ST Series

Features

- Slide table moving type miniature precise guide cylinder which is air cylinder located inside of guide block.
- High precise linear motion with build in Cross Roller Guide in the moving slide table
- Demonstrate big tolerable moment in small-size
- Auto Switch for the detection of position can be attached (except ST06S)
- Adjustable Stroke → Stopper mount (Option)
- Used for Feeding, positioning, and Up & Down in electric and semiconductor industry

Order form

ST 12L - 15 - W1 - A2 S - ST2

① ② ③ ④ ⑤ ⑥ ⑦

① Series

②, ③ Bore size & Stroke(mm)

②Name	Bore size(mm)	③Stroke(mm)
06S	6	5
06L	6	5, 10
10L	10	10, 20
12L	12	15, 25

④ Sensor bracket quantity

Blank	None
W1	1ea
W2	2ea

⑤ Auto Switch type

Symbol	Type	Length
A2	DSC PRO-A2 (2-wire)	1m
A2L		3m
B2	PLC PRO-B2 (3-wire)	1m
B2L		3m

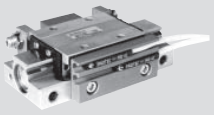
⑥ Auto Switch quantity

Blank	2ea
S	1ea

⑦ Stopper Bolt quantity

Blank	None
ST2	2ea

■ Product specification reference table (●mark means possible to mount)

Specification / Model ST06S	Auto Switch mounting 	Stopper mounting 
ST06L	-	-
ST10L	●	-
ST12L	●	●
	●	●

• For Shock Absorber and Metal Stopper specification, please inquire separately.

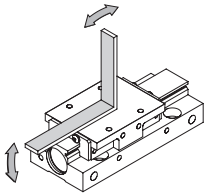
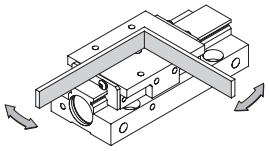
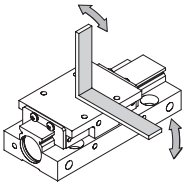
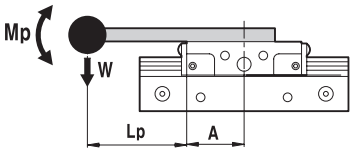
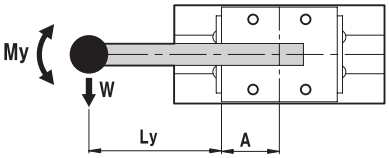
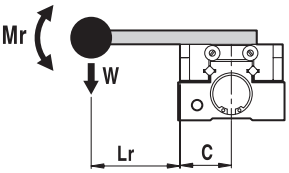
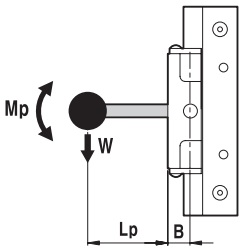
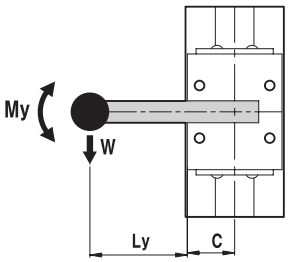
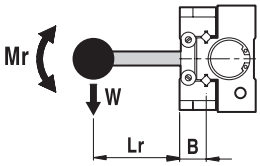
Specification

Model		ST06S	ST06L		ST10L		ST12L	
Bore size(mm)		6			10		12	
Stroke(mm)		5	5	10	10	20	15	25
Theoretical thrust(kgf) Note 2)	Close	0.28×P			0.78×P		1.13×P	
	Open							
Air port size		M3			M5		M5	
Max. load(kgf)		0.4			1.1		1.6	
Main body weight(kgf)		0.04	0.08	0.1	0.12	0.19	0.21	0.3
Fluid		Clean air Note 1)						
Air pressure(kgf/㎠)		1.5 ~ 7 (General resistance pressure: 10.5) Note 3)						
Lubrication		No need (if need, use one sort of turbine oil: SPEC ISOVG 32)						
Temperature(℃)		5 ~ 60						
Motion type		Double-acting type						
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) P: Air pressure(kgf/㎠)
Note 3) Guaranteed capacity of resist pressure: A pressure that does not cause an abnormality in parts when it is applied for 1 minute without any weight loaded.

Technical data by model

■ Mp, My, Mr 3 directions moment calculation formula Fig1

Pitch Moment(Mp)	Yawing Moment(My)	Rolling Moment(Mr)
		
		
		
Mp = W × (A + Lp) Mp = W × (B + Lp)	My = W × (A + Ly) My = W × (C + Ly)	Mr = W × (C + Lr) Mr = W × (B + Lr)

※ W : Work weight(kgf)

■ Corrections from the central distance of moments Table1

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 kinetic energy (Ea) Table2

Unit: kgf · ㎝

Model	Maximum allowable kinetic energy
ST06S-05	0.08
ST06L-05	0.08
ST06L-10	0.08
ST10L-10	0.26
ST10L-20	0.26
ST12L-15	0.51
ST12L-25	0.51

■ Maximum allowable moment Table3

Unit: kgf · ㎝

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

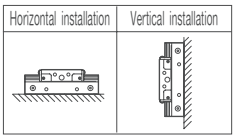
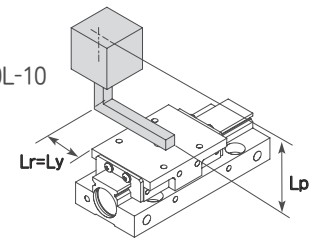
■ Maximum allowable load (Wa) Table4

Unit: kgf

Model	Maximum allowable load
ST06S-05	0.4
ST06L-05	0.4
ST06L-10	0.4
ST10L-10	1.1
ST10L-20	1.1
ST12L-15	1.6
ST12L-25	1.6

※For vertical installation, loading factor check is not required.

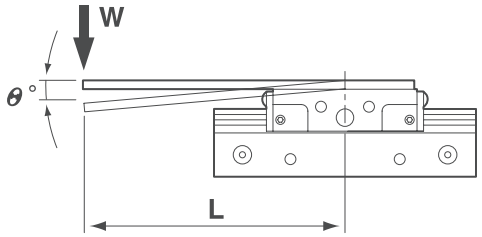
Model selection method

		Applied formula	Selection example
Condition check		■ Cylinder model selection ■ Average speed ■ Distance to the center of gravity of load ■ Distance to the center of gravity of load ■ Block installation 	Review target : ST10L-10 Horizontal use Average speed : V=300mm/sec Lp = 30mm Ly, Lr = 20mm Loading factor W = 0.2kgf 
Kinetic energy check - The kinetic energy of load should be within the allowable kinetic energy range of cylinder.		Work kinetic energy(kgf · ㎝) : $E = \frac{1}{2} \times \frac{W}{980} \times (\frac{1.4V}{10})^2$ W : work weight(kgf) V : average speed(mm/sec) Ea : cylinder allowable kinetic energy(kgf · ㎝) Table2 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 · ㎝ Ea : 0.26 kgf · ㎝ Available 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 loading factor(kgf) : Wt = $K \times W$ θ_1 : Loading factor = $\frac{Wt}{Wa}$ W : work weight(kgf) K : speed factor(300mm/sec or less: over 1, 300mm/sec: 1.6) Wa : cylinder Max. load(kgf) Table4 ＊For vertical installation, loading factor review is not required	$Wt = 1 \times 0.2 = 0.2$ kgf Wa = 1.1 kgf $\theta_1 = \frac{0.2}{1.1} = 0.18$
	Static moment	Rolling moment(kgf · ㎝) : Mr = W × (C + Lr) / 10 θ_2 : rolling Static moment load factor = $\frac{Mr}{Mra}$ C : corrections from the center distance of moments(mm) Table1 Lr : distance from the end of table to the center of load(mm) Fig1 Mra : cylinder allowable moment(kgf · ㎝) Table3	Mr = $0.2 \times \frac{(13.5+20)}{10}$ = 0.67 kgf · ㎝ Mra = 5.06 kgf · ㎝ $\theta_2 = \frac{0.67}{5.06} = 0.13$
	Dynamic moment	Pitching moment(kgf · ㎝) : Mp = $K \times W \times (B+Lp) / 10$ Yawing moment(kgf · ㎝) : My = $K \times W \times (C+Ly) / 10$ θ_3 : pitching dynamic moment load factor = $\frac{Mp}{Mpa}$ θ_4 : yawing dynamic moment load factor = $\frac{Mr}{Mya}$ K : speed factor(300mm/sec or less: over 1, 300mm/sec: 1.6) B.C : corrections from the center distance of moments(mm) Table1 Lp, Ly : distance from the end of table to the center of load(mm) Fig1 Mpa, Mya : cylinder allowable moment(kgf · ㎝) Table3	Mp = $1 \times 0.2 \times \frac{(7+30)}{10}$ = 0.74 kgf · ㎝ Mpa = 2.39 kgf · ㎝ $\theta_3 = \frac{0.74}{2.39} = 0.31$ My = $1 \times 0.2 \times \frac{(13.5+20)}{10}$ = 0.67 kgf · ㎝ 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

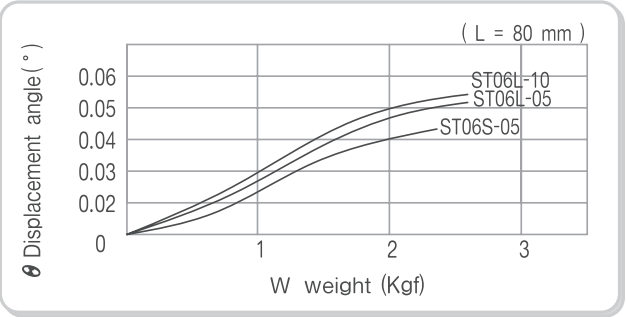
Note 1) Static moment load factor: moment created by the gravity of work
Dynamic moment load factor: moment created when the work is stopped by stopper

Table deflection

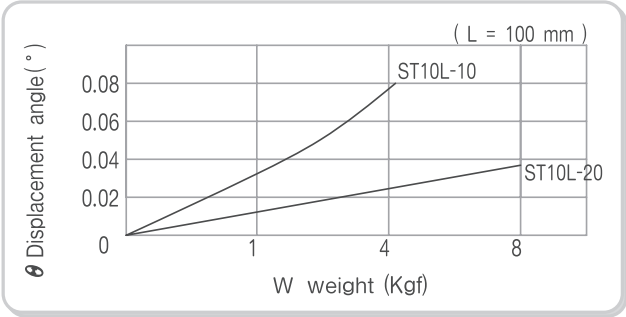
- The graph shows the deflection angle when cylinder moves to forward with certain weight loaded at the end of table end, like right graphic.
- The deflection angle values below graphs show only reference value when any weight loaded. (Please note that those are not maximum value)



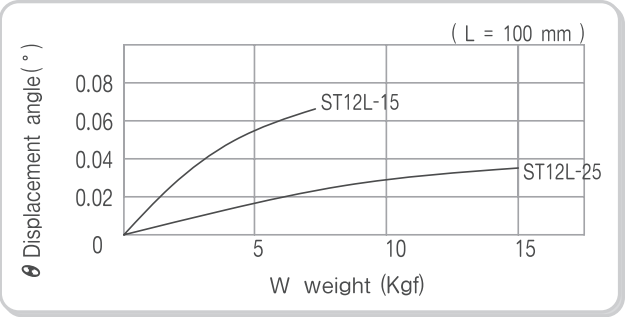
◆ ST06S, ST06L



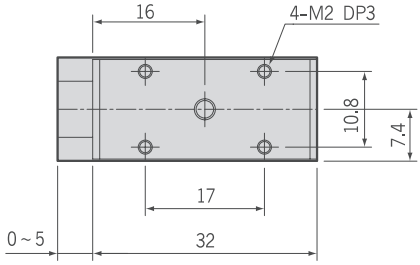
◆ ST10L

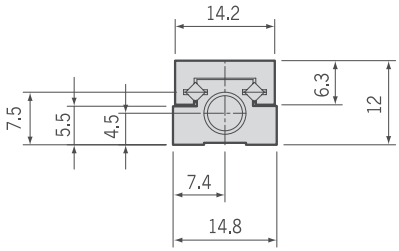


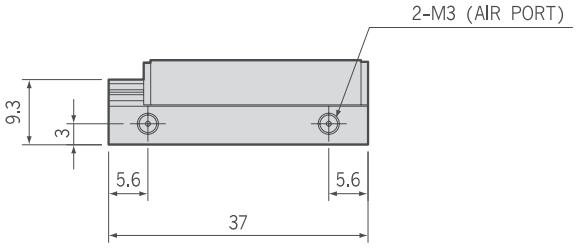
◆ ST12L

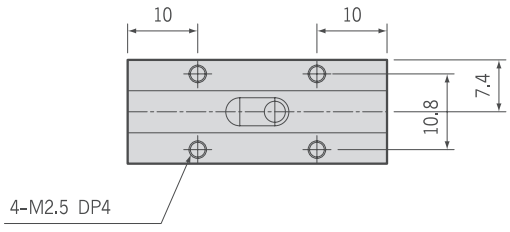


ST06S-05

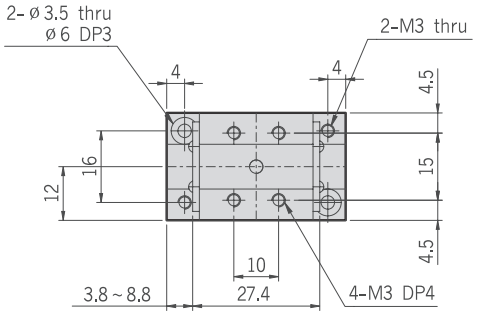

16
4-M2 DP3
10.8
7.4
17
0 ~ 5
32

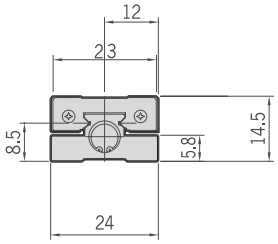

14.2
6.3
12
7.5
5.5
4.5
7.4
14.8

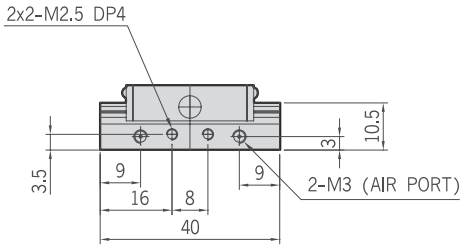

2-M3 (AIR PORT)
9.3
3
5.6
5.6
37


10
10
7.4
10.8
4-M2.5 DP4

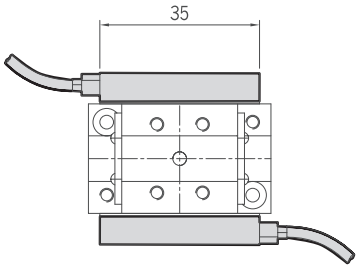
ST06L-05

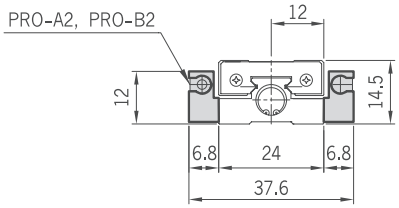


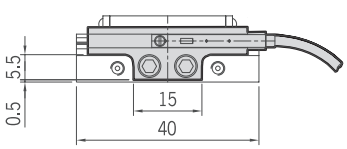




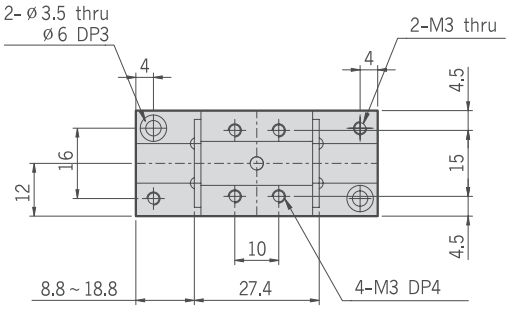
ST06L-05-Auto Switch

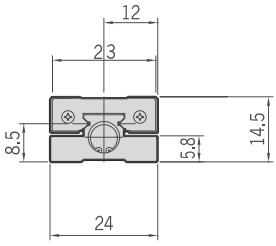


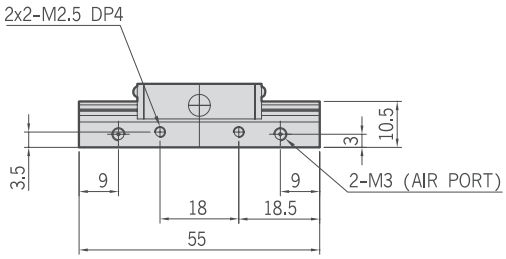




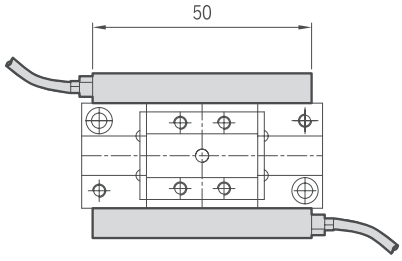
ST06L-10

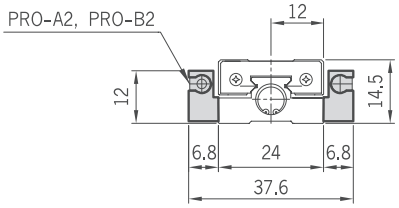


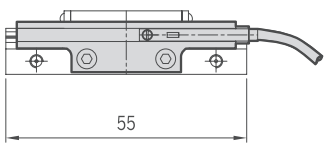




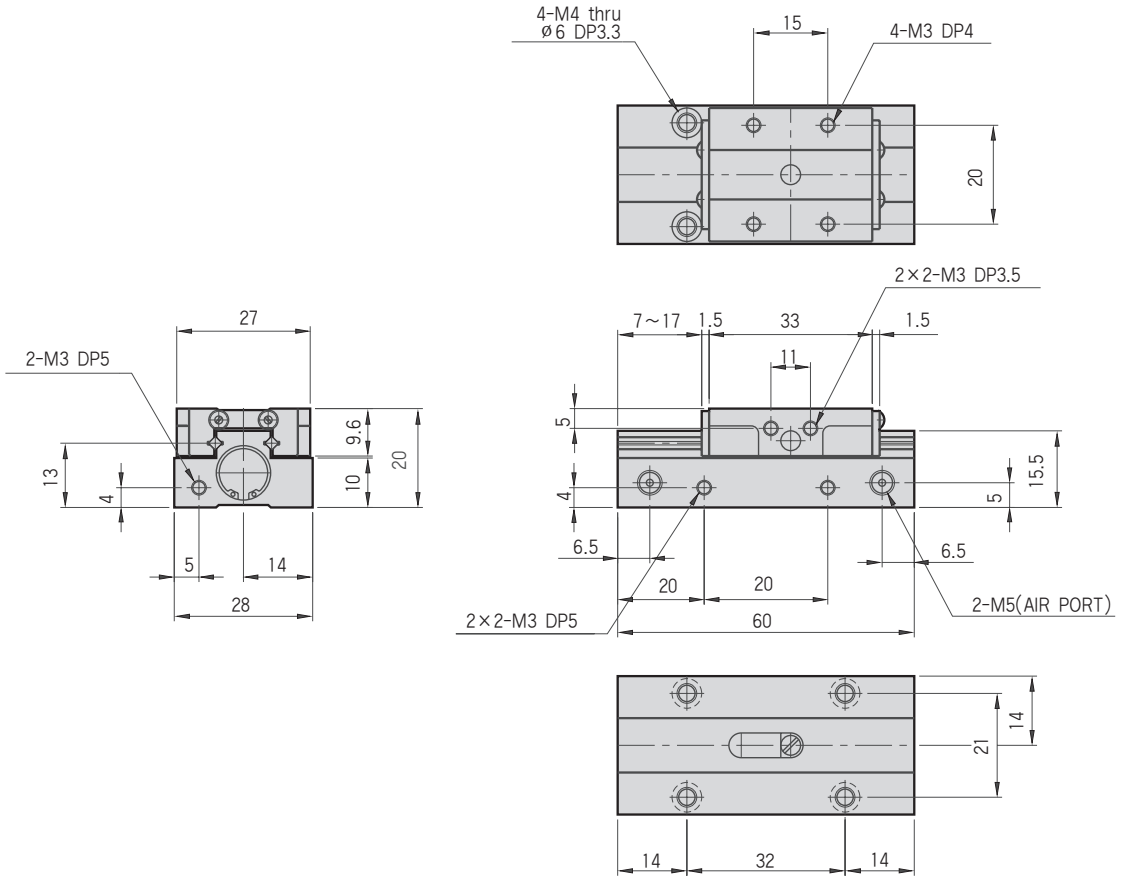
ST06L-10-Auto Switch



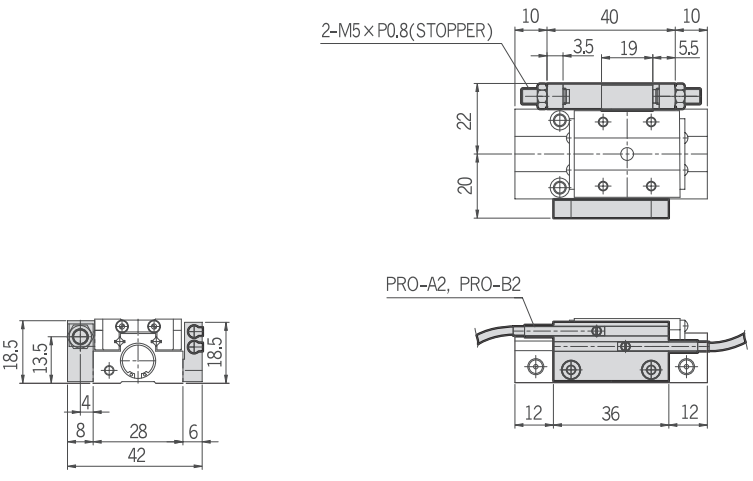




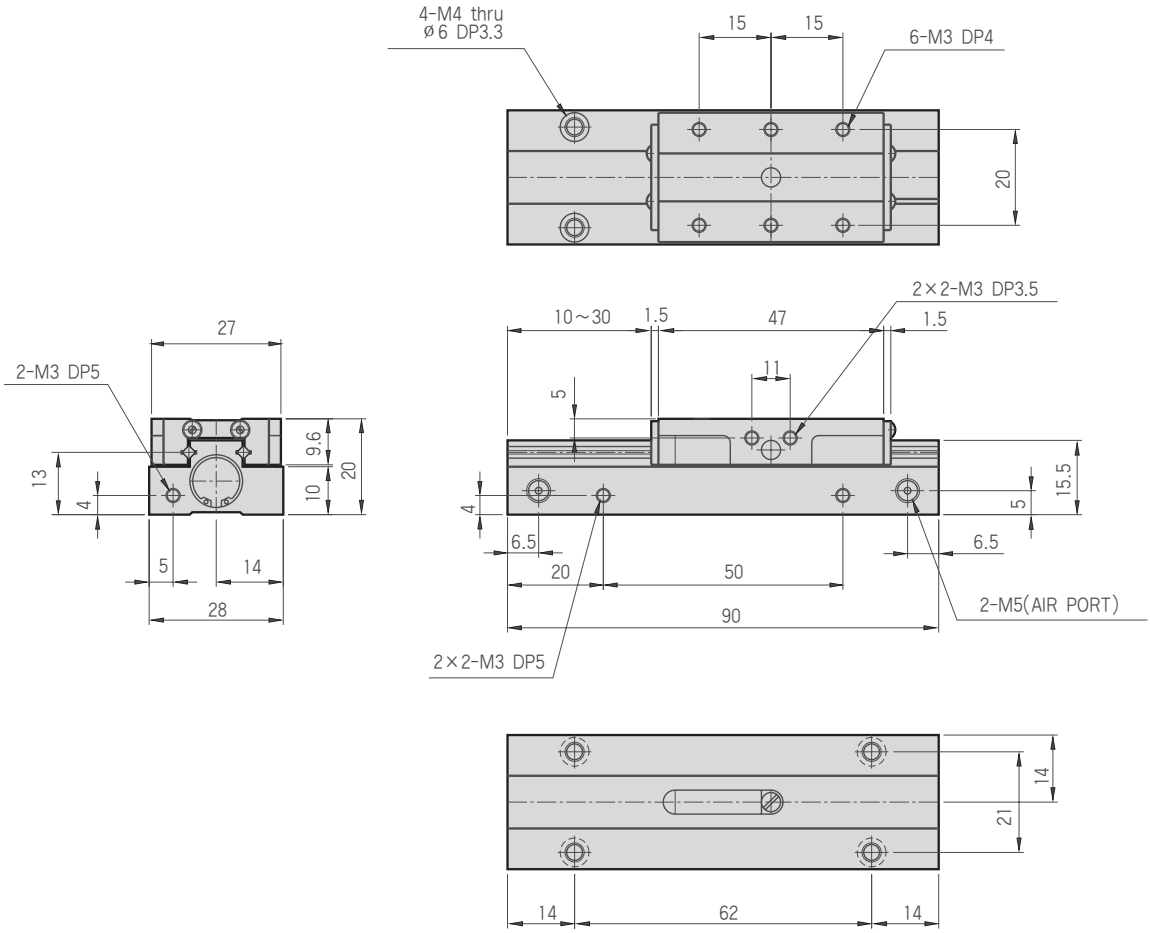
ST10L-10



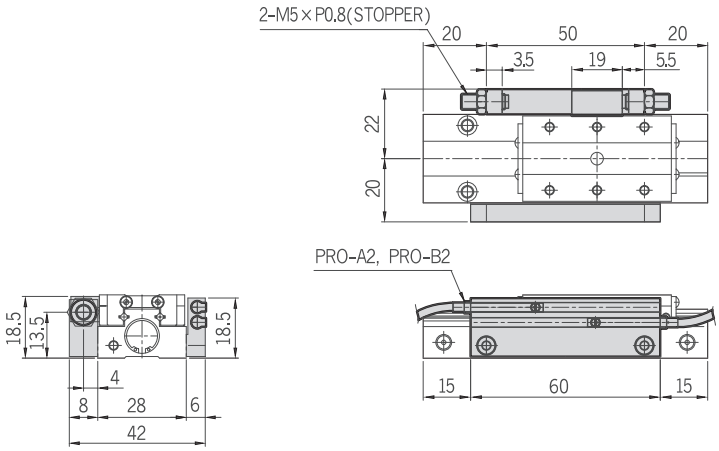
ST10L-10-Auto Switch



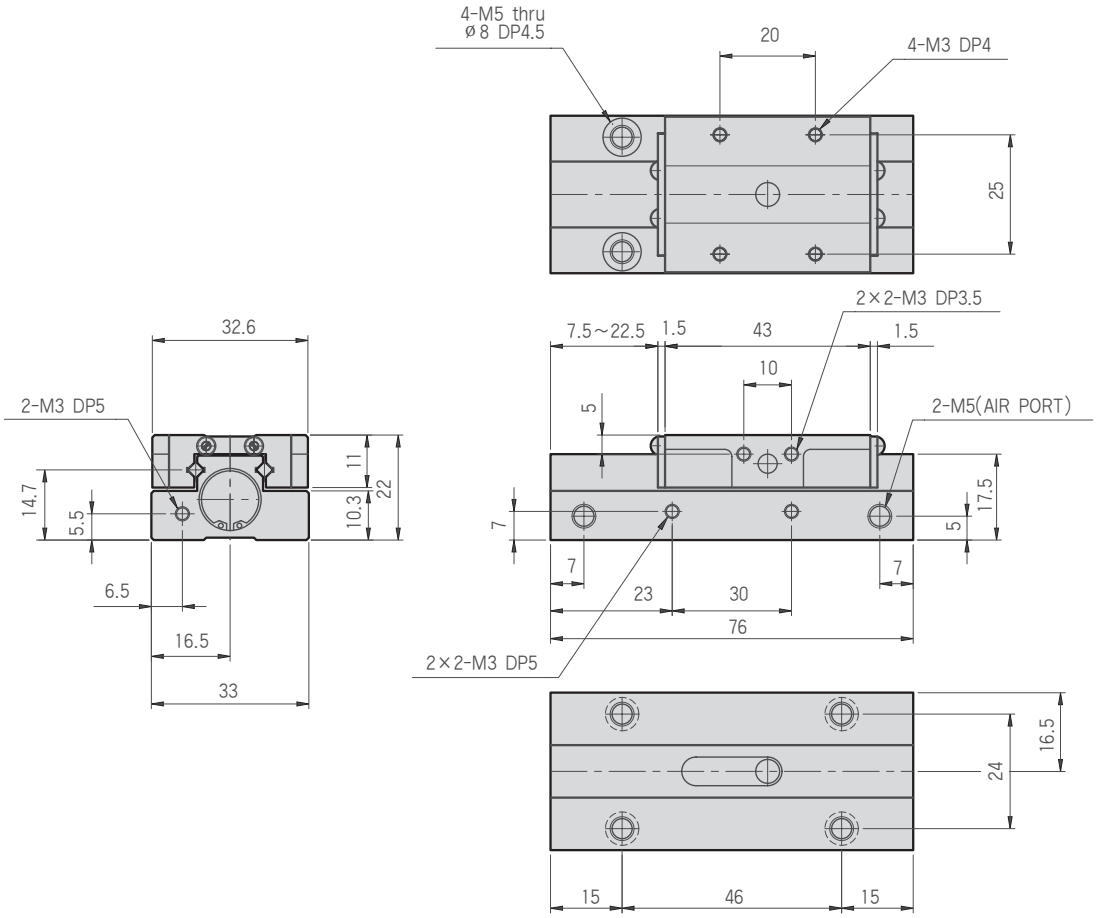
ST10L-20



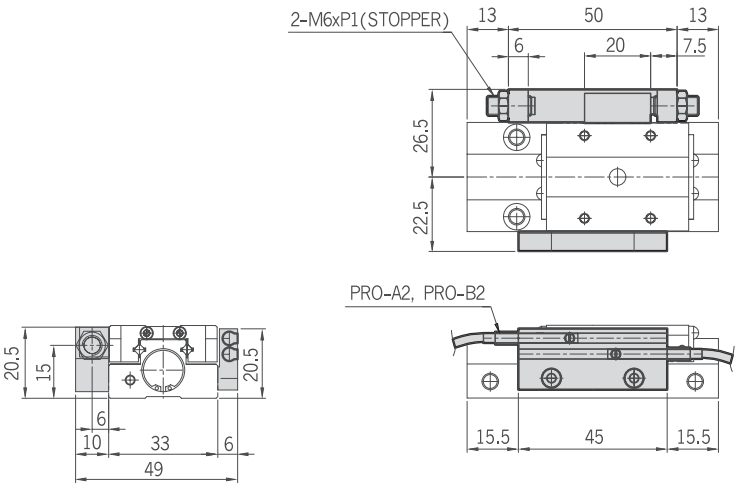
ST10L-20-Auto Switch



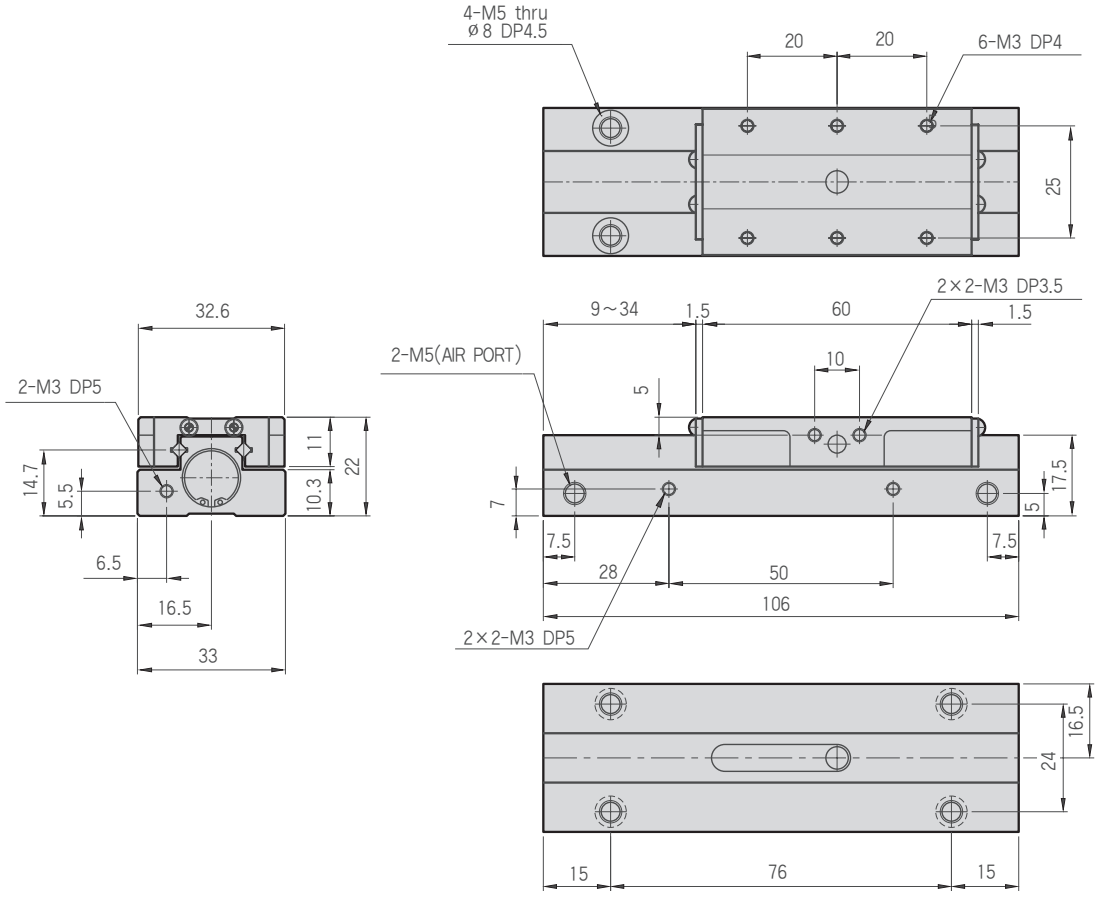
ST12L-15



ST12L-15-Auto Switch



ST12L-25



ST12L-25-Auto Switch