Model Selection

Fn: Allowable driving force (N)
Pv: Maximum operating pressure for vertical operation (MPa)
Wʙmax: Maximum connection fitting mass (kg)
Wv: Allowable load mass for vertical operation (kg)

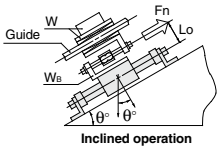
Operating Conditions

- W: Load mass (kg)
- Wʙ: Connection fitting mass (kg)
- μ: Guide's coefficient of friction
- Lo: Distance from cylinder shaft center to workpiece point of application (cm)
- Mode of operation (horizontal, inclined, vertical)
- P: Operating pressure (MPa)
- U: Maximum speed (mm/s)
- Stroke (mm)

Mode of operation

- **Horizontal operation**
- **Inclined operation**
- **Vertical operation**

Review of load mass and operating pressure



Inclined operation

First tentative bore size determination

- Horizontal: $\varnothing D \geq 1.6 \times \sqrt{\frac{F_1}{P}}$
- Inclined: $\varnothing D \geq 1.6 \times \sqrt{\frac{F_2}{P}}$
- Vertical: $\varnothing D \geq 1.6 \times \sqrt{\frac{F_3}{P}}$

Allowable Driving Force (Fn) (n = 1, 2, 3)

Horizontal	$F_1 = \mu \times (W + W_B) \times 9.8$
Inclined	$F_2 = (W + W_B) \times 9.8 \times (\mu\cos\theta + \sin\theta)$
Vertical	$F_3 = (W + W_B) \times 9.8 \times (\mu + 1)$

For the (Fn) of data (A), refer to the allowable driving force table.

Determination of allowable load mass & pressure

- $W + W_B \leq W_V$, $P \leq P_V$
- $W + W_B > W_V$, $P > P_V$

(For vertical operation, refer to page 24.)

Determination of connection fitting mass (Wʙ)

(For connection fitting mass, refer to page 24.)

$W_B > W_{Bmax}$ **Review of connection fitting**

$W_B \leq W_{Bmax}$

(Refer to data (A) on page 23.)

Second tentative determination of bore size using the graph of allowable driving force (Fn) and distance from cylinder shaft center (Lo)

(Refer to data (B) on page 23.)

Third tentative determination of bore size from the graph of maximum speed (U) and load mass (W).

(Bore size is the largest of 3 tentative determinations.)

Bore size determination

Note)
Consider Made-to-Order products, depending on an operating condition.

(Refer to page 25.)

Model selected

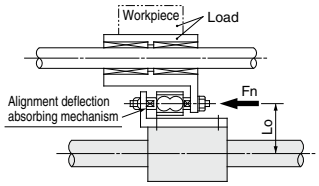
Note) Made-to-Order products should be considered, too, depending on an operating environment, etc.

Caution on Design 1

Selection Method

Selection Procedures

1. Find the drive resisting force Fn (N) when moving the load horizontally.
2. Find the distance Lo (cm) from the point of the load where driving force is applied, to the center of the cylinder shaft.
3. Select a bore size from Lo and Fn in Data (A).



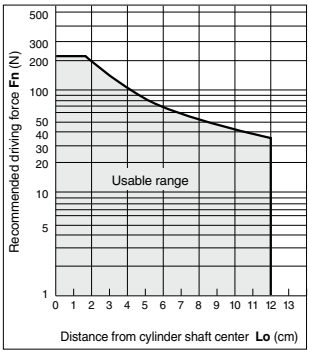
Selection Example

Given a load drive resisting force of Fn = 100 (N) and a distance from the cylinder shaft center to the load application point of Lo = 8 cm, find the intersection point by extending upward from the horizontal axis of data (A) where the distance from the shaft center is 8 cm, and then extending to the side, find the allowable driving force on the vertical axis. Models suitable to satisfy the requirement of 100 (N) are **REA32** or **REA40**.

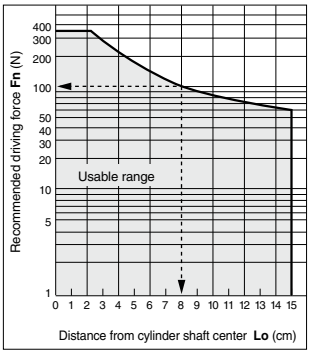
* Distance from cylinder shaft center, Lo, is the moment working point between the cylinder and the load.

<Data (A): Distance from Cylinder Shaft Center——Allowable Driving Capacity>

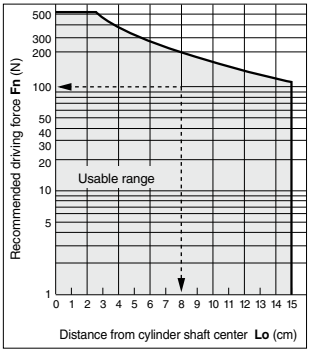
ø25



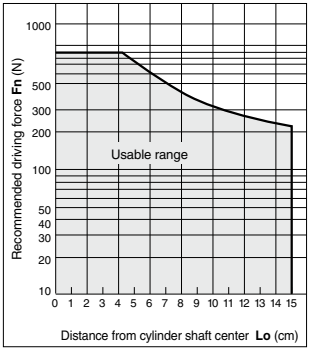
ø32



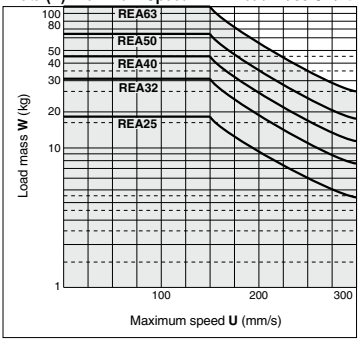
ø40



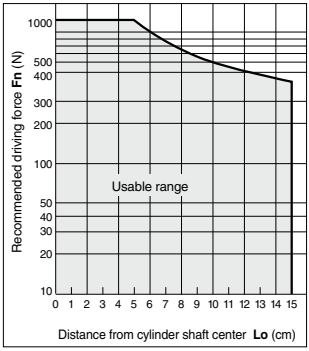
ø50



<Data (B): Maximum Speed——Load Mass Chart>



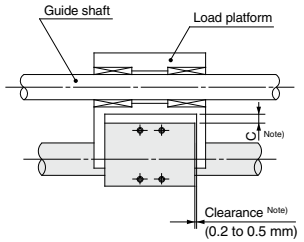
ø63



Caution on Design 2

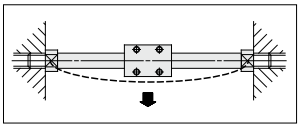
Cylinder Self-weight Deflection

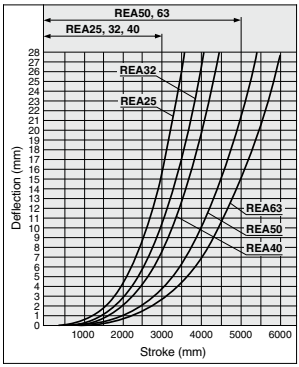
When the cylinder is mounted horizontally, deflection appears due to its own weight as shown in the data, and the longer the stroke the greater the amount of variation in the shaft centers. A connection method as shown in the figure should be considered to allow for this deflection.



The above clearance is for reference.

Note) Referring to the self-weight deflection in the graph below, provide clearance so that the cylinder does not touch the mounting surface or the load section, and is able to operate smoothly within the minimum operating pressure range for a full stroke.





∗ The above deflection data indicate values for external movement within the stroke.

Max. Connection Fitting Mass

REA (Basic type) is not directly connected to the load, and is guided by another shaft (LM guide, etc.). Load connection fittings should be designed so that they do not exceed the mass given in the table below.

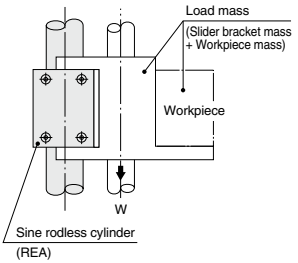
Maximum Connection Fitting Mass Wbmax (kg)

Model	Maximum load (kg)
REA25	1.2
REA32	1.5
REA40	2.0
REA50	2.5
REA63	3.0

∗ When loading the mass exceeding the above values, please consult with SMC.

Vertical Operation

The load should be guided by a ball type bearing (Linear guide, etc.). If a slide bearing is used, sliding resistance increases due to the load mass and load moment, which can cause malfunction.
When the cylinder is mounted vertically or sidelong, sliders may move downwards due to the self-weight or workpiece mass. If an accurate stopping position is required at the stroke end or the middle-stroke, use an external stopper to secure accurate positioning.



Model	Allowable load mass **Wv** (kg)	Maximum operating pressure **Pv** (MPa)
REA25	18.5	0.65
REA32	30.0	0.65
REA40	47.0	0.65
REA50	75.0	0.65
REA63	115.0	0.65

Note) Use caution, since the magnetic coupling may be dislocated if it is used over the maximum operating pressure.

Intermediate Stop

The cushion effect (smooth start-up, soft stop) exists only before the stroke end in the stroke ranges indicated in the table below.
The cushion effect (smooth start-up, soft stop) cannot be obtained in an intermediate stop or a return from an intermediate stop using an external stopper, etc.

Cushion Stroke

Model	Stroke (mm)
REA25	30
REA32	30
REA40	35
REA50	40
REA63	40

Sine Rodless Cylinder/Basic Type

REA Series

ø25, ø32, ø40, ø50, ø63

How to Order

Basic type **REA** **25** **□** – **300** – **□**

- **Sine rodless cylinder (Basic type)**
- **Bore size**

25	25 mm
32	32 mm
40	40 mm
50	50 mm
63	63 mm

- **Port thread type**

Symbol	Type	Bore size
Nil	Rc	25, 32, 40
TN	NPT	50, 63
TF	G	32, 50, 63

- **Stroke (mm)** Refer to "Standard Stroke" below.
- **Made to Order** Refer to the table below for details.

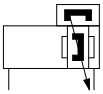
Specifications

Bore size (mm)	25	32	40	50	63
Fluid	Air				
Proof pressure	1.05 MPa				
Maximum operating pressure	0.7 MPa				
Minimum operating pressure	0.18 MPa				
Ambient and fluid temperature	–10 to 60°C (No freezing)				
Piston speed (Max.) Note)	50 to 300 mm/s				
Lubrication	Not required (Non-lube)				
Stroke length tolerance (mm)	0 to 250 st: $^{+1}_{0}$, 251 to 100 st: $^{+1.4}_{0}$, 1001 st or longer: $^{+1.8}_{0}$				
Holding force (N)	363	588	922	1,470	2,260

Note) Piston speed above indicates the maximum speed. It takes approximately 0.5 seconds (for one side) after the body moves from the stroke end until it goes through the cushion stroke, while it takes approximately 1 second for both sides.

Symbol

Air cushion (Magnet type)



Made to Order: Individual Specifications (For details, refer to pages 111 and 112.)

Symbol	Specifications
-X168	Helical insert thread specifications
-X206	Additional moving element mounting taps
-X210	Non-lubricated exterior specifications
-X324	Non-lubricated exterior specifications with dust seal

Made to Order Specifications

Click here for details

Symbol	Specifications
-XB11	Long stroke type
-XC24	With magnet shielding plate
-XC57	With floating joint

Refer to the "Pneumatic Clean Series" (CAT.E02-23) catalog for clean room specifications.

Standard Stroke

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke (mm)
25	200, 250, 300, 350, 400, 450, 500, 600, 700, 800	3000
32	200, 250, 300, 350, 400, 450, 500, 600, 700, 800	
40	200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000	
50	200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000	5000
63	200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000	

Note 1) Intermediate stroke is available in 1 mm increments.
Note 2) Strokes over 2000 mm are available as made-to-order. (Refer to -XB11.)

Weight

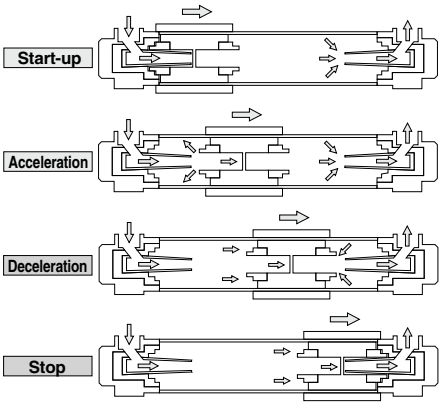
(kg)

Bore size (mm)	25	32	40	50	63
Basic weight	0.65	1.16	1.96	3.04	4.57
Additional weight per each 50 mm of stroke	0.023	0.033	0.04	0.077	0.096

Calculation: (Example) **REA32-500**
- Basic weight ·····1.16 (kg)
- Additional weight ····0.033 (kg/50 st)
- Cylinder stroke ·····500 (st)

1.16 + 0.033 x 500 ÷ 50 = 1.49 kg

Working principle



Start-up/Acceleration

The driving air from the cylinder port passes through the inside of the cushion ring, and flows into the left chamber of the drive piston from the clearance between the cushion seal and the U-shaped groove in the outer surface of the cushion ring. Further, the exhaust air in the right chamber of the drive piston passes from inside the hollow cushion ring through the cylinder port and is released to the atmosphere by the drive solenoid valve.

When the differential pressure (thrust) generated on either side of the drive piston becomes larger than the starting resistance of the machinery, the drive piston begins to move to the right. As the drive piston moves to the right, the U-shaped groove in the outer surface of the cushion ring gradually becomes deeper, a flow corresponding to the drive speed of the drive piston flows into the left chamber of the drive piston, and the drive piston proceeds to accelerate. The U-shaped groove is machined into the cushion ring in such a way that this acceleration process can proceed smoothly (as a sine function).

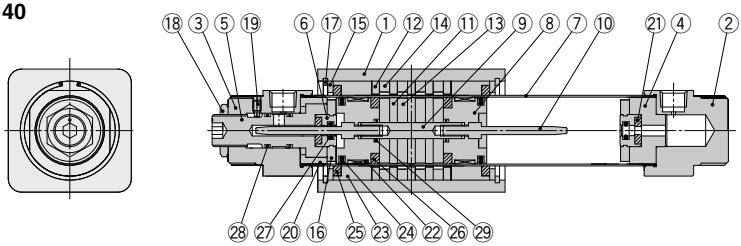
Deceleration/Stop

In current cushion mechanisms, when the cushion seal installed on the drive piston is pushed into the cushion ring at the right stroke end, the drive piston's right chamber is pressurized and a sudden braking force is generated.

However, in a sine rodless cylinder, due to the U-shaped groove provided on the outer surface of the cushion ring, whose depth changes as a sine function, a large quantity of the air in the cushion chamber is discharged when the cushion seal is pushed in, and a sudden braking force is not generated. With the progression of the cushion stroke, the discharge flow from the cushion chamber is restricted, and therefore, a soft stop is achieved at the stroke end.

Construction

ø25, ø32, ø40



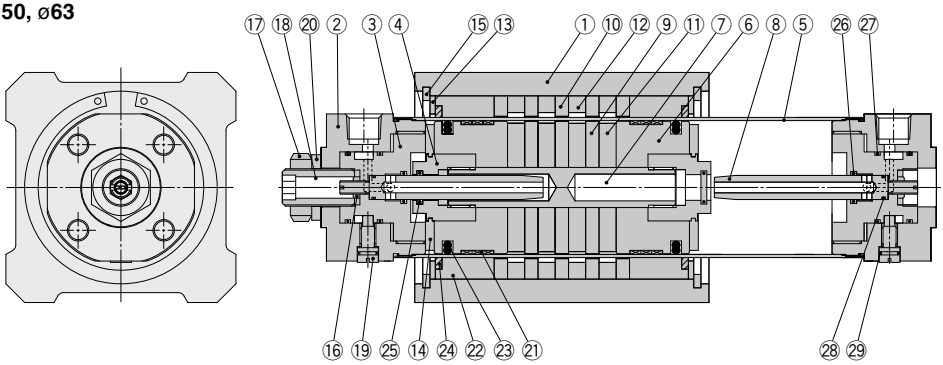
Component Parts

No.	Description	Material	Note
1	**Body**	Aluminum alloy	
2	**Head cover**	Aluminum alloy	
3	**Head cover A**	Aluminum alloy	
4	**End collar**	Aluminum alloy	
5	**End collar A**	Aluminum alloy	
6	**Cushion seal holder**	Aluminum alloy	
7	**Cylinder tube**	Stainless steel	
8	**Piston**	Aluminum alloy	
9	**Shaft**	Stainless steel	
10	**Cushion ring**	Copper alloy	ø25 is stainless steel
11	**Piston side yoke**	Rolled steel plate	
12	**External slider side yoke**	Rolled steel plate	
13	**Magnet A**	—	
14	**Magnet B**	—	
15	**Spacer**	Aluminum alloy	

Component Parts

No.	Description	Material	Note
16	**Bumper**	Urethane rubber	
17	**Retaining ring**	Carbon tool steel	
18	**Lock nut**	Copper alloy	
19	**Hexagon socket head set screw**	Chromium steel	
20	**Tube holder**	Aluminum alloy	
21	**Lube-retainer C**	Special resin	
22	**Wear ring A**	Special resin	
23	**Wear ring B**	Special resin	
24	**Piston seal**	NBR	
25	**Lube-retainer B**	Special resin	
26	**Lube-retainer A**	Special resin	
27	**Cushion seal**	NBR	
28	**O-ring**	NBR	
29	**O-ring**	NBR	

ø50, ø63



Component Parts

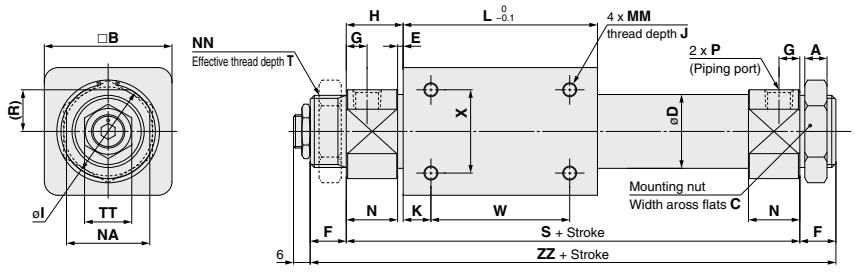
No.	Description	Material	Note
1	**Body**	Aluminum alloy	
2	**Head cover**	Aluminum alloy	
3	**Cushion ring holder**	Aluminum alloy	
4	**Cushion seal holder**	Aluminum alloy	
5	**Cylinder tube**	Stainless steel	
6	**Piston**	Aluminum alloy	
7	**Shaft**	Stainless steel	
8	**Cushion ring**	Copper alloy	
9	**Piston side yoke**	Rolled steel plate	
10	**External slider side yoke**	Rolled steel plate	
11	**Magnet A**	—	
12	**Magnet B**	—	
13	**Spacer**	Aluminum alloy	
14	**Bumper**	Urethane rubber	
15	**Retaining ring**	Carbon tool steel	

Component Parts

No.	Description	Material	Note
16	**Lock nut B**	Carbon steel	
17	**Lock nut A**	Carbon steel	
18	**Adjustment screw**	Carbon steel	
19	**Stopper bolt**	Carbon steel	
20	**Spring washer**	Steel wire	
21	**Wear ring A**	Special resin	
22	**Wear ring B**	Special resin	
23	**Piston seal**	NBR	
24	**Lube-retainer**	Special resin	
25	**Cushion seal**	NBR	
26	**O-ring**	NBR	
27	**O-ring**	NBR	
28	**O-ring**	NBR	
29	**O-ring**	NBR	

Dimensions

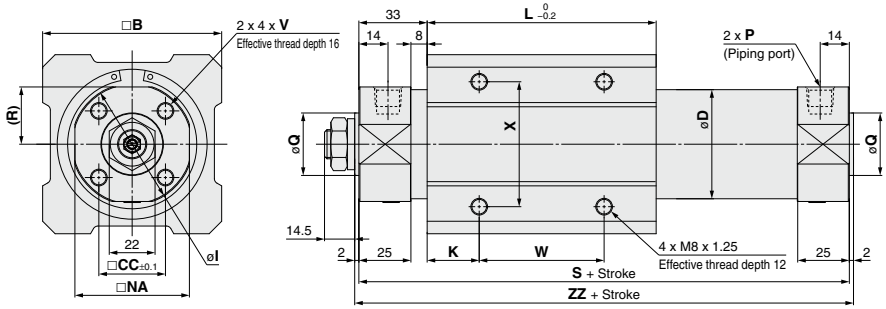
REA25/32/40



Model	A	B	C	D	E	F	G	H	I	J	K	L	MM	N	NA	NN	R	S	T
REA25	8	46	32	26.4	2	13	7.5	20.5	34	8	10	70	M5 x 0.8	18.5	30	M26 x 1.5	15	111	10
REA32	8	60	32	33.6	2	16	8	22	40	8	15	80	M6 x 1	20	36	M26 x 1.5	18	124	13
REA40	10	70	41	41.6	3	16	11	29	50	10	16	92	M6 x 1	26	46	M32 x 2	23	150	13

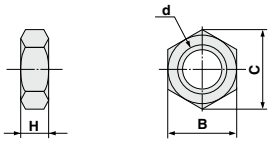
Model	W	X	ZZ	TT	P (Piping port)		
					Nil	TN	TF
REA25	50	30	137	17	Rc1/8	NPT1/8	G1/8
REA32	50	40	156	19	Rc1/8	NPT1/8	G1/8
REA40	60	40	182	22	Rc1/4	NPT1/4	G1/4

REA50/63



Model	B	CC	D	I	K	L	NA	Q	R	S	V	W	X	ZZ	P (Piping port)		
															Nil	TN	TF
REA50	86	32	52.4	58	25	110	55	30 −0.007 −0.037	27.5	176	M8 x 1.25	60	60	180	Rc1/4	NPT1/4	G1/4
REA63	100	38	65.4	72	26	122	69	32 −0.007 −0.043	34.5	188	M10 x 1.5	70	70	192	Rc1/4	NPT1/4	G1/4

Mounting Nuts: 2 pcs. Packaged with Each Cylinder



Model	Applicable bore size (mm)	d	H	B	C
SN-032B	**ø25, ø32**	M26 x 1.5	8	32	37
SN-040B	**ø40**	M32 x 2.0	10	41	47.3