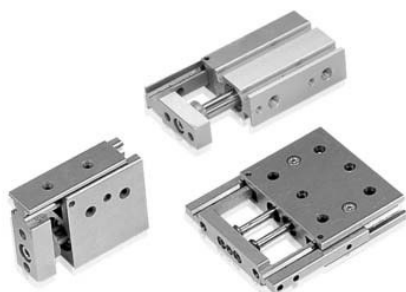


# SC Series

## Features



- Miniature Guide Cylinder unified small size air cylinder with Cross Roller Guide in one body
- High position accuracy with Cross Roller guide equipped moving table. (Position accuracy : ±0.01mm)
- Excellent durability and high speed
- Used for Up Down, Clamping, Stopper, Feeding Pusher in electric and semi-conductor industry
- Diversity of installation and application
- Auto Switch for the detection of position can be attached (SC-A Series)

### ■ Features by product

Model	Appearance	Features	Bore size(mm)	Stroke(mm)
SC		<ul style="list-style-type: none"> <li>• All-in-one structure of heat treated alloy steel for guide unit and cylinder chamber in one body</li> <li>• High-solidity structure guide unit for external load</li> </ul>	ø 6 ø 10	5 ~ 30
SC-A		<ul style="list-style-type: none"> <li>• Small size and light weight with separated guide unit and cylinder chamber structure</li> <li>• No projection auto switch mount with the internal sensor groove on the cylinder body</li> <li>• Excellent side space utilization</li> </ul>	ø 8 ø 10 ø 16	5 ~ 40
SC-D		<ul style="list-style-type: none"> <li>• Double type cylinder with dual linear guide in one body</li> <li>• Double thrust and allowable moment than the existing type</li> <li>• For SC10D, possible to mount Auto Switch at the inside of body</li> </ul>	ø 6 ø 10	5 ~ 30

## Order form

**SC 06 - 05 - A2 S**  
 ① ② ③ ④ ⑤

### ④ Auto Switch type

Symbol	Type	Length	Applied cylinder
A2	DSC PRO-A2	1m	SC16A SC10D
A2L	(2-wire)	3m	
B2	PLC PRO-B2	1m	SC08A SC10A
B2L	(3-wire)	3m	
A2N	DSC PRO-A2N	1m	SC08A SC10A
A2NL	(2-wire)	3m	

\* For SC06, SC10, SC06D, impossible to mounting magnetic switch.

① Series

②, ③ Bore size & Stroke(mm)

②Name	Bore size(mm)	③Stroke(mm)	④Sensor attaching Y/N
06	6	5,10,15	-
10	10	5,10,15,20,30	-
08A	8	5,10,15	A2N, A2NL
10A	10	5,10,15,20,30	A2N, A2NL
16A	16	5,10,20,30,40	A2, A2L B2, B2L
06D	6	5,10,15	-
10D	10	5,10,15,20,30	A2, A2L B2, B2L

⑤ Auto Switch quantity

Blank	2ea
S	1ea



## Specification

Model		SC06	SC10	SC08A	SC10A	SC16A	SC06D	SC10D	
Bore size(mm)		6	10	8	10	16	6×2	10×2	
Rod(mm)		3	6	4	6	8	3×2	6×2	
Stroke(mm)		5 ~ 15	5 ~ 30	5 ~ 15	5 ~ 30	5 ~ 40	5 ~ 15	5 ~ 30	
Theoretical thrust(kgf)	Forward	0.28×P	0.79×P	0.5×P	0.79×P	2.01×P	0.57×P	1.57×P	
	Backward	0.21×P	0.5×P	0.38×P	0.5×P	1.51×P	0.42×P	1.01×P	
Air port size		M3	M5	M3	M5	M5	M3	M5	
Max. load(kgf)		0.3	0.72	0.54	0.72	2.15	0.6	1.43	
Fluid		Clean air						Note 1)	
Air pressure(kgf/cm <sup>2</sup> )		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(°C)		5 ~ 60							
Motion speed(mm/sec)		50 ~ 500							
Motion type		Double-acting type							
Positioning accuracy(mm)		± 0.01							
Stroke allowable tolerance in forward(mm)		0 ~ +0.8							

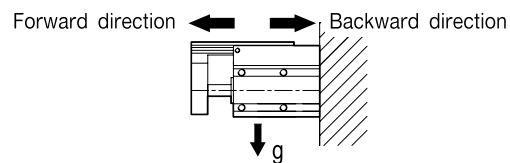
Note 1) Clean air: Fresh air containing solid matters with 0.3% of supersaturated moisture and 99.9% of liquid oil that passed through the 3-10 $\mu$ m degree of filtering

Note 2) P: Air pressure(kgf/cm<sup>2</sup>)

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.

## Main body weight

Model	Stroke(mm)	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	



Unit: kgf

## Theoretical thrust

Model	Operation direction (refer to the figure)	Pressuring dimension (mm)	Air pressure(kgf/cm <sup>2</sup> )						
			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	79	1.58	2.37	3.16	3.95	4.74	5.53	
	Backward	50	1	1.5	2	2.5	3	3.5	
SC10A	Forward	79	1.58	2.37	3.16	3.95	4.74	5.53	
	Backward	50	1	1.5	2	2.5	3	3.5	
SC10D	Forward	157	3.14	4.71	6.28	7.85	9.42	1.1	
	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	

PRECISION

PST-NS

PST

SC

ST

STS-L

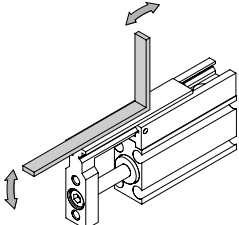
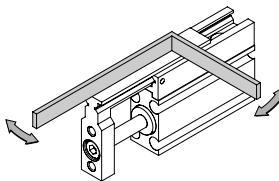
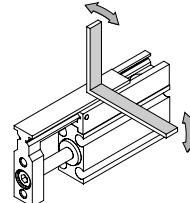
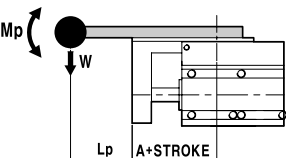
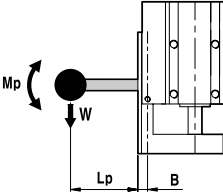
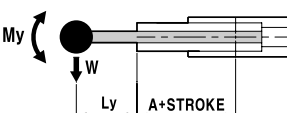
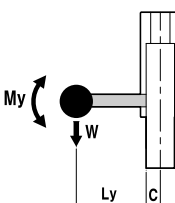
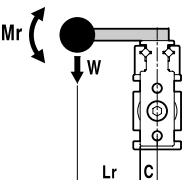
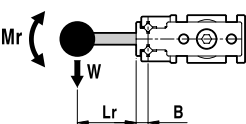
SD

PSW

## Technical data by model

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

Fig1

Pitch Moment(Mp)	Yawing Moment(My)	Rolling Moment(Mr)
		
 	 	 
$M_p = W \times (A + \text{STROKE} + L_p)$ $M_p = W \times (B + L_p)$	$M_y = W \times (A + \text{STROKE} + L_y)$ $M_y = W \times (C + L_y)$	$M_r = W \times (C + L_r)$ $M_r = W \times (B + L_r)$

※ W : Work weight(kgf)

### ■ Corrections from the central distance of moments

Table1

Unit: mm

Corrections Model	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)

Table2

Unit: kgf · cm

Model	Maximum allowable kinetic energy (Ea)
SC06	0.11
SC06D	0.22
SC08A	0.17
SC10	0.23
SC10A	0.23
SC10D	0.47
SC16A	1.09

### ■ Maximum allowable moment

Table3

Unit: kgf · cm

Allowable moment Model	Pitching moment Mp	Yawing moment My	Rolling moment Mr
SC06	2.14	2.14	3.42
SC06D	4.27	4.27	6.83
SC08A	3.28	3.28	3.34
SC10	3.1	3.1	3.68
SC10A	3.87	3.87	4.67
SC10D	6.85	6.85	5.53
SC16A	12.3	12.3	15.8

### ■ Maximum allowable load (Wa)

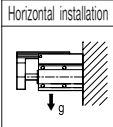
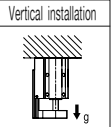
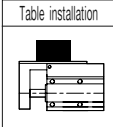
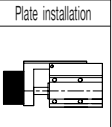
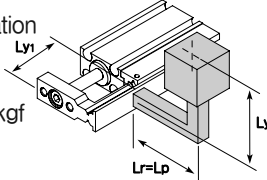
Table4

Unit: kgf

Model	Maximum allowable load (Wa)
SC06	0.3
SC06D	0.6
SC08A	0.54
SC10	0.72
SC10A	0.72
SC10D	1.43
SC16A	2.15

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

Model selection method

	Applied formula	Selection example
<p><b>Condition check</b></p> <ul style="list-style-type: none"> <li>■ Cylinder model selection</li> <li>■ Distance to the center of gravity in load</li> <li>■ Block installation</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Horizontal installation</p>  </div> <div style="text-align: center;"> <p>Vertical installation</p>  </div> <div style="text-align: center;"> <p>Table installation</p>  </div> <div style="text-align: center;"> <p>Plate installation</p>  </div> </div>	<ul style="list-style-type: none"> <li>■ Average speed</li> <li>■ Loaded weight</li> <li>■ Load installation</li> </ul>	<p>Review target: SC10A-15                  Table installation                  Block horizontal installation                  Average speed:  <math>V=300\text{mm/sec}</math>                  Loading factor <math>W=0.2\text{ kgf}</math>  <math>Ly_1 = 10\text{mm}</math>  <math>Ly_2 = 20\text{mm}</math>  <math>Lp, Lr = 15\text{mm}</math></p> 
<p><b>Kinetic energy check</b></p> <p>- The kinetic energy of load should be within the allowable kinetic energy range of cylinder.</p>	<p>Work kinetic energy(kgf · cm) : <math>E = K_1 \times \frac{1}{2} \times \frac{W}{980} \times (\frac{1.4V}{10})^2</math></p> <p><math>W</math> : work weight(kgf)  <math>V</math> : average speed(mm/sec)  <math>K_1</math> : installation factor(table installation: 1, plate installation: 1.6)  <math>E_a</math> : cylinder allowable kinetic energy(kgf · cm)                  Applicable only if <math>E &lt; E_a</math></p> <p style="text-align: right;"><b>Table2</b></p>	<p><math>E = 1 \times \frac{1}{2} \times \frac{0.2}{980} \times (\frac{1.4 \cdot 300}{10})^2 = 0.18\text{ kgf} \cdot \text{cm}</math></p> <p><math>E_a : 0.23\text{ kgf} \cdot \text{cm}</math>                  Available as <math>E(0.18) &lt; E_a(0.23)</math></p>
<p><b>Load factor check</b></p> <p>- Loading factor                  - Static moment load factor                  - Dynamic moment load factor                  - Total sum of load factors should not exceed</p>	<p><b>Loading factor</b></p> <p>Suitable loading factor(kgf) : <math>Wt = K_1 \times K_2 \times W</math>  <math>\theta_1</math> : Loading factor = <math>\frac{Wt}{W_a}</math></p> <p><math>W</math> : work weight(kgf)  <math>K_1</math> : installation factor(table installation: 1, plate installation: 1.6)  <math>K_2</math> : speed factor(300mm/sec or less: over 1, 300mm/sec: 1.6)  <math>W_a</math> : cylinder Max. load(kgf)                  *For vertical installation, loading factor review is not required</p> <p style="text-align: right;"><b>Table4</b></p>	<p><math>Wt = 1 \times 1 \times 0.2 \times = 0.2\text{ kgf}</math>  <math>W_a = 0.72\text{ kgf}</math>  <math>\theta_1 = \frac{0.2}{0.72} = 0.28</math></p>
<p><b>Static moment</b></p>	<p>Yawing moment(kgf · cm) : <math>My = W \times (A + \text{Stroke} + Ly_1) / 10</math>                  Rolling moment(kgf · cm) : <math>Mr = W \times (B + Lr) / 10</math>  <math>\theta_2</math> : yawing Static moment load factor = <math>\frac{My}{M_{ya}}</math>  <math>\theta_3</math> : rolling Static moment load factor = <math>\frac{Mr}{M_{ra}}</math></p> <p><math>W</math> : work weight(kgf)  <math>A, B</math> : corrections from the center distance of moments(mm) <b>Table1</b>  <math>Ly_1, Lr</math> : distance from the end of table to the center of load(mm) <b>Fig1</b>  <math>M_{ya}, M_{ra}</math> : cylinder allowable moment(kgf · cm) <b>Table3</b></p>	<p><math>My = 0.2 \times \frac{(21+15-10)}{10} = 0.52\text{ kgf} \cdot \text{cm}</math>  <math>M_{ya} = 3.87\text{ kgf} \cdot \text{cm}</math>  <math>\theta_2 = \frac{0.52}{3.87} = 0.14</math>  <math>Mr = 0.2 \times \frac{(3.5+15)}{10} = 0.37\text{ kgf} \cdot \text{cm}</math>  <math>M_{ra} = 4.67\text{ kgf} \cdot \text{cm}</math>  <math>\theta_3 = \frac{0.37}{4.67} = 0.08</math></p>
<p><b>Dynamic moment</b></p>	<p>Pitching moment(kgf · cm) : <math>Mp = K_2 \times W \times (B + Lp) / 10</math>                  Yawing moment(kgf · cm) : <math>My = K_2 \times W \times (C + Ly_2) / 10</math>  <math>\theta_4</math> : pitching dynamic moment load factor = <math>\frac{Mp}{M_{pa}}</math>  <math>\theta_5</math> : yawing dynamic moment load factor = <math>\frac{My}{M_{ya}}</math></p> <p><math>W</math> : work weight(kgf)  <math>K_2</math> : speed factor(300mm/sec or less: over 1, 300mm/sec: 1.6)  <math>B, C</math> : corrections from the center distance of moments(mm) <b>Table1</b>  <math>Lp, Ly_2</math> : distance from the end of table to the center of load(mm) <b>Fig1</b>  <math>M_{pa}, M_{ya}</math> : cylinder allowable moment(kgf · cm) <b>Table3</b></p>	<p><math>Mp = 1 \times 0.2 \times \frac{(3.5+15)}{10} = 0.37\text{ kgf} \cdot \text{cm}</math>  <math>M_{pa} = 3.87\text{ kgf} \cdot \text{cm}</math>  <math>\theta_4 = \frac{0.37}{3.87} = 0.1</math>  <math>My = 1 \times 0.2 \times \frac{(5+20)}{10} = 0.5\text{ kgf} \cdot \text{cm}</math>  <math>M_{ya} = 3.87\text{ kgf} \cdot \text{cm}</math>  <math>\theta_5 = \frac{0.5}{3.87} = 0.13</math></p>
<p><b>Total load factor</b></p>	<p><math>\theta_t = \theta_1 + \theta_2 + \theta_3 + \theta_4 + \theta_5 \leq 1</math></p>	<p><math>\theta_t = 0.28 + 0.14 + 0.08 + 0.1 + 0.13 = 0.73 \leq 1</math>                  SC10A-15 is applicable</p>

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

PRECISION

PST-NS

PST

SC

ST

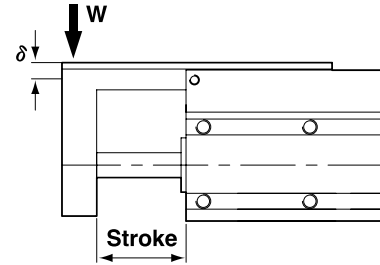
STS-L

SD

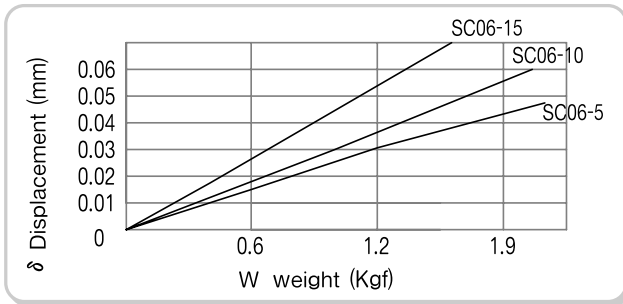
PSW

## Table deflection

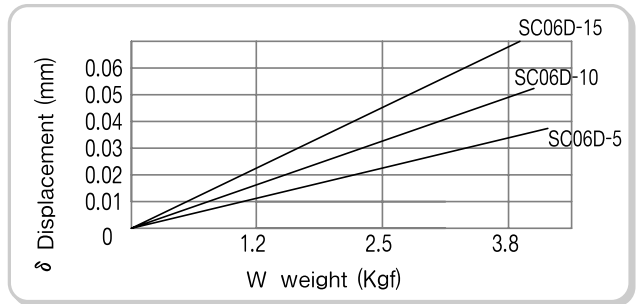
- The graph shows the deflection length when cylinder moves to forward with certain weight loaded at the end of table end, like right graphic.
- The deflection length values below graphs show only reference value when any weight loaded. (Please note that those are not maximum value)



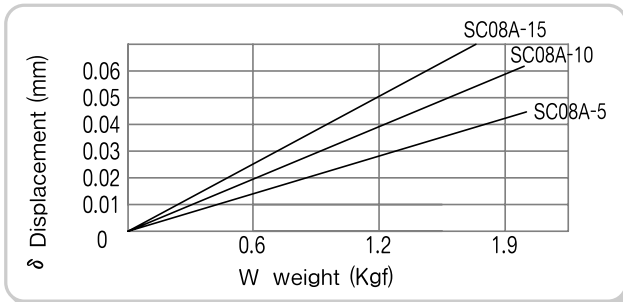
### ◆ SC06



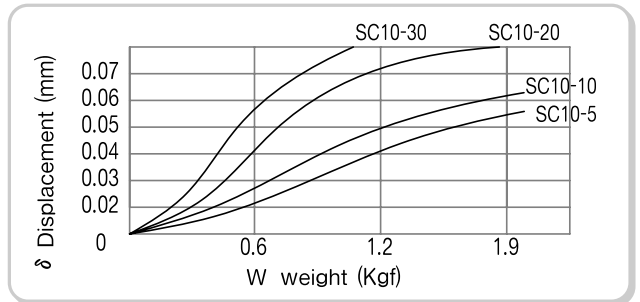
### ◆ SC06D



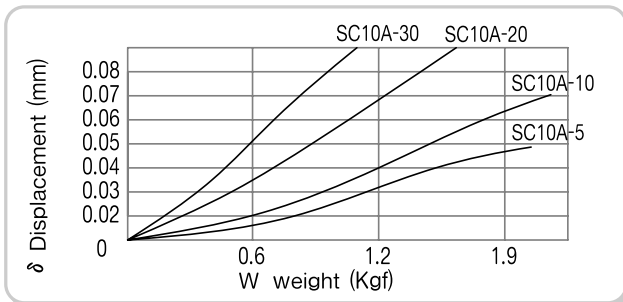
### ◆ SC08A



### ◆ SC10



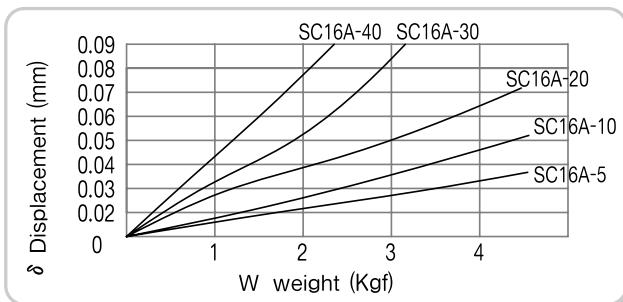
### ◆ SC10A



### ◆ SC10D



### ◆ SC16A

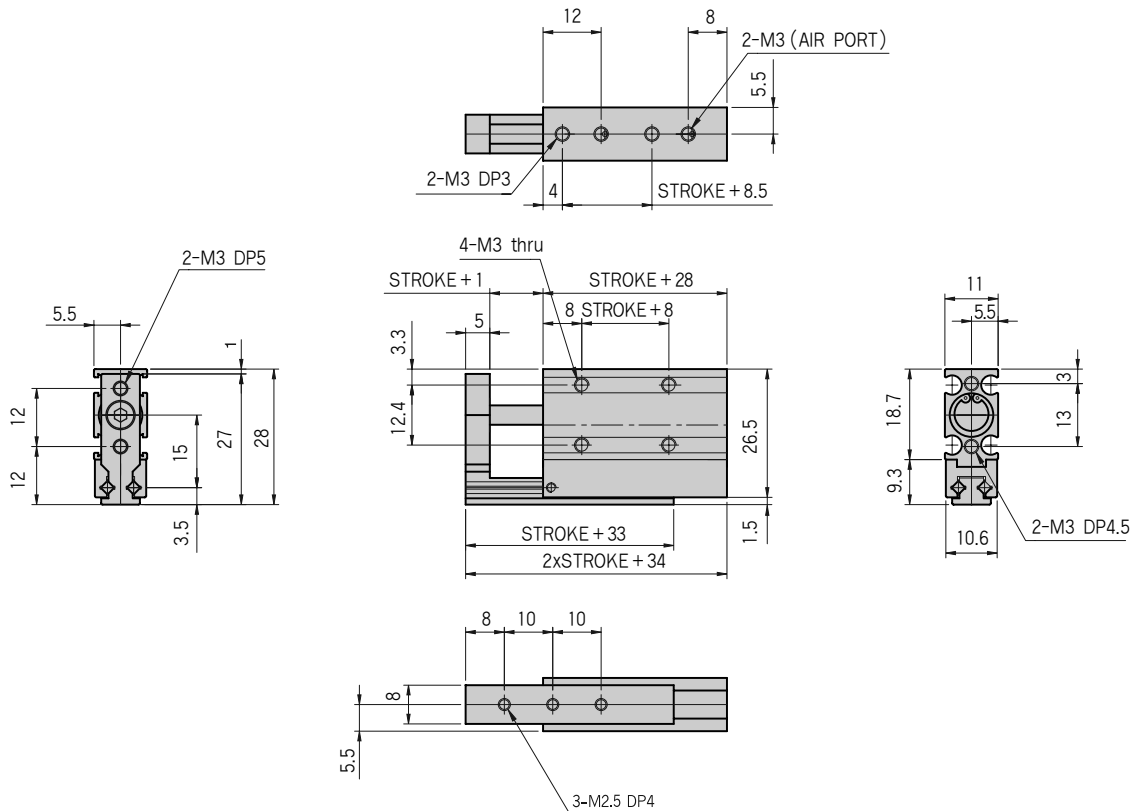




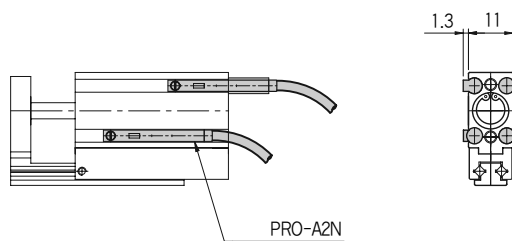
# SC Series

06 10 **08A** 10A 16A 06D 10D

## SC08A

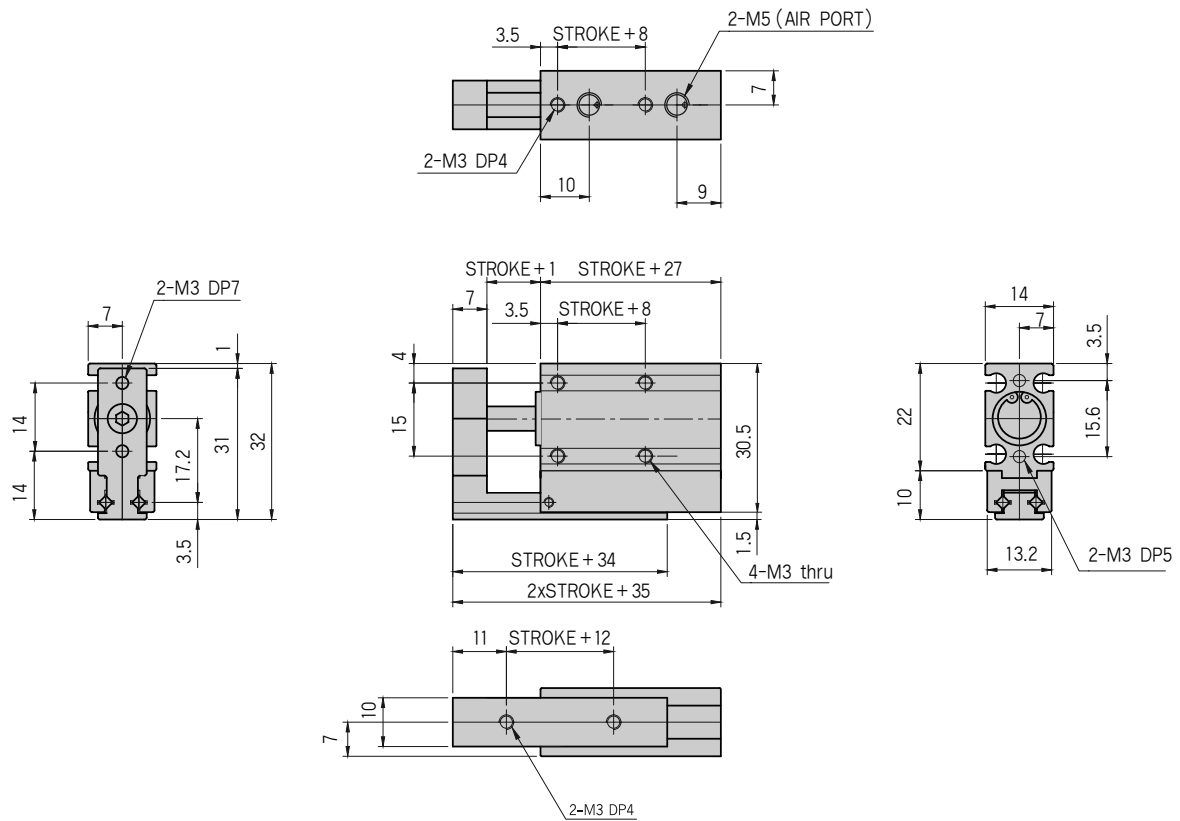


## SC08A-Auto Switch

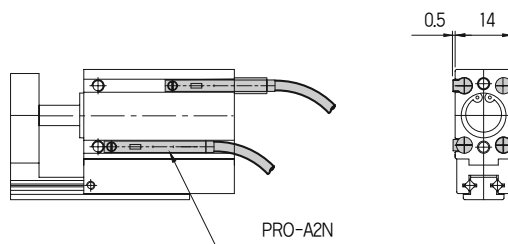


06 10 08A **10A** 16A 06D 10D

SC10A



SC10A-Auto Switch



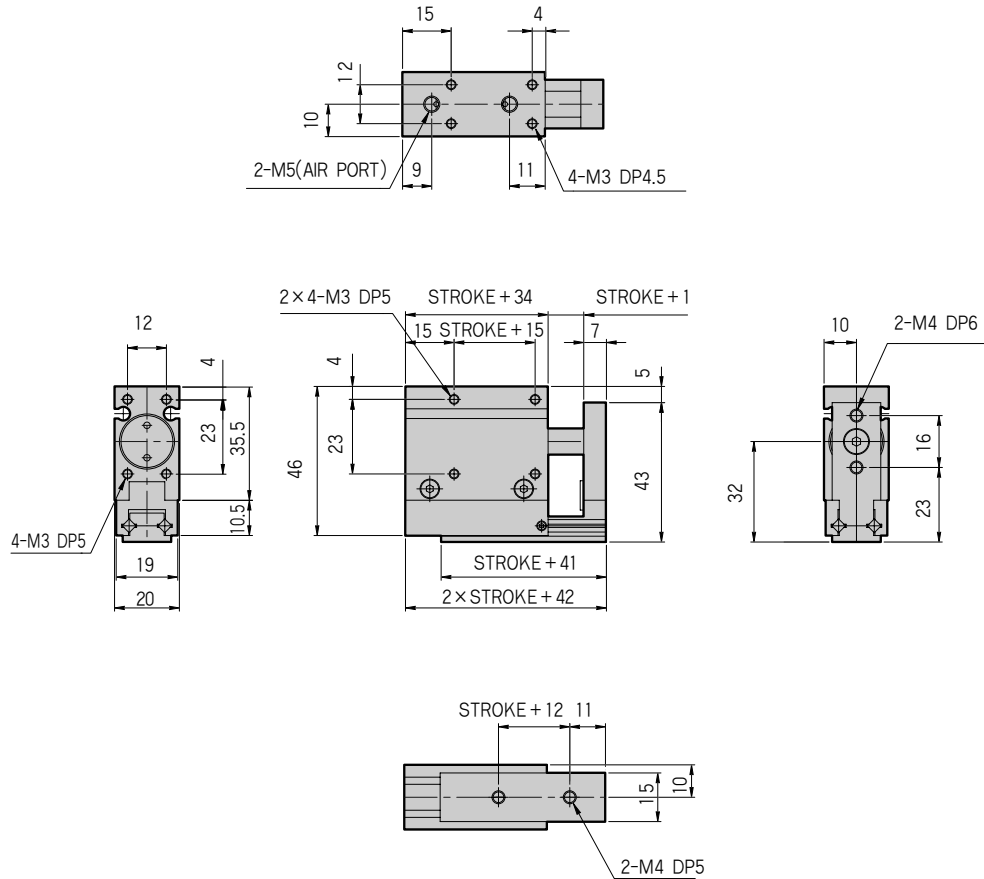
**PRECISION**  
 PST-NS  
 PST  
**SC**  
 ST  
 STS-L  
 SD  
 PSW



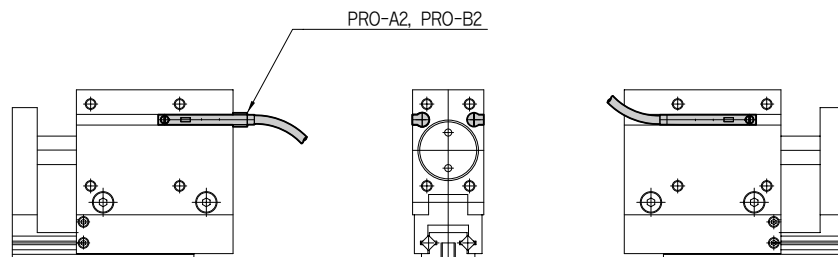
# SC Series

06 10 08A 10A **16A** 06D 10D

## SC16A

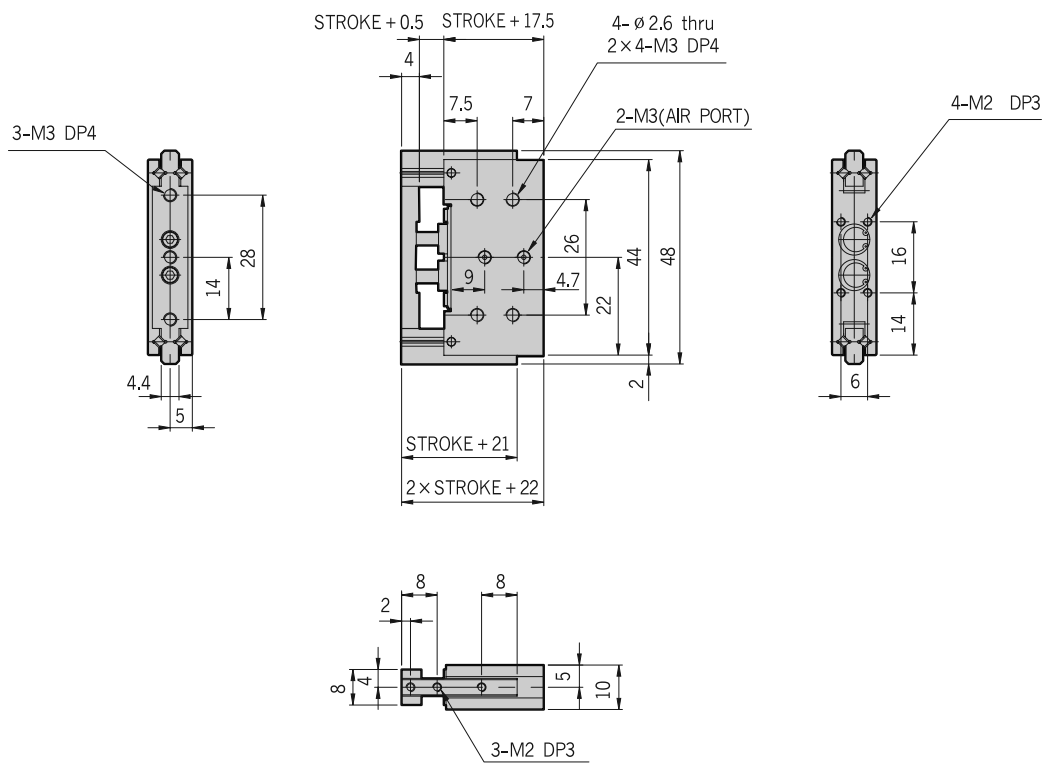


## SC16A-Auto Switch



06 10 08A 10A 16A 06D 10D

SC06D



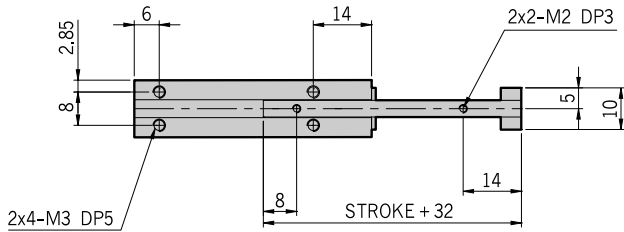
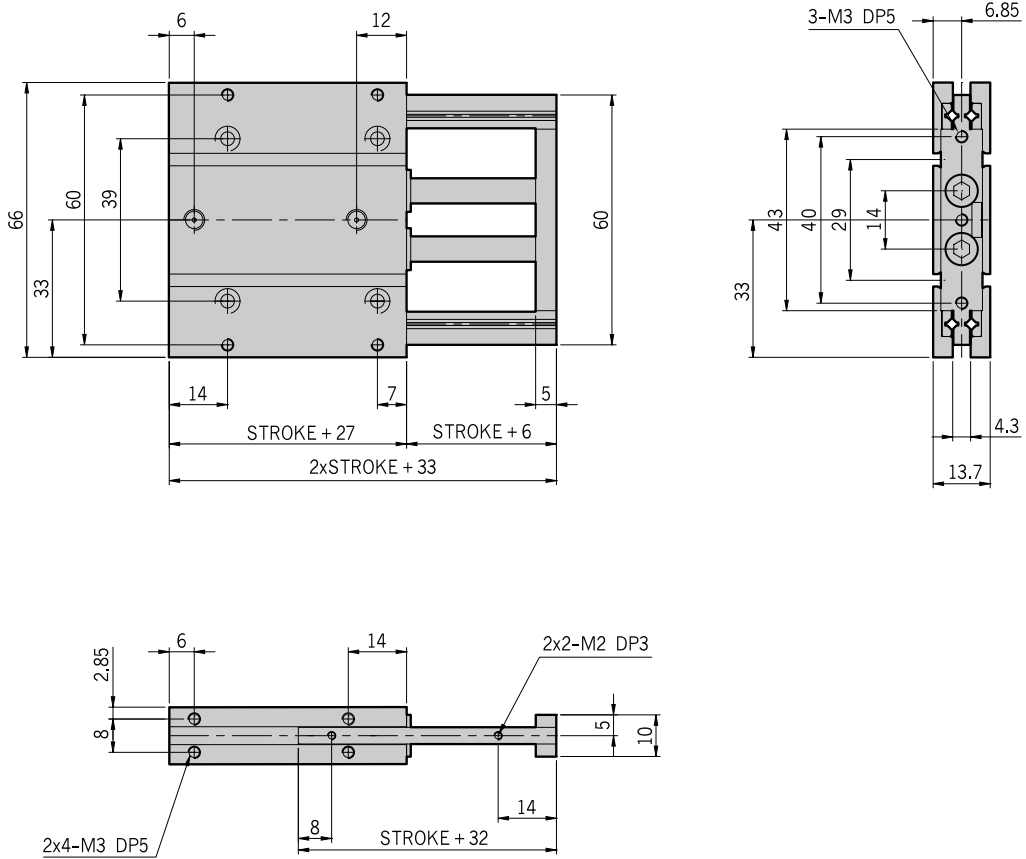
**PRECISION**

PST-NS
PST
<b>SC</b>
ST
STS-L
SD
PSW

# SC Series

06 10 08A 10A 16A 06D 10D

## SC10D



## SC10D-Auto Switch

