

## Rodless Type

### Overview

This is a rodless cylinder with brake, attaching a compact and highly reliable brake to the  $\phi 12$  to  $\phi 63$  equivalent series (SRL3) of rodless cylinders.

### Features

#### Easy Brake Release

The brake can be released simply by returning the tilt of the brake plate to its original position using a flathead screwdriver etc.

#### Elimination of Piping Trouble

Supply of air pressure to the brake section does not require moving piping (cable carrier, etc.), but only piping to the end flange.

#### Simple Structure

The number of components in the brake section is extremely small, and the structure is simple.

#### Space Saving

Due to the low-profile and compact brake mechanism, it saves space.

Repeatability  $\pm 1.5$  mm  
(300 mm/s at no load)  
Brake Durability High Life

# SRT3

## Rodless Cylinder with Brake

$\phi 12, \phi 16, \phi 20, \phi 25, \phi 32,$   
 $\phi 40, \phi 50, \phi 63$  Equivalent



## C O N T E N T S

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●: Standard, ○: Option, ■: Not Available

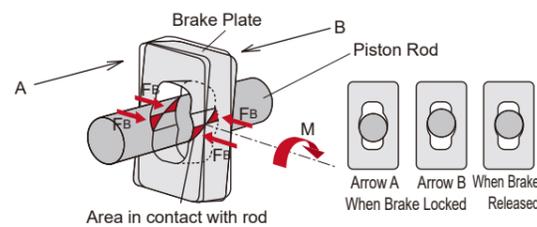
Rodless Type	Variation	Model Number	Bore Size (mm)	Stroke (mm)										Min Stroke (mm)	Max Stroke (mm)	Intermediate stroke (per mm)	Mounting Type		Cushion					Option	Switch	Page	
				200	300	400	500	600	700	800	900	1000	Basic Type				Axial Foot Type	Cushion on Both Sides	Cushion on R Side	Cushion on L Side	Without Cushion	Floating Joint					
													00				LB	B	R	L	N	Y					
	Double Acting Type	SRT3	ø12 Equivalent, ø16 Equivalent, ø20 Equivalent ø25 Equivalent, ø32 Equivalent, ø40 Equivalent ø50 Equivalent, ø63 Equivalent	●	●	●	●	●	●	●			●	●		1000		●	●	●	●	●	●	○	○		178
				●	●	●	●	●	●	●			●	●		1500	1	●	●	●	●	●	●	○	○		
				●	●	●	●	●	●	●			●	●		2000		●	●	●	●	●	●	○	○		

Note: ○ only when without switch, not available when with switch.

## Product Introduction

### ● Equipped with New Brake Mechanism

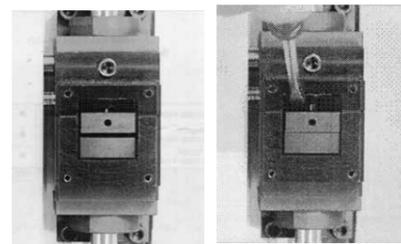
Equipped with a new swash plate type brake mechanism, it features excellent durability and strong holding force (equivalent to cylinder thrust at 0.6 MPa).



By applying rotational force M to the brake plate, force  $F_B$  in the axial direction is generated to hold the rod, ensuring excellent durability and strong holding force.

### ● Easy Brake Release

The brake can be released simply by returning the tilt of the brake plate to its original position using a flathead screwdriver etc.



### ● Elimination of Piping Trouble

Supply of air pressure to the brake section does not require moving piping (cable carrier, etc.), but only piping to the end flange.

### ● Simple Structure

The number of components in the brake section is extremely small, and the structure is simple.

### ● Space Saving

Due to the low-profile and compact brake mechanism, it saves space.

### ● Switch Mounting Possible

Various cylinder switches such as non-contact and contact types can be mounted.



M□V

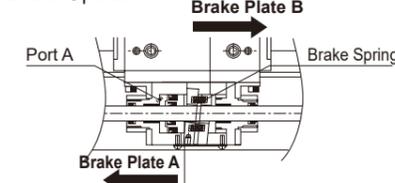


M□H

- Non-contact 2-wire M2V/H
- Non-contact 3-wire M3V/H
- Contact 2-wire M0V/H, M5V/H
- 2-color Display Non-contact 2-wire M2WV, T2WV/H
- 2-color Display Non-contact 3-wire M3WV, T3WV/H
- For AC Magnetic Field T2YD, T2YDT

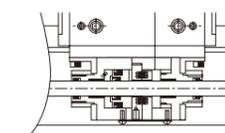
## Operational Principle

### Brake Operation



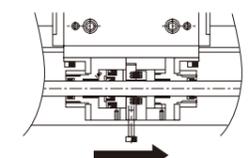
When air is exhausted from port (A), brake plates (A) and (B) are pushed by spring force, brake plates (A) and (B) tilt in the direction of the arrow using each as a fulcrum, and the braking force is amplified by the cylinder thrust to hold the Piston Rod.

### Brake Release



When air is supplied from port (A), brake plates (A) and (B) are pushed by the release piston, brake plates (A) and (B) become perpendicular to the Piston Rod, clearance is created between them, and the rod becomes free.

### Manual Brake Release



Remove the cover, screw a Hexagon Socket Head Cap Screw etc. into the brake plate (A) and tilt it in the direction of the arrow to make the brake plates (A) and (B) parallel, and the Piston Rod becomes free. (The brake can also be released by returning the tilt of the brake plate to its original position using a flathead screwdriver etc.)

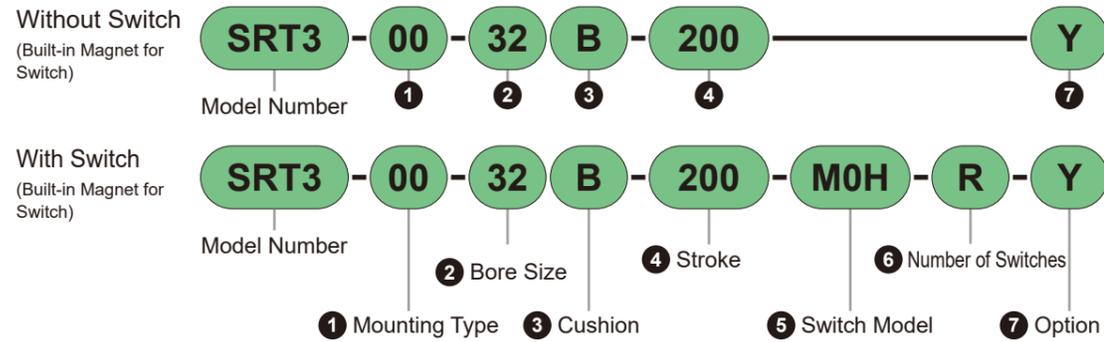


# Rodless Cylinder with Brake SRT3 Series

● Bore Size: ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63 Equivalent



## Model No. Notation



### 1 Mounting Type

Mounting brackets are included with the product before shipment.

Code	Description
00	Basic Type
LB	Axial Foot Type

### 2 Bore Size (mm)

Code	Description
12	ø12 Equivalent
16	ø16 Equivalent
20	ø20 Equivalent
25	ø25 Equivalent
32	ø32 Equivalent
40	ø40 Equivalent
50	ø50 Equivalent
63	ø63 Equivalent

### 3 Cushion

Code	Description
B	Cushion on Both Sides
R	Cushion on R Side
L	Cushion on L Side
N	Without Cushion

### 4 Stroke (mm)

Bore Size	Stroke	Intermediate Stroke
ø12 to ø20 Equivalent	1 to 1000	in 1mm increments
ø25 to ø40 Equivalent	1 to 1500	
ø50, ø63 Equivalent	1 to 2000	

Note: Refer to P. 180 for the minimum stroke with switch.

### 5 Switch Model

For switch details, refer to P. 1457. Switches are included with the product before shipment.

Contact	Indicator Light Special Function	Wiring (Output)	Load Voltage (V)		Load Current (mA)		Lead Wire *1	
			AC	DC	AC	DC	Straight	L-shaped
Non-contact	1-color	2-wire	-	10 to 30	-	5 to 30	M2H□	M2V□
	2-color		-	10 to 30	-	5 to 30	-	M2WV□
	1-color	3-wire (NPN)	-	30 or less	-	100 or less	M3H□	M3V□
	2-color		-	30 or less	-	100 or less	-	M3WV□
	1-color (Custom Product)	2-wire	-	24+/-10%	-	5 to 20	T2WH□	T2WV□
	2-color		3-wire (NPN)	-	30 or less	-	50 or less	T3WH□
Contact	For 2-color AC Magnetic Field	2-wire	-	24+/-10%	-	5 to 20	T2YD□	-
			-	-	-	-	T2YDT□	-
Contact	1-color Without Indicator Lamp	2-wire	110	12/24	7 to 20	5 to 50	M0H□	M0V□
			110	5/12/24	20 or less	50 or less	M5H□	M5V□

### \*Lead Wire Length

Code	Description
No Code	1 m (Standard)
3	3 m (Option)
5	5 m (Option)

Example) Lead wire length  
1 m M0V  
3 m M0V<sup>3</sup>  
5 m M0V<sup>5</sup>

\*1: Enter the code selected in the "Lead wire length" table into "□" of the Switch Model.

\*2: Switches other than the above models are also available. (Custom Product) For details, refer to P. 1457.

### 6 Number of Switches

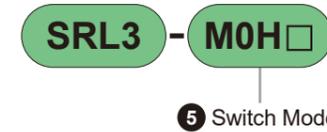
Code	Description
R	1 pc on R Side
L	1 pc on L Side
D	2 pcs
T	3 pcs
4	4 pcs (Indicate number of switches for 4 pcs or more.)

### 7 Option

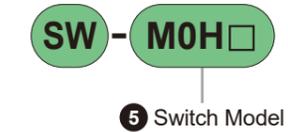
Code	Description
Y	Floating Joint

## Switch Individual Model No. Notation

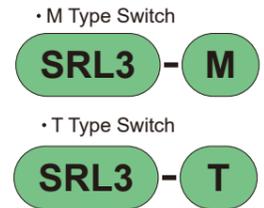
● Switch body+Mounting bracket set (\*1)



● Switch Body Only



● Mounting bracket complete set (\*2)



● Lead wire holder (\*3)

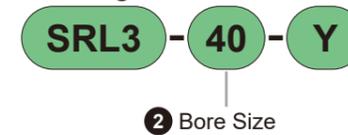


\*1: Lead wire holder is not included in the Switch Body + Mounting Bracket Set. If a lead wire holder is required, please order it separately.

\*2: Mounting brackets differ between M type switch and T type switch.

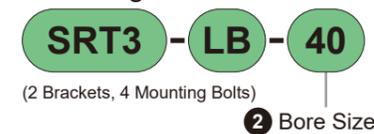
\*3: Lead wire holder is 10 pcs/1 set.

## Floating Joint Set Model No. Notation



(Mount, Mount Base, Pin, Flat Washer, Pan Head Screw with Spring Washer, 4 Mounting Bolts)

## Mounting Bracket Model No. Notation



Specifications

Item		SRT3							
Bore Size	mm	ø12 Equivalent	ø16 Equivalent	ø20 Equivalent	ø25 Equivalent	ø32 Equivalent	ø40 Equivalent	ø50 Equivalent	ø63 Equivalent
Operating Method		Double Acting Type							
Operating Fluid		Compressed Air							
Max Operating Pressure	MPa	0.7							
Min Operating Pressure	Cylinder Part	0.2			0.15			0.1	
	Brake Part	0.3 *1							
Proof Pressure	MPa	1.05							
Ambient Temperature	°C	5 to 60							
Port Size	Cylinder Part	M5		Rc1/8		Rc1/4		Rc3/8	
	Brake Part	M5							
Stroke Tolerance	mm	$^{+2.0}_0$ (up to 1000)				$^{+2.5}_0$ (up to 2000)			
Operating Piston Speed	mm/s	50 to 1000 (1.97 to 39.4 in/sec)							
Cushion		Air Cushion							
Lubrication		Not required (When lubricating, use turbine oil Class 1 ISO VG32)							
Holding Force	N	66	118	184	288	483	754	1178	1870

\*1: The minimum Operating Pressure of the brake part is the value when the load is balanced.

Allowable Absorbed Energy

Bore Size (mm)	With Cushion		Without Cushion
	Allowable Absorbed Energy (J)	Cushion Stroke (mm)	Allowable Absorbed Energy (J)
ø12 Equivalent	0.03	14.5	0.003
ø16 Equivalent	0.22	19.2	0.007
ø20 Equivalent	0.59	22.2	0.010
ø25 Equivalent	1.40	20.9	0.015
ø32 Equivalent	2.57	23.5	0.030
ø40 Equivalent	4.27	23.9	0.050
ø50 Equivalent	9.13	24.9	0.072
ø63 Equivalent	17.4	29.6	0.138

Stroke

Bore Size (mm)	Standard Stroke (mm)	Max Stroke (mm)	Min Stroke (mm)
ø12 Equivalent	200, 300	1000	1
ø16 Equivalent			
ø20 Equivalent			
ø25 Equivalent	600, 700	1500	
ø32 Equivalent			
ø40 Equivalent	800, 900	2000	
ø50 Equivalent			
ø63 Equivalent			

Note: Intermediate strokes can be manufactured in 1mm increments.

Number of M Type Switches Mounted and Min Stroke (mm)

Number of Switches	1		2	
	M□V	M□H	M□V	M□H
Switch Model				
Bore Size (mm)				
ø12 Equivalent	10	10	30	45
ø16 Equivalent				
ø20 Equivalent				
ø25 Equivalent				
ø32 Equivalent				
ø40 Equivalent	15	15		
ø50 Equivalent				
ø63 Equivalent				

Number of T Type Switches Mounted and Min Stroke (mm)

Number of Switches	1		2	
	T□V	T□H	T□V	T□H
Switch Model				
Bore Size (mm)				
ø12 Equivalent	5	5	45	50
ø16 Equivalent				
ø20 Equivalent				
ø25 Equivalent	10	10		
ø32 Equivalent				
ø40 Equivalent				
ø50 Equivalent				
ø63 Equivalent				

Cylinder Weight

Unit: kg

Bore Size (mm)	Weight at 0mm Stroke			Mounting Bracket Weight		Additional Weight per 100mm Stroke
	Basic Type (00)	Foot Type (LB)	Switch Weight	T Type	M Type	
ø12 Equivalent	0.83	0.84	Refer to the Weight listed in the Switch Specifications on P. 1457.	0.005	0.001	0.18
ø16 Equivalent	0.95	0.96				0.21
ø20 Equivalent	1.17	1.19				0.26
ø25 Equivalent	2.24	2.34				0.43
ø32 Equivalent	3.8	3.9				0.54
ø40 Equivalent	5.0	5.1				0.71
ø50 Equivalent	7.4	7.5				0.96
ø63 Equivalent	12.4	12.7				1.46

Theoretical Thrust Table

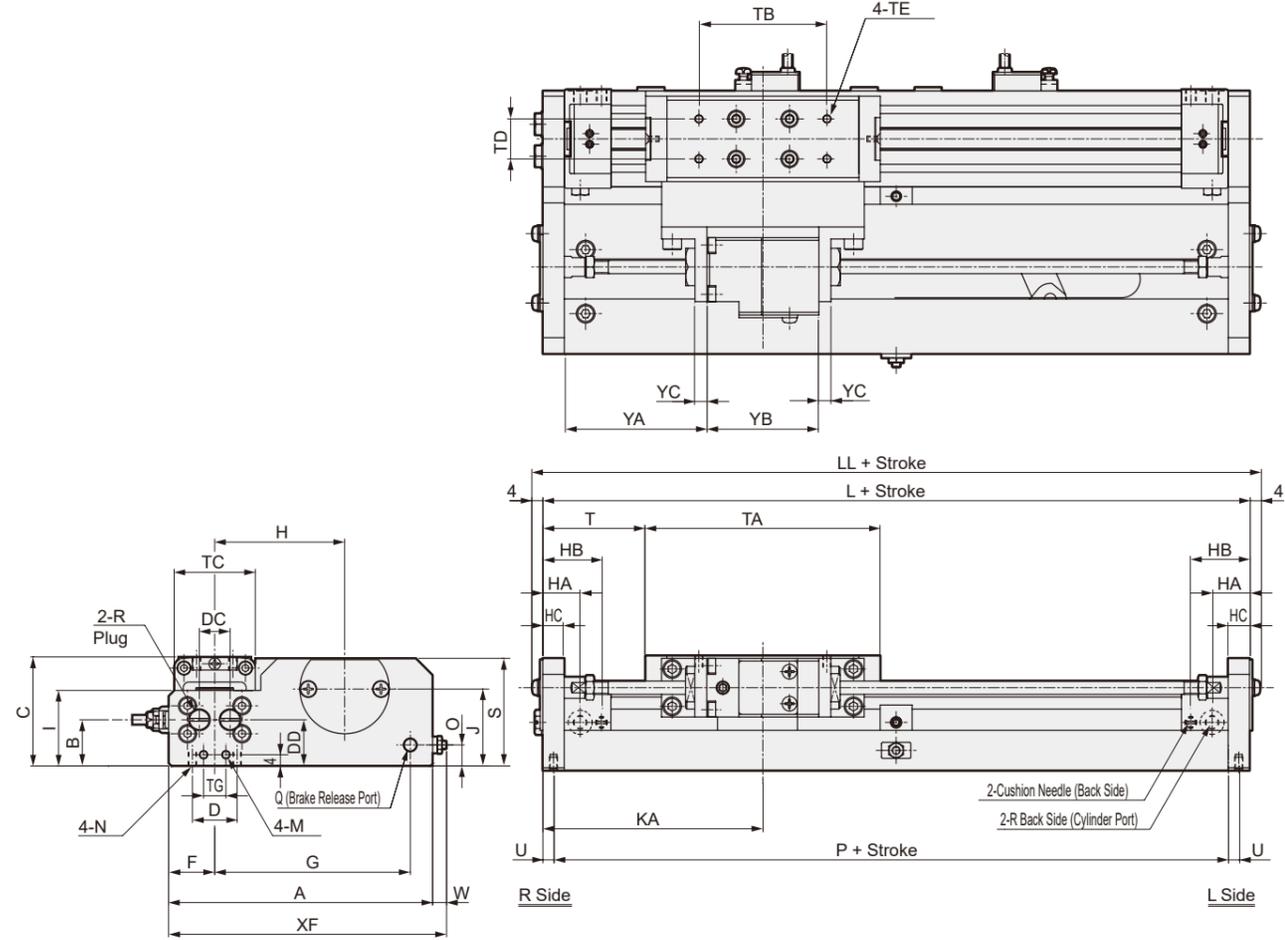
(Unit: N)

Bore Size (mm)	Operating Direction	Operating Pressure MPa							
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø12 Equivalent	Push/Pull	-	-	27.7	41.5	55.3	69.1	83.0	96.8
ø16 Equivalent	Push/Pull	-	-	43.2	64.8	86.4	1.08x10 <sup>2</sup>	1.30x10 <sup>2</sup>	1.51x10 <sup>2</sup>
ø20 Equivalent	Push/Pull	-	-	62.9	94.4	1.26x10 <sup>2</sup>	1.57x10 <sup>2</sup>	1.89x10 <sup>2</sup>	2.20x10 <sup>2</sup>
ø25 Equivalent	Push/Pull	-	81.4	1.08x10 <sup>2</sup>	1.63x10 <sup>2</sup>	2.17x10 <sup>2</sup>	2.71x10 <sup>2</sup>	3.25x10 <sup>2</sup>	3.80x10 <sup>2</sup>
ø32 Equivalent	Push/Pull	-	1.22x10 <sup>2</sup>	1.63x10 <sup>2</sup>	2.44x10 <sup>2</sup>	3.26x10 <sup>2</sup>	4.07x10 <sup>2</sup>	4.88x10 <sup>2</sup>	5.70x10 <sup>2</sup>
ø40 Equivalent	Push/Pull	-	1.90x10 <sup>2</sup>	2.53x10 <sup>2</sup>	3.80x10 <sup>2</sup>	5.06x10 <sup>2</sup>	6.33x10 <sup>2</sup>	7.60x10 <sup>2</sup>	8.86x10 <sup>2</sup>
ø50 Equivalent	Push/Pull	1.99x10 <sup>2</sup>	2.98x10 <sup>2</sup>	3.98x10 <sup>2</sup>	5.96x10 <sup>2</sup>	7.95x10 <sup>2</sup>	9.94x10 <sup>2</sup>	1.19x10 <sup>3</sup>	1.39x10 <sup>3</sup>
ø63 Equivalent	Push/Pull	3.14x10 <sup>2</sup>	4.70x10 <sup>2</sup>	6.27x10 <sup>2</sup>	9.41x10 <sup>2</sup>	1.25x10 <sup>3</sup>	1.57x10 <sup>3</sup>	1.88x10 <sup>3</sup>	2.20x10 <sup>3</sup>

Dimensional Drawings (Bore Size:  $\phi 12$ ,  $\phi 16$  Equivalent)

Basic Type (00)

- SRT3-00-12 to 16



Code	A	B	C	D	DC	DD	F	G	H	HA	HB	HC	I	J	KA	L	LL	M	N	O	P	Q	R	S
Bore Size (mm)																		M3 Depth 5	M3 Depth 6	8	144	M5	M5	39
$\phi 12$ Equivalent	94.5	16.5	39	16	11	16.5	16.5	70	46	14	22	8	27	27.5	76	152	160	M3 Depth 5	M3 Depth 6	8	144	M5	M5	39
$\phi 16$ Equivalent	98.5	18	43	20	12	18	18.5	72	48	14	22	8	30	31	82.5	165	173	M3 Depth 5	M3 Depth 6	8	157	M5	M5	42

Code	T	TA	TB	TC	TD	TE	TG	U	W	XF	YA	YB	YC
Bore Size (mm)													
$\phi 12$ Equivalent	35.5	81	42	29	13	M3 Depth 5	8	4	5	99.5	47	42	8
$\phi 16$ Equivalent	38.5	88	48	32	15	M3 Depth 5	12	4	5	99.5	53.5	42	8

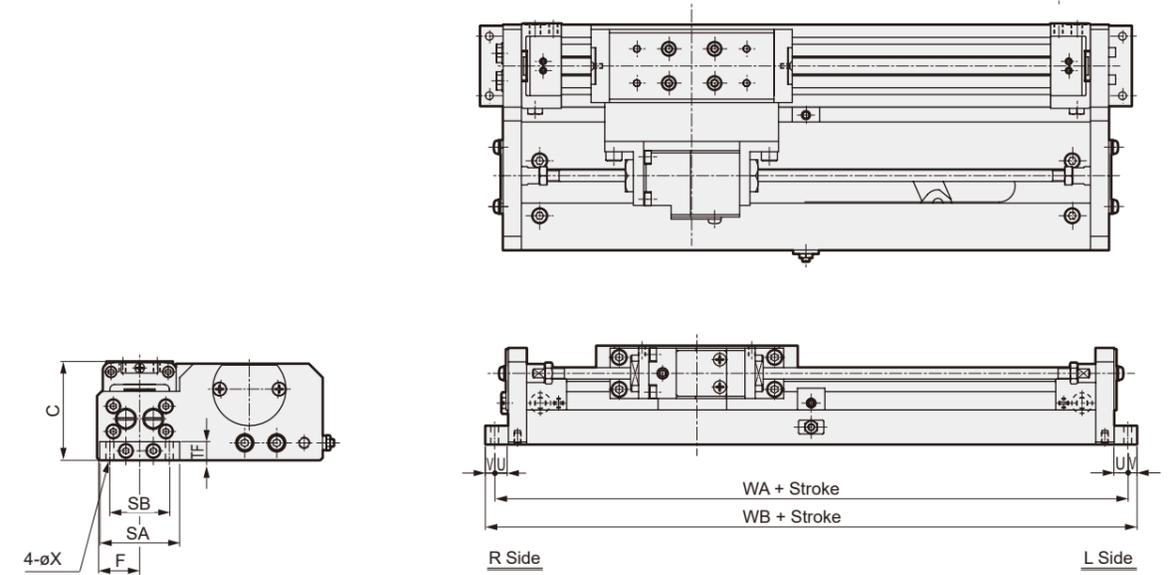
Note: For dimensions with each switch, refer to P. 190.

Dimensional Drawings

Dimensional Drawings (Bore Size:  $\phi 12$ ,  $\phi 16$  Equivalent)

Axial Foot Type (LB)

- SRT3-LB-12 to 16



Code	C	F	Mounting Method							
Bore Size (mm)			SA	SB	TF	U	V	X	WA	WB
$\phi 12$ Equivalent	39	16.5	32	24	8	6	4	3.4	164	172
$\phi 16$ Equivalent	43	18.5	35	26	8	6	4	3.4	177	185

Note: For dimensions with each switch, refer to P. 190.

Rodless Type

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

Rodless Type

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

Cylinder Switch

Ending

Cylinder Switch

Ending

Dimensional Drawings (Bore Size:  $\phi 20$  Equivalent)

Basic Type (00)  
 ● SRT3-00-20

Rodless Type

SRL3

SRG3

SRM3

**SRT3**

MRL2

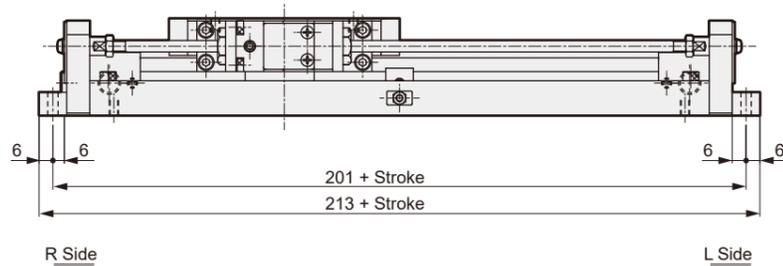
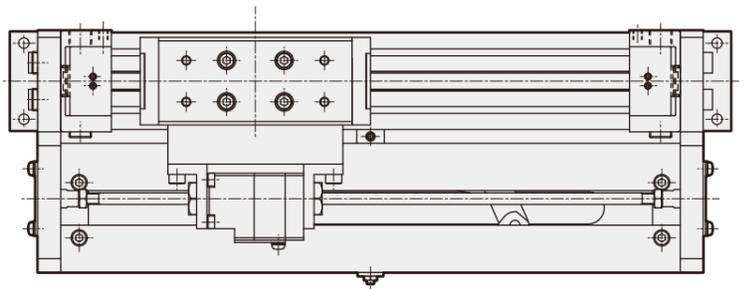
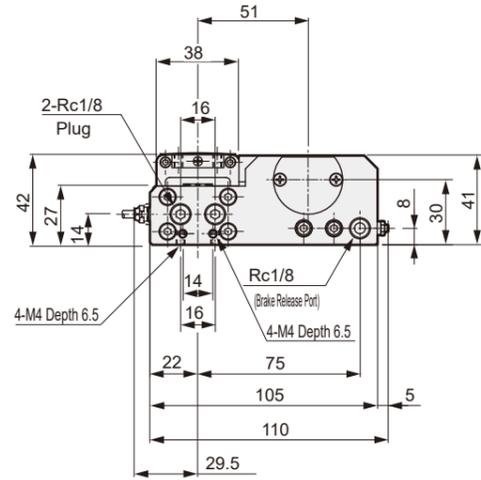
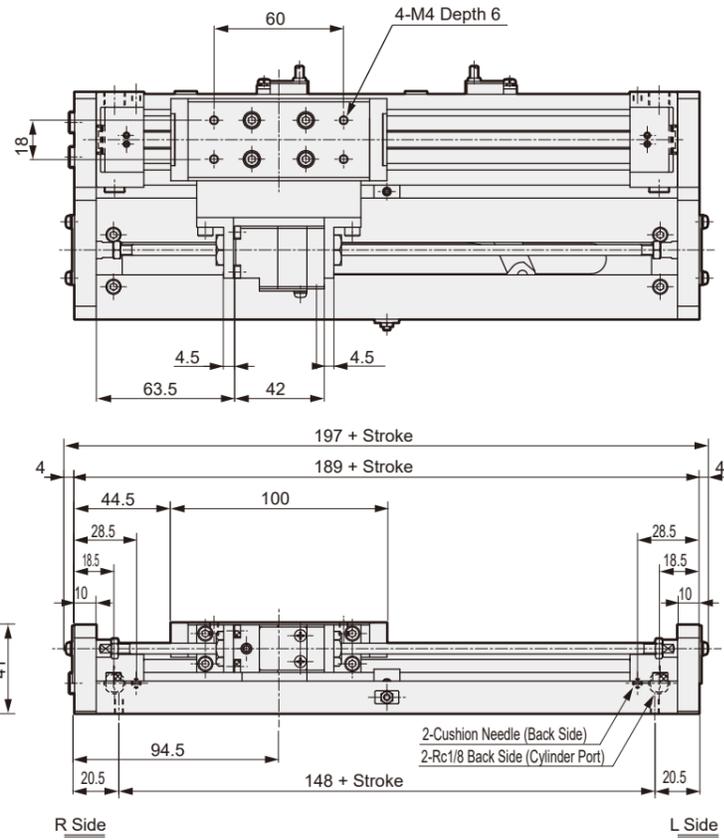
MRG2

SM-25

Axial Foot Type (LB)  
 ● SRT3-LB-20

Cylinder Switch

Ending



Dimensional Drawings (Bore Size:  $\phi 25$  Equivalent)

Basic Type (00)  
 ● SRT3-00-25

Rodless Type

SRL3

SRG3

SRM3

**SRT3**

MRL2

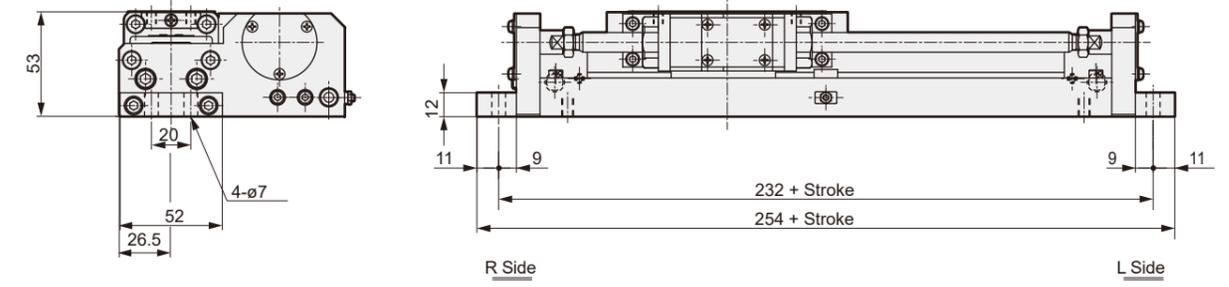
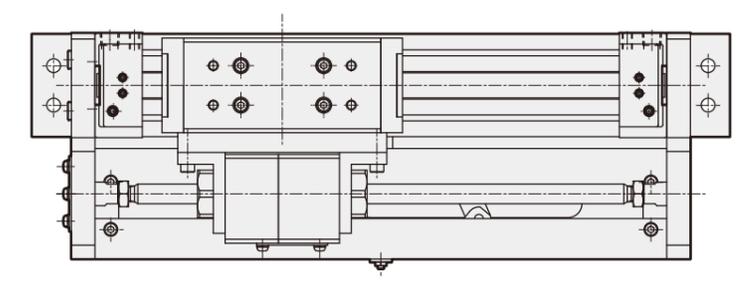
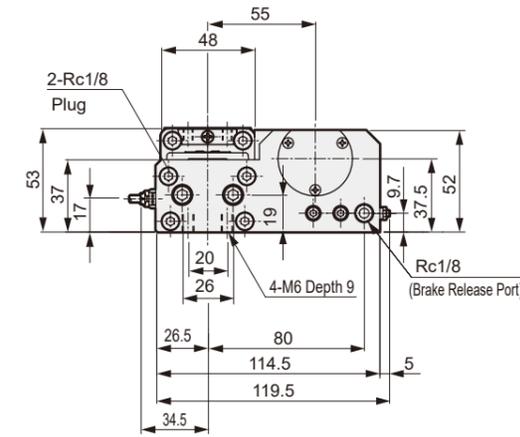
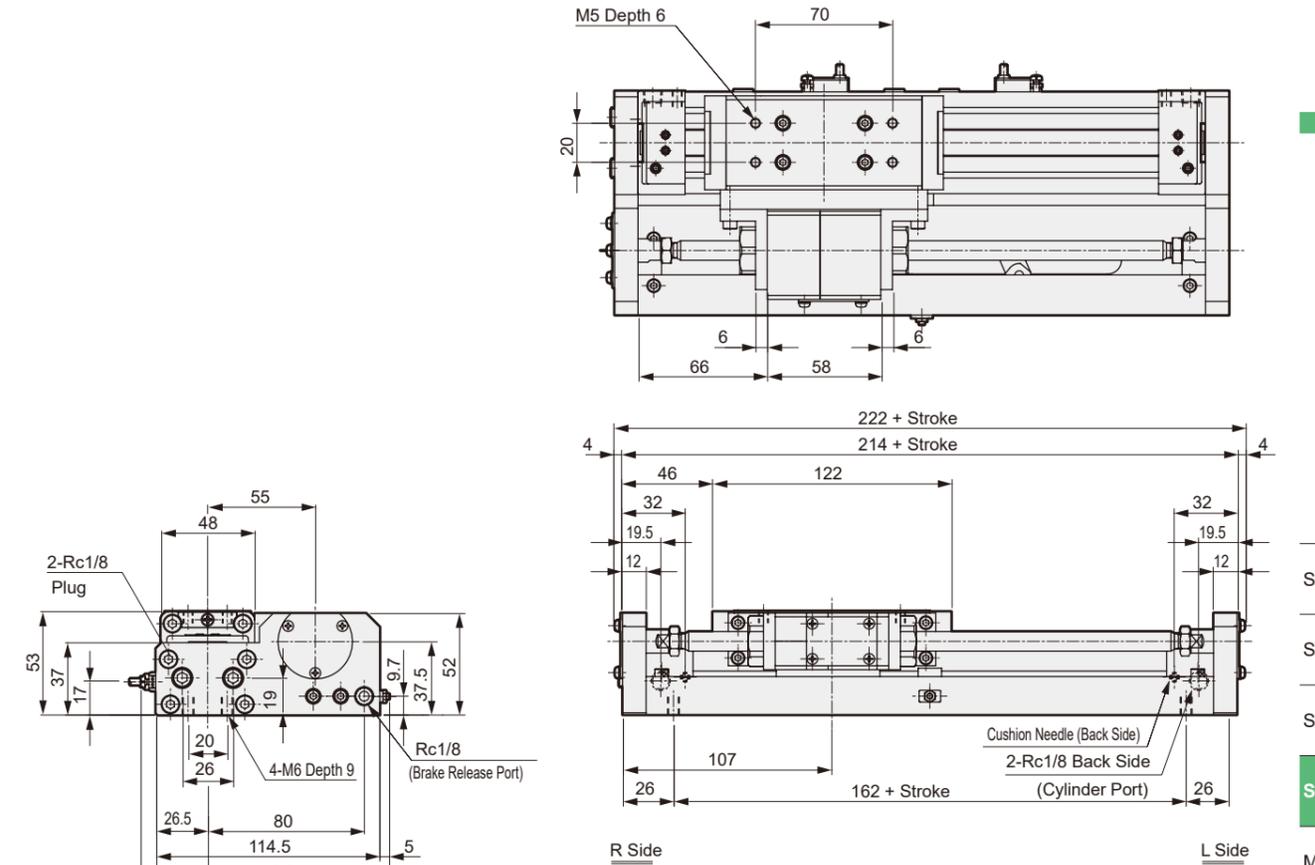
MRG2

SM-25

Axial Foot Type (LB)  
 ● SRT3-LB-25

Cylinder Switch

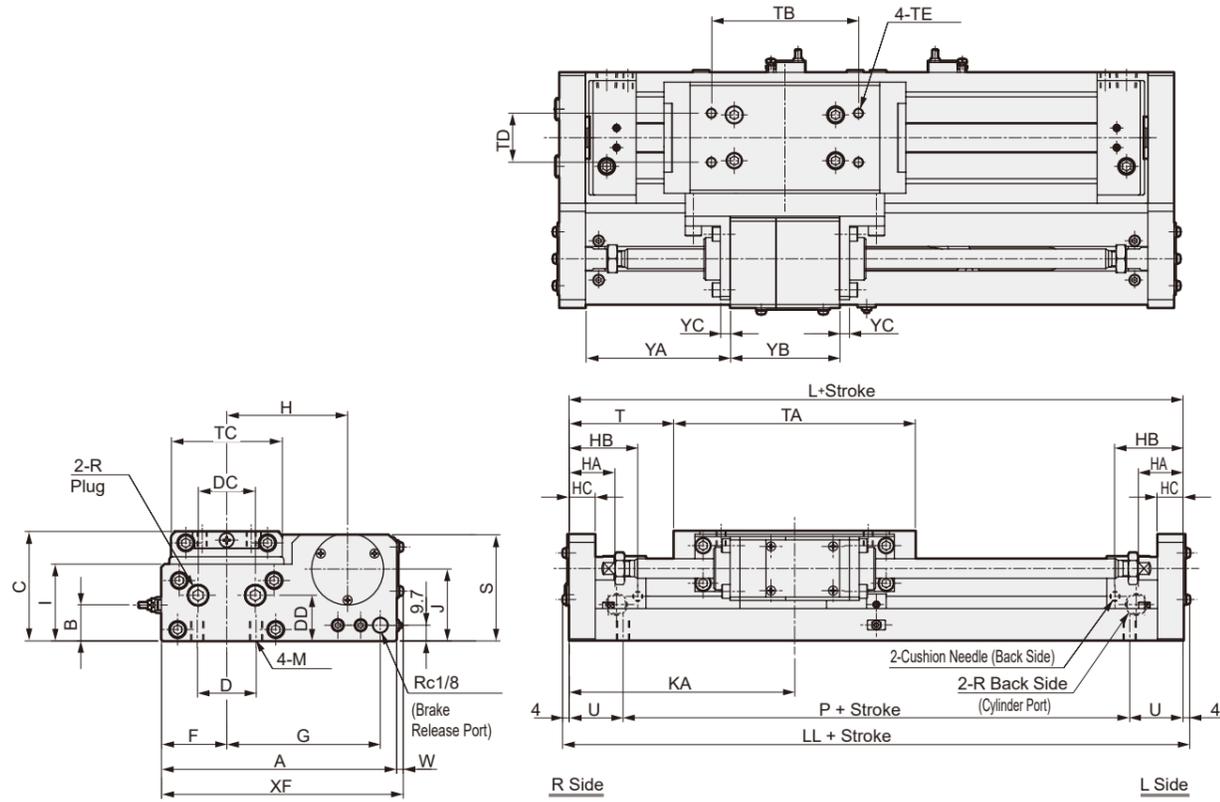
Ending



Dimensional Drawings (Bore Size: ø32 to ø63 Equivalent)

Basic Type (00)

- SRT3-00-32 to 63



Code	A	B	C	D	DC	DD	F	G	H	HA	HB	HC	I	J	KA	L	LL	M	P	R	S	T
ø32 Equivalent	129	18.5	57	32	27	21	33	87	66	24	37.5	14	39	39	127	254	262	M6 Depth 9	196	Rc 1/4	56	60
ø40 Equivalent	144	22	67	36	35	28	40	94	74	29	42	16	47	44	138	276	284	M8 Depth 12	210	Rc 1/4	65	64
ø50 Equivalent	177	28	82	45	35	35	48	102	89	33	51	18	57	52	147	294	302	M8 Depth 12	212	Rc 3/8	77	71
ø63 Equivalent	209	35	95	50	39	42	59	113	105	35	52	20	68	60	168	336	344	M10 Depth 15	258	Rc 3/8	93	84

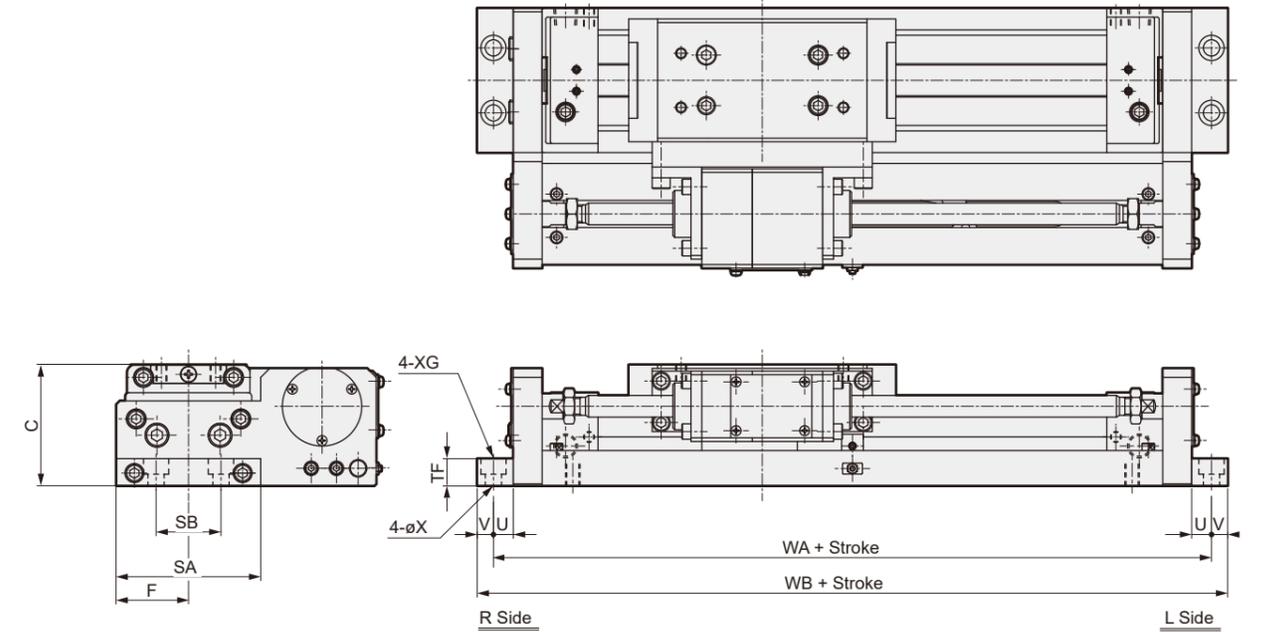
Code	TA	TB	TC	TD	TE	U	W	XF	YA	YB	YC
ø32 Equivalent	134	80	56	20	M6 Depth 7.5	29	4	133	78.5	69	6
ø40 Equivalent	148	90	68	30	M6 Depth 9	33	4	148	88.5	67	6
ø50 Equivalent	152	100	80	30	M8 Depth 10.5	41	4	181	92.5	73	8
ø63 Equivalent	168	110	102	40	M8 Depth 11.5	39	1	210	98.5	99	9

Note: For dimensions with each switch, refer to P. 190.

Dimensional Drawings (Bore Size: ø32 to ø63 Equivalent)

Axial Foot Type (LB)

- SRT3-LB-32 to 63



Code	Bore Size (mm)	C	F	Mounting Method							
				SA	SB	TF	U	V	WA	WB	X
ø32 Equivalent	57	33	64	32	12	9	11	272	294	7	-
ø40 Equivalent	67	40	80	36	15	11	9	298	316	9	14 Counterbore Depth 8.6
ø50 Equivalent	82	48	94	45	20	11	9	316	334	9	14 Counterbore Depth 8.6
ø63 Equivalent	95	59	116	50	25	13	12	362	386	11	17.5 Counterbore Depth 10.8

Note: For dimensions with each switch, refer to P. 190.

Rodless Type

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

Rodless Type

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

Cylinder Switch

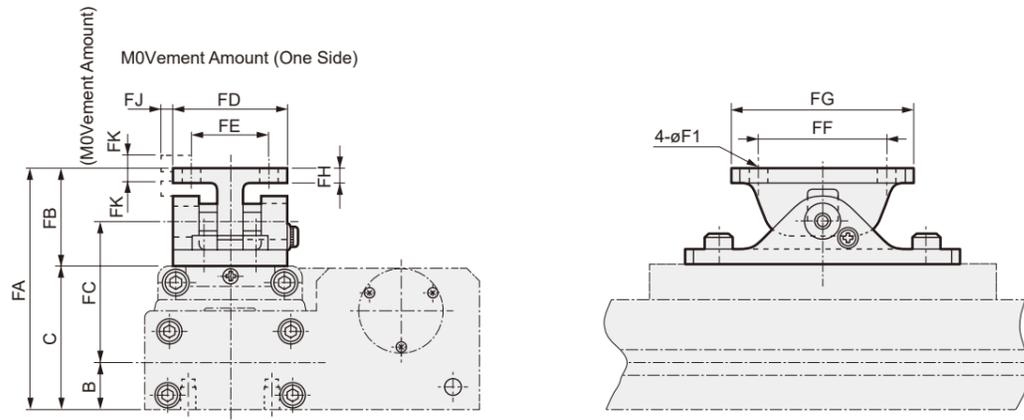
Ending

Cylinder Switch

Ending

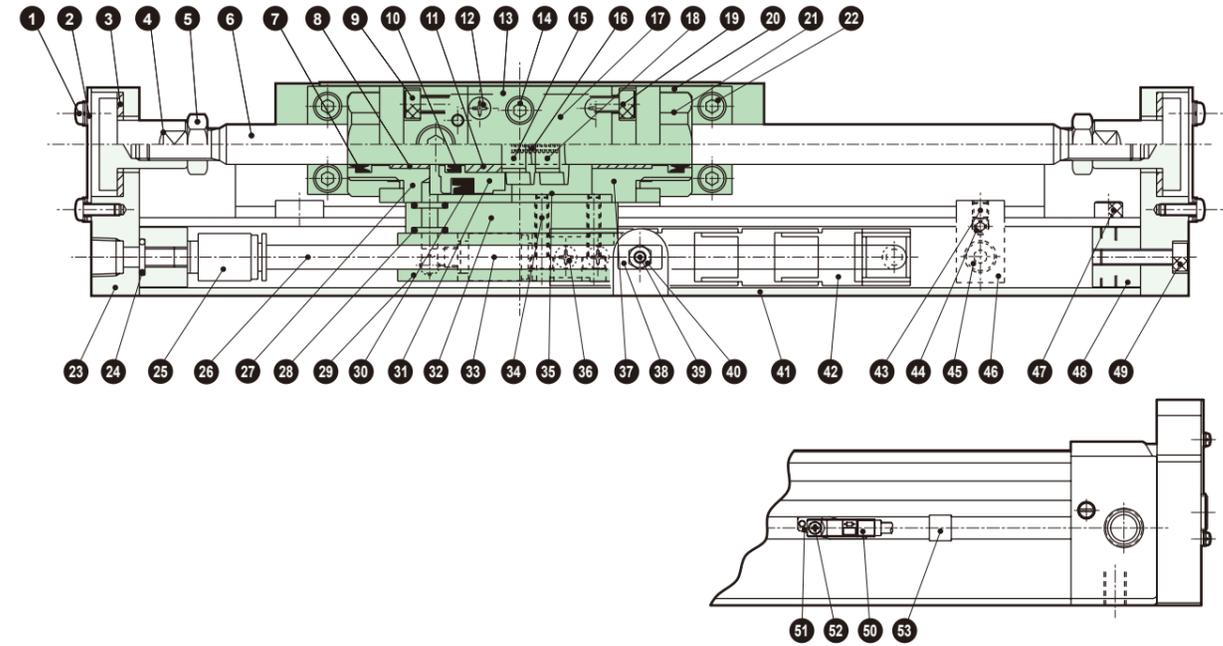
Dimensional Drawings with Option

● Floating Joint



Code	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	B	C
<b>Bore Size (mm)</b>													
ø12 Equivalent	54	21	31.5	24	16	30	40	3	3.4	3	3	10.5	33
ø16 Equivalent	58	21	34	24	16	30	40	3	3.4	3	3	12	37
ø20 Equivalent	67	25	39	30	20	40	56	4	4.5	3	3	14	42
ø25 Equivalent	78	25	47	30	20	40	56	4	6	3	3	17	53
ø32 Equivalent	95	38	55.5	45	30	50	70	6	7	5	5	18.5	57
ø40 Equivalent	105	38	62	45	30	50	70	6	7	5	5	22	67
ø50 Equivalent	126	44	73	60	40	70	90	8	9	5	5	28	82
ø63 Equivalent	139	44	79	60	40	70	90	8	9	5	5	35	95

Internal Structure and Materials



No.	Part Name	Material	Remarks	No.	Part Name	Material	Remarks
1	Pan Head Screw	Steel	Zinc Chromate	29	Adapter	Aluminum Alloy	Alumite
2	Joint Cover	Aluminum Alloy	Alumite	30	Piston Packing	Nitrile Rubber	
3	Slide Plate	Bearing Alloy		31	Release Piston	Aluminum Alloy	Alumite
4	Floating Joint	Steel	Manganese Phosphate	32	Spacer	Aluminum Alloy	Alumite
5	Hexagon Nut Type 3	Steel	Zinc Chromate	33	Push-in Fitting		
6	Brake Shaft	Steel	Industrial Chrome Plating	34	Hexagon Socket Head Cap Screw	Steel	Black Oxide
7	Rod Packing	Nitrile Rubber		35	Body B	Aluminum Alloy	Alumite
8	Bearing Bush	Bearing Alloy		36	Pan Head Screw	Steel	Zinc Chromate
9	Hexagon Socket Head Cap Screw	Steel	Black Oxide	37	Brake End Cover	Aluminum Alloy	Alumite
10	Rod Packing	Nitrile Rubber		38	Square Nut	Steel	Zinc Chromate
11	Bearing Bush	Oil Impregnated Bearing Alloy		39	Pan Head Screw	Steel	Zinc Chromate
12	Pan Head Screw	Steel	Zinc Chromate	40	Hexagon Nut Type 3	Steel	Zinc Chromate
13	Brake Mounting Base	Aluminum Alloy	Alumite	41	Cable Holder	Aluminum Alloy	Alumite
14	Hexagon Socket Head Cap Screw	Steel	Black Oxide	42	Cable Carrier	Special Resin	
15	Brake Plate A	Special Steel	Zinc Chromate	43	Hexagon Socket Set Screw	Steel	Black Oxide (ø12 to ø40 equivalent only)
16	Brake Spring	Steel	Black Oxide	44	Hexagon Socket Set Screw (ø12 to ø40 equivalent) Hexagon Socket Button Head Screw (ø50, ø63 equivalent)	Steel	Black Oxide
17	Cover	Aluminum Alloy	Alumite	45	Hexagon Socket Button Head Screw	Steel	Black Oxide
18	Brake Plate B	Special Steel	Zinc Chromate	46	Rail Stopper Plate	Steel	Zinc Chromate
19	Hexagon Socket Head Cap Screw	Steel	Black Oxide	47	Hexagon Socket Head Cap Screw	Steel	Black Oxide
20	Brake Mounting Foot	Steel	Zinc Chromate	48	Cable Holder Stopper	Aluminum Alloy	Alumite
21	Fixing Nut	Steel	Zinc Chromate	49	Hexagon Socket Head Cap Screw	Steel	Black Oxide
22	Hexagon Socket Head Cap Screw	Steel	Black Oxide				
23	End Face Flange	Aluminum Alloy	Alumite	<b>With Switch</b>			
24	Gasket	Nitrile Rubber		50	Switch		
25	Push-in Fitting			51	Mounting Bracket	Stainless Steel	
26	Tube	Polyamide		52	Cross-Recessed Pan Head Screw	Stainless Steel	
27	Body A	Aluminum Alloy	Alumite	53	Lead Wire Holder	Polyacetal	
28	Gasket	Nitrile Rubber					

For maintenance parts, please visit the CKD Equipment Product Site  
(<https://www.ckd.co.jp/kiki/en/>) → "model No." → Maintenance Parts.

Rodless Type

Rodless Type

SRL3

SRL3

SRG3

SRG3

SRM3

SRM3

SRT3

SRT3

MRL2

MRL2

MRG2

MRG2

SM-25

SM-25

Cylinder Switch

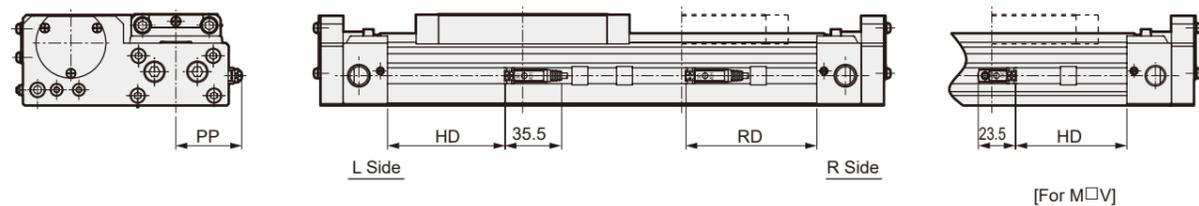
Cylinder Switch

Ending

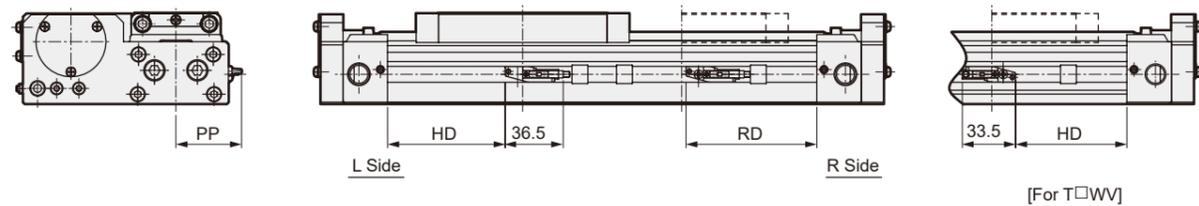
Ending

## SRT3 Series Switch External Dimensions Diagram

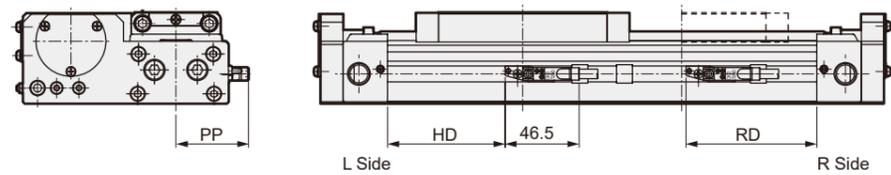
● M0H/V, M5H/V, M2H/V, M2WV, M3H/V, M3WV, M3PH/V



● T2WH/V, T3WH/V



● T2YD, T2YDT



Code	M□			T2W, T3W			T2YD(T)		
	PP	HD	RD	PP	HD	RD	PP	HD	RD
ø12 Equivalent	24.5	40.5	60.5	24.3	32	69	28.4	36	65
ø16 Equivalent	26.5	47	67	26.3	38	76	30.4	42	72
ø20 Equivalent	29.5	52.5	72.5	29.3	44	81	33.4	48	77
ø25 Equivalent	34.5	60	82	34.3	52	90	38.4	56	86
ø32 Equivalent	41.5	74	96	41.3	66	104	45.4	70	100
ø40 Equivalent	48.5	80	102	48.3	72	110	52.4	76	106
ø50 Equivalent	56.5	79	101	56.3	71	109	60.4	75	105
ø63 Equivalent	67.5	98	120	67.3	90	128	71.4	94	124

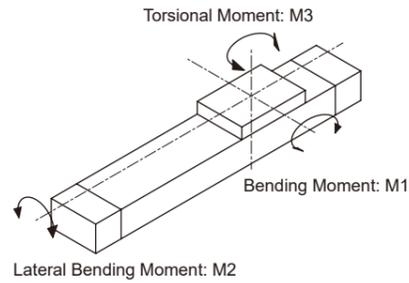
MEMO

Rodless Cylinder with Brake (SRT3) Model Selection Guide

[STEP1]

A moment acts depending on the cylinder mounting direction and the position of the center of gravity of the load.

Types of Moment Generated by Load



[Table 1] Value of a

Bore Size	a (m)
ø12 Equivalent	0.023
ø16 Equivalent	0.025
ø20 Equivalent	0.028
ø25 Equivalent	0.036
ø32 Equivalent	0.039
ø40 Equivalent	0.045
ø50 Equivalent	0.054
ø63 Equivalent	0.060

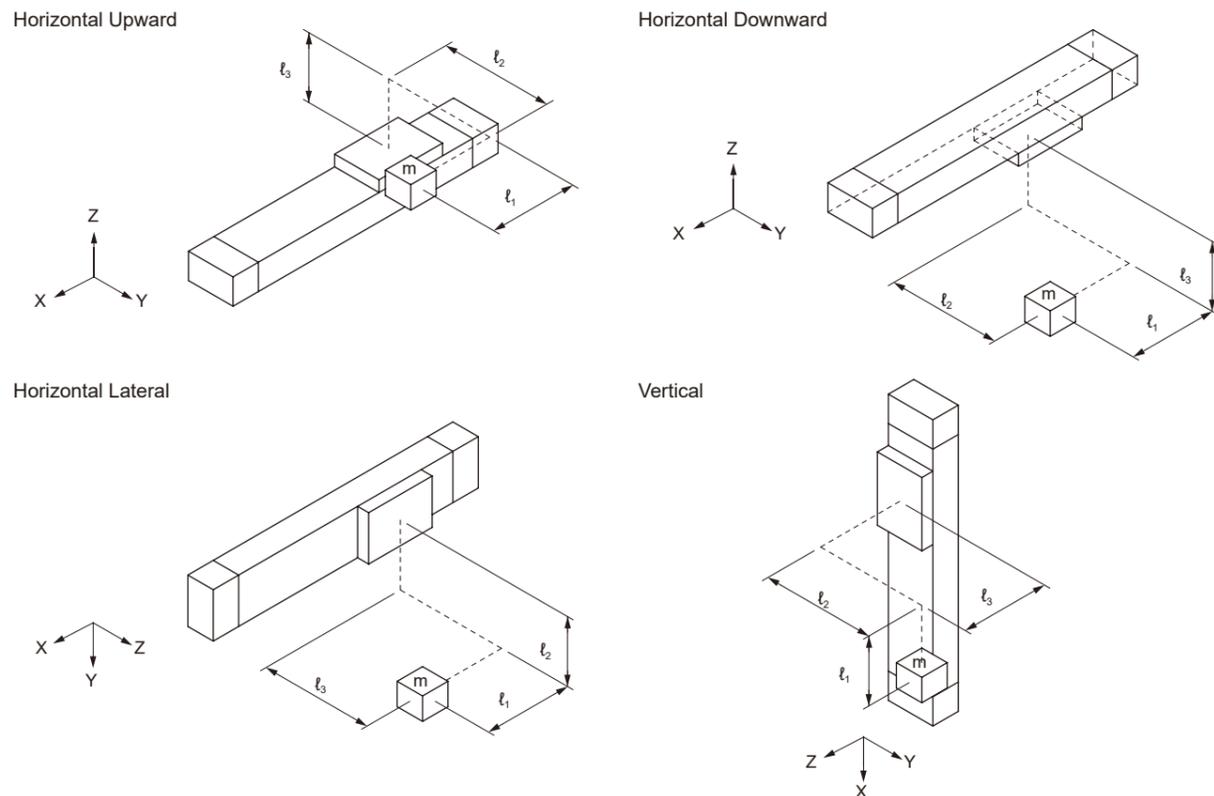


1 Determine the static moment.

Unit: N·m

Mounting Direction	Horizontal Upward	Horizontal Downward	Horizontal Lateral	Vertical
Vertical Load W	m x 9.8			-
Static Moment	M1	W x l <sub>1</sub>	W x l <sub>1</sub>	-
	M2	W x l <sub>2</sub>	W x l <sub>2</sub>	W x (l <sub>3</sub> + a)
	M3	-	-	W x l <sub>1</sub>

m : Load weight (kg)  
 l<sub>1</sub> : Stroke distance from the center of table to the center of gravity of load [m]  
 l<sub>2</sub> : Length in the width direction from the center of table to the center of gravity of load [m]  
 l<sub>3</sub> : Length in the vertical direction from the center of table to the center of gravity of load [m]



2 Determine the dynamic moment generated by the inertial force of the load at the stroke end.

Unit: N·m

Mounting Direction	Horizontal Upward	Horizontal Downward	Vertical	Horizontal Lateral
Dynamic Moment	M1i	W x (l <sub>3</sub> + a) x G		
	M2i	Dynamic moment M2i does not occur		
	M3i	W x l <sub>2</sub> x G		

Dynamic moment is calculated as above regardless of mounting direction.

The approximate value of G coefficient is obtained from Table 2.

[Table 2] Va (Average Speed) =  $\frac{\text{Moving Distance}}{\text{Moving Time}}$  (m/s)

Va (Average Speed) (m/s)	Vm (Stroke End Speed) (m/s)	G Coefficient
0.3	to 0.65	9
0.6	to 1.00	15
0.9	to 1.30	23
1.2	to 2.00	40

G Coefficient =

3 Select the approximate cylinder I.D.

Select the approximate cylinder I.D.

M1+M1i =  (N·m) → (ø )  
 M2 =  (N·m) → (ø )  
 M3+M3i =  (N·m) → (ø )  
 W =  (N) → (ø )  
 E' =  $\frac{1}{2} \times m \times Vm^2$  =  (J) → (ø )

Temporarily select the maximum Bore Size

ø

[Table 3] Allowable Values

Item	Wmax (N)	M1max (N·m)	M2max (N·m)	M3max (N·m)
ø12 Equivalent	30	1.5	0.6	0.6
ø16 Equivalent	140	5	1	1
ø20 Equivalent	200	10	1.5	3
ø25 Equivalent	360	17	5	10
ø32 Equivalent	620	36	10	21
ø40 Equivalent	970	77	23	26
ø50 Equivalent	1470	154	32	42
ø63 Equivalent	2320	275	52	76

[Table 4] Allowable Absorbed Energy (E<sub>0</sub>)

Bore Size (mm)	Built-in Air Cushion (J)
ø12 Equivalent	0.03
ø16 Equivalent	0.22
ø20 Equivalent	0.59
ø25 Equivalent	1.40
ø32 Equivalent	2.57
ø40 Equivalent	4.27
ø50 Equivalent	9.13
ø63 Equivalent	17.4

Note: Shock absorbers cannot be attached to SRT3. Kinetic Energy due to Load: If E' exceeds the allowable absorbed energy: E<sub>0</sub>, install an external buffer device.

4 Determine the combined moment at stroke end (M<sub>T</sub>).

(Confirm that the following formula is satisfied for the tube Bore Size selected in 3.)

$$M_T = \frac{M1 + M1_i}{M1_{max}} + \frac{M2}{M2_{max}} + \frac{M3 + M3_i}{M3_{max}} + \frac{W}{W_{max}} < 1$$

- M : Combined Moment (Condition is less than 1.)
- W<sub>max</sub> : Max allowable value of W (from Table 3)
- M1<sub>max</sub> : M1 Max allowable value (from Table 3)
- M2<sub>max</sub> : M2 Max allowable value (from Table 3)
- M3<sub>max</sub> : M3 Max allowable value (from Table 3)

- If M<sub>T</sub> greatly exceeds 1, change the selection conditions.
- If M<sub>T</sub> slightly exceeds 1, it may become 1 or less by improving accuracy in STEP 2. Proceed to STEP 2 and verify.

[STEP2]

Next, improve the accuracy of load factor, effective thrust, stroke end speed, and combined moment value.

● Determine the load factor.

$$\alpha = \frac{F_0}{F} \times 100 [\%]$$

α : Load Factor  
F<sub>0</sub>: Force required to move the workpiece (N)  
F : Cylinder Effective Thrust (N) (Fig 1 to 3)

Horizontal Operation	Vertical Operation
F <sub>0</sub> =F <sub>w</sub> + F <sub>1</sub> + F <sub>2</sub> + F <sub>3</sub> + F <sub>L</sub>	F <sub>0</sub> =W + F <sub>1</sub> + F <sub>2</sub> + F <sub>3</sub> + F <sub>L</sub>

- F<sub>w</sub>: W x 0.2 (N)
- F<sub>1</sub>: M<sub>1</sub> x C<sub>1</sub> (N)
- F<sub>2</sub>: M<sub>2</sub> x C<sub>2</sub> (N)
- F<sub>3</sub>: M<sub>3</sub> x C<sub>3</sub> (N)
- F<sub>L</sub>: Other resistance (Guide resistance, etc.) (N)
- W : Load (N)

Note: Coefficient to correct the increase in friction force generated when moment is applied

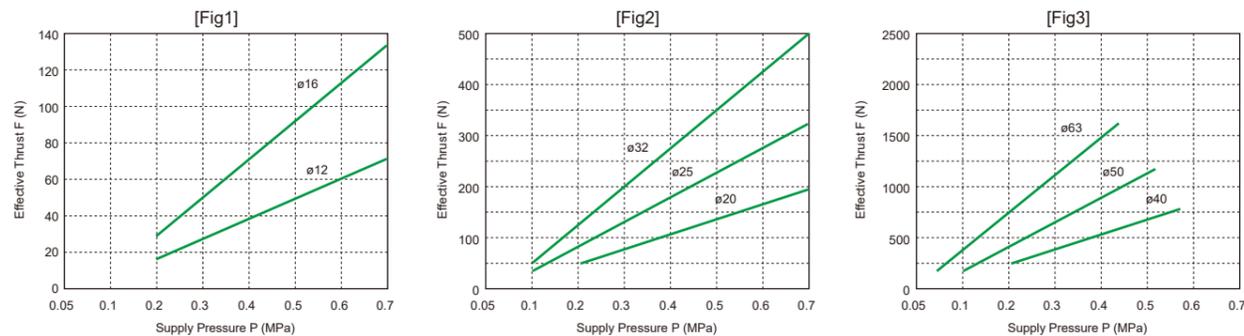
[Table 5] Friction Coefficient by Each Moment 1/m

Bore Size (mm)	C1	C2	C3
ø12 Equivalent	8	27	8
ø16 Equivalent	7	24	7
ø20 Equivalent	6	21	6
ø25 Equivalent	5	16	5
ø32 Equivalent	4	13	4
ø40 Equivalent	4	11	4
ø50 Equivalent	4	9	4
ø63 Equivalent	3	8	3

[Table 6] Guideline for Load Factor

Operating Pressure (MPa)	Load Factor (%)
0.2 to 0.3	α≤40
0.3 to 0.6	α≤50
0.6 to 0.7	α≤60

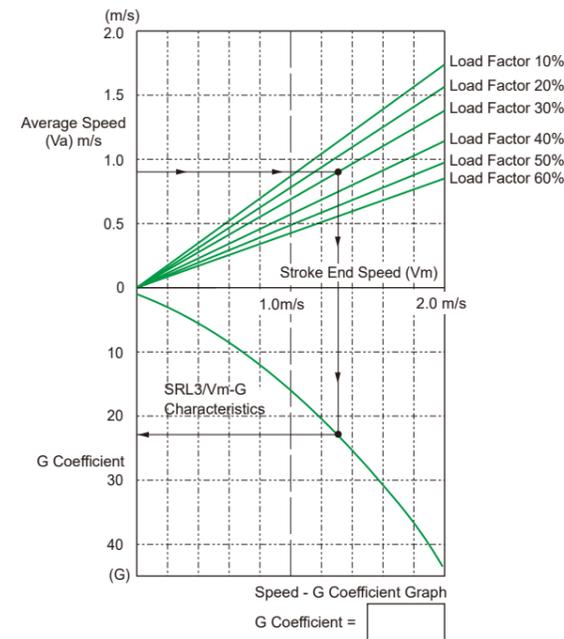
● Graph for Determining Effective Thrust



[STEP3]

Obtain the stroke end speed (V<sub>m</sub>) from <Fig. 3> using the average speed (V<sub>a</sub>) and the load factor obtained in STEP 2, and further obtain the G coefficient.

● Speed - G Coefficient Graph <Fig. 3>



- The arrow (->) in the figure shows an example of obtaining
  - Average Speed : 0.9 m/s
  - Load Factor : 30%
  - at
  - Stroke End Speed : 1.3 m/s
  - G Coefficient : 22.5

[STEP4]

● Check the combined moment (M<sub>T</sub>) with the G coefficient obtained from STEP 3.

$$M1 + M1_i = \text{[ ] (N·m)}$$

$$M2 = \text{[ ] (N·m)}$$

$$M3 + M3_i = \text{[ ] (N·m)}$$

$$W = \text{[ ] (N)}$$

$$M_T = \frac{M1 + M1_i}{M1_{max}} + \frac{M2}{M2_{max}} + \frac{M3 + M3_i}{M3_{max}} + \frac{W}{W_{max}}$$

- M<sub>T</sub> ≤ 1**
- ↓
- Bore Size Determined** (\*Refer to [Table 3] in STEP 1)
- ↓
- Check Cushion Capacity**

Mounting Direction	Horizontal Upward	Horizontal Downward	Vertical	Horizontal Lateral
	M1i	W x (l <sub>3</sub> + a) x G		
M2i	Dynamic moment M2i does not occur			
M3i	W x l <sub>2</sub> x G			

Unit: N·m  
It is the same formula as STEP 1, but this time calculate using the G coefficient value obtained in STEP 3.

Rodless Type

Rodless Type

SRL3

SRL3

SRG3

SRG3

SRM3

SRM3

SRT3

SRT3

MRL2

MRL2

MRG2

MRG2

SM-25

SM-25

Cylinder Switch

Cylinder Switch

Ending

Ending

## [STEP5]

### ● Confirmation of Cushion Capacity

$$E = \frac{1}{2} \times m \times V_m^2$$

E : Kinetic Energy at Stroke End (J)  
 m : Load Weight (kg)  
 V<sub>m</sub>: Piston Cushion Entry Speed (m/s)

[Table 7] Allowable Absorbed Energy (E<sub>0</sub>)

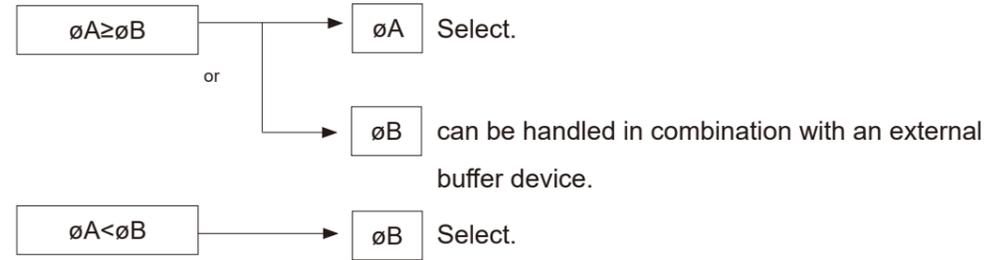
Bore Size (mm)	Built-in Air Cushion (J)
ø12 Equivalent	0.03
ø16 Equivalent	0.22
ø20 Equivalent	0.59
ø25 Equivalent	1.40
ø32 Equivalent	2.57
ø40 Equivalent	4.27
ø50 Equivalent	9.13
ø63 Equivalent	17.4

Note: Shock absorbers cannot be attached to SRT3. Kinetic Energy at Stroke End: If E exceeds the allowable absorbed energy: E<sub>0</sub>, install an external buffer device.

## [STEP6]

● Let the Bore Size determined by cushion capacity be  $\phi A$ . (Bore Size determined from STEP 5)

● The Bore Size determined from the load conditions is  $\phi B$ . (Bore Size determined from STEP 4)



## MEMO



# For Safe Use of This Product

Please read before use. Check P. 41 at the beginning for general cylinders and P. 1512 for cylinder switches.

### Specific Precautions: Rodless Cylinder with Brake SRT3 Series

#### Design / Selection

#### WARNING

■ Structure so that the human body does not directly touch the driven object and the moving parts of the cylinder with brake.

Install a protective cover so that the human body cannot touch it directly. Or, if there is a risk of touching, provide a sensor etc. to make a safe structure such as emergency stop before touching or sounding a warning sound to notify danger.

■ Use a balance circuit that considers the cylinder shooting out.

If the brake is operated at an arbitrary position during the stroke such as intermediate stop, and air pressure is applied to only one side of the cylinder, the piston will shoot out at high speed when the brake is released. In such a case, there is a risk of causing injury to the human body such as pinching hands and feet, and causing damage to the machine, so use a balance circuit like the recommended pneumatic circuit to prevent shooting out.

■ The Rodless cylinder with brake is a lubrication-free specification, so absolutely do not lubricate it. It causes brake malfunction.

■ Please note that holding force is the ability to hold a static load without vibration or shock after the brake is activated under no load.

Therefore, please be careful when using near the upper limit of the holding force at all times.

■ Do not apply impact load, strong vibration, or rotational force when the brake is operating.

If impact load, strong vibration, or rotational force is applied from the outside, the holding force will decrease and it is dangerous, so please be careful.

■ When performing intermediate stop, consider the stopping accuracy and overrun amount.

Because it is a mechanical lock, it does not stop instantly in response to the stop signal, but stops with a time delay. The stroke that slides due to this delay is the overrun amount. And the range between the maximum and minimum overrun amount is the stopping accuracy.

- Place the limit switch in front of the desired stop position by the overrun amount.
- The limit switch requires a detection length (dog length) of the overrun amount + α.
- In the case of our cylinder switch, the operating range is 7 to 16 mm (depending on the switch model). If the overrun amount exceeds this, perform self-holding of the contact on the switch load side.

■ Do not use multiple cylinders with brakes in synchronization. If synchronization is lost, excessive moment load or load concentration may occur on the cylinder where the brake worked first, causing brake release failure, reduced life, damage, etc.

■ To further improve stopping accuracy, shorten the time from the stop signal until the brake operates and stops as much as possible.

To do so, use a DC type control electric circuit and valve with good response, and place the valve and cylinder as close as possible.

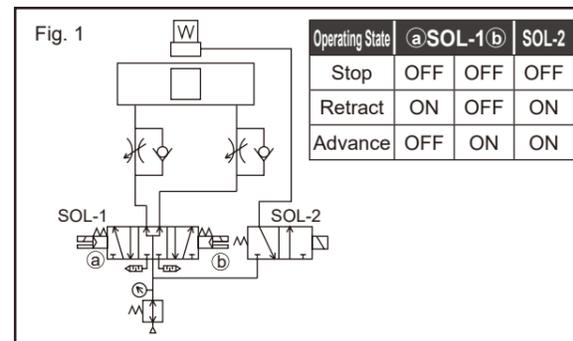
■ Please note that stopping accuracy is affected by changes in piston speed.

If the piston speed changes due to load fluctuation or disturbance during the reciprocating stroke of the cylinder, the dispersion of the stop position will increase, so consider keeping the piston speed constant immediately before the stop position. Also, during the cushion stroke and while in the acceleration range from the start of operation, the speed change is large, so the dispersion of the stop position becomes large. The stopping accuracy at piston speed 300 mm/s with no load is +/- 1.5 mm (reference value).

#### Precautions for Basic Circuit

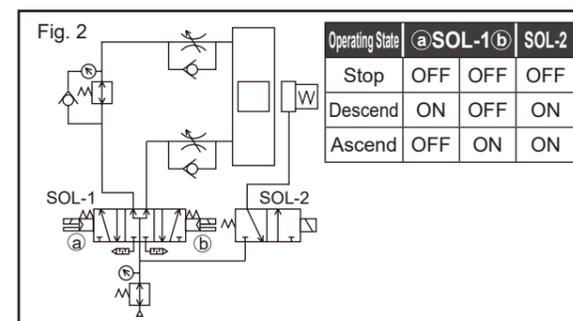
##### ● For Horizontal Load

Please pipe as shown in Fig. 1 for use. In the case of a rodless cylinder, the cross-sectional areas on both sides of the piston are equal, so a pressure reducing valve for balancing is not necessary.



##### ● For Vertical Load

If the load is downward as shown in Fig. 2, the table will malfunction in the Load Direction when the brake is released, so install a pressure reducing valve with check valve on the upper side to reduce the thrust in the Load Direction and balance the load.



Note: If pressure fluctuation occurs due to other Pneumatic Component, install a dedicated pressure reducing valve to stabilize operation.

■ When releasing the brake, make sure to release the brake earlier than the cylinder operation. If the cylinder operation is faster, the brake may not release.

■ If back pressure is applied during locking, the lock may be released, so use a single valve or an individual exhaust type manifold for the brake release valve.

■ To prevent the piston from shooting out at startup, be sure to use a 3-position PAB connection (both-side pressurization) valve for cylinder drive.

■ To balance the thrust including the load, be sure to insert a pressure reducing valve with check valve on the side with larger thrust.

#### CAUTION

■ Cannot be used in environments where welding spatter etc. falls on the cylinder.

■ Cannot be used in places where cutting oil, coolant fluid, oil mist, etc. come directly into contact with the cylinder.

If it is unavoidable due to cylinder installation, be sure to provide a cover etc. to protect the cylinder.

■ Cannot be used in environments where foreign matter such as chips, dust, dirt, spatter, etc. come directly into contact with the cylinder or fly around.

If it is unavoidable due to cylinder installation, provide a cover etc. so that it can be protected. Also, be sure to consult us when using in such an environment.

■ Slit type rodless cylinders represented by SRL3 structurally have external air leakage at a level that does not affect speed control.

■ Be careful not to generate negative pressure inside the cylinder tube. When used as an air balancer or when the table is driven by external force, inertial force, etc. with all ports blocked, negative pressure may be generated in the cylinder, causing the seal belt to detach and air leakage to occur. Be careful not to generate negative pressure in the cylinder by driving with external force, inertial force, etc.

#### Precautions Regarding Stopping Accuracy

##### ● Stop Pitch and Load Factor

Stopping accuracy varies depending on stop pitch and load factor. The load factors in the table below are recommended to obtain the specified stopping accuracy.

Stop Pitch	Load Factor
50 mm or less	20% of Thrust
50 mm to 100 mm	40% of Thrust
100 mm or more	60% of Thrust

##### ● Selection of Brake Valve

Stopping accuracy and overrun amount vary depending on the response of the brake valve. Also, connect the valve directly to the brake port to improve stopping accuracy.

##### ● When Using PC (Programmable Controller)

If a PC (Programmable Controller) is used for the electric control device of the brake valve, the stopping accuracy will deteriorate due to the scan time (calculation processing time). When using a PC, do not incorporate only the brake valve into the PC circuit.

■ Do not change the load weight significantly when the brake is stopped. The stop position may change.

■ Abrasion powder with the protective tape may be generated when the cable carrier slides. Please consider the usage environment.

Rodless Type

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

Cylinder Switch

Ending

Rodless Type

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

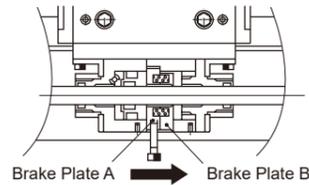
Cylinder Switch

Ending

During Use

**WARNING**

- How to release the brake manually



- Remove the cover, screw a Hexagon Socket Head Cap Screw etc. into the brake plate A and tilt it in the direction of the arrow to make the brake plates A and B parallel, and the Piston Rod becomes free. Please note that unless the two brake plates are securely tilted, release will be in one direction only.

- The brake can be released by manual release operation or by pressurizing air to the brake release port. When installing a load, if the brake is released by this operation, the load may fall, so be sure to return the manual release operation to the initial state, or confirm that the brake works with no air in the brake release port before installation.

- Do not apply force exceeding the brake holding force listed in the catalog to the cylinder.

- If the cylinder speed is fast, the length of the detection dog must take into account the response time of the relay. Please note that if the dog length is short, the stop signal will not be output and it will not stop.

- During equipment maintenance, for safety, please take separate measures to prevent the load from falling due to its own weight.

- Never disassemble and inspect the brake part as it is dangerous when reused.

- The required amount of grease is applied to the brake part, so avoid applying more grease and do not wipe off the grease.

- The brake part cannot be replaced.

- Please always use with the dust cover attached except during manual release, as it may cause a malfunction.

**CAUTION**

- Do not apply strong impact or excessive moment to the table.

- Perform sufficient alignment when connecting to a load that has an external guide mechanism.

- The longer the stroke, the larger the variation in the axis center, so please consider a connection method (floating) that can absorb the displacement amount.

- Adjust the air balance of the cylinder.

With the brake released, attach the load to the cylinder and balance the load by adjusting the air pressure on the rod side and head side of the cylinder. By ensuring this load balance, it is possible to prevent malfunctions such as cylinder shooting out when releasing the brake and brake not releasing normally.

- Adjust the mounting position of the detection part such as the cylinder switch.

When performing intermediate stop, adjust the mounting position of the detection part such as the cylinder switch considering the overrun amount with respect to the desired stop position.

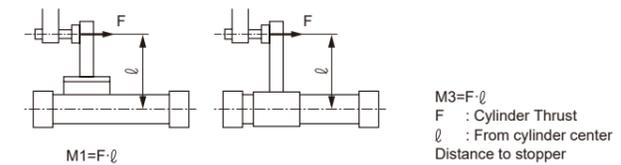
- Load fluctuation during the reciprocating stroke of the cylinder causes changes in piston speed, and changes in piston speed increase the dispersion of the stop position. Adjust the mounting so that there is no load fluctuation during the cylinder reciprocating stroke, especially immediately before stopping.

- During the cushion stroke and while in the acceleration range from the start of operation, the speed change is large, so the dispersion of the stop position becomes large. Therefore, please note that if step operation with a short stroke from the start of operation to the next position is performed, the accuracy in the specification column may not be achieved.

- Abrasion powder with the protective tape may be generated when the cable carrier slides. Please be careful when using in an environment that dislikes dust.

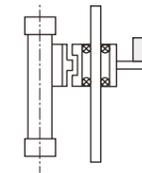
- Ensure that the moment including the inertial force generated during load movement or stopping does not exceed the allowable load. If this value is exceeded, damage will occur.

- When the overhang is large and stopping at both ends with the piston, a bending moment acts due to the inertial force of the load even if it is within the range of the internal cushion's absorbed energy. When kinetic energy is large and an external cushion etc. is used, please hit the workpiece center of gravity as much as possible.
- When an external stopper is used, please select taking into account the bending moment due to cylinder thrust.
- Moment acting when stopped by an external stopper



- When an external guide is attached, if it is not aligned, the movement will not be smooth, and at the same time, the resistance due to twisting will act as a moment, so structure the connection part to absorb misalignment.

- Example of using guide



- Avoid electric welding after installing the rodless cylinder. Current flows through the cylinder, causing sparks between the dust proof belt and the cylinder tube, damaging the dust proof belt.

- Operating a unit with excessive inertia will cause damage to the Cylinder Body and malfunction, so be sure to use it within the allowable range.

- Do not make scratches, dents, etc. on the Cylinder Body. It causes malfunction.

- Please note that in usage conditions where negative pressure is generated in the cylinder due to external force, inertial force, etc., external air leakage and malfunction may occur due to detachment of the seal belt.

- Please treat our shock absorber as a consumable part. Replace it when a decrease in energy absorption capacity is observed or when operation is no longer smooth.

- If the air supply piping is thin or long, the stopping accuracy will deteriorate, so please consider this sufficiently.

- If the cylinder has been stopped for a long time, such as first thing in the morning or afternoon, the frictional resistance increases and the piston speed changes, so the stopping accuracy may deteriorate. Perform a break-in operation to obtain stable stopping accuracy.

For precautions during installation, adjustment, use, and maintenance, please refer to "During Use" in this catalog and the Instruction Manual on the CKD Component Product Site (<https://www.ckd.co.jp/kiki/en/>) -> "Model Number".

Rodless Type

Rodless Type

SRL3

SRL3

SRG3

SRG3

SRM3

SRM3

SRT3

SRT3

MRL2

MRL2

MRG2

MRG2

SM-25

SM-25

Cylinder Switch

Cylinder Switch

Ending

Ending