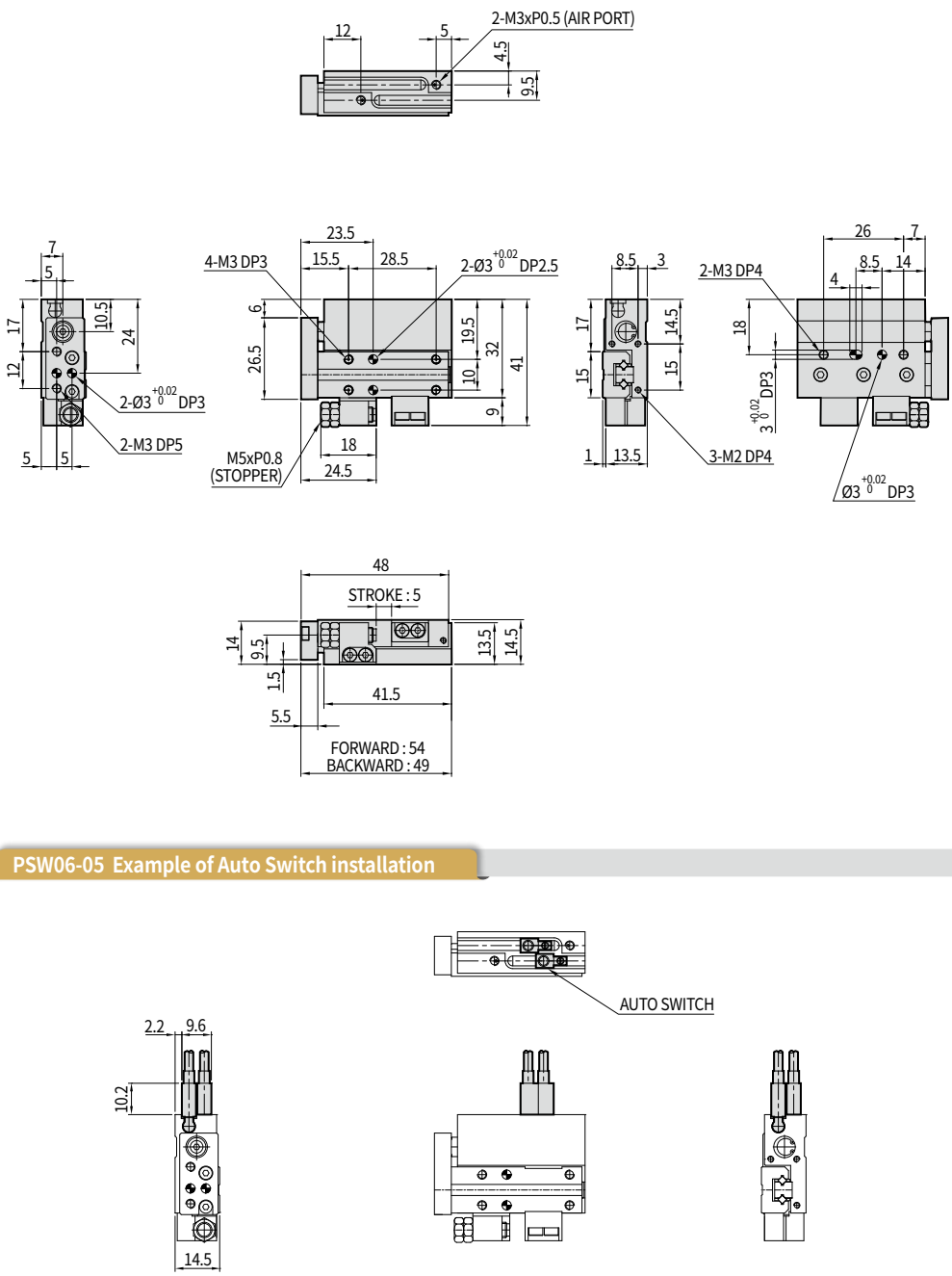


▶ PSW12



PSW Series

PSW06-05

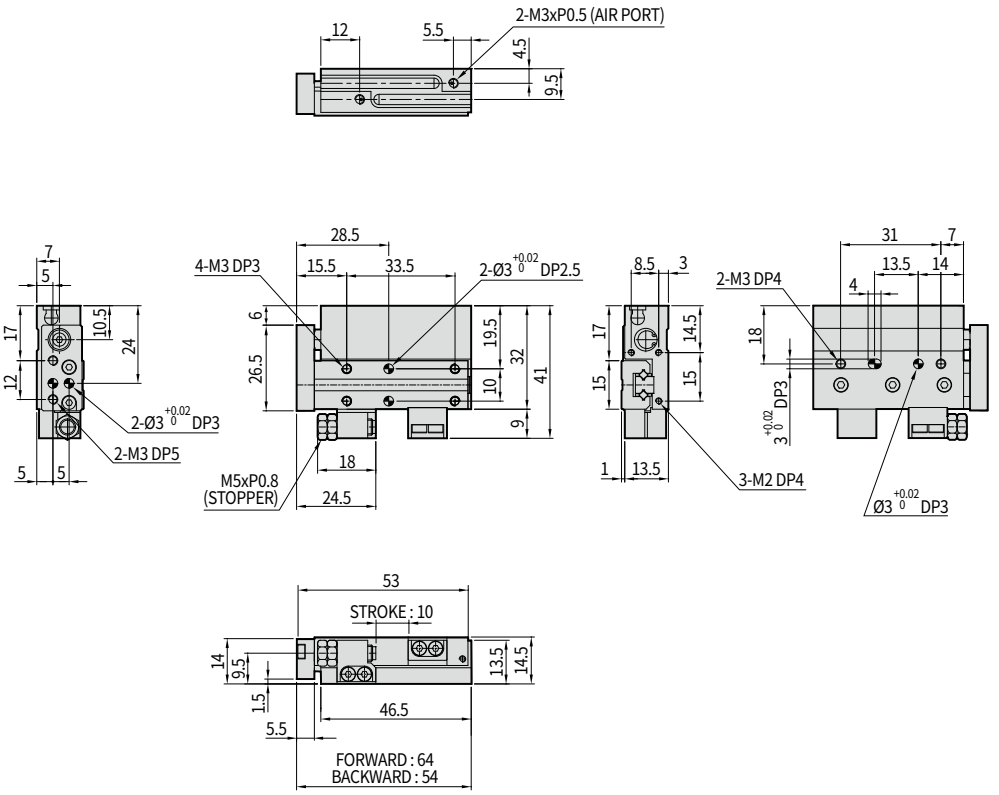


PSW06-05 Example of Auto Switch installation

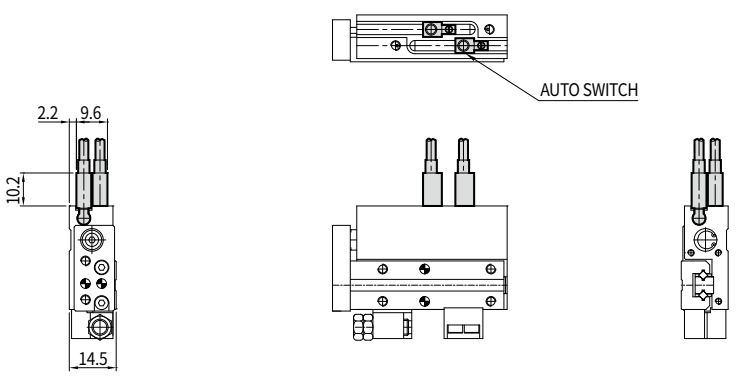
PSW Series

06 08 12
05 10 15 20

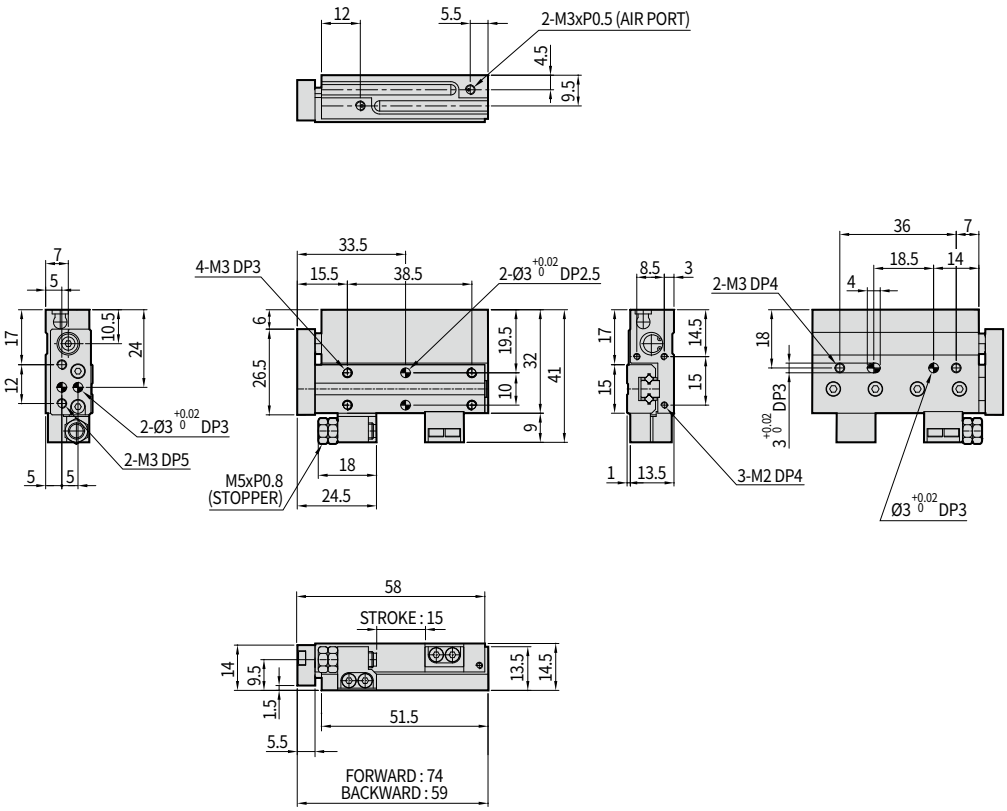
PSW06-10



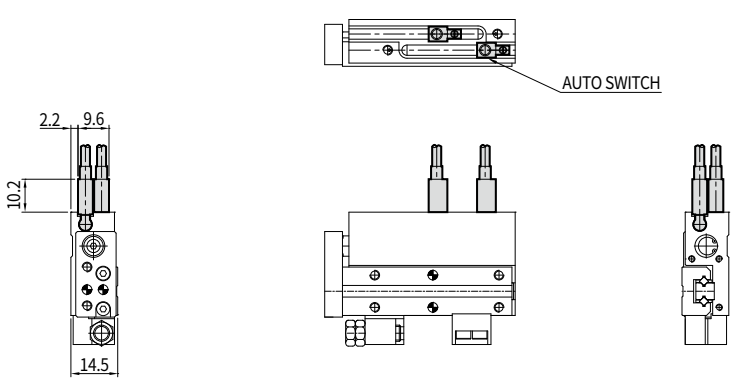
PSW06-10 Example of Auto Switch installation



PSW06-15



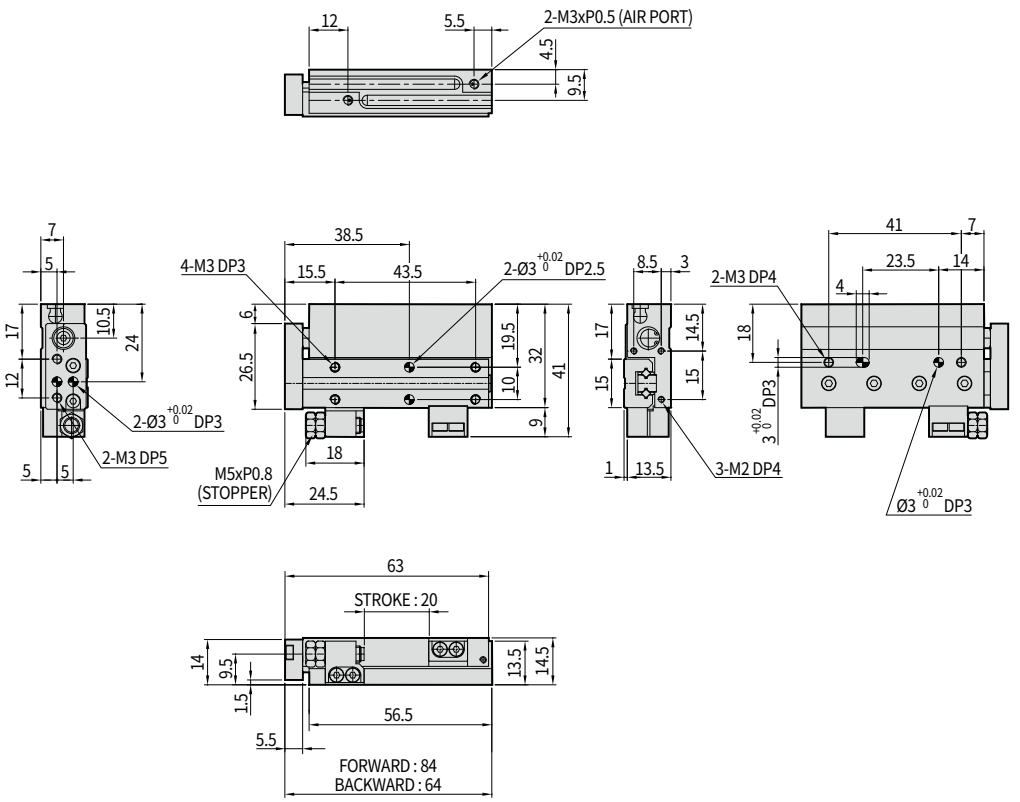
PSW06-15 Example of Auto Switch installation



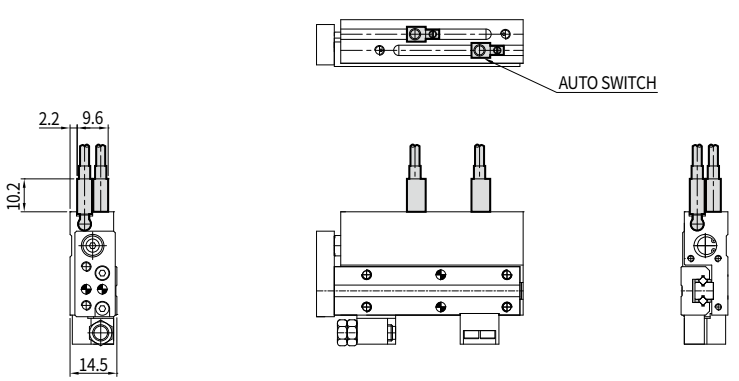
PSW Series

06 08 12
05 10 15 20

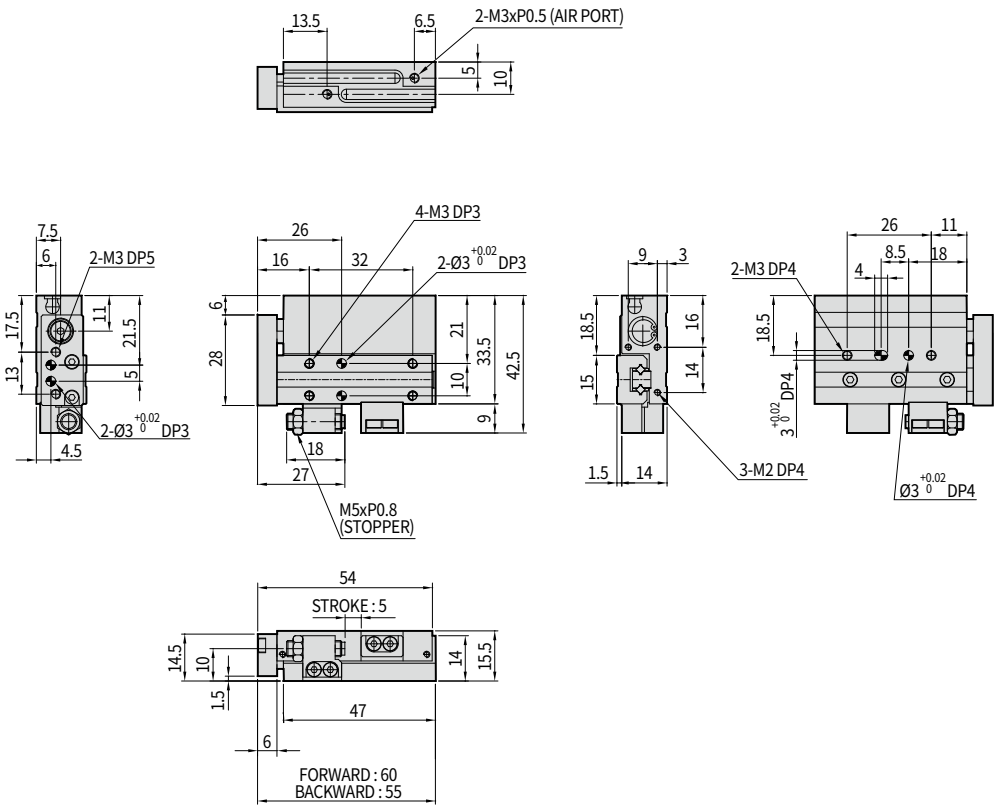
PSW06-20



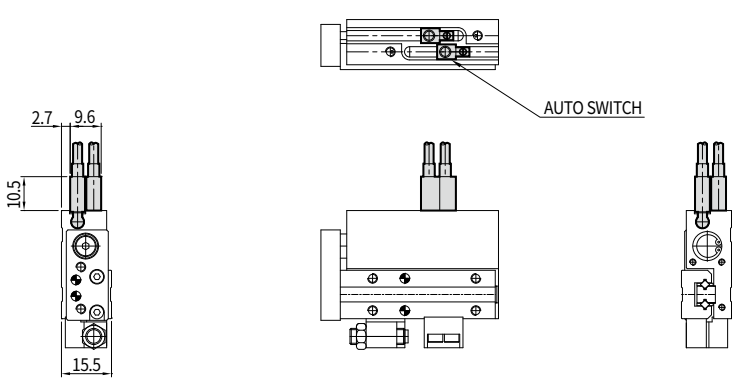
PSW06-20 Example of Auto Switch installation



PSW08-05



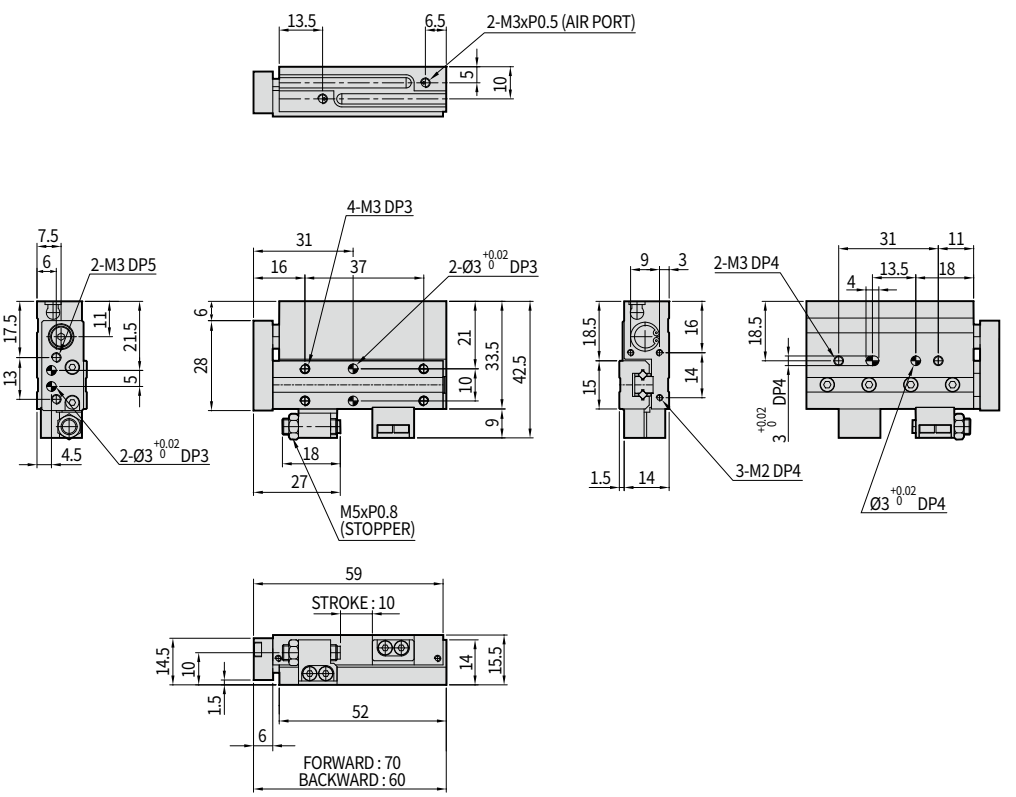
PSW08-05 Example of Auto Switch installation



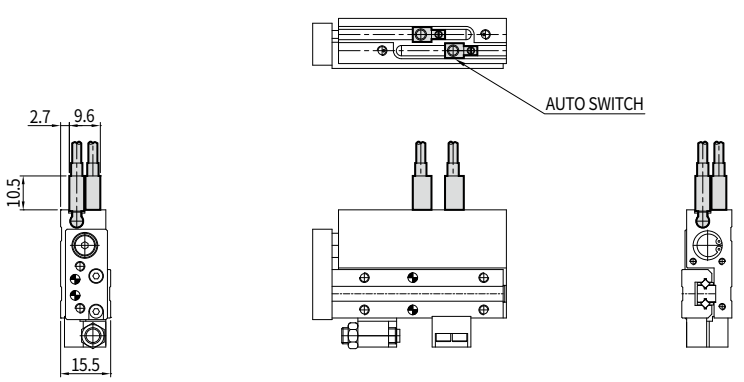
PSW Series

06 08 12
05 10 20 30

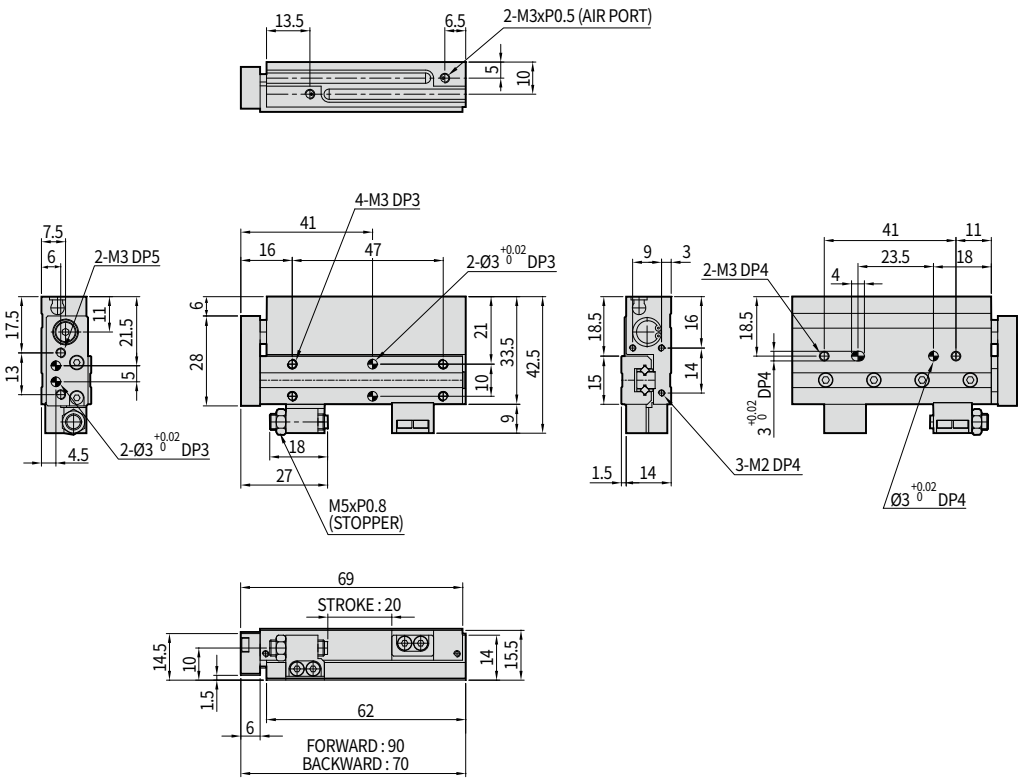
PSW08-10



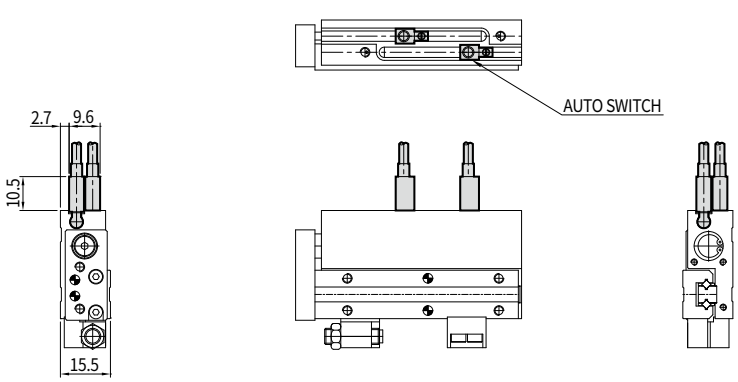
PSW08-10 Example of Auto Switch installation



PSW08-20



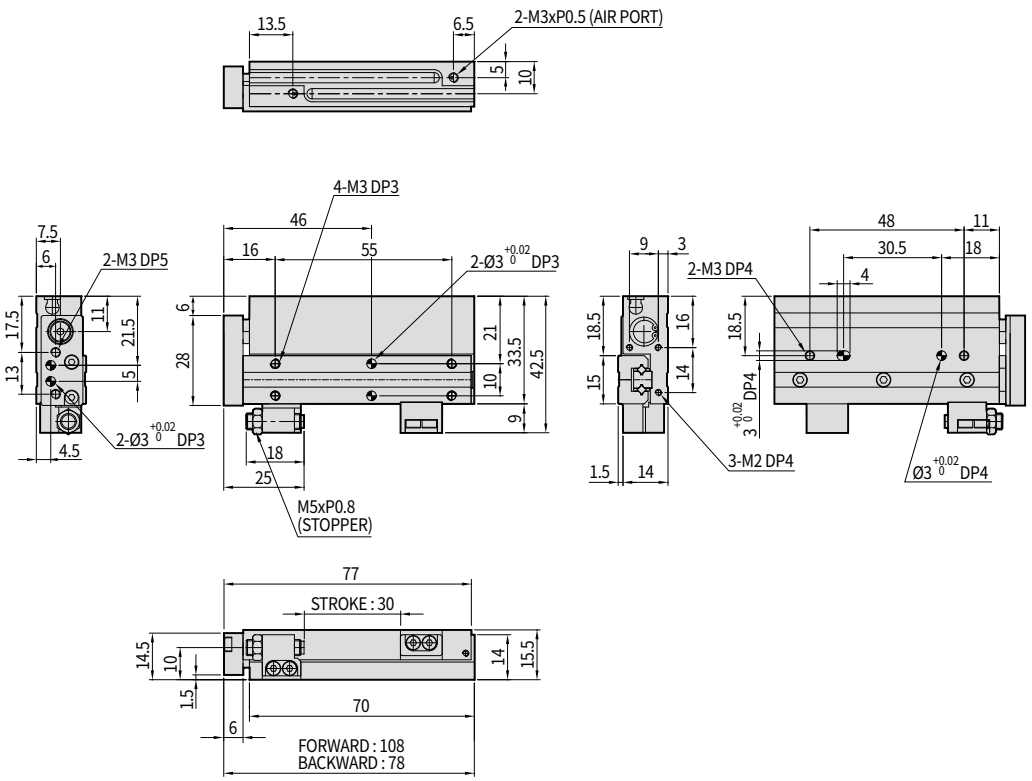
PSW08-20 Example of Auto Switch installation



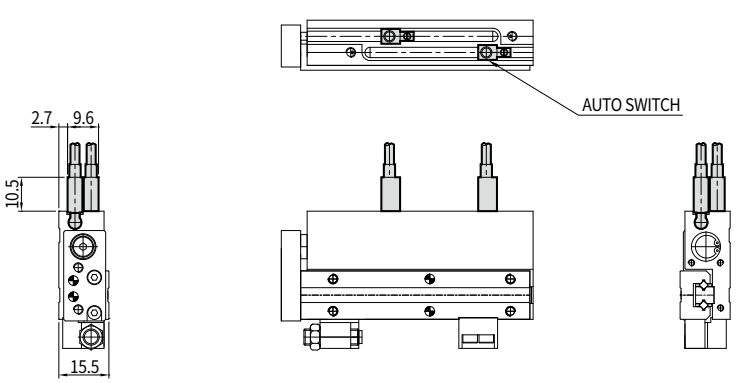
PSW Series

06 08 12
05 10 20 30

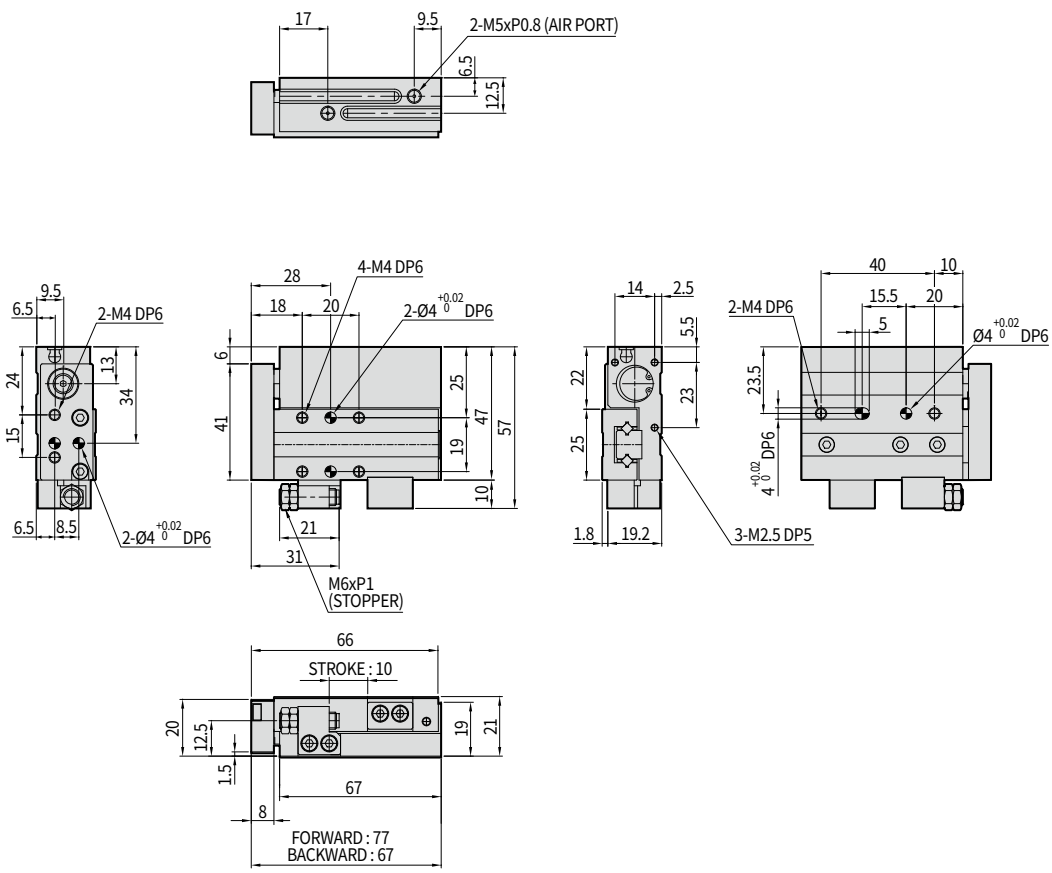
PSW08-30



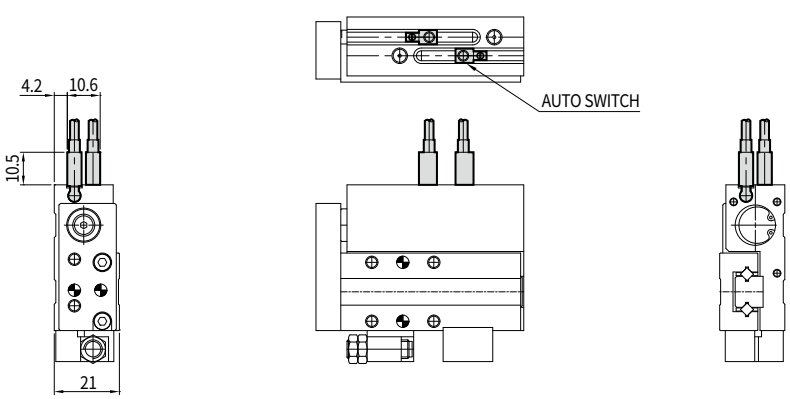
PSW08-30 Example of Auto Switch installation



PSW12-10



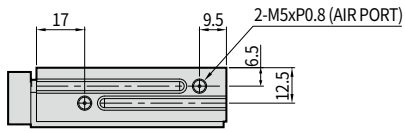
PSW12-10 Example of Auto Switch installation

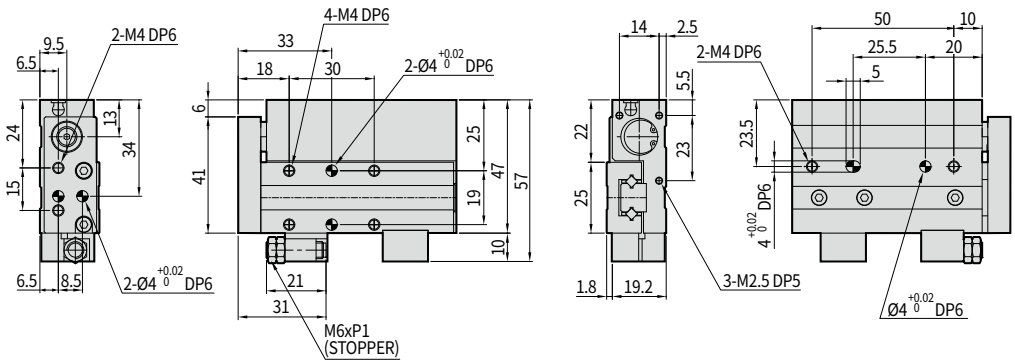


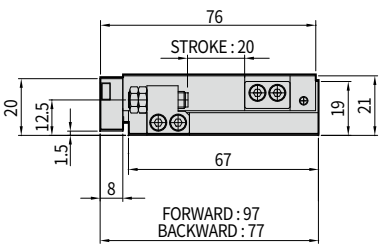
PSW Series

06 08 12
10 20 30 40 50

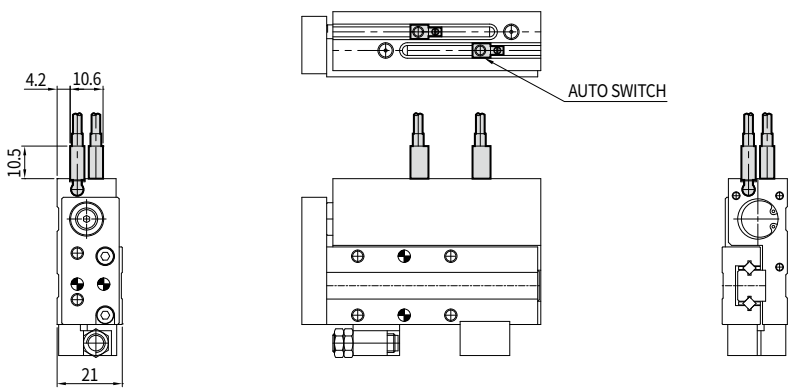
PSW12-20



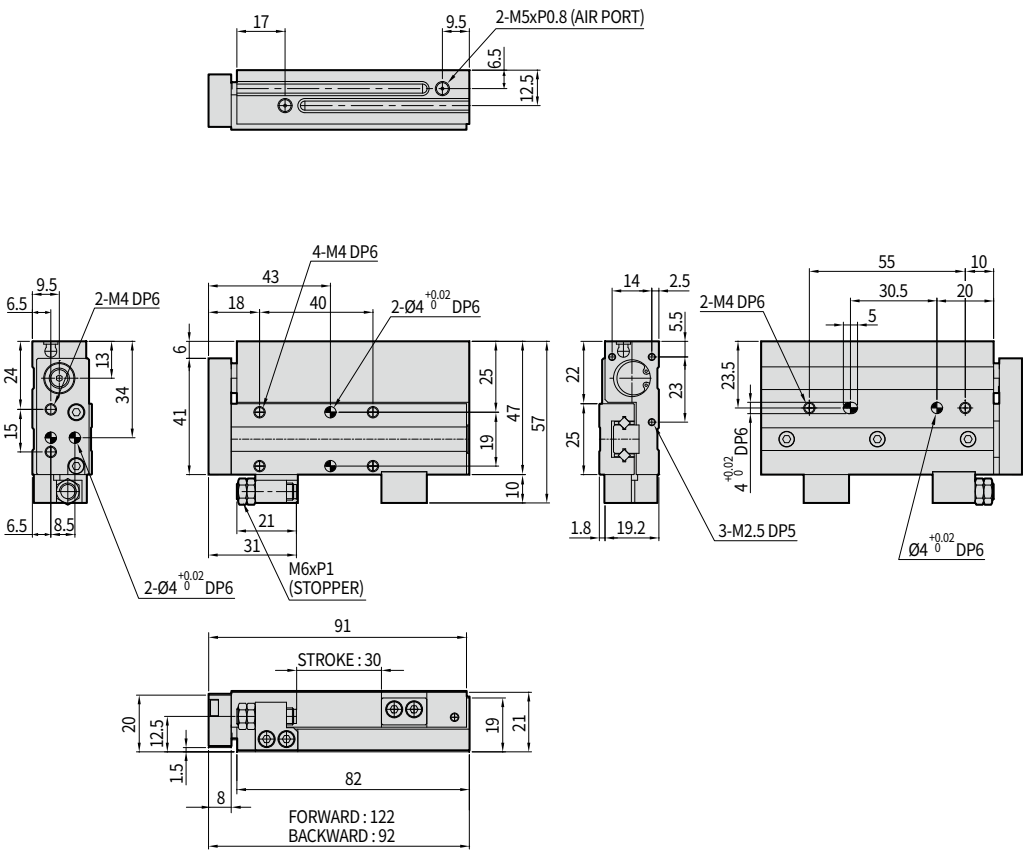




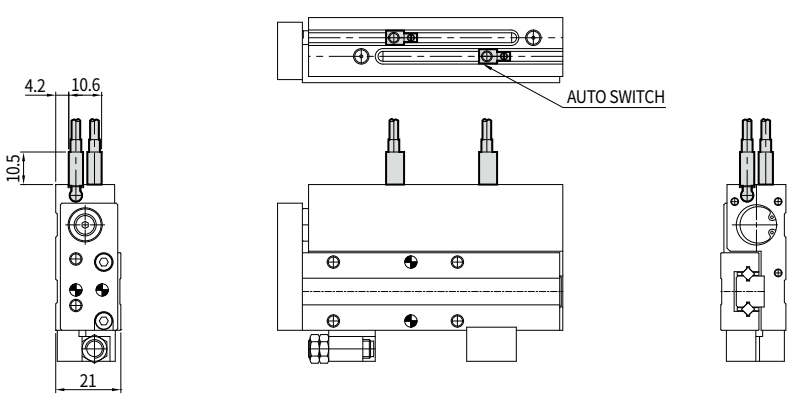
PSW12-20 Example of Auto Switch installation



PSW12-30



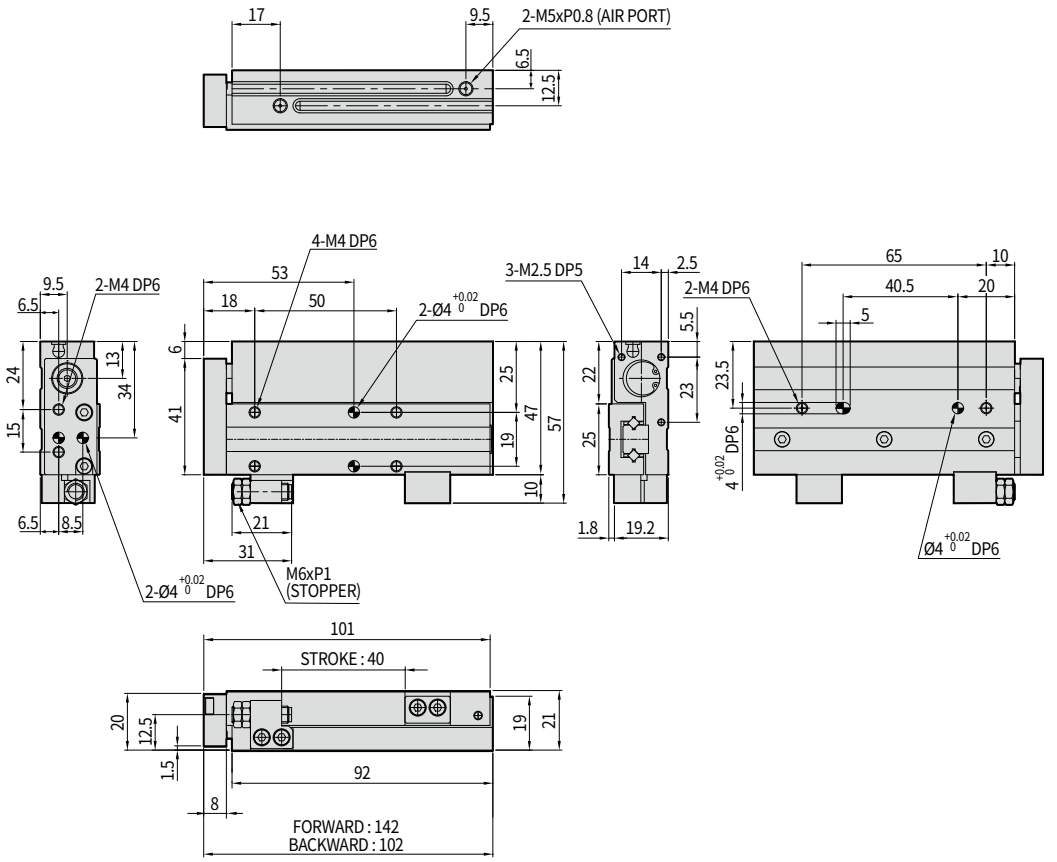
PSW12-30 Example of Auto Switch installation



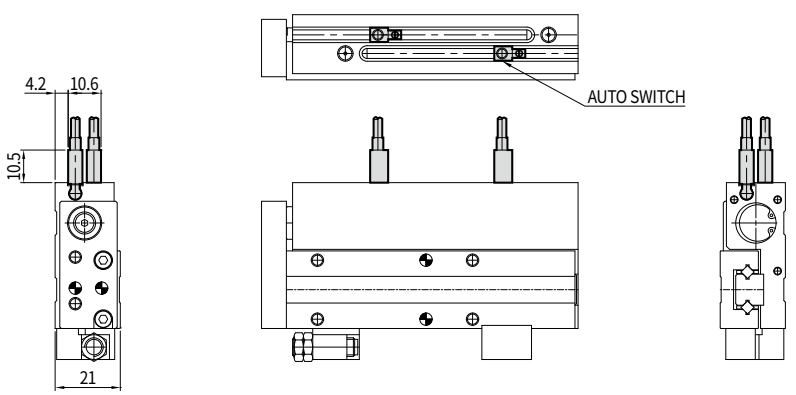
PSW Series

06 08 12
10 20 30 40 50

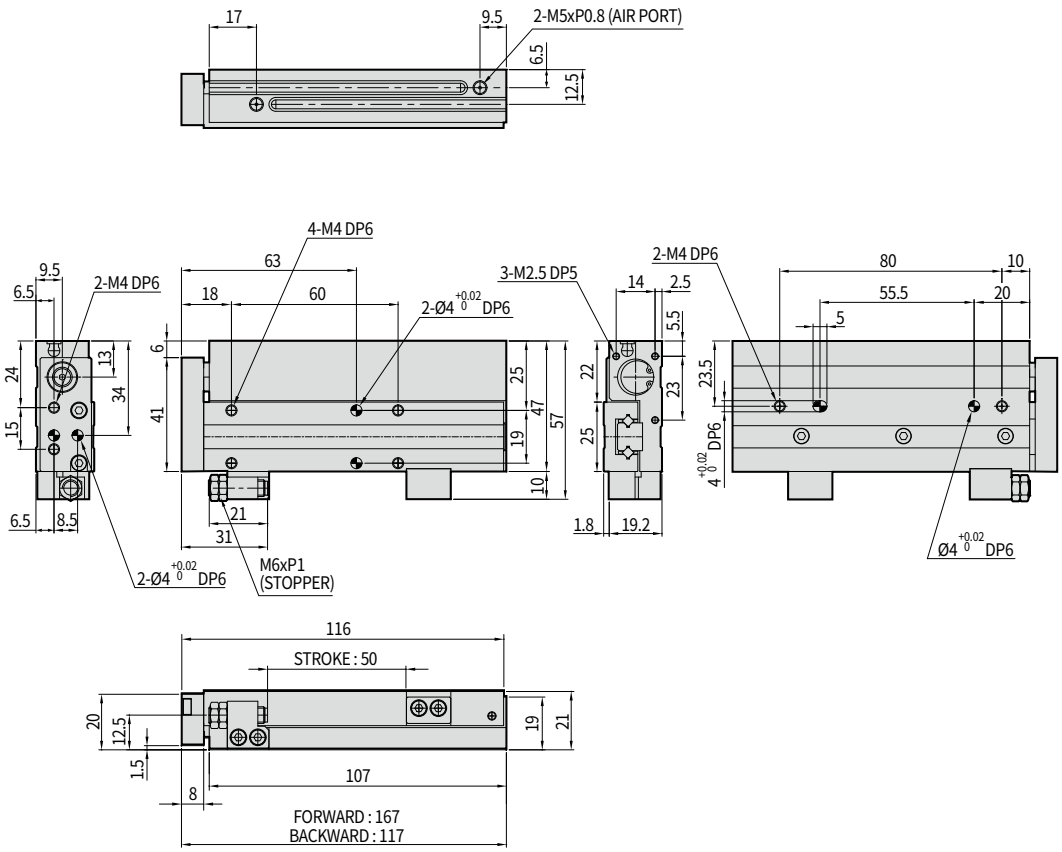
PSW12-40



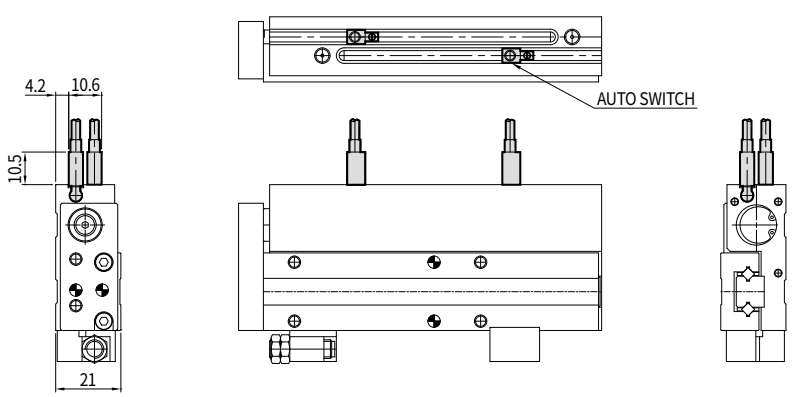
PSW12-40 Example of Auto Switch installation



PSW12-50

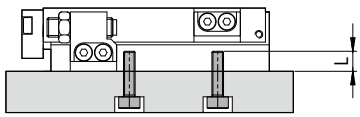


PSW12-50 Example of Auto Switch installation



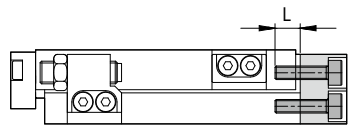
Installation Information

1. Installation by body tap holes



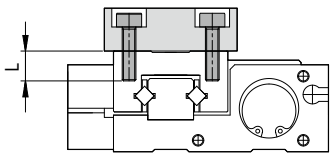
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PSW06	M3×P0.5	11	4
PSW08	M3×P0.5	11	4
PSW12	M4×P0.7	25	6

2. Installation by body tap holes



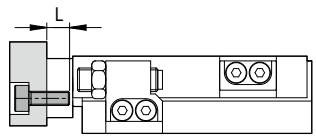
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PSW06	M2×P0.4	1.5	4
PSW08	M2×P0.4	1.5	4
PSW12	M2.5×P0.45	4.9	5

3. Installation by table tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PSW06	M3×P0.5	11	3
PSW08	M3×P0.5	11	3
PSW12	M4×P0.7	25	6

4. Installation by plate tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PSW06	M3×P0.5	11	5
PSW08	M3×P0.5	11	5
PSW12	M4×P0.7	25	6

MEMO

PROTEC

P&M Catalogue

PICK UP CYLINDER

P & M INCORPORATED

Please read it before use, with individual notes for each series as well, for your safe use.

⚠ Basic Safety Notes for PICK UP CYLINDER ❶

⚠ Caution — Notes in Installation

■ **Be careful to protect "V" groove from damage which the ball bearing is rubbed on slide rail and guide.**

■ **Be careful not to cause scratch or shock on the cylinder body and mounting surfaces.**

Damage in mounting surfaces makes worse the flatness, and cause work failure due to the increased swing of guide unit and/or friction resistance.

■ **For assembly connector, tighten it to the specified torque.**

■ **Install screw to the cylinder and tighten it to the specified torque.**

Otherwise, it may cause defect in working. Also, insufficient screw tightening may cause dislocation or work pieces to drop.

■ **Keep away from any object that could be affected by a magnetic field.**

The piston of cylinder has a magnet, so keep it away from magnetic tape, magnetic disc, and etc., which could be affected by a magnetic field.

⚠ Caution — Notes in Selection

■ **Do not exceed the specified load when selecting the product.**

Select model based on the specified maximum load factor according to each Bore size. Otherwise, it may result in distorted load of the guide unit, which may cause swing to guide unit, deterioration, and adverse effects on cylinder life.

■ **Avoid excessive external force or shock.**

■ **For the selection of each series, refer to the specification in this catalogue.**

For the selection of each series, refer to the specification in this catalogue. Correct use for cylinder within the specified temperature and pressure range may result in reduction in malfunction and failure.

■ **At the backward position, slight clearance could be occurred between slider(table) and cylinder body. But, this is a phenomenon that occurs during normal operation, and there is no problem with product quality at all.**

■ **The possibility of failure in vacuum loss shall be considered.**

Decreased vacuum pressure due to power failure or trouble of vacuum system may cause a loss of suction power of vacuum pad and it might lead of work drop during it working. Therefore, safety measures shall be taken such as installing guide to prevent drop.

■ **Select the appropriate ejector according to intake flow.**

Insufficient intake flow of ejector may result in poor suction. Sufficient volume of ejector should be considered. Too long or thick pipes may cause delay in operation time. Perform pipe line between ejector and cylinder in the shortest distance. Protect pipe line from any scratches or damage. It could lead vacuum leakage.

⚠ Caution — Notes in operating Environment and Handling

■ **Be careful of using in the place where vibration or shock occurs frequently, it may cause a failure.**

Do not use air cylinder for the purpose of shock or vibration absorbing. It may cause of human injury or damage on the machine parts.

■ **Do not put your finger in between cylinder body and rotary prevention plate.**

When cylinder operate, finger jam could be occurred.

■ **To control the moving speed of cylinder, please use speed controller.**

When controlling of moving speed, increase it from low-speed to required speed gradually.

■ **Be careful not to crash or create damage on the inside of cylinder & piston rod.**

Cylinder inner diameter is managed with precision allowance, and any small scratches or distortion may cause malfunction. In addition, any scratches of motion units such as piston rod may lead damage to packing and malfunction due to air leakage.

■ **When used around heat source of high temperature, product can be heated by radiant heat and cause failure. Therefore, install protective covers to block heat source.**

■ **Be care of corrosion resistance for the stability in Ball Bearing guide unit.**

Be care of corrosion resistance in humid environment as water drop can be created in guide unit and it can get rusty in such environment.

■ **Add up lubricant at the frictional surface of cylinder regularly.**

Add up lubricant at the frictional surface of cylinder periodically. It may result in expanded life of cylinder.

■ **There is the compression spring at the end of cylinder, which helps in shock absorption and positioning of Work Pick Up. Do not disassemble it from cylinder.**

Spring is a consumable part. For stable usage, replace it if any deterioration of energy absorption is occurred.

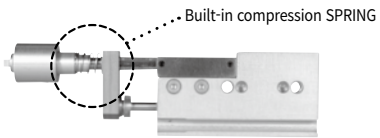
Please read it before use, with individual notes for each series as well, for your safe use.

⚠ Basic Safety Notes for PICK UP CYLINDER ❷

⚠ Caution — Notes in operating Environment and Handling

■ **There is the compression spring at the end of cylinder, which helps in shock absorption and positioning of Work Pick Up. Do not disassemble it from cylinder.**

Spring is a consumable part. For stable usage, replace it if any deterioration of energy absorption is occurred.



■ **Select appropriate vacuum pad according to the shape and material of work.**

■ **Make sure to connect fixing or connection unit of cylinder firmly.**

Make sure that the cylinder is connected firmly, in particular, if used in the place where vibration and shock occur frequently.

■ **Always use clean air. Otherwise, it may result in clogged vacuum tube due to foreign matters or dust.**

■ **Do not use in the environment that can be affected by foreign substances such as dust and chip, and cutting oil.**

It may cause vibration, increase of frictional resistance, and air leakage. In such environment, please install appropriate protective covers after the consultation with our company.

■ **For motor equipped products, operate it in a fixed state so that the cable on the motor side does not move.**

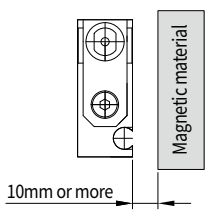
If the wire is shaken or greatly bent due to the operation of the cylinder or equipment, the durability of the wire (especially the motor-cable connection part) will be affected.

■ **For motor equipped products, do NOT operate rotation axis by external force.**

If an external force is applied to the motor shaft while power is applied, an alarm will stop the motor by the its own protection function. In this case, use the error clear function of the driver or turn the power back on.

⚠ Caution — Notes in Auto Switches application

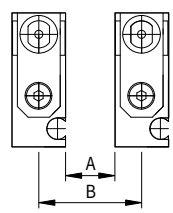
■ **When there are magnetic materials like steel plate near the switch of cylinder, most likely they may cause malfunction in the switch, therefore they need to be designed and installed with sufficient clearance from the surface of cylinder (maintain 10mm or more).**



■ **Always use stainless bolts when mounting auto switch to cylinder in order to prevent switch malfunction. If unavoidable, use commercial bolts after removing the magnetic properties.**

■ **If two or more cylinders are installed close, auto switch might malfunction due to magnetic field interference. It is need to be installed with sufficient space.**

(In case of unavoidable use with less than the minimum free distance, please attach a steel plate or magnetic blocking plate to the opposite cylinder close to the auto switch. If magnetic blocking plate is not installed, it could be the reason of malfunction. For more details, please contact to office.)



※ Maximum cylinder proximity distance.

Stopper Options		A (mm)	B (mm)
PPU06B, PPU12B		8	20
		8	28
PPC06	Magnetic sensor	10.2	18
	Micro Photo sensor	0.2	8
PPR10 PPRL10 (For the alternative use with A and B type)		6.2	18
PPR13 PPRL13 (For the alternative use with A and B type)		8	24

GUIDE EMBEDDED PICK UP CYLINDER

PPU-B Series

High precise, high solidity compact type

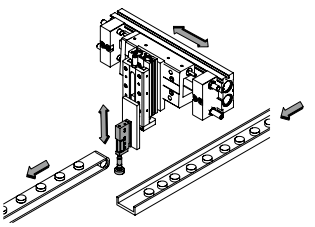
Application

Suitable to precise handling for small workpiece such as electronic components and semiconductor chips.

Widen products line up

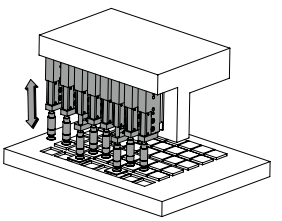
New Release Ø12 model !

Application 1



Suction and moving for small components.

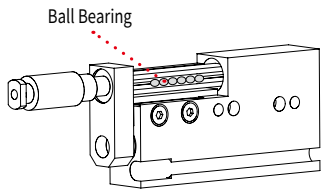
Application 2



- Handling system for IC chips.
- Parallel aligned application. (min pitch : 20mm)

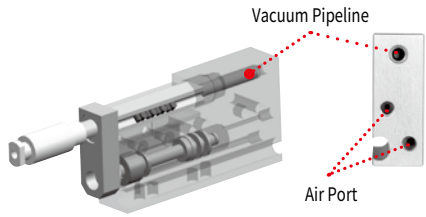
Ball Bearing Guide

- Ball bearing inside linear motion guide applied.
- High solidity, high precise structure not needed extra guide installation.
- High speed responsiveness by linear guide application.



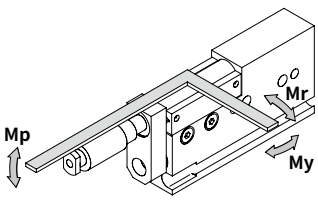
Guide - Vacuum rod unified structure

- Slim type pick up cylinder having anti-rotation function by vacuum pipeline embedded in the high precise guide rail.



Displacement for three direction moments

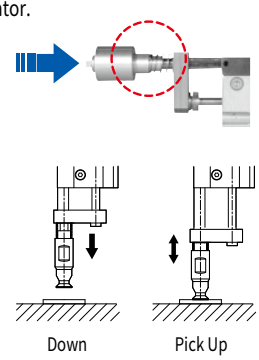
	Moment	Displacement
Mp (Pitching moment)	1.5 kgf·cm	0.01 mm
My (Yawing moment)	1.5 kgf·cm	0.01 mm
Mr (Rolling moment)	3.3 kgf·cm	0.2°



※ Displacement is based on the end of connector.

Buffer function at the end of picker

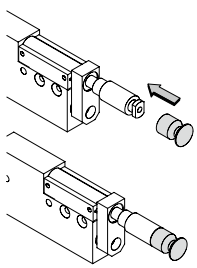
- Positioning and buffering function when picking up.
- Protection function for both of workpiece and actuator.



Various vacuum pad applicable

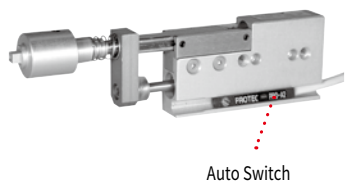
- Depend on the shape of connector, various vacuum pad can be assembled.

※ If you need non-standard connector, please contact to office.



Auto Switch installation (Optional)

- Magnetic sensing auto switch seated on the side of body is available.



PICK UP CYLINDER / HIGH PRECISION GUIDE

PPU-B Series

New released Ø12 model !

Features

- Miniature type vacuum pick up cylinder with vacuum pipe inside on the high precise guide.
- High speed responsiveness and precise performance from ball bearing inside of precise guide.
- Various installation options. (3 ways of installation)
- Positioning and buffering function when picking up by buffer function on the end of picker.
- Suitable for handling for small workpiece such as IC chips and electronic components.
- Diversity types of Auto Switch installation. (Optional)

Order Form

PPU	06B	P	-	10	-	E	-	CA2	-	A2	L	S	PM
①	②	③		④		⑤		⑥		⑦	⑧	⑨	⑩

① Series Name

② Cylinder Bore Size

Order	CYL Bore(mm)
06B	6
12B	12

④ Standard Strokes

Order (=Standard Strokes(mm))
05, 10, 15, 20, 25, 30
05, 10, 15, 20, 25, 30

③ Auto Switch Mounting Bracket

Order	Bracket
Blank	Non-Mounted
M	Mounted (Outside magnetic sensing)
P	Mounted (Micro photo)

- For "Blank", magnetic sensing type auto switch can be attached on the body side sensor slot.
- For micro photo and outside magnetic type can be used for detecting backward position only.

⑤ Special Option

Order	Special Option
Blank	Standard
E	Secondary battery field

⑧ Magnetic Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

- Cable length for micro photo is 1M only.

⑨ Num of Magnetic Auto Switches

Order	Quantity
Blank	2PCS
S	1PCS

- With outside magnetic auto switch option selection, 2 PCS of auto switch can be attached regardless stroke.
- Auto switch qty is different by stroke for each model, please refer below table.

※ Max auto switch qty by stroke
(At the case of without outside magnetic auto switch)

Stroke(mm)	Quantity
05, 10, 15, 20	1PCS
25, 30	2PCS

- For 2 PCS auto switch application, it is needed to be assemble by face to face of each heads. Please considering wire direction.

⑥ Connector Options

Order	Model	Connector Type	Remark	Order	Model	Connector Type	Remark
Blank	PPU06B	PAD Direct mounting	Ca1 as Standard	Blank	PPU12B	PAD Direct mounting	Ca3 as Standard
CA2		PAD Direct mounting		CA4		PAD Direct mounting	
CB1		Screw type	M5 Male screw	CB3		Screw type	M5 Male screw
CB2			M3 Male screw	CB4			M6 Male screw
CC1			M5 Female screw	CC3			M5 Female screw
CC2			M3 Female screw	CC4			M6 Female screw
CN		No Connector	M4 Male screw	CN		No Connector	Ø8

⑦ Magnetic Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
A2	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2C	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic reed switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic solid state	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic solid state	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic solid state	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic solid state	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

⑩ Micro Photo Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Frequency
		Wires	Direction	AC	DC	AC	DC	
Blank	No Auto Switch provided							
PM	Micro photo	4-Wire	Refer individual diagram	-	24V (5~24V)	-	50mA	3kHz

* Can be used only for "P" option selection for <③ Auto Switch mounting Bracket>of order form.
※ Applied micro photo sensor : PRO-PM-U

Accessory Order Form

(1) Connector

PPU 06B - CA1 - ASSY
① ② ③ ④

① Series Name

② Cylinder Bore Size

③ Connector

※ For more detailed, please refer order form <⑥ Connector Options>.

④ Order Name for Accessory
- Based for 1 piece of product.

※ **When replacing the connector, be careful not to damage the vacuum rod.**
- When disassembling: After heating the connector joint, rotate it counterclockwise to disassemble it.
- When assembling: Assemble after applying Loctite. Be aware of damage to the inner O-ring.

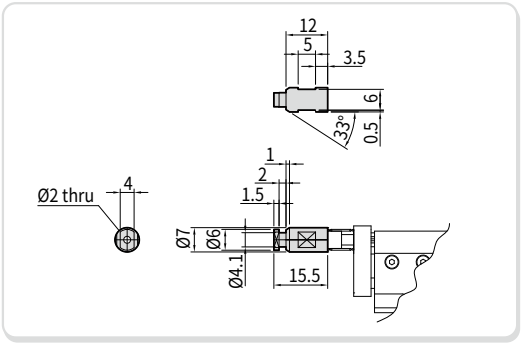
Specification

Item Name		PPU06B						PPU12B					
CYL Bore Size(mm)		6						12					
Rod Size(mm)		3						6					
Standard Strokes(mm)		5	10	15	20	25	30	5	10	15	20	25	30
Theoretical Thrust(kgf)	Forward	0.28×P						1.13×P					
P : Air Pressure(kgf/㎠)	Backward	0.21×P						0.85×P					
Fitting Size		M3						M5					
Weight(kgf)		0.04		0.05		0.09		0.2		0.22		0.28	
Buffering Stroke(mm)		3						4					
Fluid		Clean Air Note 1)											
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 9.2) Note 2)											
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)											
Temperature Range(°C)		5 ~ 60											
Operation Type		Double Acting											
Position Accuracy(mm)		± 0.01											
Type of Guide		Linear Guide											

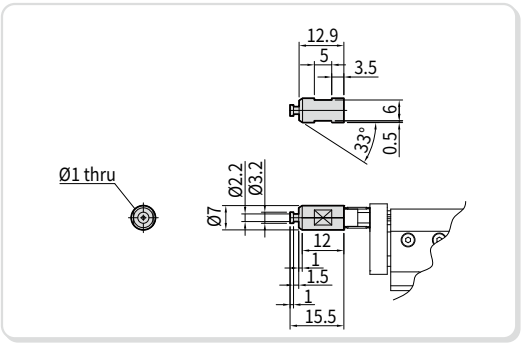
Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

Types of Connector (PPU06B)

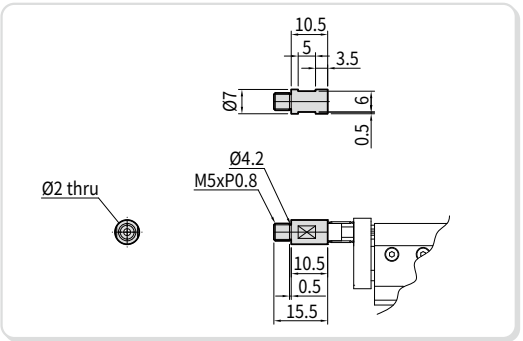
▶ PRO-CA1



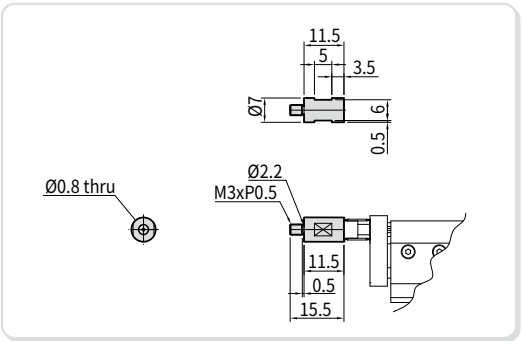
▶ PRO-CA2



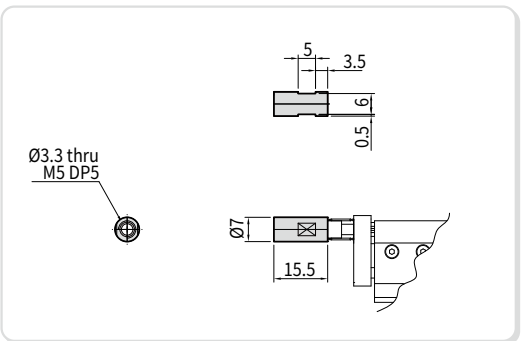
▶ PRO-CB1



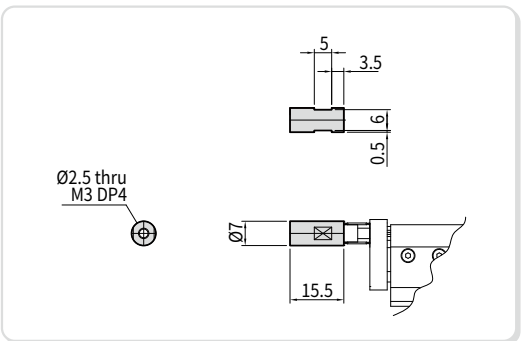
▶ PRO-CB2



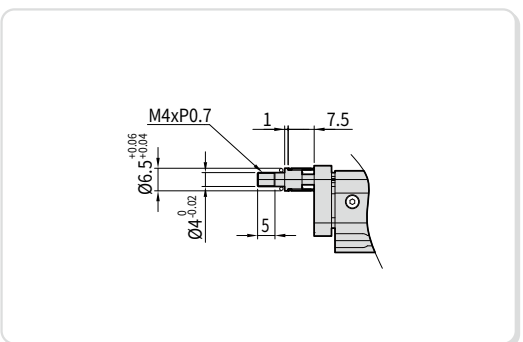
▶ PRO-CC1



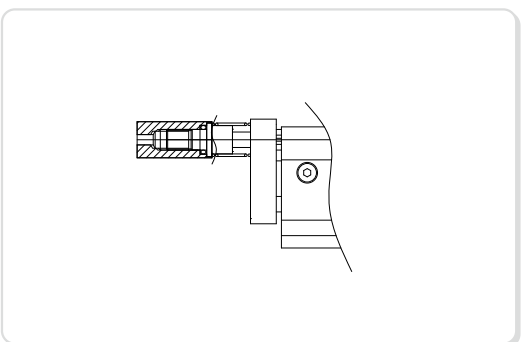
▶ PRO-CC2



▶ No Connector (PPU06B-CN)

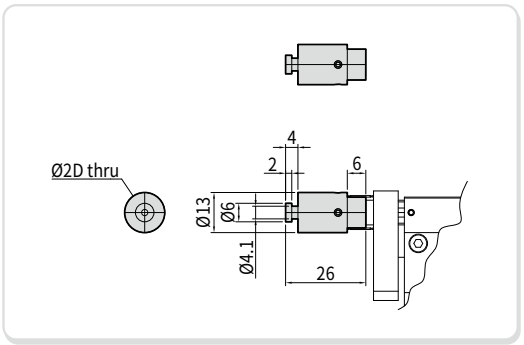


▶ Example of CN option assembling

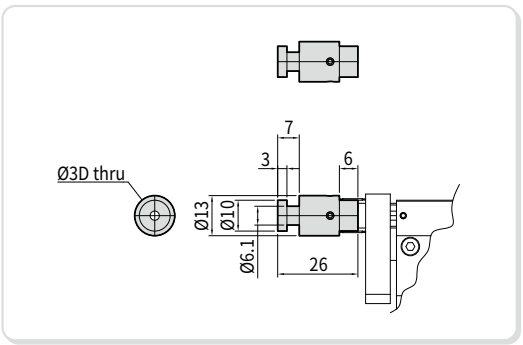


Types of Connector (PPU12B)

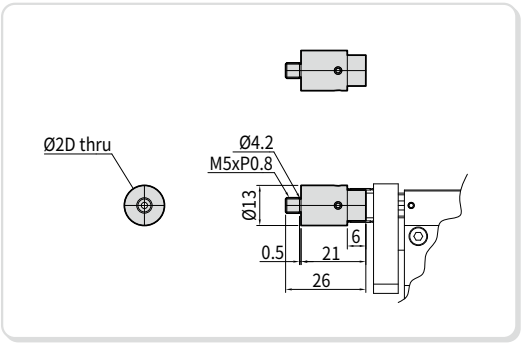
▶ PRO-CA3



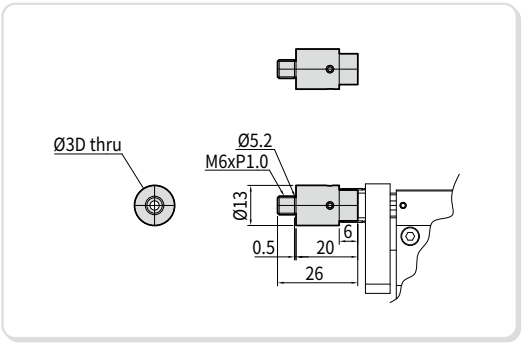
▶ PRO-CA4



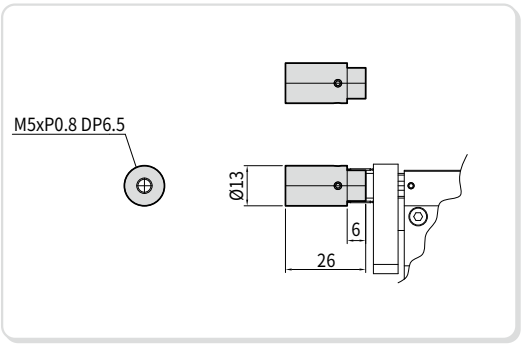
▶ PRO-CB3



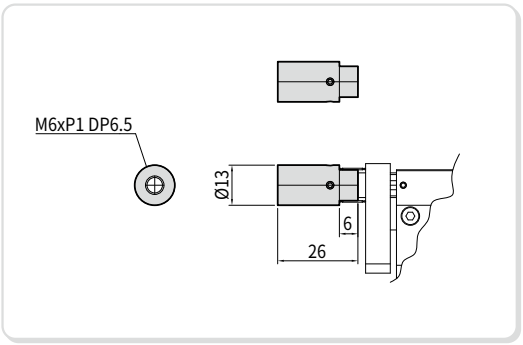
▶ PRO-CB4



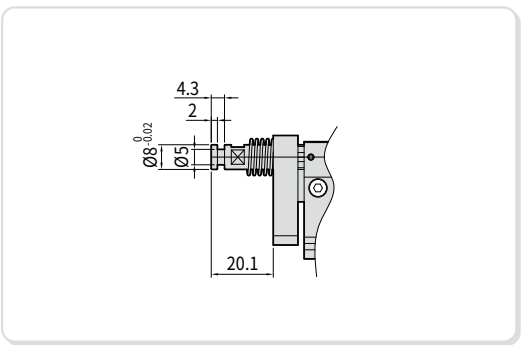
▶ PRO-CC3



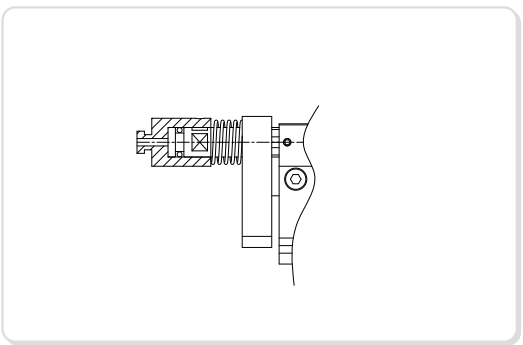
▶ PRO-CC4



▶ No Connector (PPU12B-CN)



▶ Example of CN option assembling



PPU-B Series

06B 12B

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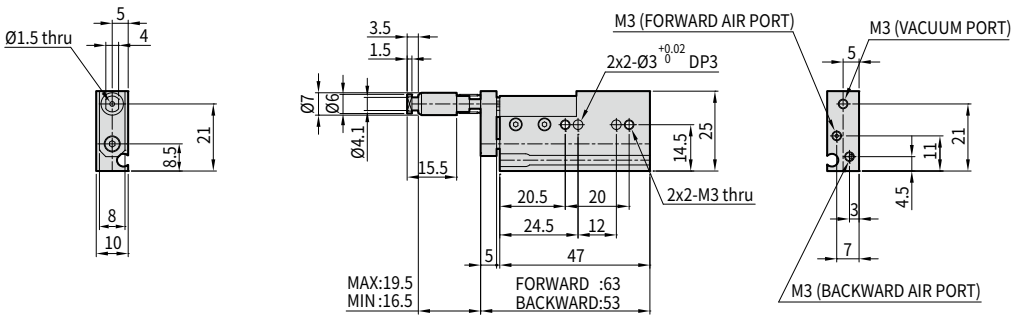
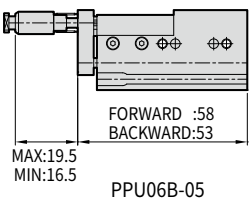
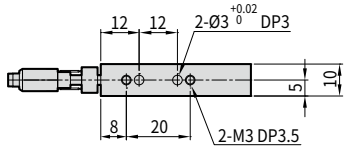
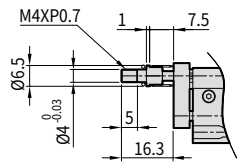
PPU06B-05, 10





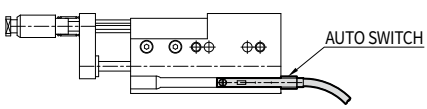
PPU06B-05

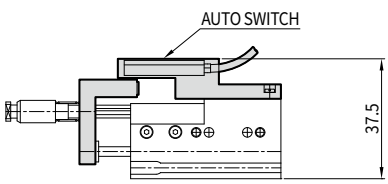


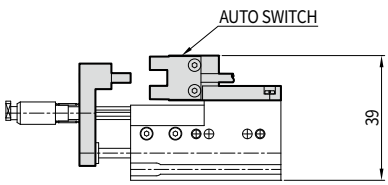


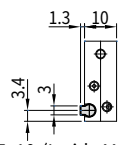
CN Option

PPU06B-05, 10 Example of Auto Switch installation

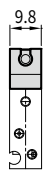




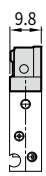




PPU06B-05, 10-(Inside Magnetic Sensor type)

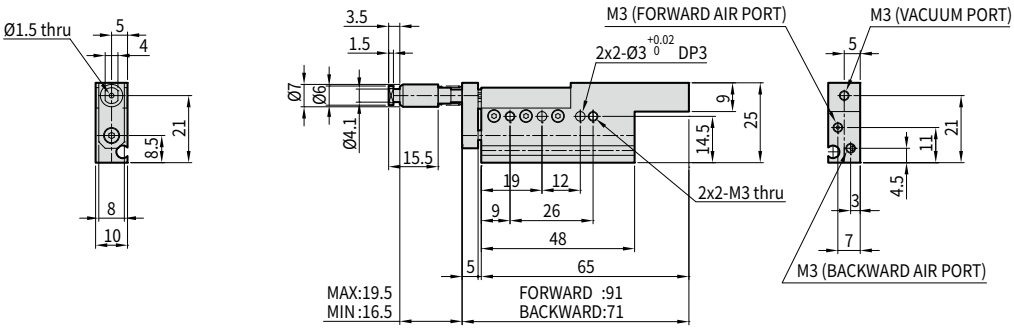


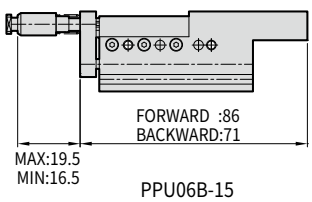
PPU06BM-05, 10-(Outside Magnetic Sensor type)



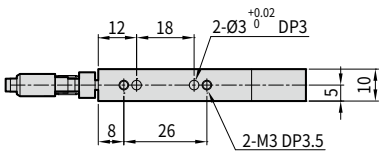
PPU06BP-05, 10-(Photo Sensor type)

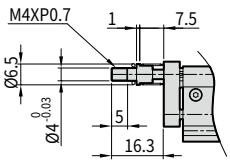
PPU06B-15, 20





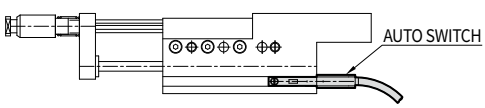
PPU06B-15

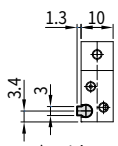




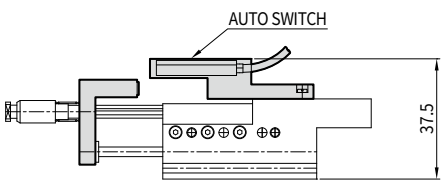
CN Option

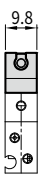
PPU06B-15, 20 Example of Auto Switch installation



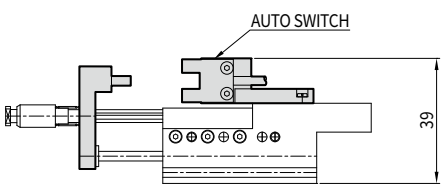


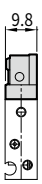
PPU06B-15, 20-(Inside Magnetic Sensor type)





PPU06BM-15, 20-(Outside Magnetic Sensor type)





PPU06BP-15, 20-(Photo Sensor type)

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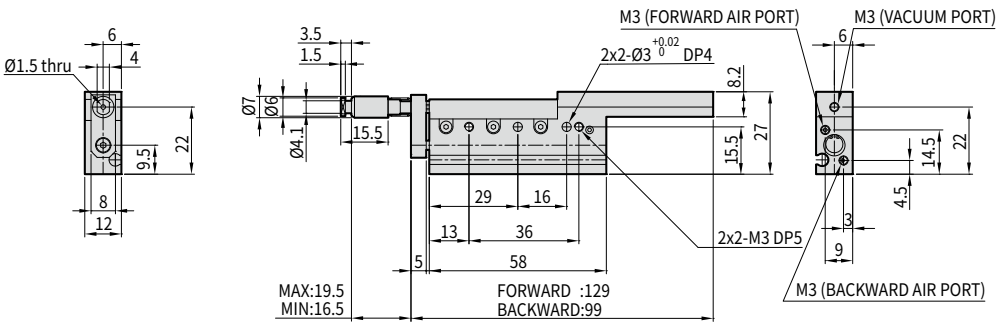
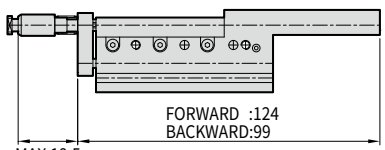
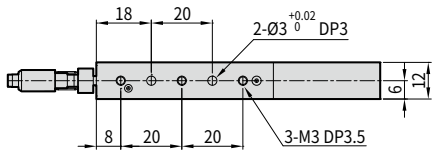
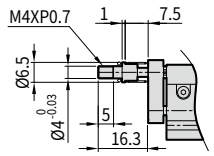




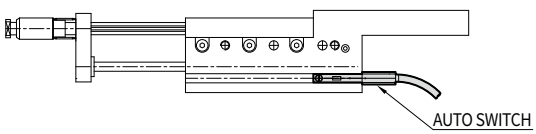
PPU06B-25

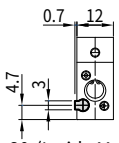




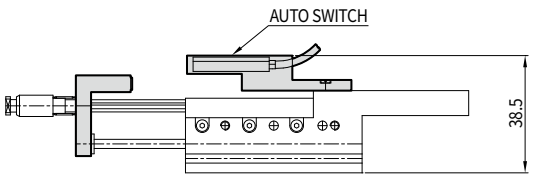
CN Option

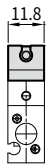
PPU06B-25, 30 Example of Auto Switch installation



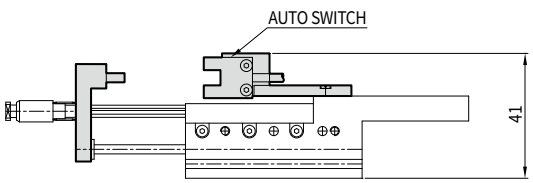


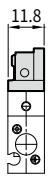
PPU06B-25, 30-(Inside Magnetic Sensor type)





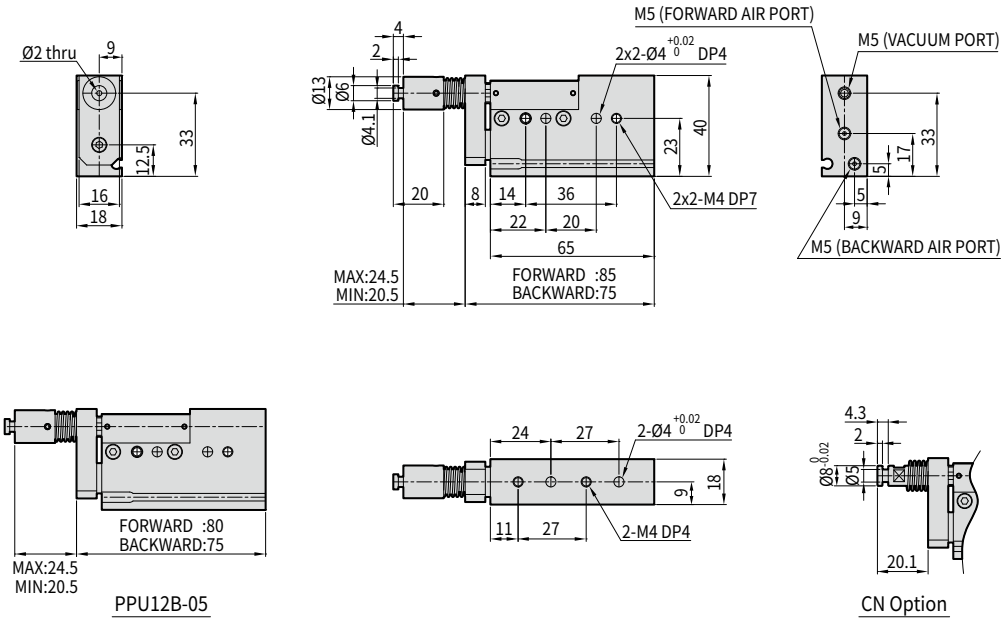
PPU06BM-25, 30-(Outside Magnetic Sensor type)





PPU06BP-25, 30-(Photo Magnetic Sensor type)

PPU12B-05, 10



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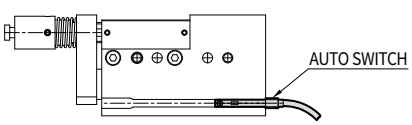
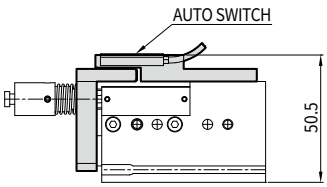
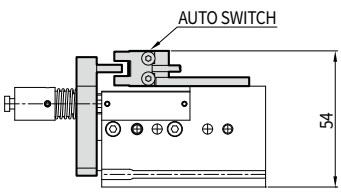
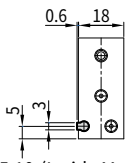
CN Option

PPU12B-05, 10 Example of Auto Switch installation

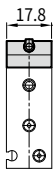




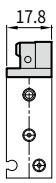




PPU12B-05,10-(Inside Magnetic Sensor type)



PPU12BM-05,10-(Outside Magnetic Sensor type)



PPU12BP-05,10-(Photo Sensor type)

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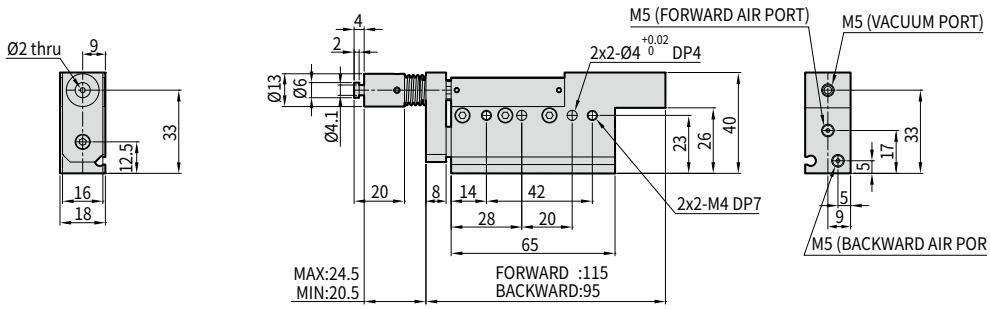
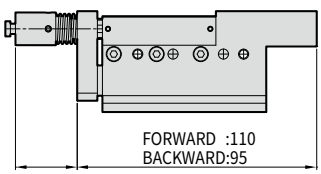
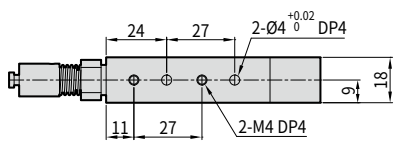
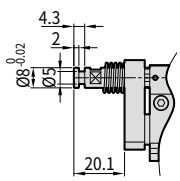




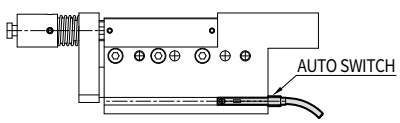
PPU12B-15

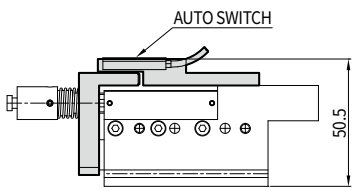


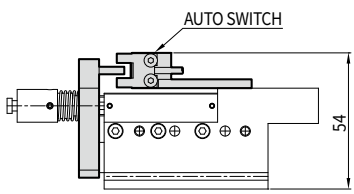


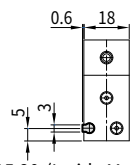
CN Option

PPU12B-15, 20 Example of Auto Switch installation

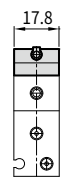




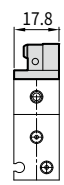




PPU12B-15,20-(Inside Magnetic Sensor type)

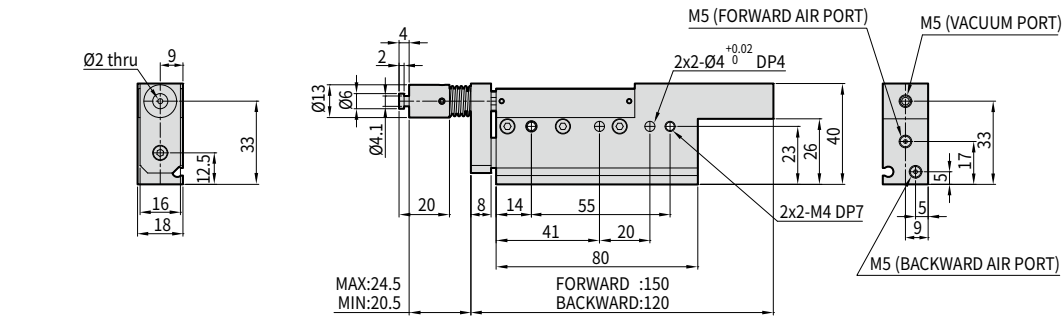


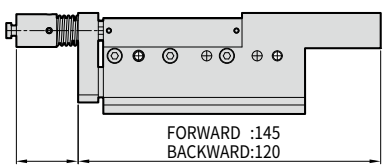
PPU12BM-15,20-(Outside Magnetic Sensor type)



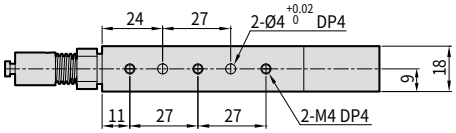
PPU12BP-15,20-(Photo Sensor type)

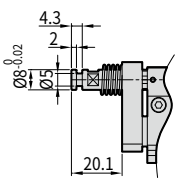
PPU12B-25, 30





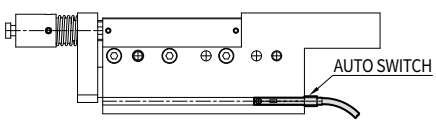
PPU12B-25

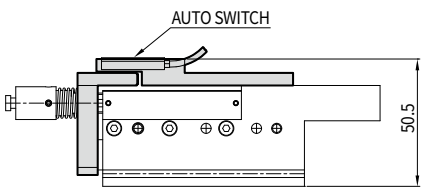


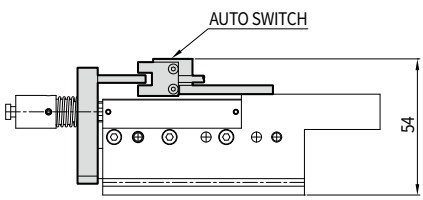


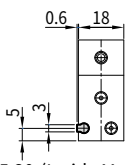
CN Option

PPU12B-25, 30 Example of Auto Switch installation

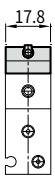




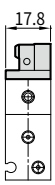




PPU12B-25,30-(Inside Magnetic Sensor type)

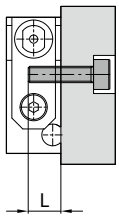


PPU12BM-25,30-(Outside Magnetic Sensor type)



PPU12BP-25,30-(Photo Sensor type)

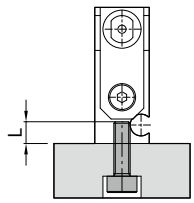
1. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06B	M3×P0.5	11	9
PPU12B	M4×P0.7	25	7

* Please be careful of interference caused by sensor protrusion for mounting on the side.

2. Installation by body tap holes



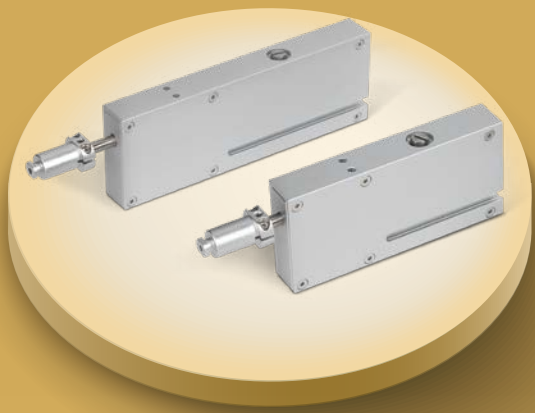
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06B	M3×P0.5	11	3.5
PPU12B	M4×P0.7	25	4

MEMO

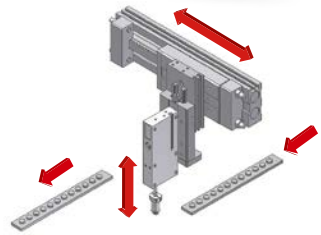
GUIDE EMBEDDED
PICK UP CYLINDER

PPU-CV Series

Linear guide inside
Dust cover applied to prevent dust scattering

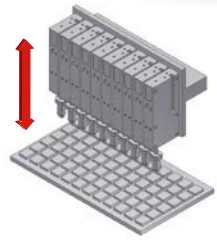


Application 1



Suction and moving for small components.

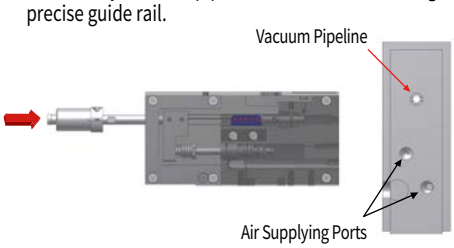
Application 2



- Handling system for IC chips.
- Parallel aligned application. (min pitch : 20mm)

Up & Down motion and Vacuum pipe unified

■ Slim type pick up cylinder having anti-rotation function by vacuum pipeline embedded in the high precise guide rail.



Guide inside sealed cylinder

■ Guide is located inside and internal dust not exposed to the outside, so it can be used in a clean environment.

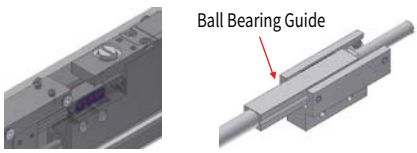
■ Dust seal applied on the moving part of vacuum rod, so it prevents external dust goes inside.

Linear guide inside

■ Ball bearing inside linear motion guide applied.

■ High solidity, high precise structure not needed extra guide installation.

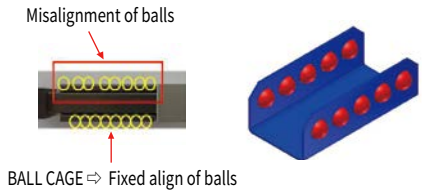
■ High speed responsiveness by ball bearing guide application.



Cage type ball bearing

■ Preventing miss align of ball bearing during use.

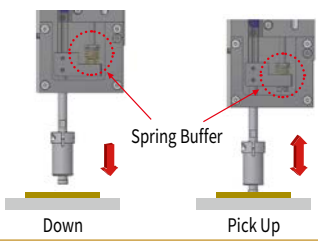
■ Removed error of stroke due to widening of ball position distance.



Buffer function at the end of picker

■ Positioning and buffering function when picking up.

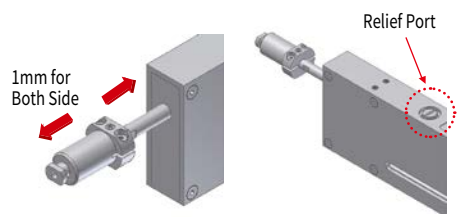
■ Protection function for both of workpiece and actuator.



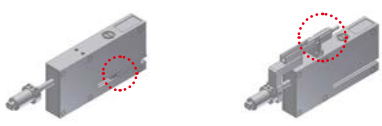
Adjustment of connector height, relief port

■ Adjustment of connector height → 1mm for both side

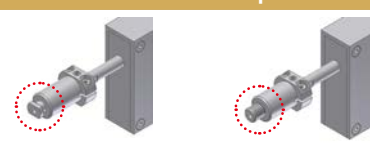
■ Relief port → Prevent dust scattering by suction of inner dust.

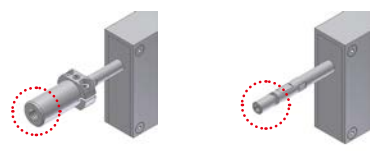


Various types of Auto Switch



Various connector options





PICK UP CYLINDER / HIGH PRECISION GUIDE

PPU-CV Series

Features

NEW

- Miniature type vacuum pick up cylinder with vacuum pipe inside on the high precise guide.
- High speed responsiveness and precise performance from ball bearing inside of precise guide.
- Positioning and buffering function when picking up by buffer function on the end of picker.
- Suitable for handling for small workpiece such as IC chips and electronic components.
- Covered type product which is internal dust not exposed to the outside, so it can be used in a clean environment.
- Diversity types of Auto Switch installation. (Optional)

Order Form

PPU 06CV P - 10 - CD2 - A2 L S PM

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series Name

② Cylinder Bore Size

Order	CYL Bore(mm)
06CV	6
08CV	8

④ Standard Strokes

Order (=Standard Strokes(mm))
05, 10, 15, 20
05, 10, 15, 20

③ Auto Switch Mounting Bracket

Order	Bracket
Blank	Non-Mounted
M	Mounted (Outside magnetic sensing)
P	Mounted (Micro photo)

* For "Blank", magnetic sensing type auto switch can be attached on the body side sensor slot.
* For micro photo and outside magnetic type can be used for detecting backward position only.

⑤ Connector Options

Order	Connector Type	Remark
Blank	PAD Direct mounting	CD1 as Standard
CD2	PAD Direct mounting	
CE1	Screw type	M5 Male screw
CE2		M3 Male screw
CF1		M5 Female screw
CF2		M3 Female screw
CN	No connector	M3 Female screw

* For more detailed, please refer order form <Connector Options>.

⑥ Magnetic Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
A2	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2C	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic reed switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic solid state	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic solid state	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic solid state	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic solid state	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

⑦ Magnetic Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

* Cable length for micro photo is 1M only.

⑧ Num of Magnetic Auto Switches

Order	Quantity
Blank	2PCS
S	1PCS

* Blank : Available only for outside magnetic sensing auto switch bracket selected.

⑨ Micro Photo Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Frequency
		Wires	Direction	AC	DC	AC	DC	
Blank	No Auto Switch provided							
PM	Micro photo	4-Wire	Refer individual diagram	-	24V (5~24V)	-	50mA	3kHz

* Can be used only for "P" option selection for <③ Auto Switch Mounting Bracket>of order form.
※ Applied micro photo sensor : PRO-PM-U

Accessory Order Form

(1) Connector

PPU 06CV - CD1 - ASSY
① ② ③ ④

① Series Name

② Cylinder Bore Size

③ Connector

※ For more detailed, please refer order form <⑤ Connector Options>.

④ Order Name for Accessory
- Based for 1 piece of product.

※ When replacing the connector, be careful not to damage the vacuum rod.

- When disassembling: After heating the connector joint, rotate it counterclockwise to disassemble it.
- When assembling: Assemble after applying Loctite. Be aware of damage to the inner O-ring.

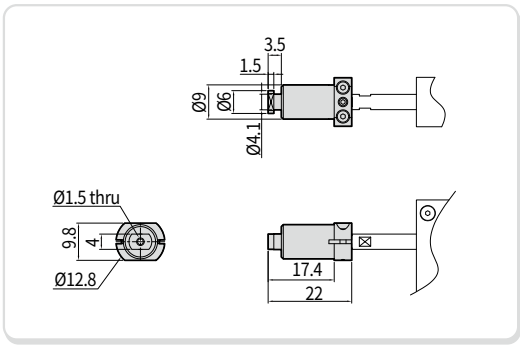
Specification

Item Name		PPU06CV				PPU08CV			
CYL Bore Size(mm)		6				8			
Rod Size(mm)		3				4			
Standard Strokes(mm)		5	10	15	20	5	10	15	20
Theoretical Thrust(kgf)	Forward	0.28×P				0.5×P			
P : Air Pressure(kgf/㎠)	Backward	0.21×P				0.37×P			
Fitting Size		M3							
Weight(kgf)		0.09	0.09	0.12	0.12	0.15	0.15	0.18	0.18
Buffering Stroke(mm)		3							
Fluid		Clean Air Note 1)							
Pressure Range(kgf/㎠)		2.5 ~ 7 (Guaranteed Resist Pressure : 9.2) Note 2)							
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)							
Temperature Range(℃)		5 ~ 60							
Operation Type		Double Acting							
Position Accuracy(mm)		± 0.01							
Type of Guide		Linear Guide							

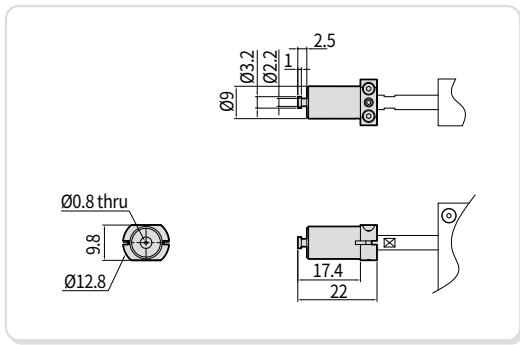
Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

Types of Connector (PPU06CV)

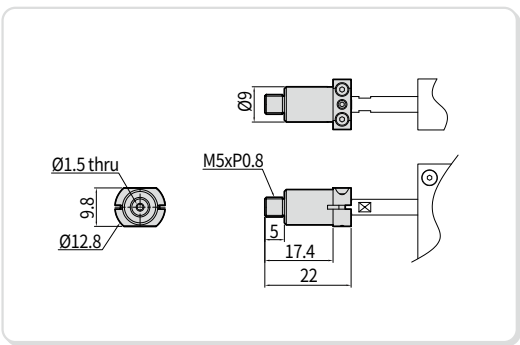
▶ PRO-CD1



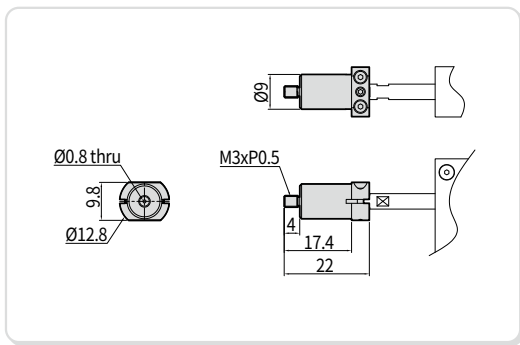
▶ PRO-CD2



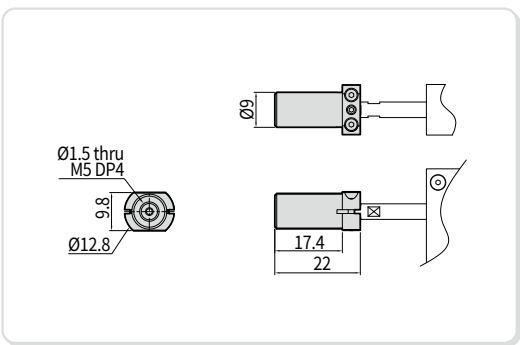
▶ PRO-CE1



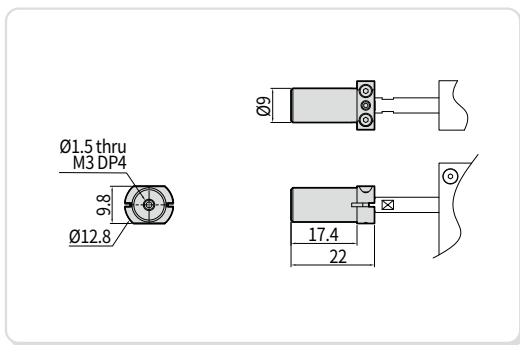
▶ PRO-CE2



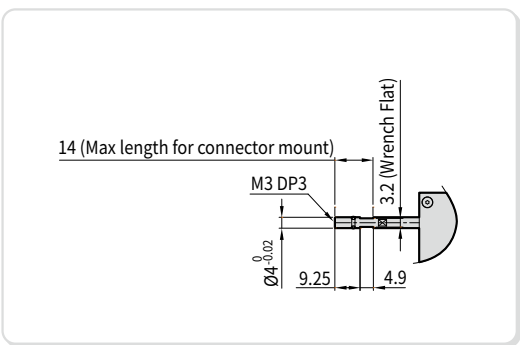
▶ PRO-CF1



▶ PRO-CF2

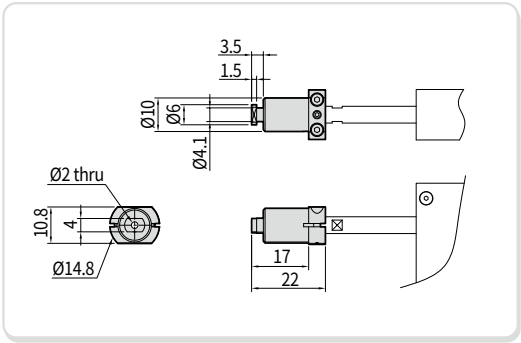


▶ No Connector (PPP06CV-CN)

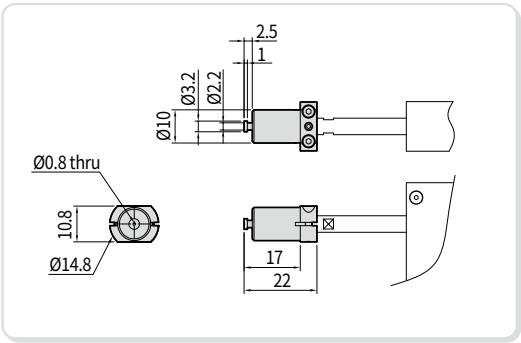


Types of Connector (PPU08CV)

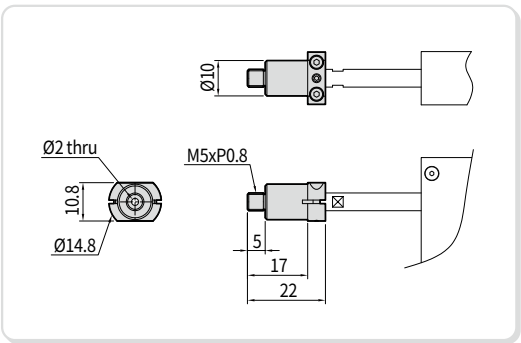
▶ PRO-CD1



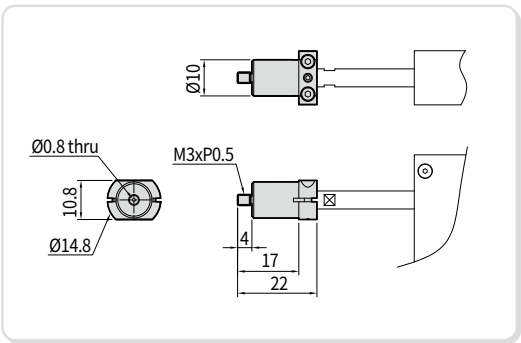
▶ PRO-CD2



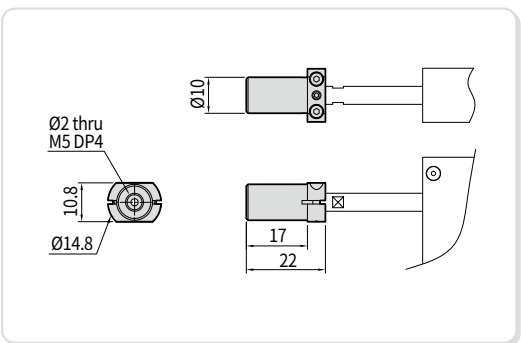
▶ PRO-CE1



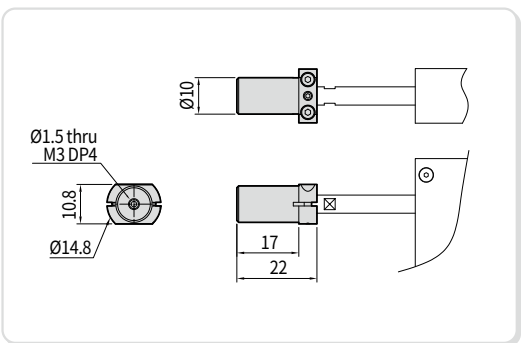
▶ PRO-CE2



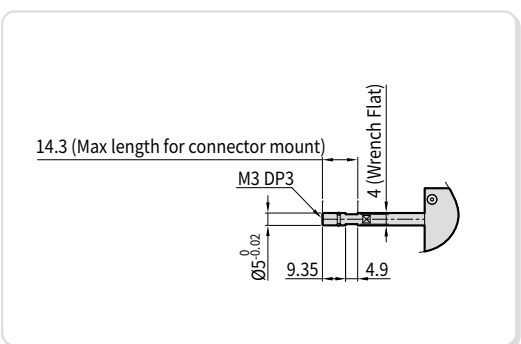
▶ PRO-CF1



▶ PRO-CF2



▶ No Connector (PPP08CV-CN)

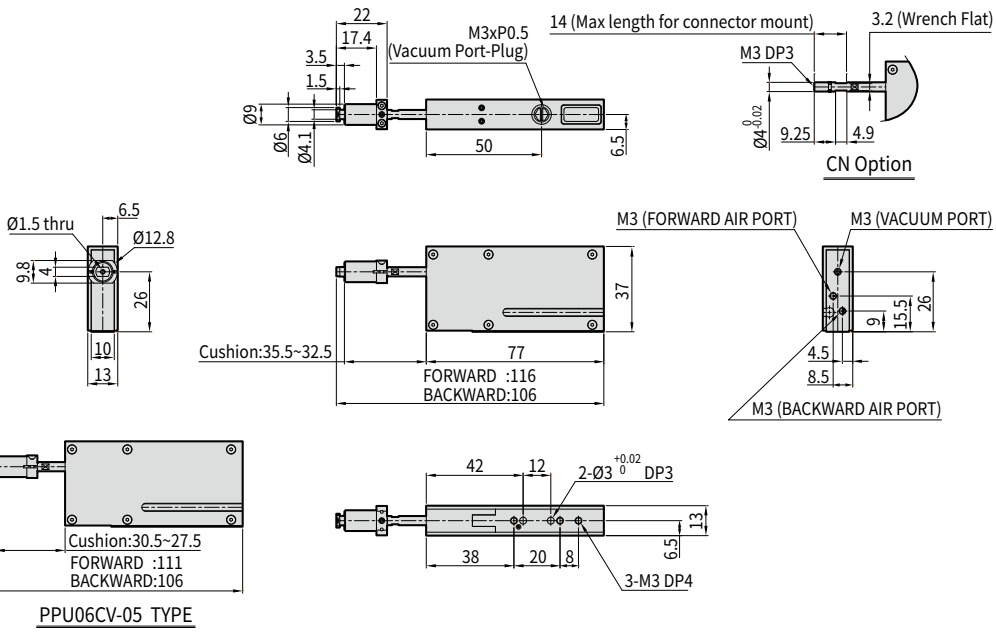


PPU-CV Series

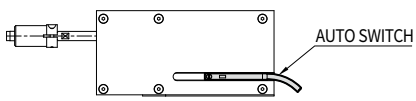
06CV 08CV

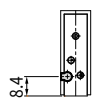
05 10 15 20

PPU06CV-05, 10

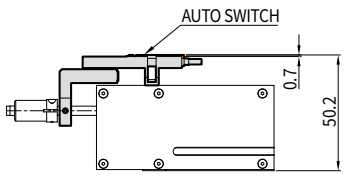


PPU06CV-05, 10 Example of Auto Switch installation

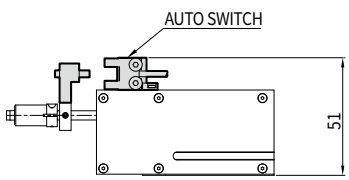


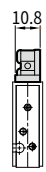


PPU06CV-05, 10 (Inside Magnetic Sensor Type)



PPU06CVM-05, 10 (Outside Magnetic Sensor Type)



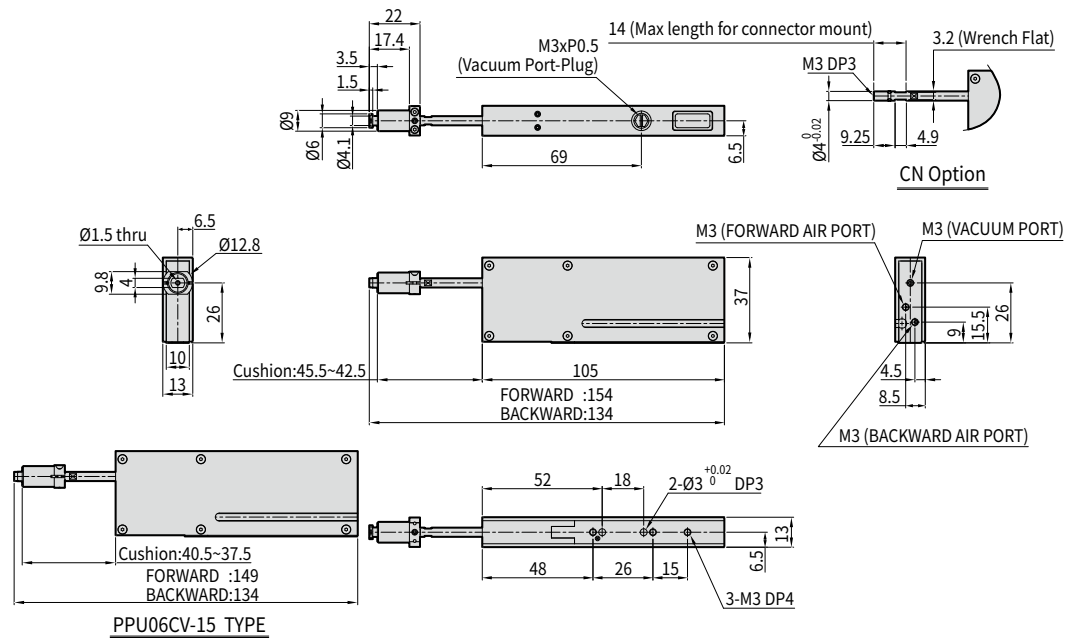


PPU06CVP-05, 10 (Photo Sensor Type)

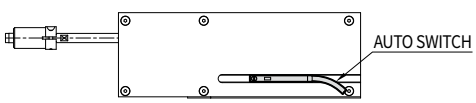
06CV 08CV

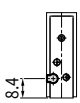
05 10 15 20

PPU06CV-15, 20

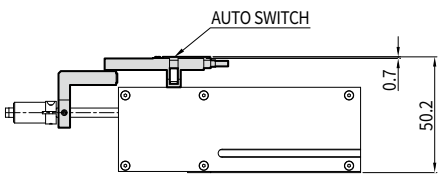


PPU06CV-15, 20 Example of Auto Switch installation

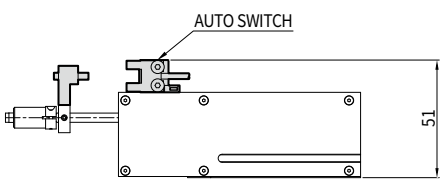




PPU06CV-15, 20 (Inside Magnetic Sensor Type)



PPU06CVM-15, 20 (Outside Magnetic Sensor Type)



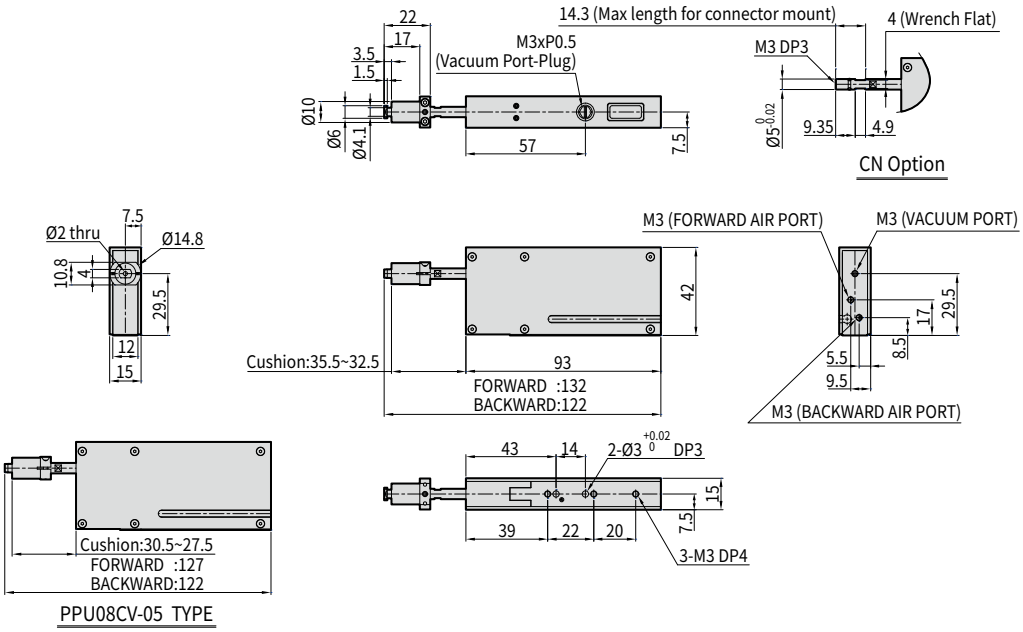
PPU06CVP-15, 20 (Photo Sensor Type)

PPU-CV Series

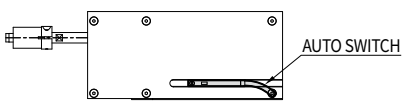
06CV 08CV

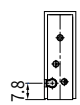
05 10 15 20

PPU08CV-05, 10

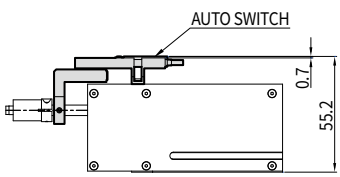


PPU08CV-05, 10 Example of Auto Switch installation





PPU08CV-05, 10 (Inside Magnetic Sensor Type)



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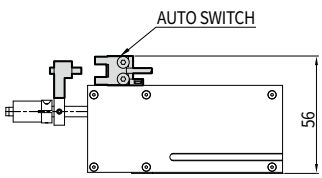
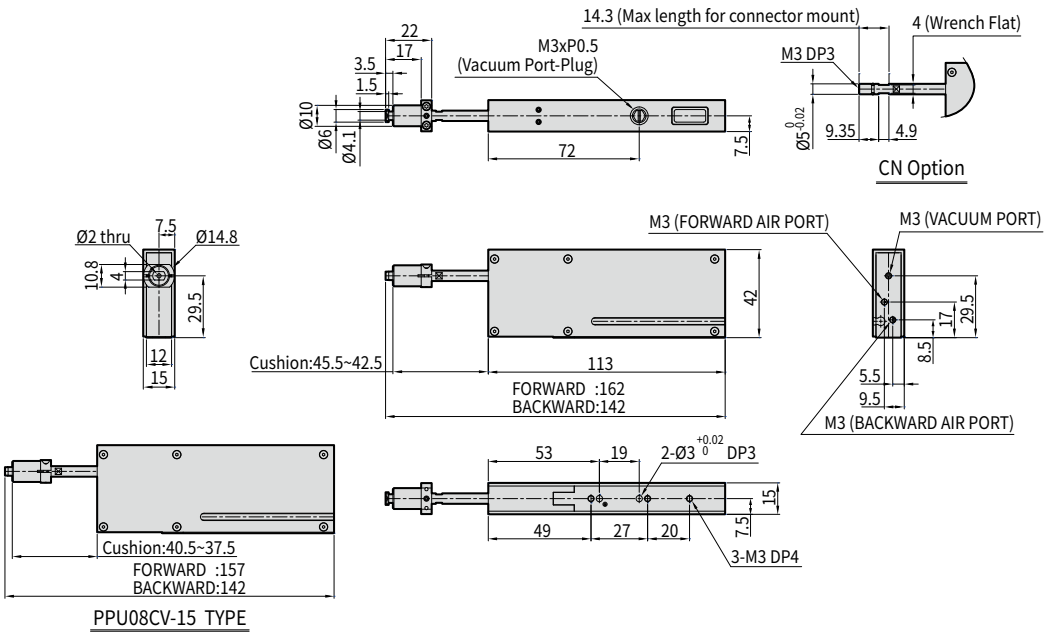
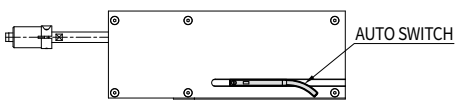


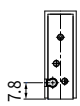
PPU08CVP-05, 10 (Photo Sensor Type)

PPU08CV-15, 20

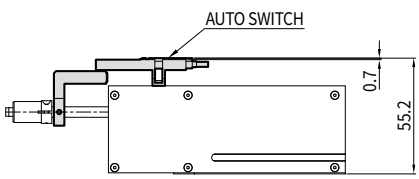


PPU08CV-15, 20 Example of Auto Switch installation

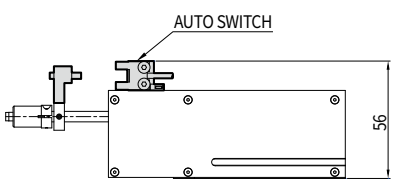




PPU08CV-15, 20 (Inside Magnetic Sensor Type)

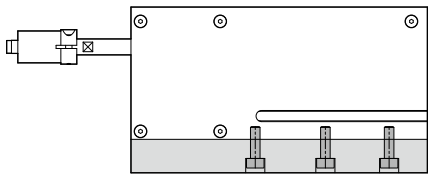


PPU08CVM-15, 20 (Outside Magnetic Sensor Type)



PPU08CVP-15, 20 (Photo Sensor Type)

1. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06CV	M3×P0.5	11	4
PPU08CV	M3×P0.5	11	4

MEMO

PICK UP CYLINDER / HIGH PRECISION GUIDE

PPU-H Series

Features

NEW

- Miniature type vacuum pick up cylinder with vacuum pipe inside on the high precise guide.
- High position accuracy with block type connector which has location pin.
- High speed responsiveness and precise performance from ball bearing inside of precise guide.
- Various installation options. (3 ways of installation)
- Positioning and buffering function when picking up by buffer function on the end of picker.
- Suitable for handling for small workpiece such as IC chips and electronic components.
- Auto Switch installation. (Optional)

Order Form

PPU 06H - 10 - A2 L S

① ② ③ ④ ⑤ ⑥

① Series Name

② Cylinder Bore Size ③ Standard Strokes

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))
06H	6	05, 10, 15, 20, 25, 30

④ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
A2	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2C	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic reed switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic solid state	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic solid state	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic solid state	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic solid state	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)

⑤ Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

⑥ Auto Switch Quantity

Order	Quantity
Blank	2PCS
S	1PCS

* Auto switch qty is different by stroke for each model, please refer below table.

※ Max auto switch qty by stroke (At the case of without outside magnetic auto switch)

Stroke(mm)	Quantity
05, 10, 15, 20	1PCS
25, 30	2PCS

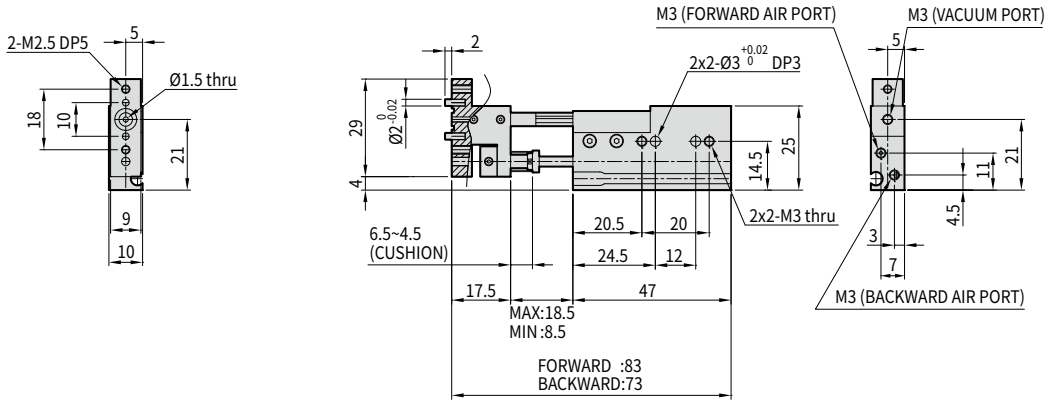
* For 2 PCS auto switch application, it is needed to be assemble by face to face of each heads. Please considering wire direction.

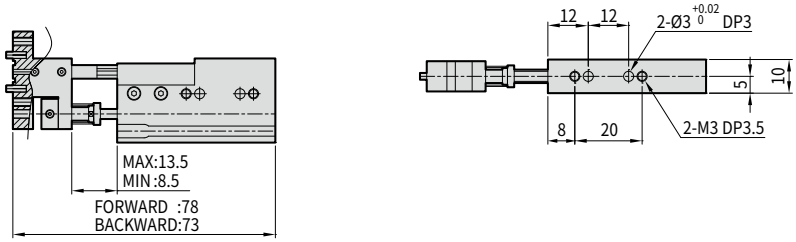
Specification

Item Name		PPU06H					
CYL Bore Size(mm)		6					
Rod Size(mm)		3					
Standard Strokes(mm)		5	10	15	20	25	30
Theoretical Thrust(kgf) P : Air Pressure(kgf/㎠)	Forward	0.28×P					
	Backward	0.21×P					
Fitting Size		M3					
Weight(kgf)		0.04	0.04	0.05	0.05	0.09	0.09
Buffering Stroke(mm)		2					
Fluid		Clean Air Note 1)					
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 9.2) Note 2)					
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)					
Temperature Range(°C)		5 ~ 60					
Operation Type		Double Acting					
Position Accuracy(mm)		± 0.01					
Type of Guide		Linear Guide					

Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

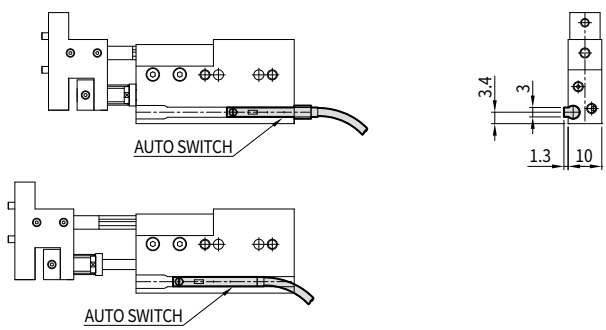
PPU06H-05,10



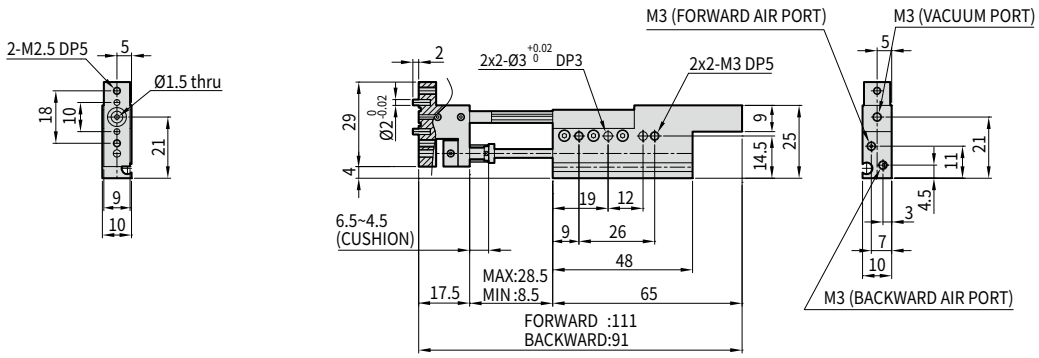


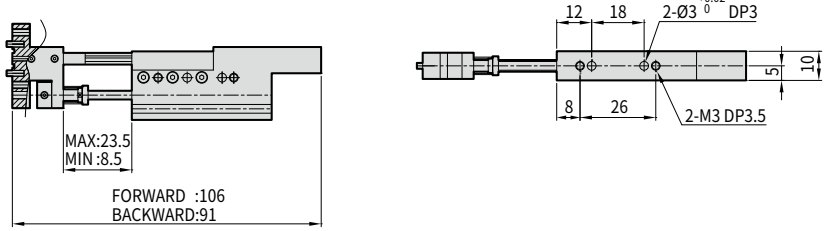
PPU06H-05 TYPE

PPU06H-05,10 Example of Auto Switch installation



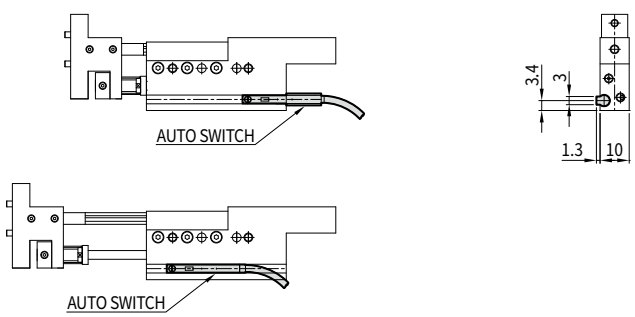
PPU06H-15,20





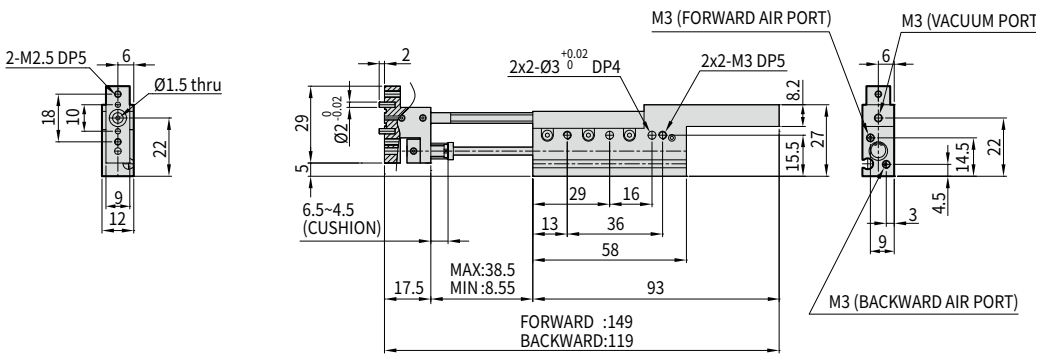
PPU06H-15 TYPE

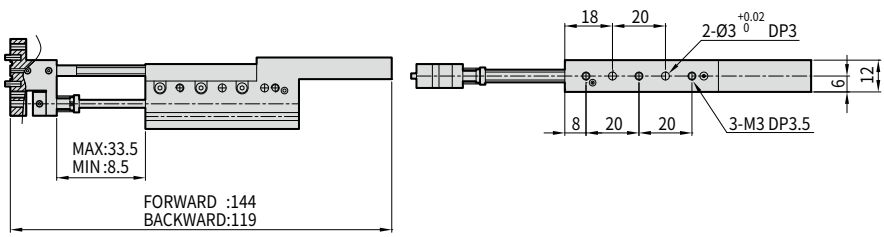
PPU06H-15,20 Example of Auto Switch installation



PPU-H Series

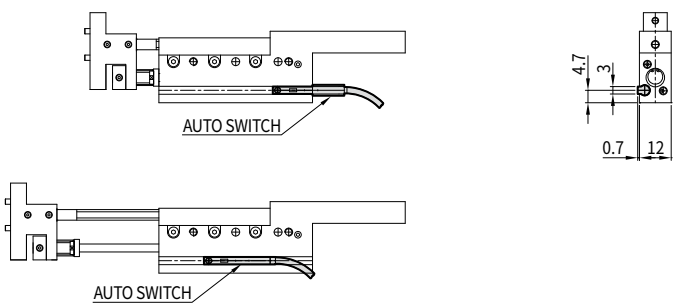
PPU06H-25,30





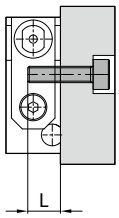
PPU06H-25 TYPE

PPU06H-25,30 Example of Auto Switch installation



Installation Information

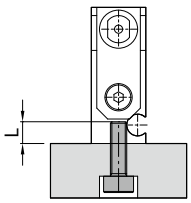
1. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06H	M3×0.5	11	9

* Please be careful of interference caused by sensor protrusion for mounting on the side.

2. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06H	M3×0.5	11	3.5

PICK UP CYLINDER / HIGH PRECISION GUIDE

PPU-S Series

Features

- Ultra slim type pick up cylinder reduced width by separated guide and vacuum rod.
- High speed responsiveness and precise performance from ball bearing inside of precise guide.
- Various installation options. (3 ways of installation)
- Positioning and buffering function when picking up by buffer function on the end of picker.
- Suitable for handling for small workpiece such as IC chips and electronic components.
- Auto Switch installation. (Optional)

Order Form

PPU 06S - 10A - C1 N

① ② ③ ④ ⑤

① Series Name

② Cylinder Bore Size

Order	CYL Bore(mm)
06S	6

③ Stroke

Order	Stroke(mm)
10A	10

④ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Frequency
		Wires	Direction	AC	DC	AC	DC	
Blank	No Auto Switch provided							
C1	Micro photo	4-Wire	Horiz	-	24V (12~24V)	-	20mA	3kHz

* By one sensor mounting, can detect two positions. (Up and down)

⑤ Auto Switch Output

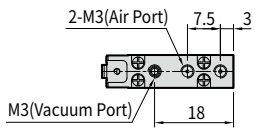
Order	Output
N	NPN
P	PNP

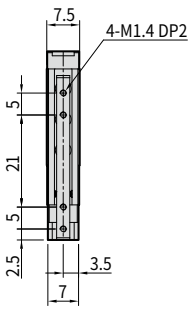
Specification

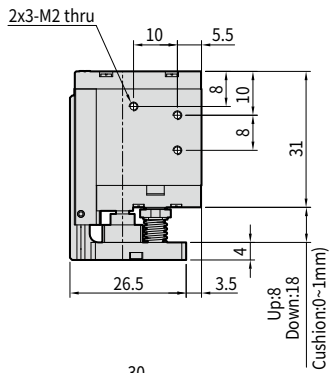
Item Name		PPU06S-10A
CYL Bore Size(mm)		6
Rod Size(mm)		3
Standard Strokes(mm)		10
Theoretical Thrust(kgf)	Forward	0.28×P
P : Air Pressure(kgf/㎠)	Backward	0.21×P
Fitting Size		M3
Weight(kgf)		0.03
Buffering Stroke(mm)		1
Fluid		Clean Air Note 1)
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 9.2) Note 2)
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)
Temperature Range(°C)		5 ~ 60
Operation Type		Double Acting
Position Accuracy(mm)		± 0.01
Type of Guide		Linear Guide

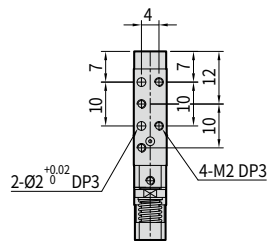
Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

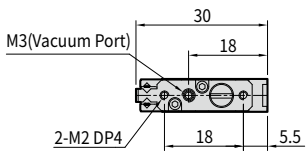
PPU06S-10A



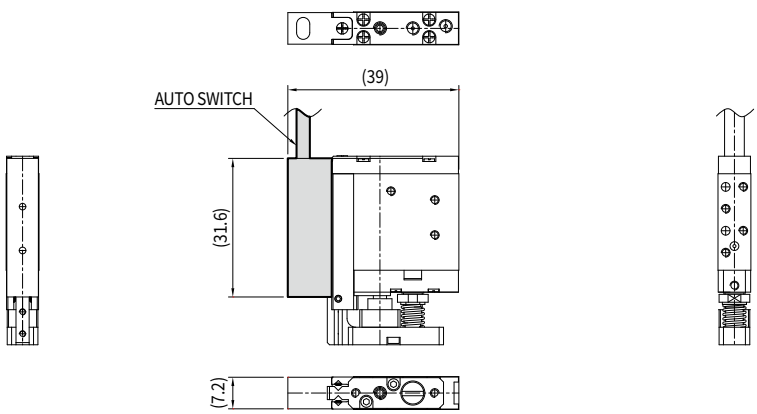






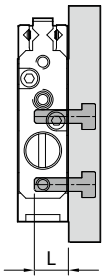


PPU06S-10A Example of Auto Switch installation



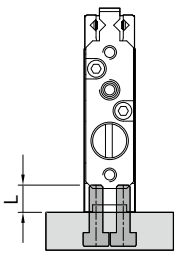
Installation Information

1. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06S	M2×P0.4	1.5	7.5

2. Installation by body tap holes

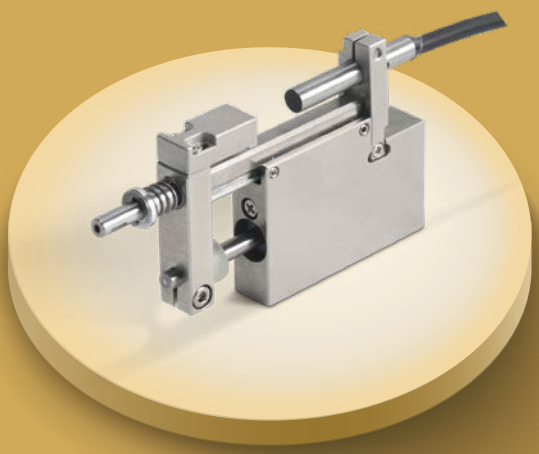


Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06S	M2×P0.4	1.5	4

GUIDE EMBEDDED
PICK UP CYLINDER

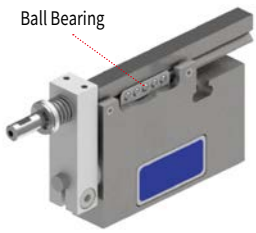
PPU-F Series

LINEAR GUIDE type,
high precise and slim body



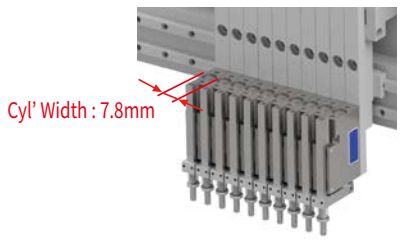
Ball bearing inside

- High precise ball bearing linear guide.
- High speed responsiveness by linear guide application.
- Ball cage for prevent malfunction.



Slim type advantage for parallel batch

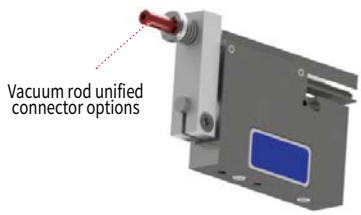
- -22% reduced width than PPU06B-10.
- Best application for limited space such as Auto Pitch Changer.



Customized connector available

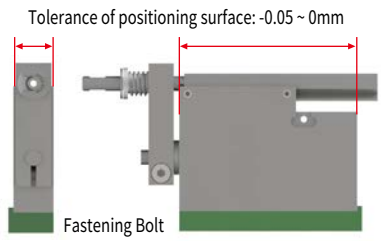
- Options of connector shape for various PAD application.

※ Please contact to office for order of customizing connectors.



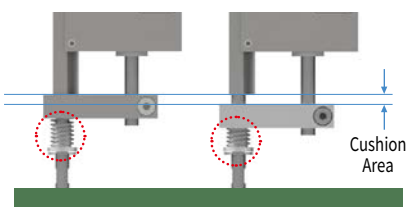
Superior precise specification

- Guide embedded body for superior precision.
- Surface-based positioning ensures superior precise installation.
- Securing the concentricity of vacuum rod through precise external tolerance management.



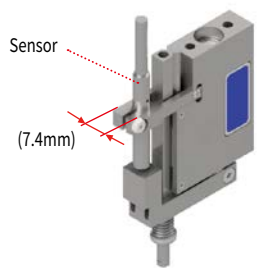
Buffer function for protection of picker and Workpiece

- Buffer of picker and workpiece and positioning.



Auto Switch could be attached for detection of position

- Maintained slim width by Ø4 proximity sensor application.



PICK UP CYLINDER / HIGH PRECISION GUIDE

PPU-F Series

Features

NEW

- Miniature type vacuum pick up cylinder with vacuum pipe inside on the high precise guide.
- High speed responsiveness and precise performance from ball bearing inside of precise guide.
- Advantage for limited space by 7.8mm slim body.
- Positioning and buffering function when picking up by buffer function on the end of picker.
- Surface based locating makes extra precise positioning.

Order Form

PPU 06F W - 10 - PD S

① ② ③ ④ ⑤ ⑥

① Series Name

② Cylinder Bore Size / ④ Standard Strokes

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))
06F	6	10

⑥ Auto Switch Quantity

Order	Quantity
S	1PCS

③ Auto Switch Mounting Bracket

Order	Bracket
Blank	Non-Mounted
W	Mounted

* For "Blank", auto switch can not be mounted.

⑤ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage	Current	Body Length	Sensing Distance	Frequency	Protect Level
		Wires	Direction	DC					
Blank	No Auto Switch provided								
PD	Proximity	3-Wire	Horiz	10~30V	Max 100mA	25.1mm	1.2mm ± 10%	4kHz	IP 67

* Auto Switch can detect backward position only.
* For auto switch mounting, <③ Auto Switch Mounting Bracket> option should be selected.
* The internal element of an auto switch is very sensitive to external impact. When assembling individually, make sure that the tightening torque is less than 2Kgf/cm.

Accessory Order Form

(1) Auto Switch Mounting Bracket

PPU 06F - W - ASSY
① ② ③ ④

① Series Name

② Cylinder Bore Size

③ Auto Switch Mounting Bracket

④ Order Name for Accessory
- Based for 1 piece of product.

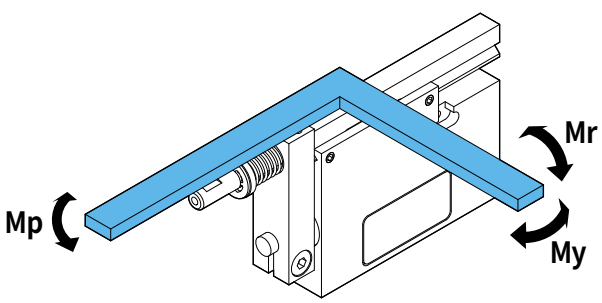
Specification

Item Name		PPU06F-10
CYL Bore Size(mm)		6
Rod Size(mm)		3
Standard Strokes(mm)		10
Theoretical Thrust(kgf)	Forward	0.28×P
P : Air Pressure(kgf/㎠)	Backward	0.21×P
Fitting Size		M3
Weight(kgf)		0.05
Buffering Stroke(mm)		2
Fluid		Clean Air Note 1)
Pressure Range(kgf/㎠)		1.5 ~ 7 (Guaranteed Resist Pressure : 9.2) Note 2)
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)
Temperature Range(℃)		5 ~ 60
Operation Type		Double Acting
Position Accuracy(mm)		± 0.01
Type of Guide		Linear Guide

Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

Displacement Against 3-Directions

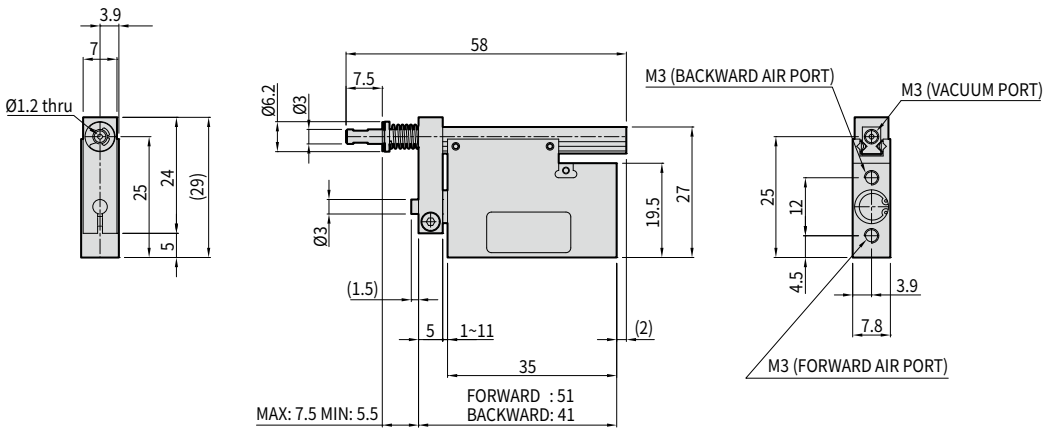
※ The moment center equals with guide center.

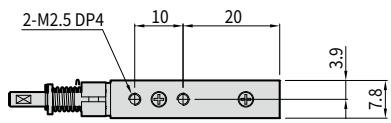


	Maximum Allowable Moment	Displacement
Mp (Pitching moment)	1.05 kgf·cm	0.01 mm
My (Yawing moment)	1.05 kgf·cm	0.01 mm
Mr (Rolling moment)	1.29 kgf·cm	0.2 °

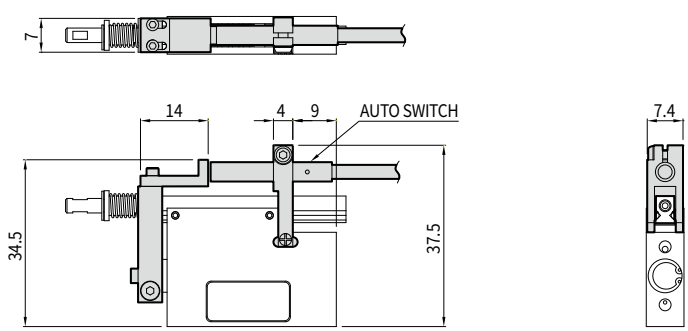
※ Above listed allowable moment refer static values.

PPU06F-10



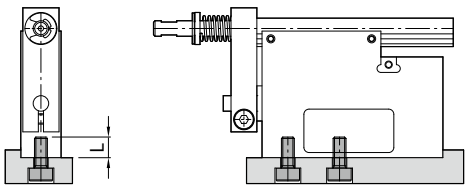


PPU06F-10 Example of Auto Switch installation



Installation Information

1. Installation by body tap holes



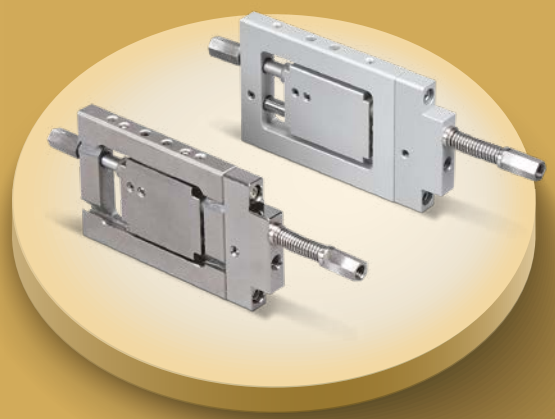
Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU06F-10	M2.5×P0.4	4.9	4

GUIDE EMBEDDED PICK UP CYLINDER

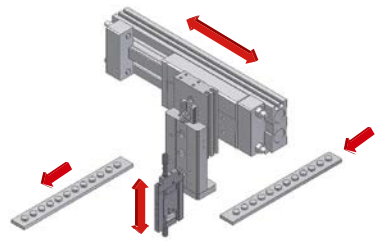
PPU-D Series

Ultra slim and double thrust structure

Extra slim type pick up cylinder with 4.8mm width

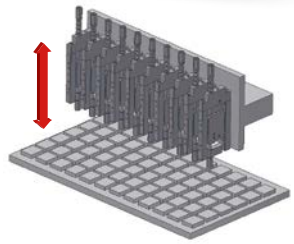


Application 1



Vacuum suction and transfer for small components.

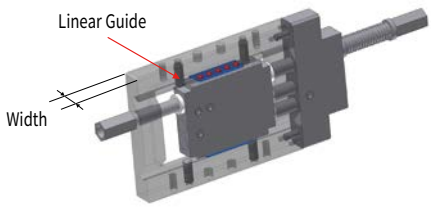
Application 2



■ Handling system for IC chips.
■ Minimum pitch for parallel aligned application
: 5mm (At the case of PPU03D-05 application)

Linear Guide

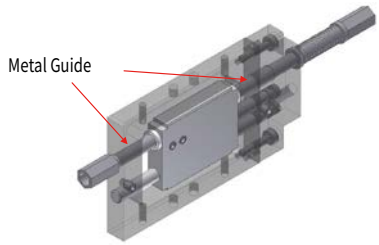
- Precise linear guide application.
- high precise structure not needed extra guide installation.
- High speed responsiveness by linear guide application.



Item	Width(mm)
PPU03D(M)	4.8
PPU04D(M)	5.8
PPU05D(M)	6.8

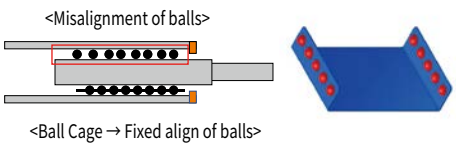
Metal Guide

- Affordable metal guide application.



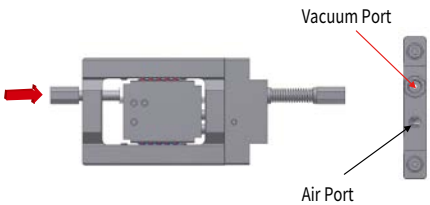
Cage type ball bearing

- Preventing miss align of ball bearing during use.
- Removed error of stroke due to widening of ball position distance.



Guide - Vacuum rod unified structure

- Extra slim pick up cylinder having anti-rotation function guide part having embedded vacuum pipeline.



PICK UP CYLINDER / HIGH PRECISION GUIDE

PPU-D Series

Features

NEW

- Extra slim single acting type pick up cylinder which is double cylinder structure inside and having anti-rotation function guide part having embedded vacuum pipeline.
- High precision linear guide and affordable metal guide options.
- High solidity structure not needed extra guide installation.
- Extra slim structure of 4.8mm width.
- Suitable for handling for small workpiece such as IC chips and electronic components.

Order Form

PPU 03D M - 05

① ② ③ ④

① Series Name

② Cylinder Bore Size

④ Standard Strokes

Order	CYL Bore(mm)	Order (=Standard Strokes(mm))
03D	3	05
04D	4	05
05D	5	05

③ Guide Options

Order	Guide
Blank	Linear Guide
M	Metal Guide

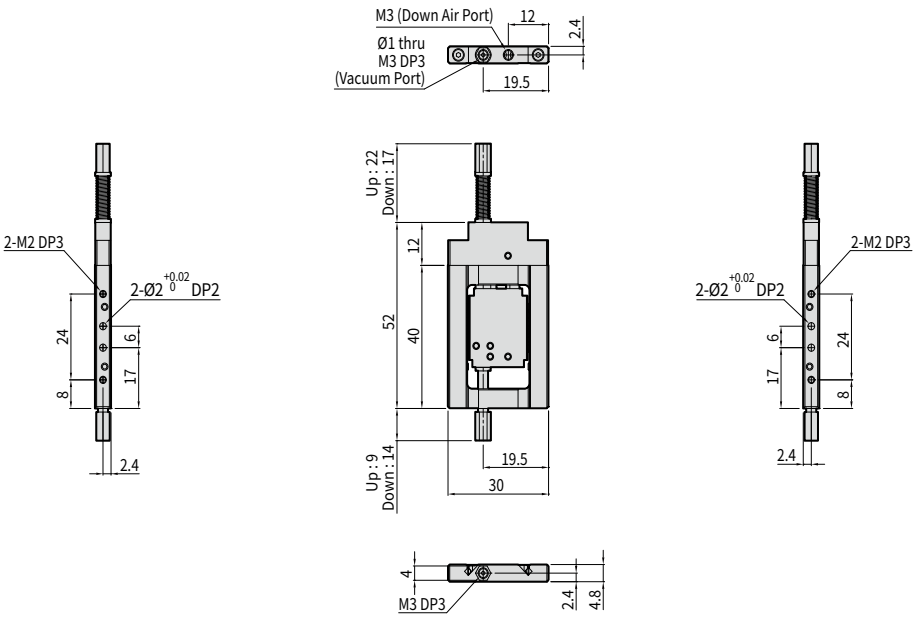
Specification

Item Name		PPU03D	PPU04D	PPU05D	PPU03DM	PPU04DM	PPU05DM
CYL Bore Size(mm)		3	4	5	3	4	5
Rod Size(mm)		3	4	5	3	4	5
Stroke(mm)		5					
Theoretical Thrust(kgf) Air Pressure : 5kgf/㎠	Forward	0.3	0.5	1.1	0.3	0.5	1.1
Fitting Size		M3					
Weight(kgf)		0.045	0.065	0.085	0.025	0.032	0.045
Fluid		Clean Air Note 1)					
Pressure Range(kgf/㎠)		5 ~ 7 (Guaranteed Resist Pressure : 9) Note 2)					
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)					
Temperature Range(°C)		5 ~ 60					
Operation Type		Single Acting (Normal UP)					
Position Accuracy(mm)		± 0.01			± 0.1		
Type of Guide		Linear Guide			Metal Guide		

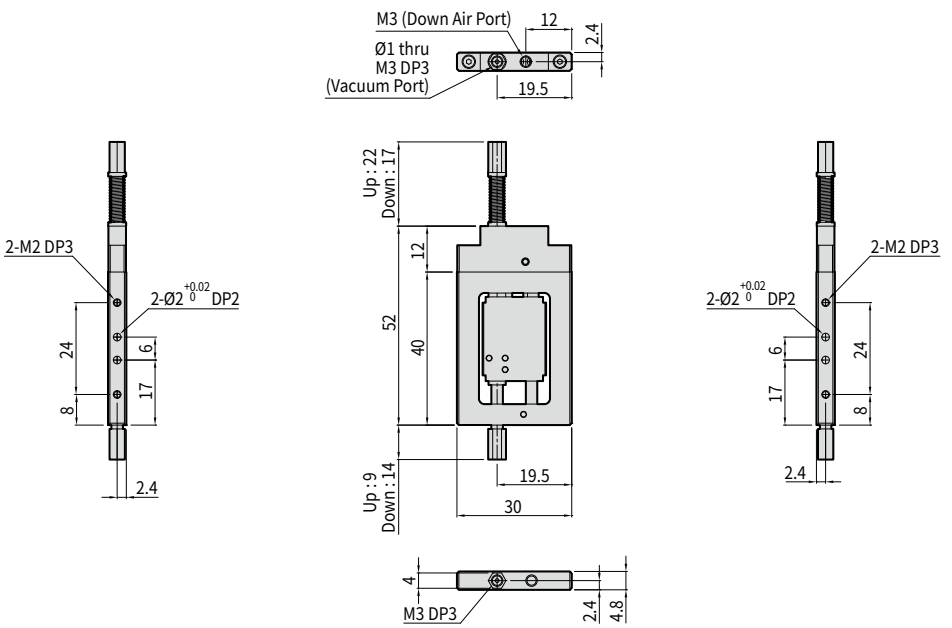
Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

PPU-D Series

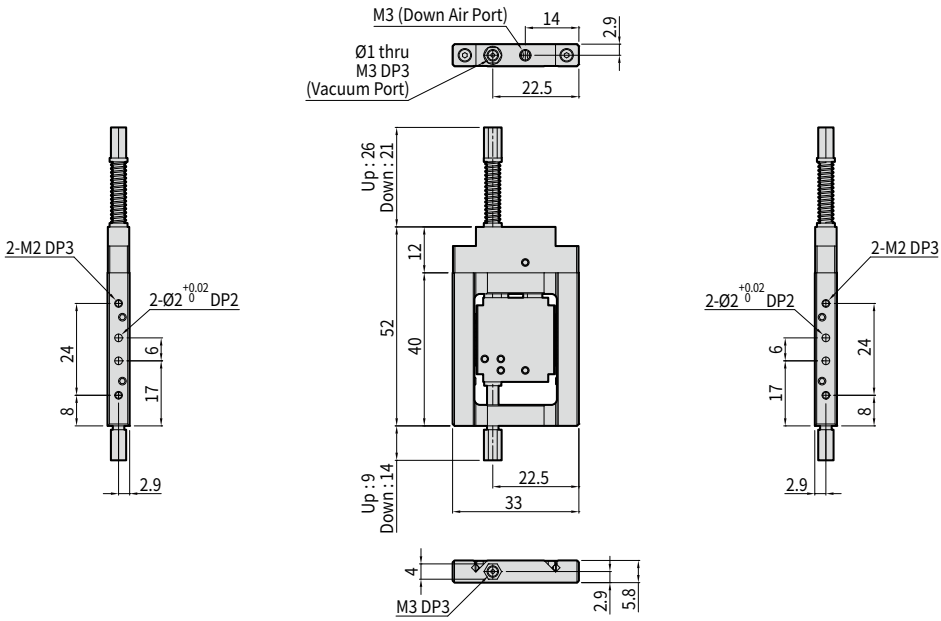
PPU03D-05



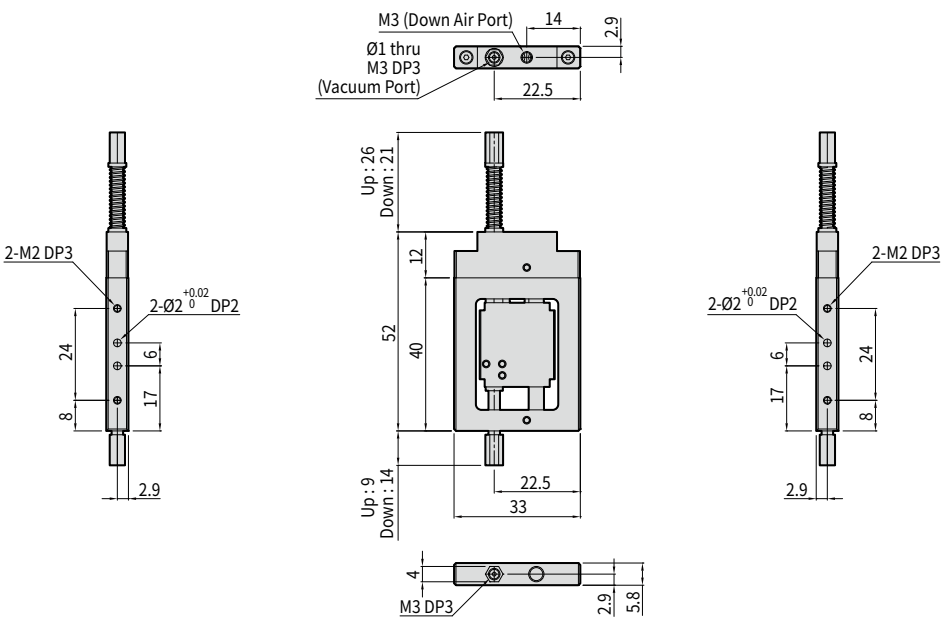
PPU03DM-05



PPU04D-05

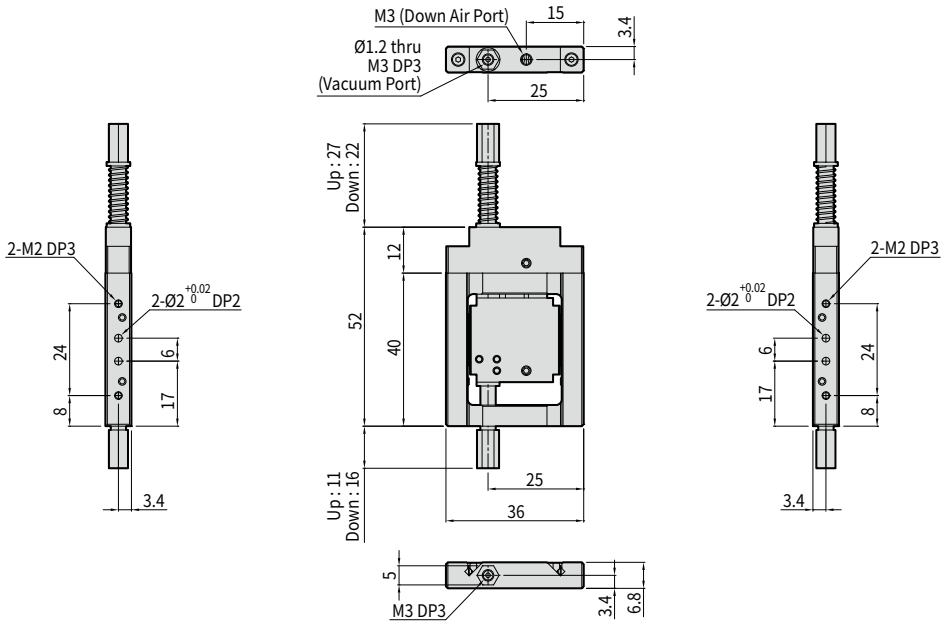


PPU04DM-05

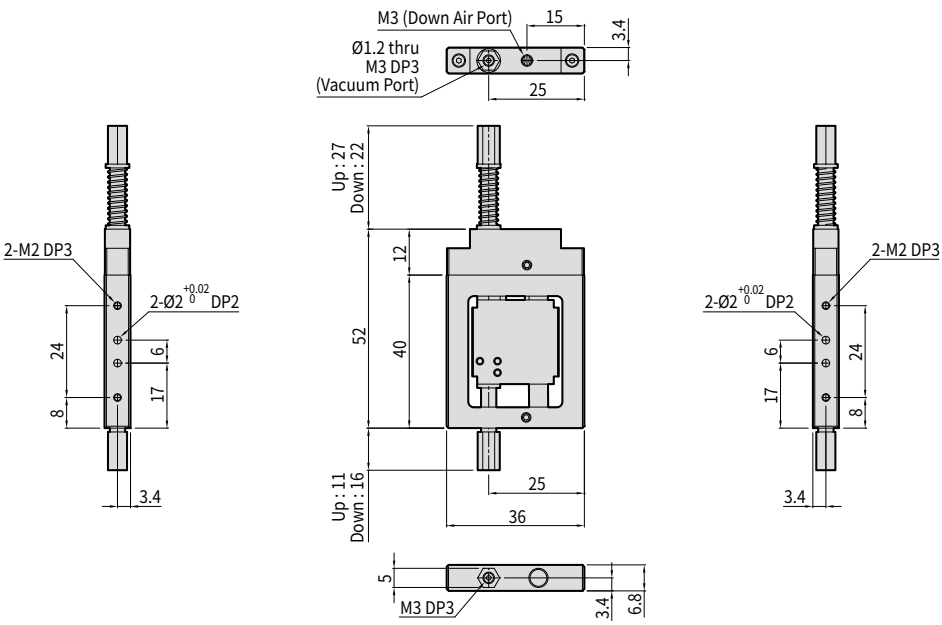


PPU-D Series

PPU05D-05

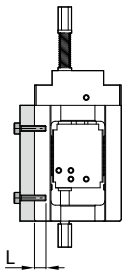


PPU05DM-05



Installation Information

1. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPU03D	M2×P0.4	1.5	3
PPU04D	M2×P0.4	1.5	3
PPU05D	M2×P0.4	1.5	3

PICK UP CYLINDER / HIGH PRECISION GUIDE

PPC Series

Features

- Miniature pick up cylinder unified small cylinder and vacuum rod in one body.
- Suitable for handling for small workpiece such as IC chips and electronic components.
- Miniaturization, lighten and generalization type by slim body.
- Improved high speed and external moment handling performance by Sliding Bearing.
- High precise and minimize size with install shock absorbing function inside of cylinder. (Optional)
- Various Auto Switch installation. (Optional)

Order Form

PPC 06 C S - 10 - A2N L S

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series Name

② Cylinder Bore Size

Order	CYL Bore(mm)
06	6

⑤ Standard Strokes

Order	(=Standard Strokes(mm))
10	05, 10, 15

③ Cushion Option

Order	Cushion
Blank	Without cushion
C	With cushion

* Cushion stroke : 2mm

④ Auto Switch Mounting Bracket

Order	Bracket
Blank	Non-Mounted
S	Mounted (Magnetic sensor)
P	Mounted (Micro photo sensor)

* For "Blank", auto switch can not be mounted.
* For micro photo type can be used for detecting backward position only.

⑦ Magnetic Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

* Cable length for micro photo is 1M only.

⑧ Num of Magnetic Auto Switches

Order	Quantity
S	1PCS

* Selectable auto switch quantity is only 1 PCS. (Cannot select 2 PCS)
* For micro photo auto switch selection, this option always blank.

⑥ Auto Switch Specification

※ Magnetic Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time	MAX Close Pitch(mm)
		Wires	Direction	AC	DC	AC	DC			
Blank	No Auto Switch provided									
A2N	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms	18

※ Micro Photo Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Frequency	MAX Close Pitch(mm)
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
PM	Micro photo	4-Wire	Refer individual diagram	-	24V (5~24V)	-	50mA	3kHz	8

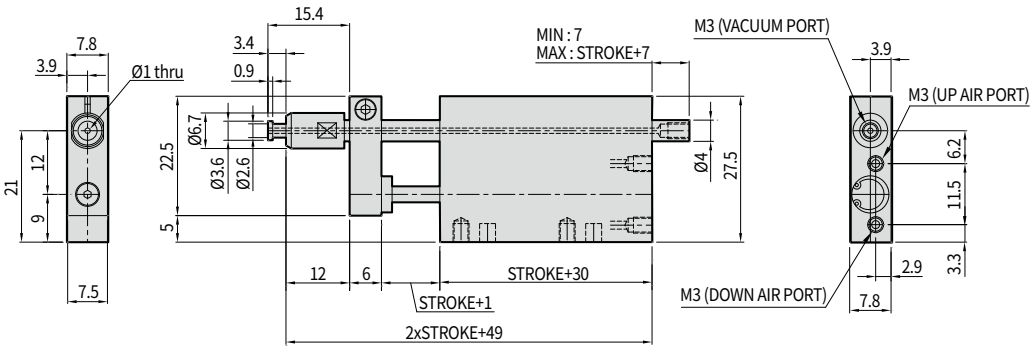
※ Applied micro photo sensor : PRO-PM-U

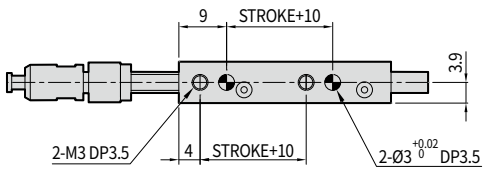
Specification

Item Name		PPC06		
CYL Bore Size(mm)		6		
Rod Size(mm)		3		
Standard Strokes(mm)		5	10	15
Theoretical Thrust(kgf)	Forward	0.28×P		
P : Air Pressure(kgf/㎠)	Backward	0.21×P		
Fitting Size		M3		
Weight(kgf)		0.032		
Fluid		Clean Air Note 1)		
Pressure Range(kgf/㎠)		3 ~ 7 (Guaranteed Resist Pressure : 10.5) Note 2)		
Buffering Stroke(mm)		2 Note 3)		
Lubrication		Not Need (If need, use one sort of turbine oil : SPEC ISOVG 32)		
Temperature Range(℃)		5 ~ 60		
Operation Type		Double Acting		
Position Accuracy(mm)		± 0.1		
Type of Guide		Sliding Bearing Guide		

Note 1) Clean Air : Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3~10㎛ degree of filtering.
Note 2) Guaranteed Resist Pressure : A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.
Note 3) For Cushion option selected.

PPC06

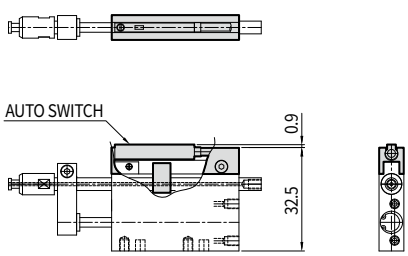




※ Cushion stroke : 2mm (Optional)

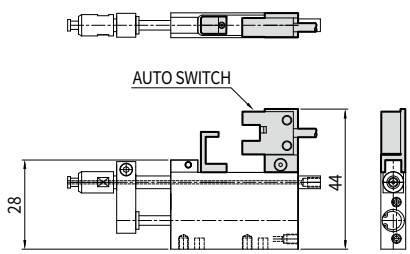
PPC06 Example of Auto Switch installation

1. MAGNETIC AUTO SWITCH



PPC06S - With magnetic type auto switch option

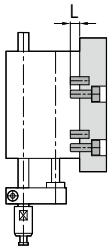
2. PHOTO SENSOR TYPE



PPC06P - With micro photo auto switch option

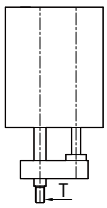
Installation Information

1. Installation by body tap holes



Item	Fastening Bolt	Max Torque (kgf·cm)	Max Bolt Length L (mm)
PPC06	M3×P0.5	11	3.5

2. Connector assembling part



Item	Fastening Bolt	Max Torque (kgf·cm)
PPC06	M3×P0.5	11
	M4×P0.7	25

PICK UP CYLINDER

PPR Series

Features

- Miniature pick up cylinder with rotary function by compressed air.
- Suitable for handling which required suction and rotate for small workpiece such as IC chips and electronic components.
- Miniaturization, lighten and generalization type by slim body.
- Minimized backlash by external stopper mount.
- Auto Switch installation. (Optional)

Order Form

PPR 10 - 90 - A2N L S

① ② ③ ④ ⑤ ⑥

① Series Name

② Cylinder Bore Size

Order	CYL Bore(mm)
10	10
13	13

③ Rotating Angle

Order	Rotating Angle(°)
90	90
180	180

⑤ Auto Switch Cable Length

Order	Cable Length
Blank	1M
L	3M

⑥ Auto Switch Quantity

Order	Quantity
Blank	2PCS
S	1PCS

* Only one auto switch can be mounted for PPR10 model.

④ Auto Switch Specification

Order	Sensing Type	Cable Spec		Voltage		Current		Protect Level	Operation Time
		Wires	Direction	AC	DC	AC	DC		
Blank	No Auto Switch provided								
A2C	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2N	Magnetic reed switch	2-Wire	Horiz	100V	24V	5~20mA	5~40mA	IP 67	1ms
A2V	Magnetic reed switch	2-Wire	Ver	100V	24V	5~20mA	5~40mA	IP 67	1ms
B2	Magnetic solid state	3-Wire	Horiz	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms
B2B	Magnetic solid state	2-Wire	Horiz	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3B	Magnetic solid state	2-Wire	Ver	-	24V (10~28V)	-	Less than 50mA	IP 67	1ms
B3C	Magnetic solid state	3-Wire	Ver	-	24V (5~28V)	-	Less than 50mA	IP 67	1ms

* Be careful of projection for vertical wire exposed type Auto Switch model. (Please refer technical information of Auto Switch)