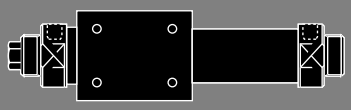
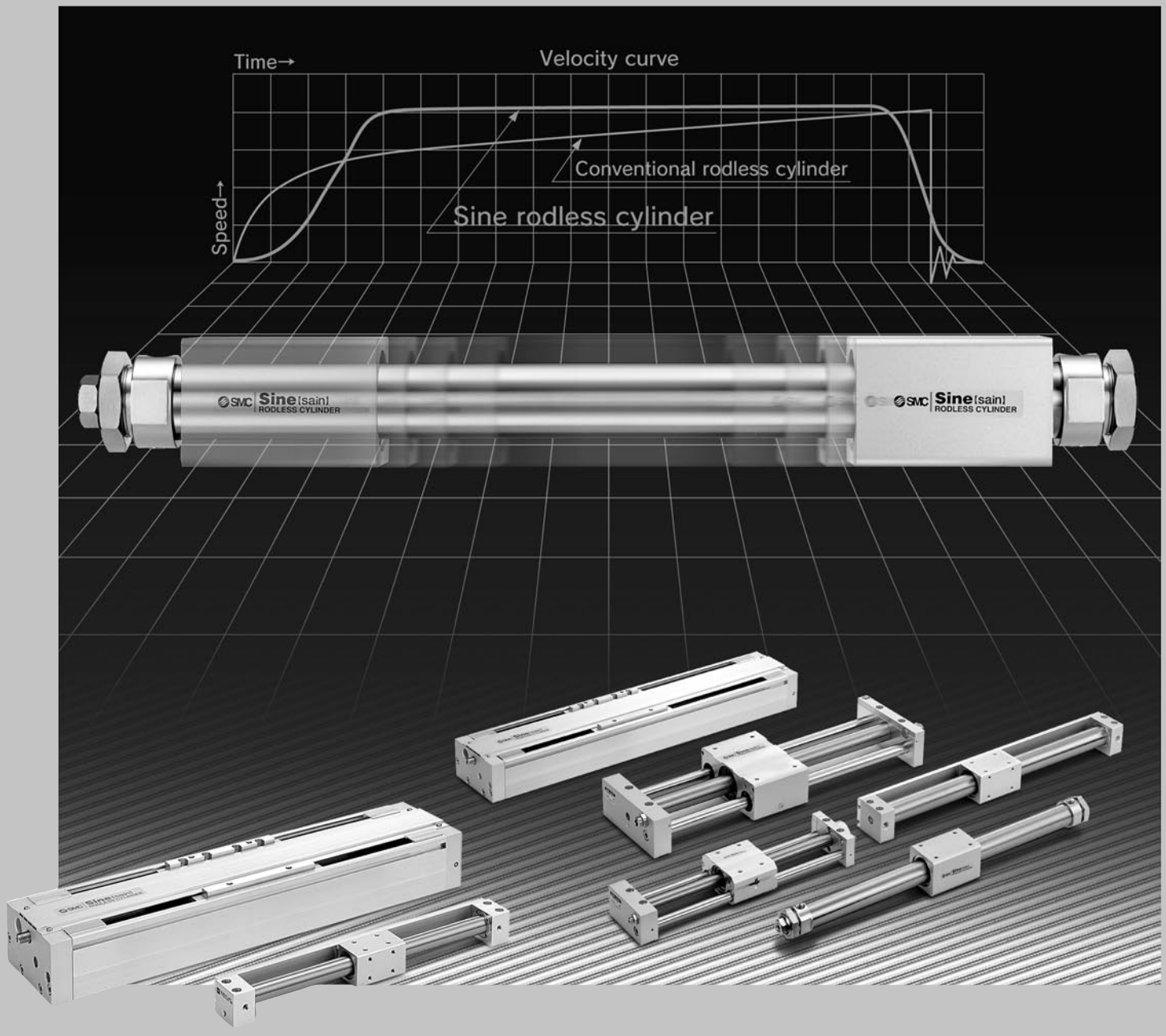


ALMOTION

Sine Rodless Cylinder
Series REA/REB

(Max. speed: 300mm/s) (max. speed: 600 mm/s)



Introducing series REB with a maximun speed of 600mm/s

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ALMOTION

Allows rapid transfer of impact

Semiconductor wafers
Magnetic disks
Ceramic products
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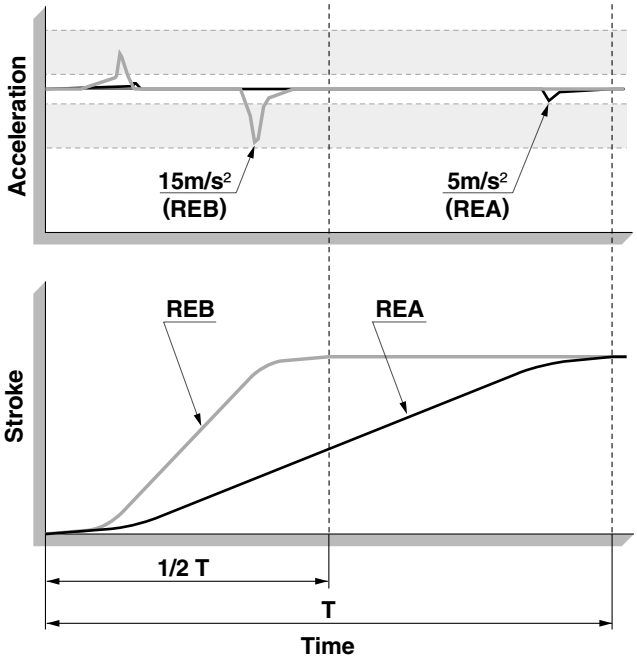
Throughput dramatically increased (Maximum speed: 600mm/s)

Series REB introduced with a maximum speed of 600mm/s. Compared with the previous type (series REA: 300mm/s), the tact time can be shortened by approximately 1/2.

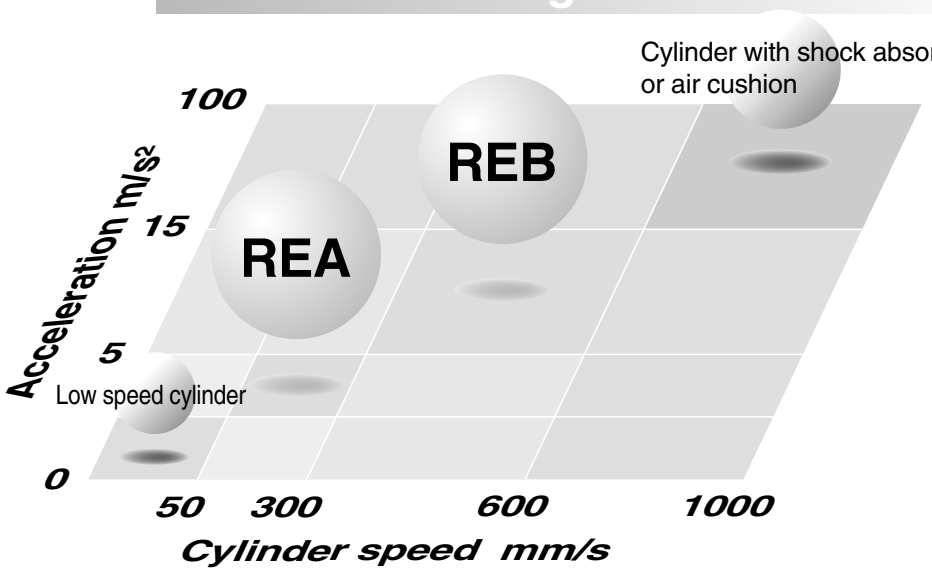


Smooth acceleration & deceleration at 5m/s²

Cushion ring

The exterior of the cushion ring is provided with a variable throttle groove in its longitudinal direction.

Acceleration ranges



Series variations

Series REA (300mm/s)

Guide type	Base cylinder	Model
Basic type	CY1B	REA
Direct mount type	CY1R	REAR
Slider type (slide bearing)	CY1S	REAS
Slider type (ball bushing)	CY1L	REAL
High precision guide (1 axis)	CY1H	REAH
High precision guide (2 axes)	CY1HT	REAHT

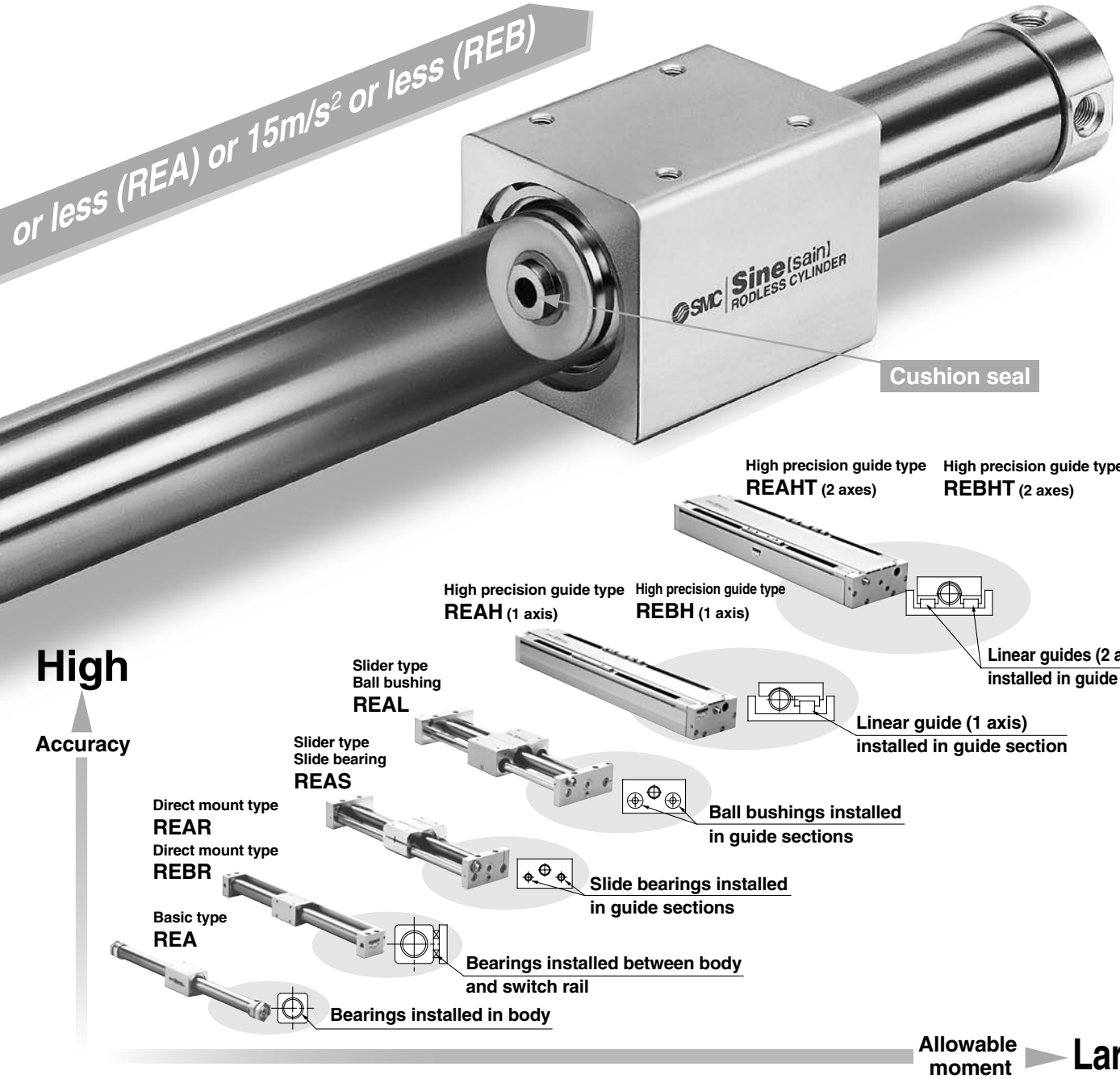
SMC

sensitive work pieces

Sine Rodless Cylinder

Series REA/REB

(Max. speed 300mm/s) (Max. speed 600mm/s)



Series REB (600mm/s)

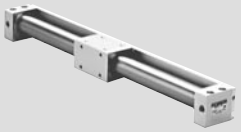
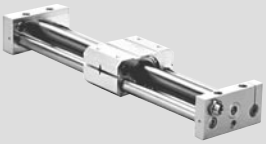
Guide type	Base cylinder	Model
Direct mount type	CY1R	REBR
High precision guide (1 axis)	CY1H	REBH
High precision guide (2 axes)	CY1HT	REBHT

Bore size: 10 15 20 25 32 40 50 63

Bore size: 10 15 20 25 32 40 50 63

Series REA/REAR/REBR/REAS/REAL/REAH/REBH

Model Selection Criteria

Model selection criteria	Recommended cylinder			
	Appearance		Features	
• When many different types of guides are used • When a long stroke is necessary	Non-integrated guide type	Series **REA** Size: ø25, ø32, ø40, ø50, ø63 	• Wide variations from ø25 to ø63	• Long strokes available.
• When many different types of guides are used • When auto switches are added to the basic type • When used without a guide for a light load • When space is very limited		Series **REAR** Size: ø10, ø15, ø20, ø25, ø32, ø40 Series **REBR** Size: ø15, ø25, ø32 	• Available with a maximum speed of 300mm/s or 600mm/s.	• Cylinder can be directly mounted. • Auto switch capable, with no cylinder lurching. • Rotation can be stopped within an allowable range. • Compact external dimensions • Mounting can be performed from the top or one side.
• To ensure a permanent path • When used for general transfer operations	Integrated guide type	Series **REAS** Size: ø10, ø15, ø20, ø25, ø32, ø40 	• A load can be carried directly by the integrated guide type. • The centralized piping type allows concentration of piping on one side plate. • Auto switch capable. • Available with a maximum speed of 300mm/s or 600mm/s. (RE□H/High precision guide type)	• Smooth operation is made possible by using special slide bearings.
• To ensure a permanent path • When smoother operation is required, even with an eccentric load		Series **REAL** Size: ø10, ø15, ø20, ø25, ø32, ø40 		• Stable operation is possible, even with an eccentric load, by using ball bushings.
• To ensure a permanent path • When a large load, large moment or high precision are required • When used for pick-and-place operations, etc.		Series **REAH** Size: ø10, ø15, ø20, ø25, ø32 Series **REBH** Size: ø15, ø25, ø32 		• The use of a linear guide facilitates a large load, large moment and high precision. • Mounting freedom is improved by providing T-slots on the mounting surfaces. • A top cover mounted over the sliding parts of the cylinder prevents scratches and damage, etc.

Sine Rodless Cylinder

Series REA
Basic Type/ø25, ø32, ø40, ø50, ø63

How to Order

Basic type **REA** **25** — **300**

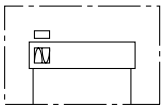
- Sine rodless cylinder (basic type)
- Bore size

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

- Stroke (mm)
  Refer to the standard stroke table.

Specifications

Fluid	Air
Proof pressure	1.05MPa
Maximum operating pressure	0.7MPa
Minimum operating pressure	0.18MPa
Ambient and fluid temperature	–10 to 60°C (with no freezing)
Piston speed	50 to 300mm/s
Lubrication	Non-lube
Stroke length tolerance	0 to 250st: $^{+1}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st and up: $^{+1.8}_{0}$



Symbol

Standard Strokes

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke (mm)
25	200, 250, 300, 350, 400, 450, 500, 600, 700, 800	4000
32	200, 250, 300, 350, 400, 450, 500, 600, 700, 800	
40	200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000	5000
50	200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000	6000
63	200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000	

Note 1) Intermediate strokes can be arranged in 1mm increments.
Note 2) Strokes over 2000mm are available as order made. (Refer to -XB11 on page 4.3-87)

Magnetic Holding Force

(N)

Bore size (mm)	**25**	**32**	**40**	**50**	**63**
Holding force	363	588	922	1,470	2,260

Weights

(kg)

Bore size (mm)	**25**	**32**	**40**	**50**	**63**
Basic weight	0.71	1.34	2.15	3.4	5.7
Additional weight per 50mm stroke	0.05	0.07	0.08	0.095	0.12

Calculation example: REA32-500
Basic weight 1.34kg
Additional weight 0.07/50mm
Cylinder stroke 500mm
} 1.34 + 0.07 x 500 ÷ 50 = 2.04kg

⚠ Specific Product Precautions

Mounting

⚠ Caution

1. Take care to avoid nicks or other damage on the outside surface of the cylinder tube.

This can lead to damage of the scraper and wear ring, which in turn can cause malfunction.

2. Pay attention to the rotation of the external slider.

Rotation should be controlled by connecting it to another shaft (linear guide, etc.).

3. Do not operate with the magnetic coupling out of position.

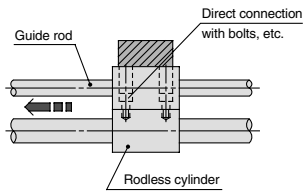
In case the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

4. Be sure that both head covers are secured to the mounting surface before operating the cylinder.

Avoid operation with the external slider secured to the surface.

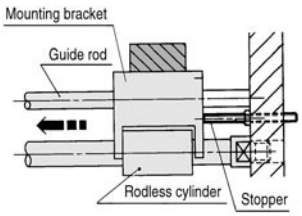
5. Do not apply a lateral load to the external slider.

When a load is mounted directly to the cylinder, variations in the alignment of each shaft centre cannot be offset, and this results in the generation of a lateral load that can cause malfunction. The cylinder should be operated using a connection method which allows for shaft alignment variations and deflection due to the cylinder's own weight. A drawing of a recommended mounting is shown in Figure 2.



Variations in the load and cylinder shaft alignment cannot be offset and may result in a malfunction.

Figure 1. Incorrect mounting



Shaft alignment variations are offset by providing clearance between the mounting bracket and cylinder. Moreover, the mounting bracket is extended above the cylinder shaft center, so that the cylinder is not subjected to moment.

Figure 2. Recommended mounting

6. Use caution regarding the allowable load weight when operating in a vertical direction.

The allowable load weight when operating in a vertical direction (reference values on page 4.3-9 is determined by the model selection method. However, if a load greater than the allowable value is applied, the magnetic coupling may break and there is a possibility of dropping the load. When using this type of application, contact SMC regarding the operating conditions (pressure, load, speed, stroke, frequency, etc.).

Disassembly & Maintenance

⚠ Caution

1. When reattaching the head covers after disassembly, confirm that they are tightened securely.

When disassembling, hold the wrench flats of one head cover with a vise, and remove the other cover using a spanner or adjustable wrench on the wrench flats. When retightening, first coat with Loctite (No. 542 red), and retighten 3 to 5° past the original position prior to removal.

Stroke Adjustment

⚠ Caution

1. This mechanism is not intended for adjustment of the cushion effect (smooth start-up, soft stop). This mechanism is for matching of the cylinder's stroke end position to the mechanical stopper, etc., of a machine. (adjustment range from 0 to -2mm)

2. Before adjustment is performed, shut off the drive air, release any residual pressure and implement measures to prevent dropping of work pieces, etc.

Stroke End Adjustment

(To ensure safety, implement with air shut down.)

⚠ Caution

1. Loosen lock nut A.

2. Insert a wrench into the hexagon socket of the adjustment screw, and turn it to the left or right, matching the cushion ring holder (stroke end) with the position of the external stopper by moving it backward or forward.

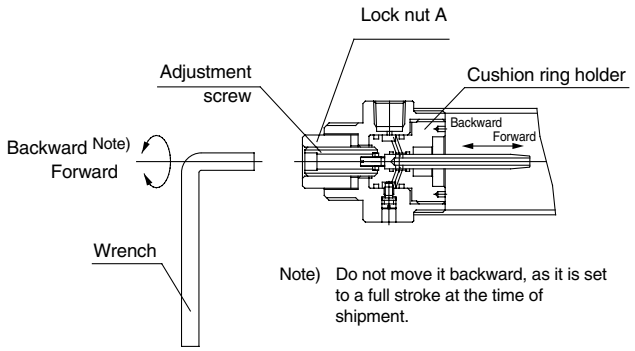
3. After the stroke end adjustment is completed, retighten lock nut A, and apply high strength Loctite No. 262 or another comparable locking agent.

Adjustment screw hexagon socket

Model	Width across flats (mm)
REA25	5
REA32	5
REA40	6
REA50	8
REA63	8

Lock nut A fastening torque

Model	Fastening torque (N·m)
REA25	1.2
REA32	1.2
REA40	2.1
REA50	3.4
REA63	3.4



Note) Do not move it backward, as it is set to a full stroke at the time of shipment.

Series REA
Model Selection 1

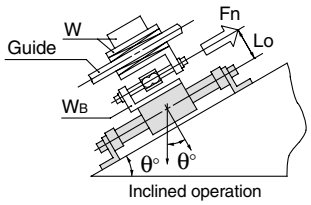
Fn: Allowable driving force (N)
Pv: Maximum operating pressure for vertical operation (MPa)
WBmax: Maximum connection fitting weight (kg)
Wv: Allowable load weight for vertical operation (kg)

Operating conditions

- **W: Load weight (kg)**
- **WB: Connection fitting weight (kg)**
- **μ: Guide's coefficient of friction**
- **Lo: Distance from cylinder shaft centre to work piece 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**



Inclined operation

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	$F_3 = (W + W_B) \times 9.8 \times (\mu + 1)$

Refer to the allowable driving force table for (Fn) of data A.

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: $\varnothing D \geq 1.6 \times \sqrt{\frac{F_3}{P}}$

Review of load weight and operating pressure

Determination of allowable load weight & pressure
- $W + W_B \leq W_V$, $P \leq P_V$
- $W + W_B > W_V$, $P > P_V$

(Refer to page 4.3-9 for connection fitting weight.)

(Refer to page 4.3-9 for vertical operation.)

Determination of connection fitting weight (WB)

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

$W_B \leq W_{Bmax}$

(Refer to page 4.3-8 for data A.)

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

(Refer to page 4.3-8 for data B.)

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

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

Note 1)

Review of order made products based on operating conditions

(Refer to pages 4.3-86 through 4.3-90.)

Model determination

Note 1) Depending on the operating environment, etc., order made products should also be reviewed.

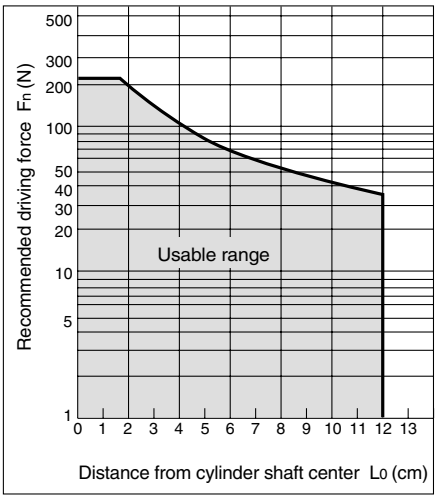
Series REA
Model Selection 2

Design Parameters 1

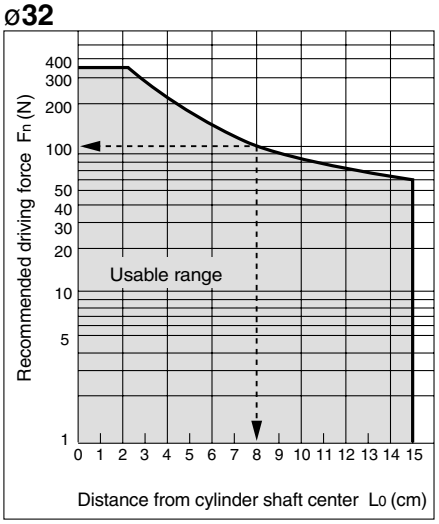
Selection Method

<Data A: Distance from cylinder shaft centre ——— Allowable driving capacity>

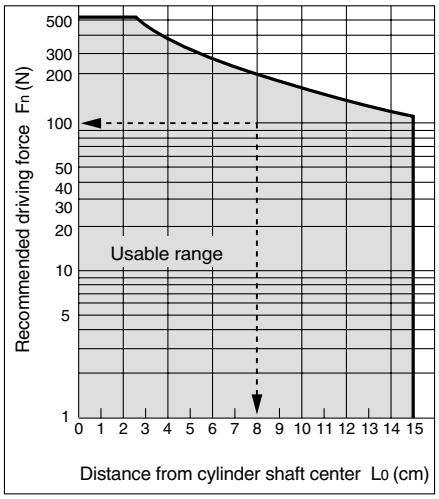
ø25



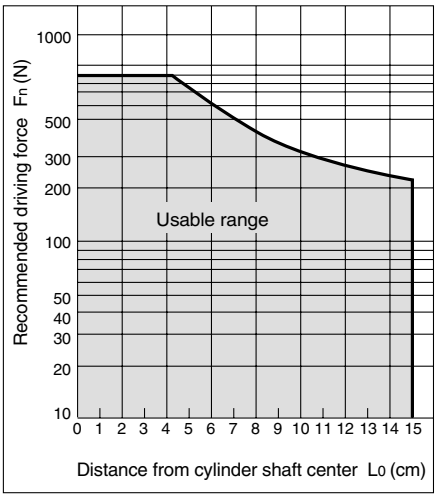
ø32



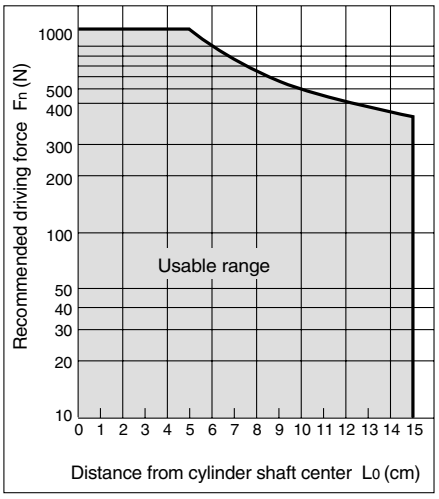
ø40



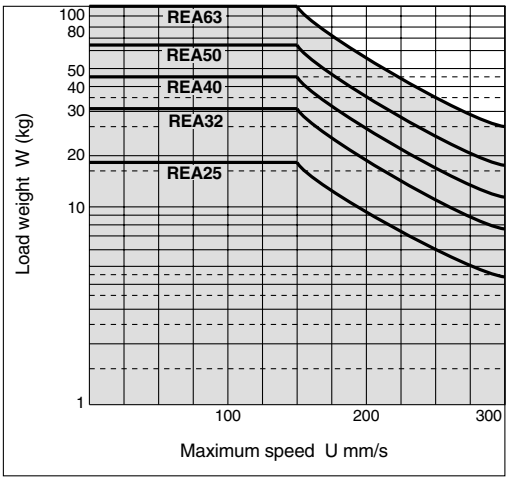
ø50



ø63



<Data B: Maximum speed ——— Load weight chart >

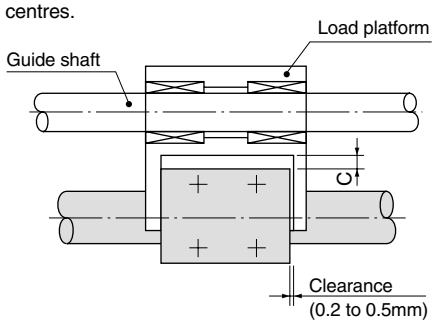


Series REA
Model Selection 3

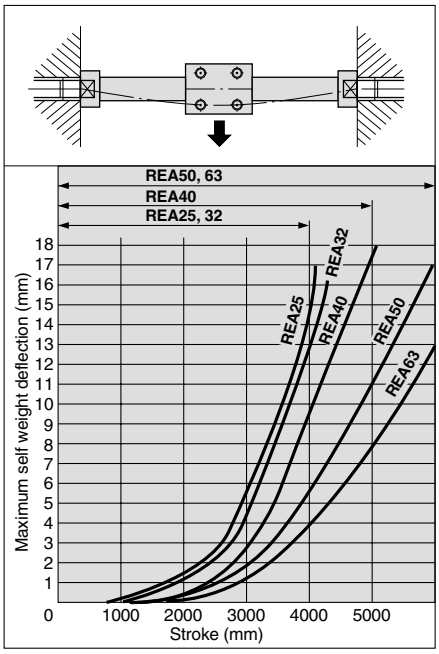
Design Parameters 2

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 centres.



* The clearance C is determined by considering the cylinder's self weight deflection and the amount of discrepancy with respect to the other shaft. Normal value: (self weight deflection) +1.5 to 2mm



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

Max. Connection Fitting Weight

The 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 weights given in the table below.

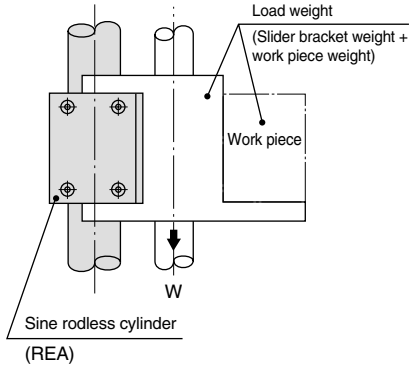
Maximum connection fitting weight W_{Bmax} (kg)

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

* Consult with SMC if weights greater than the above will be connected.

Vertical Operation

The load should be guided by a ball type bearing (LM guide, etc.). If a slide bearing is used, sliding resistance increases due to the load weight and load moment, which can cause malfunction.



Model	Allowable load weight 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, as operation above the maximum operating pressure may result in dislocation of the piston.

Intermediate Stops

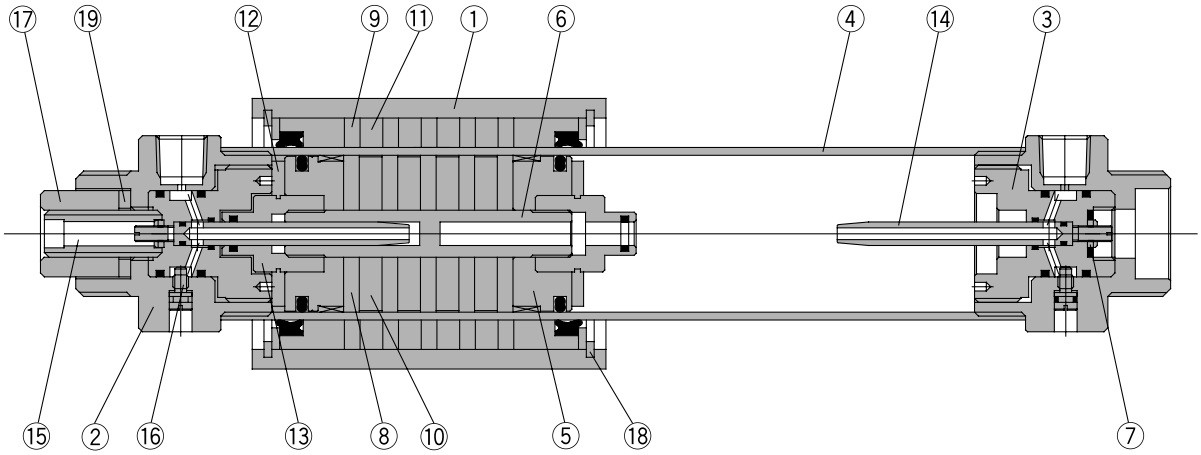
The cushion effect (smooth start-up, soft stop) exists only before the stroke end in the stroke ranges indicated in the table below.
The cushion effect (smooth start-up, soft stop) cannot be obtained in an intermediate stop or a return from an intermediate stop using an external stopper, etc.

Cushion stroke

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

Series REA

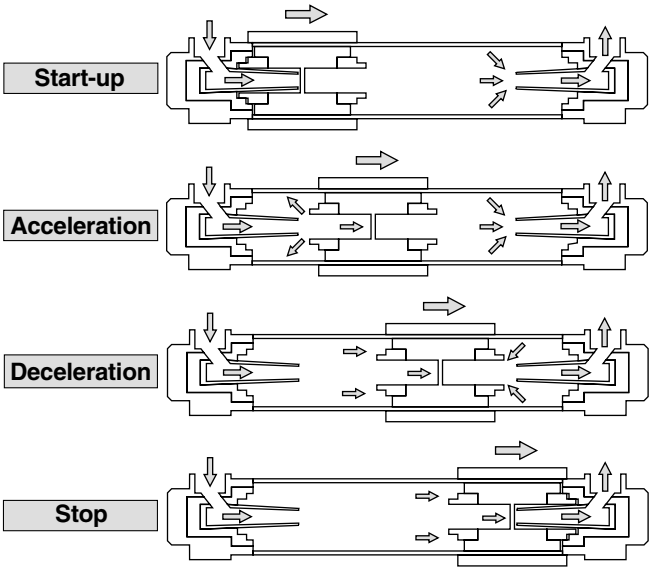
Construction



Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Head cover**	Aluminum alloy	Anodized
3	**Cushion ring holder**	Aluminum alloy	Chromated
4	**Cylinder tube**	Stainless steel	
5	**Piston**	Aluminum alloy	Chromated
6	**Shaft**	Stainless steel	
7	**Lock nut B**	Carbon steel	Nickel plated
8	**Piston side yoke**	Rolled steel	Zinc chromated
9	**External slider side yoke**	Rolled steel	Zinc chromated
10	**Magnet A**	Rare earth magnet	

No.	Description	Material	Note
11	**Magnet B**	Rare earth magnet	
12	**Bumper**	Urethane rubber	
13	**Cushion seal holder**	Aluminum alloy	Chromated
14	**Cushion ring**	Brass	Electroless nickel plated
15	**Adjustment screw**	Carbon steel	Nickel plated
16	**Stopper bolt**	Carbon steel	Nickel plated
17	**Lock nut A**	Carbon steel	Nickel plated
18	**Snap ring**	Carbon tool steel	
19	**Spring washer**	Steel wire	



Operating Principle

Start-up/Acceleration

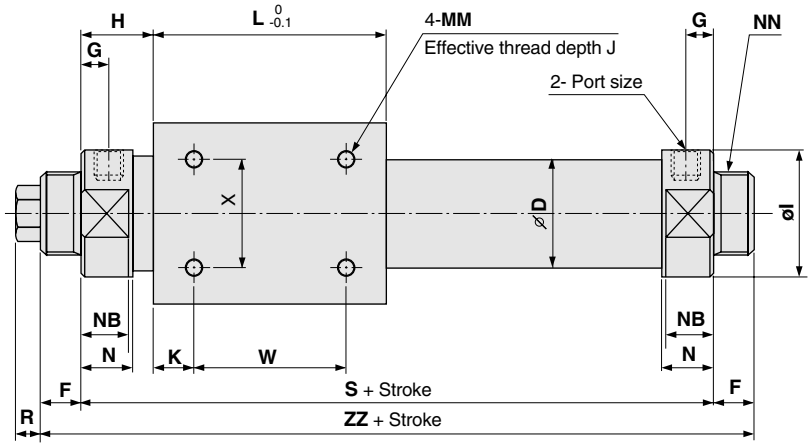
The driving air from the cylinder port passes through the inside of the cushion ring, and flows into the left chamber of the drive piston from the clearance between the cushion seal and the U-shaped groove in the outer surface of the cushion ring. Further, the exhaust air in the right chamber of the 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 conventional 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.

Dimensions

REA 25, 32, 40

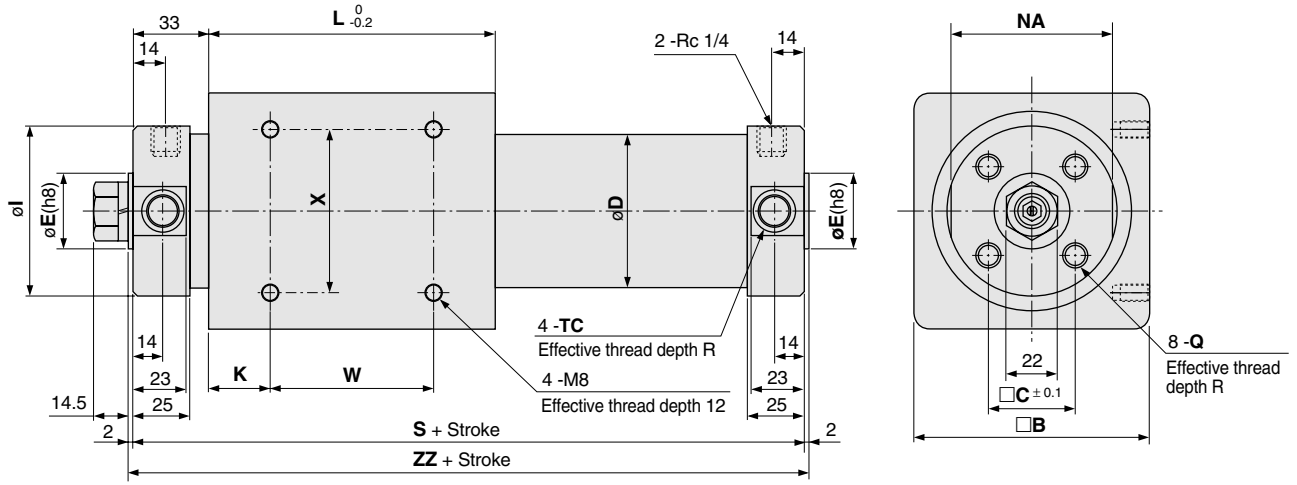


(mm)

Model	Port size	B	D	F	G	H	I	K	L	MM x J	N	NA	NB	NN
REA25	Rc 1/8	46	27.8	13	8	20.5	34	10	70	M5 x 8	15	30	13	M26 x 1.5
REA32	Rc 1/8	60	35	16	9	22	40	15	80	M6 x 8	17	36	15	M26 x 1.5
REA40	Rc 1/4	70	43	16	11	29	50	16	92	M6 x 10	21	46	19	M32 x 2.0

Model	S	W	X	ZZ	R	T
REA25	111	50	30	137	8	17
REA32	124	50	40	156	8	17
REA40	150	60	40	182	10	19

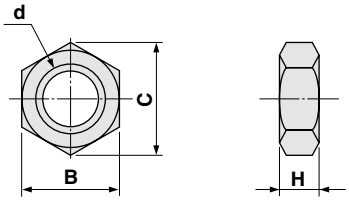
REA 50, 63



(mm)

Model	B	C	D	E(h8)	I	K	L	NA	Q x R	S	TC x R	W	X	ZZ
REA50	86	32	53	$30^{0}_{-0.033}$	58.2	25	110	55	M8 x 16	176	M12 x 1.25 x 7.5	60	60	180
REA63	100	38	66	$32^{0}_{-0.039}$	72.2	26	122	69	M10 x 16	188	M14 x 1.5 x 11.5	70	70	192

Mounting nuts: 2pcs. packaged with each cylinder



(mm)

Part No.	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	11	41	47.3

Sine Rodless Cylinder

Series REAR
Direct Mount Type
ø10, ø15, ø20, ø25, ø32, ø40

How to Order

REA R 25 — 300 [ ] — Z73 [ ]

Sine rodless cylinder

Direct mount type

Bore size

10	10mm
15	15mm
20	20mm
25	25mm
32	32mm
40	40mm

Standard stroke

Refer to the standard stroke table on page 4.3-13.

Switch rails

Nil	With switch rails
N	Without switch rails

Note 1) When equipped with switch rails, magnets for switches are built in.

Note 2) In case of ø15, magnets for switches are built in even when not equipped with switch rails.

Auto switch type

Nil	Without auto switch

Note 1) In case of ø20 with switch rail but without switches, the cylinder configuration is for reed switches.

∗ Refer to the table below for auto switch part numbers.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Applicable auto switches
For ø10, ø15, ø20

Refer to "Auto Switch Guide" (E274-A) for further details on auto switch units.
Refer to page 5.3-2 for further details on auto switch units.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model	Lead wire length (m) Note 1)			Applicable load	
					DC		AC		0.5 (Nil)	3 (L)	5 (Z)		
Reed switch	—	Grommet	No	2 wire	24V	5, 12V	100V or less	A90	●	●	—	IC circuit	Relay, PLC
			Yes			12V	100V	A93	●	●	—	—	
				3 wire (NPN equiv.)	—	5V	—	A96	●	●	—	IC circuit	—
Solid state switch	—	Grommet	Yes	3 wire (NPN)	24V	12V	—	M9N	●	●	—	—	Relay, PLC
				3 wire (PNP)				M9P	●	●	—		
				2 wire				M9B	●	●	—		

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) M9N
3m ..... L M9NL

For ø25, ø32, ø40

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model	Lead wire length (m) Note 1)			Applicable load	
					DC		AC		0.5 (Nil)	3 (L)	5 (Z)		
Reed switch	—	Grommet	Yes	3 wire	—	5V	—	Z76	●	●	—	IC circuit	—
				2 wire	24V	12V	100V	Z73	●	●	●	—	Relay, PLC
			No			5, 12V	100V or less	Z80	●	●	—	IC circuit	
Solid state switch	—	Grommet	Yes	3 wire (NPN)	24V	5, 12V	—	Y59A	●	●	○	IC circuit	Relay, PLC
				3 wire (PNP)				Y7P	●	●	○		
				2 wire		12V		Y59B	●	●	○	—	
	Diagnostic indication (2 colour indicator)			3 wire (NPN)		5, 12V		Y7NW	●	●	○	IC circuit	
				3 wire (PNP)				Y7PW	●	●	○		
				2 wire		12V		Y7BW	●	●	○	—	

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) Y59A
3m ..... L Y59AL
5m ..... Z Y59AZ

Note 2) Solid state auto switches marked with a "○" are produced upon receipt of order.

Specifications

Fluid	Air
Proof pressure	1.05MPa
Maximum operating pressure	0.7MPa
Minimum operating pressure	0.18MPa
Ambient and fluid temperature	–10 to 60°C
Piston speed	50 to 300mm/s
Lubrication	Non-lube
Stroke length tolerance	0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st and up: $^{+1.8}_{0}$
Mounting	Direct mount type

Standard Strokes

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke (mm)	Maximum stroke with switch (mm)
10	150, 200, 250, 300	500	500
15	150, 200, 250, 300, 350, 400 450, 500	1000	750
20	200, 250, 300, 350, 400, 450 500, 600, 700, 800	1500	1000
25		2000	1500
32			
40	200, 250, 300, 350, 400, 450 500, 600, 700, 800, 900, 1000	2000	1500

Note) Intermediate strokes can be arranged in 1mm increments.

Magnetic Holding Force

(N)

Bore size (mm)	**10**	**15**	**20**	**25**	**32**	**40**
Holding force	53.9	137	231	363	588	922

Weights

(kg)

Item \ Bore size (mm)		**10**	**15**	**20**	**25**	**32**	**40**
Basic weight (for 0st)	**REAR□ (with switch rail)**	0.111	0.277	0.440	0.660	1.27	2.06
	REAR□-□N (without switch rail)	0.080	0.230	0.370	0.580	1.15	1.90
Additional weight per 50mm stroke (when equipped with switch rail)		0.034	0.045	0.071	0.083	0.113	0.133
Additional weight per 50mm stroke (when not equipped with switch rail)		0.014	0.020	0.040	0.050	0.070	0.080

Calculation method/Example: REAR25-500 (with switch rail)
Basic weight ... 0.660kg, Additional weight ... 0.083kg/50mm, Cylinder stroke ... 500mm
0.660 + 0.083 x 500 ÷ 50 = 1.49kg

⚠ Specific Product Precautions

Mounting

⚠ Caution

1. Take care to avoid nicks or other damage on the outside surface of the cylinder tube.

This can lead to damage of the scraper and wear ring, which in turn can cause malfunction.

2. Pay attention to the rotation of the external slider.

Rotation should be controlled by connecting it to another shaft (linear guide, etc.).

3. Do not operate with the magnetic coupling out of position.

In case the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

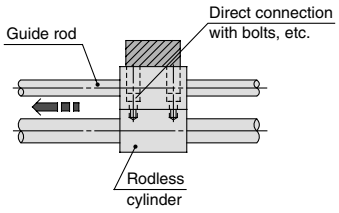
4. The cylinder is mounted with bolts through the mounting holes in the end covers. Be sure they are tightened securely.

5. Be sure that both end covers are secured to the mounting surface before operating the cylinder.

Avoid operation with the external slider secured to the surface.

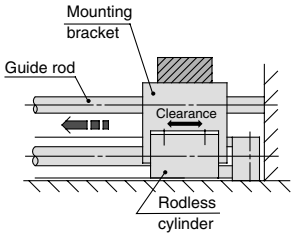
6. Do not apply a lateral load to the external slider.

When a load is mounted directly to the cylinder, variations in the alignment of each shaft centre cannot be offset, which results in the generation of a lateral load that can cause malfunction. The cylinder should be operated using a connection method which allows for shaft alignment variations and deflection due to the cylinder's own weight. A drawing of a recommended mounting is shown in Figure 2.



Variations in the load and cylinder shaft alignment cannot be offset and may result in a malfunction.

Figure 1.
Incorrect mounting



Shaft alignment variations are offset by providing clearance between the mounting bracket and cylinder. Moreover, the mounting bracket is extended above the cylinder shaft centre, so that the cylinder is not subjected to moment.

Figure 2.
Recommended mounting

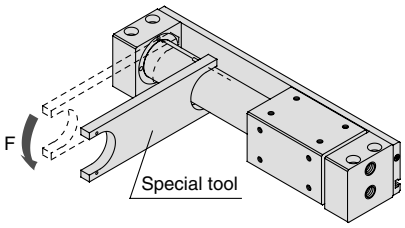
7. Use caution regarding the allowable load weight when operating in a vertical direction.

The allowable load weight when operating in a vertical direction (reference values on page 4.3-17) is determined by the model selection method. However, if a load greater than the allowable value is applied, the magnetic coupling may break and there is a possibility of dropping the load. When using this type of application, contact SMC regarding the operating conditions (pressure, load, speed, stroke, frequency, etc.).

Disassembly & Maintenance

⚠ Caution

1. Special tools are necessary for disassembly.



Special tool number list

No.	Applicable bore size (mm)
CYRZ-V	10, 15, 20
CYRZ-W	25, 32, 40

Series REAR
Model Selection 1

Fn: Allowable driving force (N)
MD: Maximum allowable moment when connection fitting, etc., is directly loaded (N·m)
Pv: Maximum operating pressure for vertical operation (MPa)
WBmax: Maximum load weight when loaded directly on the body (kg)
Wv: Allowable load weight for vertical operation (kg)

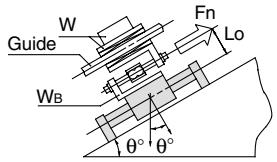
Operating conditions

- W: Load weight (kg)
- WB: Connection fitting weight (kg)
- μ: Guide's coefficient of friction
- Lo: Distance from cylinder shaft centre to work piece point of application (cm)
- L1: Distance from cylinder shaft centre to centre of gravity of connection fitting, etc. (mm)
- Presence of switches
- P: Operating pressure (MPa)
- U: Maximum Speed (mm/s)
- Stroke (mm)
- Mode of operation (horizontal, inclined, vertical)

Mode of operation

Horizontal operation | Inclined operation | Vertical operation

Review of load weight and operating pressure



Inclined operation

First tentative bore size determination $\varnothing D \geq 1.6 \times \sqrt{\frac{F_1}{P}}$

First tentative bore size determination $\varnothing D \geq 1.6 \times \sqrt{\frac{F_2}{P}}$

First tentative bore size determination $\varnothing D \geq 1.6 \times \sqrt{\frac{F_3}{P}}$

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	$F_3 = (W + W_B) \times 9.8 \times (\mu + 1)$

Refer to the allowable driving force table for (Fn) of data A.

Determination of allowable load weight & pressure

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

$W + W_B > W_V$, $P > P_V$ (See page 4.3-17 for vertical operation.)

(See page 4.3-17 for maximum load weight when loaded directly on the body.)

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

Determination of connection fitting weight (W_B)

$W_B \leq W_{Bmax}$

Review of switches and stroke

(See the standard stroke table on p.4.3-13.)

Presence of switch rails — Yes → Presence of switches — Yes → Determination of stroke with switches — NG → (See the standard stroke table on p.4.3-13.)

No / No / OK

(Refer to page 4.3-16 for data A.)

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

Presence of external guide system — Yes → (Refer to page 4.3-16 for data A.)

No

(Refer to page 4.3-16 for data B.)

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

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

Bore size determination

Note 2) $W_B \times L_1 > M_D$

Determination of rotational moment

(See page 4.3-18 for body non-rotating accuracy and maximum allowable moment.)

$W_B \times L_1 \leq M_D$

(See page 4.3-18 for body non-rotating accuracy and maximum allowable moment.)

Note 2) NG → Determination of allowable stroke — OK

Note 1)

Review of order made products based on operating conditions

(Refer to pages 4.3-86 through 4.3-90.)

Model determination

Note 1) Depending on the operating environment, etc., order made products should also be reviewed.

Note 2) An external guide system should be used if the specification is exceeded.

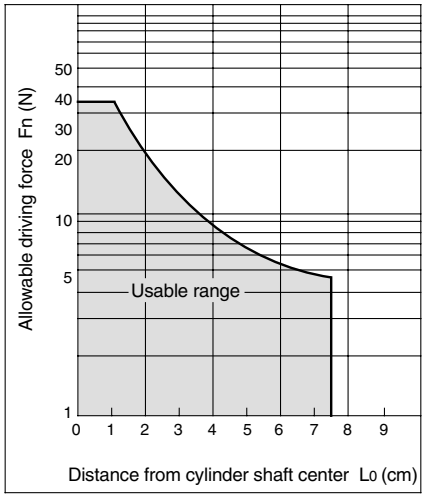
Series REAR
Model Selection 2

Design Parameters 1

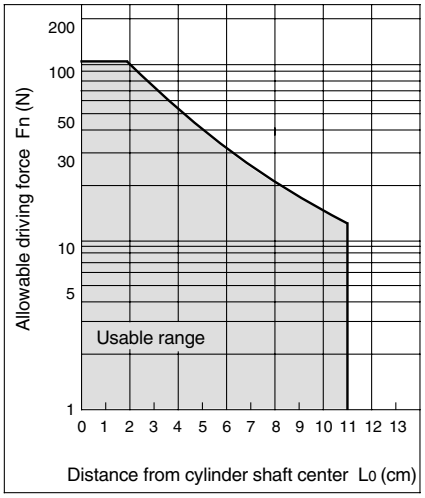
Selection Method

<Data A: Distance from cylinder shaft centre ——— Allowable driving capacity>

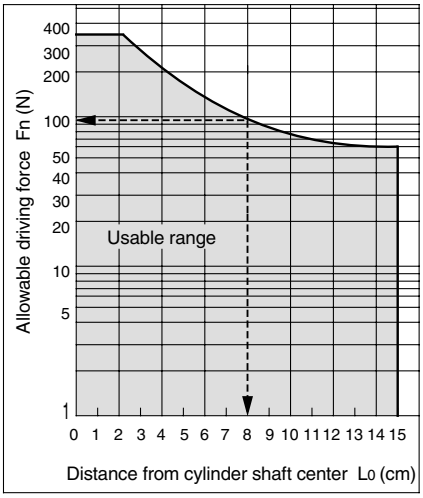
REAR10



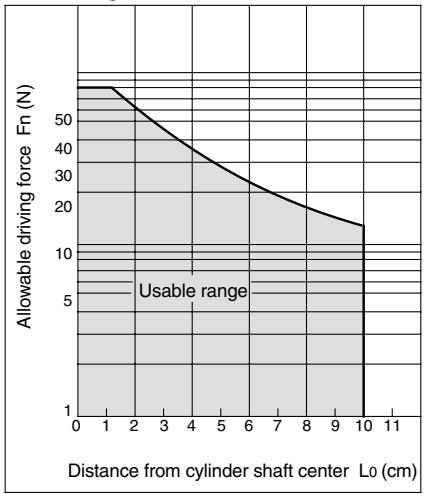
REAR20



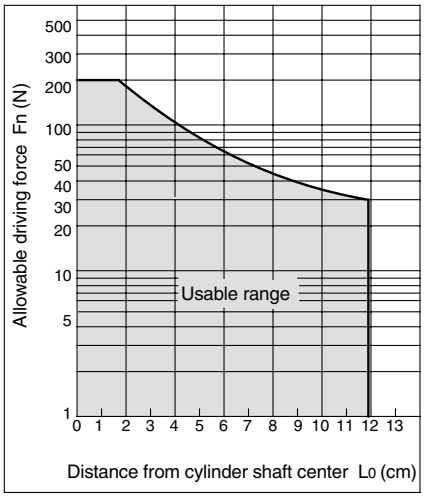
REAR32



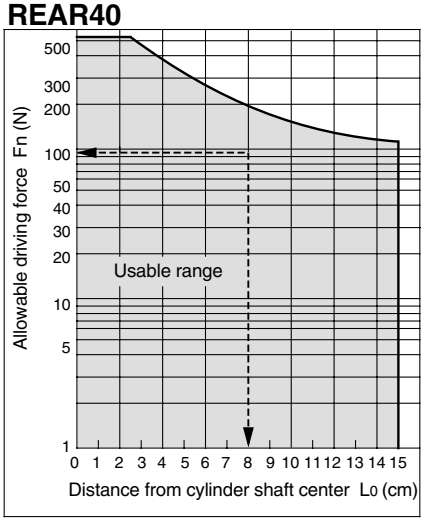
REAR15



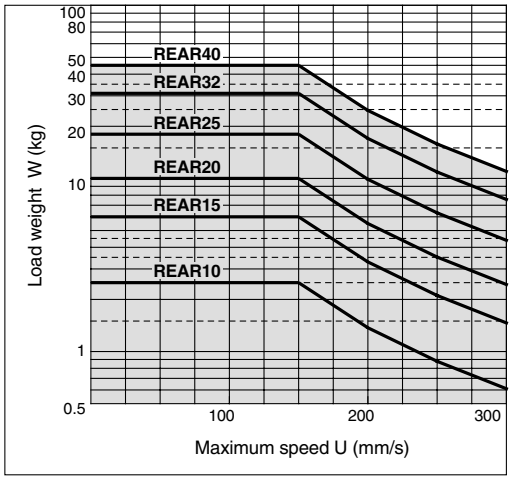
REAR25



REAR40



<Data B: Maximum speed ——— Load weight chart >

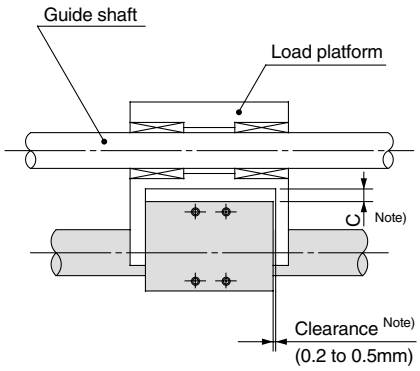


Series REAR
Model Selection 3

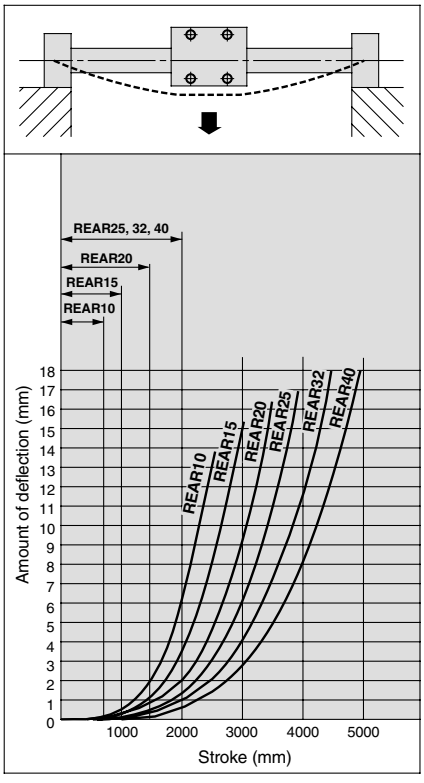
Design Parameters 2

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. Therefore, a connection method should be considered which allows for this variation as shown in the drawing.



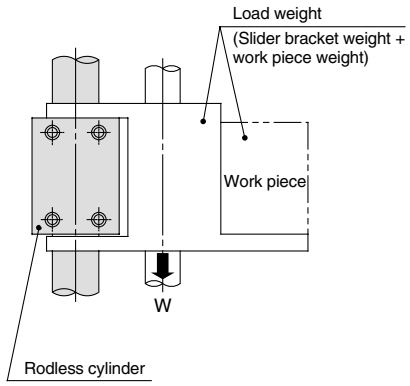
Note) Referring to the self weight deflection in the figure below, provide clearance so that the cylinder is able to operate smoothly through the full stroke within the minimum operating pressure range, without touching the mounting surface or the load, etc.



∗ The above deflection data indicate values when the external slider has moved to the middle of the stroke.

Vertical Operation

The load should be guided by a ball type bearing (LM guide, etc.). If a slide bearing is used, sliding resistance will increase due to the load weight and moment, and this can cause malfunction.



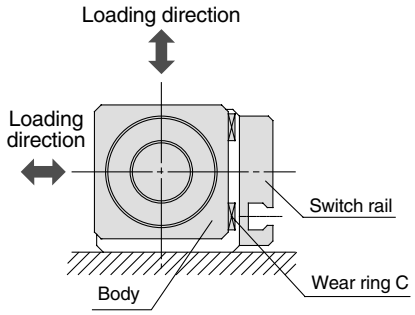
Cylinder bore size (mm)	Model	Allowable load weight Wv (kg)	Max. operating pressure Pv (MPa)
10	REAR10	2.7	0.55
15	REAR15	7.0	0.65
20	REAR20	11.0	0.65
25	REAR25	18.5	0.65
32	REAR32	30.0	0.65
40	REAR40	47.0	0.65

Note) Use caution, as operation above the maximum operating pressure can result in breaking of the magnetic coupling.

Max. Load Weight when Loaded Directly on Body

When the load is applied directly to the body, it should be no greater than the maximum values shown in the table below.

Model	Maximum load weight W_{Bmax} (kg)
REAR10	0.4
REAR15	1.0
REAR20	1.1
REAR25	1.2
REAR32	1.5
REAR40	2.0



Series REAR
Model Selection 4

Design Parameters 3

Intermediate Stops

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.

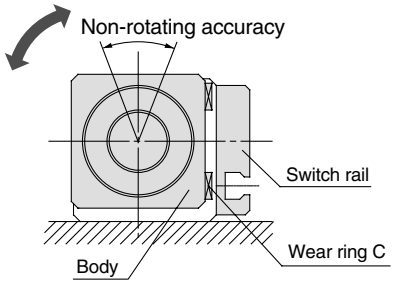
Cushion Stroke

Model	Stroke (mm)
REAR10	20
REAR15	25
REAR20	30
REAR25	30
REAR32	30
REAR40	35

Body Non-rotating Accuracy and Maximum Allowable Moment (with Switch Rail) (Reference Values)

Reference values for non-rotating accuracy and maximum allowable moment at stroke end are indicated below.

Bore size (mm)	Non-rotating accuracy (°)	Max. allowable moment (M_b) (N·m)	Note 2) Allowable stroke (mm)
10	6.0	0.05	100
15	4.5	0.15	200
20	3.7	0.20	300
25	3.7	0.25	300
32	3.1	0.40	400
40	2.8	0.62	400

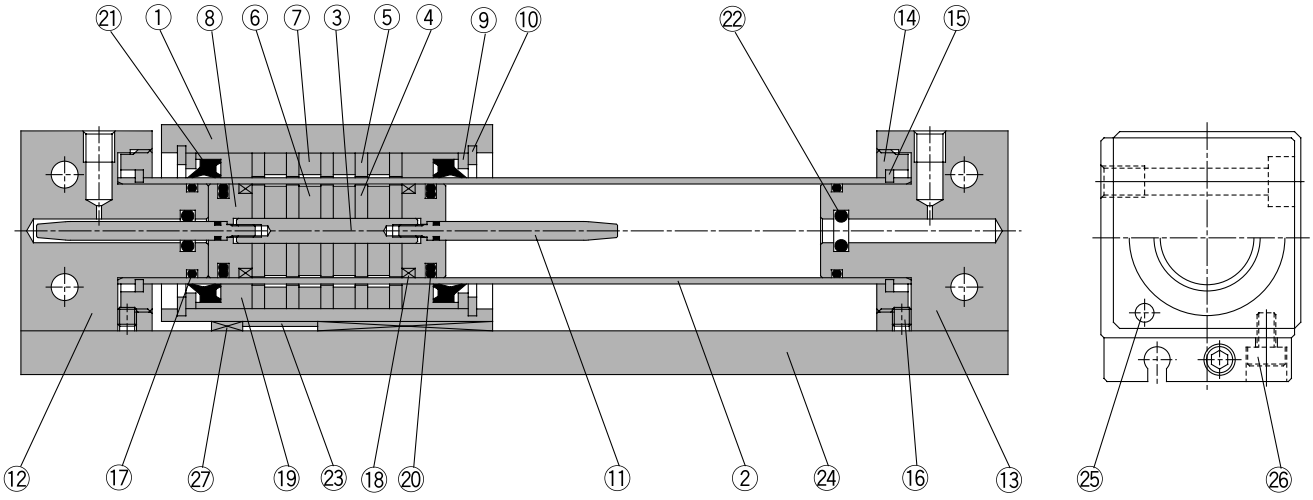


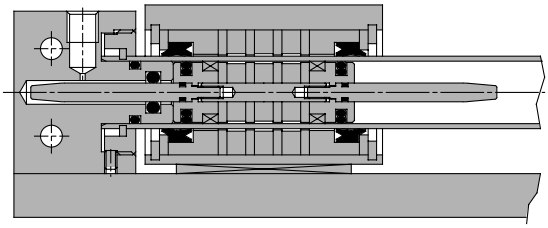
Note 1) Avoid operations where rotational torque (moment) is applied. In such a case, the use of an external guide is recommended.

Note 2) The above reference values will be satisfied within the allowable stroke ranges. However, caution is necessary because as the stroke becomes longer the inclination (rotation angle) within the stroke can be expected to increase.

Note 3) When a load is applied directly to the body, the loaded weight should be no greater than the allowable load weights on page 4.3-13.

Construction/ø10, ø15





REAR10

Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**Shaft**	Stainless steel	
4	**Piston side yoke**	Rolled steel plate	Zinc chromated
5	**External slider side yoke**	Rolled steel plate	Zinc chromated
6	**Magnet A**	Rare earth magnet	
7	**Magnet B**	Rare earth magnet	
8	**Piston**	Brass	Electroless nickel plated
9	**Spacer**	Rolled steel plate	Nickel plated
10	**Snap ring**	Carbon tool steel	Nickel plated
11	**Cushion ring**	Stainless steel	
12	**End cover A**	Aluminum alloy	Hard anodized
13	**End cover B**	Aluminum alloy	Hard anodized
14	**Attachment ring**	Aluminum alloy	Hard anodized
15	**C type snap ring for shaft**	Stainless steel	REAR10
		Hard steel wire	Nickel plated (REAR15)
16	**Hexagon socket head set screw**	Chromium steel	Nickel plated
17*	**Cylinder tube gasket**	NBR	

Parts list

No.	Description	Material	Note
18*	**Wear ring A**	Special resin	
19*	**Wear ring B**	Special resin	
20*	**Piston seal**	NBR	
21*	**Scraper**	NBR	
22*	**Cushion seal**	NBR	
23	**Magnetic shielding plate**	Rolled steel plate	Chromated
24	**Switch rail**	Aluminum alloy	Clear anodized
25	**Magnet**	Rare earth magnet	
26	**Hexagon socket head screw**	Chromium steel	Nickel plated
27*	**Wear ring C**	Special resin	

* Seal kits are sets consisting of numbers 17 through 22 above, and can be ordered using the order number for each bore size.

Replacement parts: Seal kits

Bore size (mm)	Order no.	Content
10	**REAR10-PS**	Above numbers 17, 18, 19, 20, 21, 22, 27
15	**REAR15-PS**	

Switch Rail Accessory Kits

CYR 10 E — □

Bore size • • Stroke

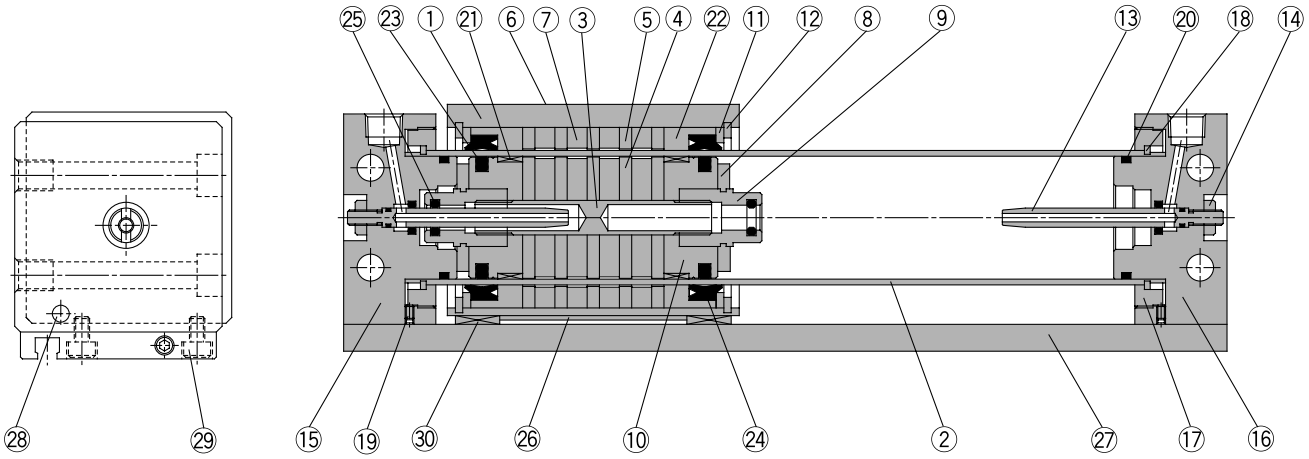
Switch rail accessory kits

Bore size (mm)	Kit no.	Content
10	**CYR10E-□**	Above numbers 24, 25, 26, 27
15	**CYR15E-□**	Above numbers 23, 24, 26, 27 Note 2)

Note 1) □ indicates the stroke.
Note 2) ø15 has internal magnets in the body.

Series REAR

Construction/ø20 to ø40



Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**Shaft**	Stainless steel	
4	**Piston side yoke**	Rolled steel plate	Zinc chromated
5	**External slider side yoke**	Rolled steel plate	Zinc chromated
6	**Magnet A**	Rare earth magnet	
7	**Magnet B**	Rare earth magnet	
8	**Bumper**	Urethane rubber	
9	**Cushion seal holder**	Aluminum alloy	Chromated
10	**Piston**	Aluminum alloy	Chromated
11	**Spacer**	Rolled steel plate	Nickel plated
12	**Snap ring**	Carbon tool steel	Nickel plated
13	**Cushion ring**	Brass	Electroless nickel plated (REAR 32, 40)
		Stainless steel	REAR 20, 25
14	**Lock nut B**	Carbon steel	Nickel plated
15	**End cover A**	Aluminum alloy	Hard anodized
16	**End cover B**	Aluminum alloy	Hard anodized
17	**Attachment ring**	Aluminum alloy	Hard anodized
18	**C type snap ring for shaft**	Stainless steel	REAR 25, 32
		Hard steel wire	Nickel plated (REAR 20, 40)
19	**Hexagon socket head set screw**	Chromium steel	Nickel plated
20*	**Cylinder tube gasket**	NBR	

Parts list

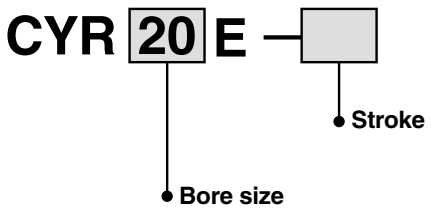
No.	Description	Material	Note
21*	**Wear ring A**	Special resin	
22*	**Wear ring B**	Special resin	
23*	**Piston seal**	NBR	
24*	**Scraper**	NBR	
25*	**Cushion seal**	NBR	
26	**Magnetic shielding plate**	Rolled steel plate	Chromated
27	**Switch rail**	Aluminum alloy	Clear anodized
28	**Magnet**	Rare earth magnet	
29	**Hexagon socket head screw**	Chromium steel	Nickel plated
30*	**Wear ring C**	Special resin	

* Seal kits are sets consisting of numbers 20 through 25 and 30 above, and can be ordered using the kit number for each bore size.

Replacement parts: Seal kits

Bore size (mm)	Kit no.	Content
20	**REAR20-PS**	Above numbers 20, 21, 22, 23, 24, 25, 30
25	**REAR25-PS**	
32	**REAR32-PS**	
40	**REAR40-PS**	

Switch Rail Accessory Kits

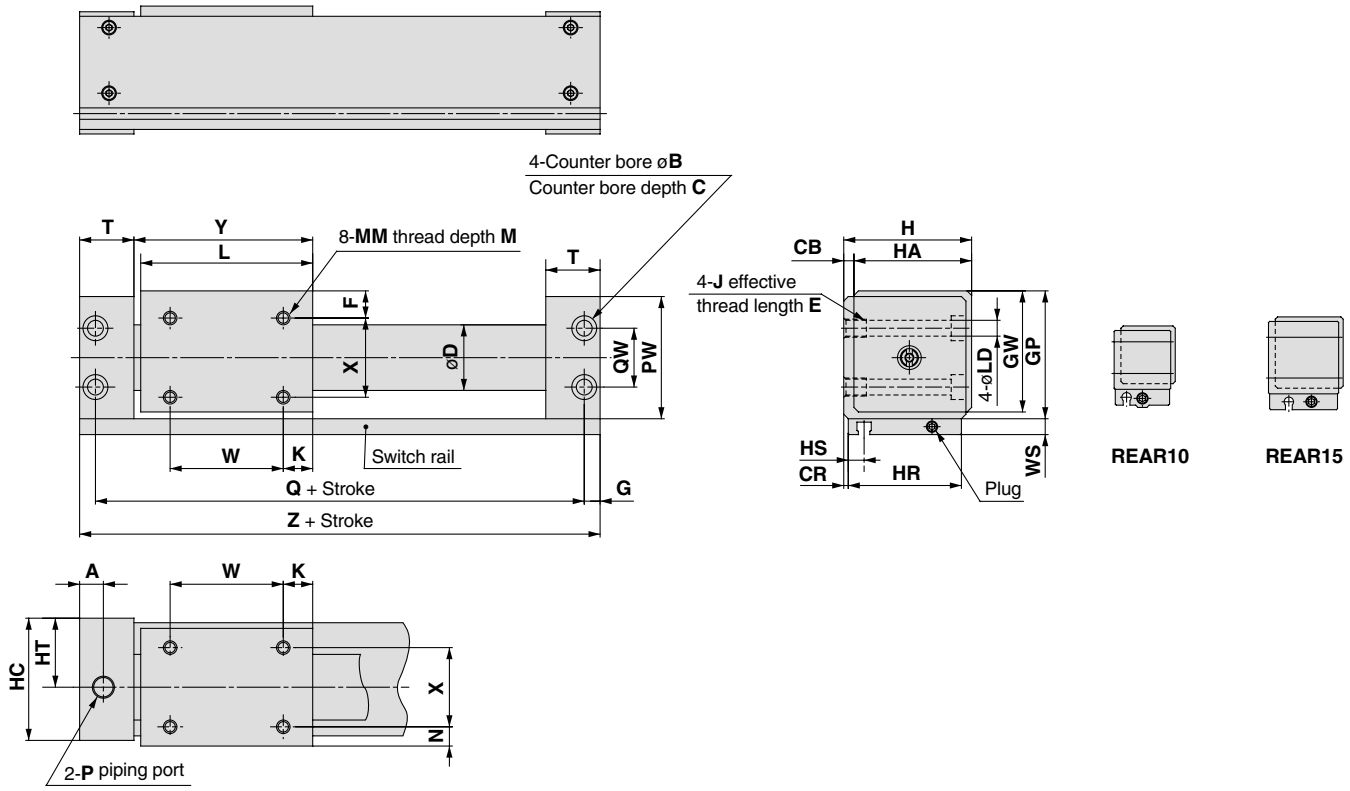


Switch rail accessory kits

Bore size (mm)		Kit no.	Content
20	For reed switch	**CYR20E-□**	Above numbers 26, 27, 28, 29, 30
	For solid state	**CYR20EN-□**	
25		**CYR25E-□**	
32		**CYR32E-□**	
40		**CYR40E-□**	

Note 1) □ indicates the stroke.

Dimensions

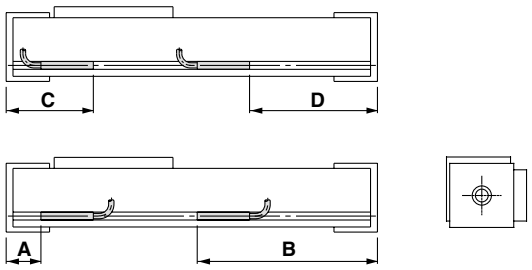


(mm)

Model	A	B	C	CB	CR	D	F	G	GP	GW	H	HA	HC	HR	HS	HT	J x E
REAR10	10.5	6.5	3.2	2	0.5	12	6.5	6	27	25.5	26	24	25	24	5	14	M4 x 6
REAR15	12	8	4.2	2	0.5	17	8	7	33	31.5	32	30	31	30	8.5	17	M5 x 7
REAR20	9	9.5	5.2	3	1	22.8	9	6	39	37.5	39	36	38	36	7.5	21	M6 x 8
REAR25	8.5	9.5	5.2	3	1	27.8	8.5	6	44	42.5	44	41	43	41	6.5	23.5	M6 x 8
REAR32	10.5	11	6.5	3	1.5	35	10.5	7	55	53.5	55	52	54	51	7	29	M8 x 10
REAR40	10	11	6.5	5	2	43	13	7	65	63.5	67	62	66	62	8	36	M8 x 10

Model	K	L	LD	M	MM	N	P	PW	Q	QW	T	W	WS	X	Y	Z
REAR10	9	38	3.5	4	M3	4.5	M5	26	68	14	19.5	20	8	15	39.5	80
REAR15	14	53	4.3	5	M4	6	M5	32	84	18	21	25	7	18	54.5	98
REAR20	11	62	5.6	5	M4	7	Rc 1/8	38	95	17	20.5	40	7	22	64	107
REAR25	15	70	5.6	6	M5	6.5	Rc 1/8	43	105	20	21.5	40	7	28	72	117
REAR32	13	76	7	7	M6	8.5	Rc 1/8	54	116	26	24	50	7	35	79	130
REAR40	15	90	7	8	M6	11	Rc 1/4	64	134	34	26	60	7	40	93	148

Proper Auto Switch Mounting Position for Stroke End Detection



ø10 to ø20

(mm)

Bore size (mm) \ Auto switch model	A		B		C		D	
	D-A9□	D-M9□	D-A9□	D-M9□	D-A9□	D-M9□	D-A9□	D-M9□
10	28	32	48	44	48	44	28	32
15	17.5	21.5	76.5	72.5	—	—	56.5	60.5
20	19.5	23.5	87.5	83.5	39.5	35.5	67.5	71.5

Note) Auto switches cannot be installed in Area C in the case of ø15.

ø25 to ø40

(mm)

Bore size (mm) \ Auto switch model	A		B		C		D	
	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W
25	18	18	97	99	43	43	74	74
32	21.5	21.5	108.5	108.5	46.5	46.5	83.5	83.5
40	23.5	23.5	124.5	124.5	48.5	48.5	99.5	99.5

Auto Switch Operation Range

(mm)

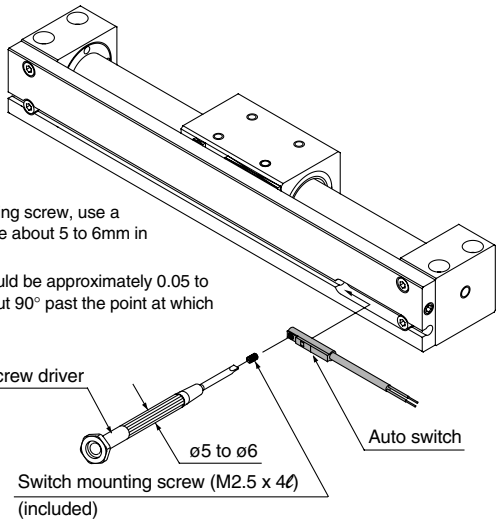
Bore size (mm) \ Auto switch model	D-A9□	D-M9□	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W
10	13	7	–	–
15	8	5	–	–
20	6	4	–	–
25	–	–	9	7
32	–	–	9	6
40	–	–	11	6

Note 1) Switches cannot be mounted in some cases.

Note 2) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment (variations on the order of ±30%).

Auto Switch Mounting

When mounting auto switches, they should be inserted into the cylinder's switch groove from the direction shown in the drawing on the right. After setting in the mounting position, use a flat head watchmakers screw driver to tighten the mounting screw which is included.



Note) When tightening the auto switch mounting screw, use a watchmakers screw driver with a handle about 5 to 6mm in diameter.

Furthermore, the tightening torque should be approximately 0.05 to 0.1N·m. As a rule, it can be turned about 90° past the point at which tightening can be felt.

Auto Switch Specifications

(1) Switches (switch rail) can be added to the standard type (without switch rail). Switch rail accessory kits are mentioned on pages 4.3-19 and 4.3-20 and can be ordered together with auto switches.

(2) Refer to the separate disassembly instructions for switch magnet installation procedures.

Sine Rodless Cylinder

Series REAS
Slider Type/Slide Bearing

How to Order

REA S 25 — 300 — A72 □

- **Sine rodless cylinder**
- **Slider type (slide bearing)**
- **Bore size**

10	10mm
15	15mm
20	20mm
25	25mm
32	32mm
40	40mm

- **Standard stroke**
  Refer to the standard stroke table on page 4.3-24.
- **Auto switch type**

Nil	Without auto switch

∗ Refer to the table below for applicable auto switch models.
∗ In cases without auto switches, there are switch rails only.

- **Number of auto switches**

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Applicable auto switches

Refer to "Auto Switch Guide" (E-274-A) for further details on auto switch units.
Refer to page 5.3-2 for further details on auto switch units.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC		Load voltage AC	Auto switch model: Electrical entry direction: Perpendicular	Auto switch model: Electrical entry direction: In-line	Lead wire length (m) Note 1): 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Applicable load	
Reed switches	—	Grommet	Yes	3 wire (NPN equiv.)	—	5V	—	—	A76H	●	●	—	—	IC circuit	—
				2 wire	—	—	200V	A72	A72H	●	●	—	—	—	Relay, PLC
					24V	12V	100V	A73	A73H	●	●	●	—		
			No			5V, 12V	100V or less	A80	A80H	●	●	—	—	IC circuit	
		Connector	Yes			12V		A73C	—	●	●	●	●	—	
			No			5V, 12V	24V or less	A80C	—	●	●	●	●	IC circuit	
Solid state switches	—	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	—	F7NV	F79	●	●	○	—	IC circuit	Relay, PLC
				3 wire (PNP)				F7PV	F7P	●	●	○	—		
				2 wire		12V		F7BV	J79	●	●	○	—	—	
		Connector						J79C	—	●	●	●	●		
	Diagnostic indication (2 colour indicator)	Grommet		3 wire (NPN)		5V, 12V		F7NWV	F79W	●	●	○	—	IC circuit	
				3 wire (PNP)				—	F7PW	●	●	○	—		
				2 wire		12V		F7BWV	J79W	●	●	○	—	—	
	Water resistant (2 colour indicator)							—	F7BA	—	●	○	—		
	With timer			3 wire (NPN)		5V, 12V		—	F7NT	—	●	○	—	IC circuit	
	With diagnostic output (2 colour indicator)			4 wire (NPN)				—	F79F	●	●	○	—		
	Latch type with diagnostic output (2 colour indicator)					—		—	Note 3) F7LF	●	●	○	—	—	

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) A80C
3m ..... L (Example) A80CL
5m ..... Z (Example) A80CZ
None ..... N (Example) A80CN

Note 2) Solid state auto switches marked with a "○" are produced upon receipt of order.
Note 3) Type D-F7LF cannot be mounted on bore size ø10.

Series REAS

Specifications

Fluid	Air
Proof pressure	1.05MPa
Maximum operating pressure	0.7MPa
Minimum operating pressure	0.18MPa
Ambient and fluid temperature	–10 to 60°C
Piston speed	50 to 300mm/s
Lubrication	Non-lube
Stroke length tolerance	0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st and up: $^{+1.8}_{0}$

Standard Strokes

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke (mm)
10	150, 200, 250, 300	500
15	150, 200, 250, 300, 350, 400 450, 500	750
20	200, 250, 300, 350, 400, 450 500, 600, 700, 800	1000
25		1500
32		
40	200, 250, 300, 350, 400, 450 500, 600, 700, 800, 900, 1000	1500

Note) Intermediate strokes can be arranged in 1mm increments.

Magnetic Holding Force

(N)

Bore size (mm)	**10**	**15**	**20**	**25**	**32**	**40**
Holding force	53.9	137	231	363	588	922

Weights

(kg)

Bore size (mm)	**10**	**15**	**20**	**25**	**32**	**40**
Basic weight	0.48	0.91	1.48	1.84	3.63	4.02
Additional weight per 50mm stroke	0.074	0.104	0.138	0.172	0.267	0.406

Calculation method/Example: REAS32-500
Basic weight ..... 3.63kg Additional weight ..... 0.267/50mm Cylinder stroke ... 500mm
3.63 + 0.267 x 500 ÷ 50 = 6.3kg

⚠ Specific Product Precautions

Operation

⚠ Warning

1. Be aware of the space between the plates and the slide block.

Take sufficient care as fingers and hands, etc., may be injured if caught while the cylinder is in operation.

2. Do not apply a load to a cylinder, which is greater than the allowable value stated in the "model selection pages".

Mounting

⚠ Caution

1. Avoid operation with the external slider fixed to the mounting surface.

The cylinder should be operated with the plates fixed to the mounting surface.

2. Perform mounting so that the external slider will operate through the entire stroke at the minimum operating pressure.

If the mounting surface is not flat, the guides will be warped, increasing the minimum operating pressure and causing premature wear of the bearings. Therefore, mounting should be performed so that the external slider will operate through the entire stroke at the minimum operating pressure. A mounting surface with a high degree of flatness is desirable, but in cases where this is not possible, adjust with shims, etc.

Series REAS
Model Selection 1

Pv: Maximum operating pressure for vertical operation (MPa)
WA: Allowable load weight based on these operating conditions (kg)
Wv: Allowable load weight for vertical operation (kg)
σ: Stroke coefficient

$$\sigma = \frac{\text{Load weight within stroke}}{\text{Max. load weight}}$$

Operating conditions
- W: Load weight (kg)
- U: Maximum speed (mm/s)
- P: Operating pressure (MPa)
- Stroke (mm)
- L0: Distance from slide block mounting surface to work piece centre of gravity (cm)
- Mode of operation (horizontal, inclined, vertical)

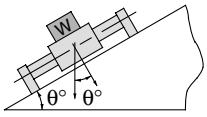
Mode of operation

- Horizontal operation
- Inclined operation
- Vertical operation

Review of load weight and operating pressure

First tentative bore size determination

- Horizontal: $\varnothing D \geq 2.8 \times \sqrt{\frac{W}{P}}$
- Inclined: $\varnothing D \geq 5.0 \times \sqrt{\frac{0.3 \times W\cos\theta + W\sin\theta}{P}}$
- Vertical: $\varnothing D \geq 5.0 \times \sqrt{\frac{0.3 \times W + W}{P}}$



Inclined operation

Determination of allowable load weight & pressure

- W > Wv, P > Pv → (Refer to page 4.3-29 for vertical operation.)
- W ≤ Wv, P ≤ Pv

(Refer to page 4.3-27 for formulas to find σ.)

Calculate stroke coefficient (σ) with stroke and tentatively determined bore size

$$\sigma = \frac{\text{Load weight in stroke}}{\text{Maximum load weight}}$$

Select an example calculation for allowable weight based on cylinder mounting orientation

(Refer to pages 4.3-27 and 4.3-28.)

Calculate (WA) from the formula for the tentatively determined bore size

- W > WA → Review of bore size, stroke and L0
- W ≤ WA

(Refer to Data B on page 4.3-27.)

Second tentative determination of bore size from graph of maximum speed (U) and load weight (W)

Note 1) Depending on the operating environment, etc., order made products should also be reviewed.

(The larger bore size is selected from two tentative determinations.)

Bore size determination

Note 1)

Review of order made products based on operating conditions

(Refer to pages 4.3-86 through 4.3-90.)

Model determination

Series REAS
Model Selection 2

Design Parameters 1

How to Find σ when Selecting the Allowable Load Weight

Since the maximum load weight with respect to the cylinder stroke changes as shown in the table below, σ should be considered as a coefficient determined in accordance with each stroke.

Example) for REAS25–650

(1) Maximum load weight = 20kg

(2) Load weight for 650st = 13.6kg

(3) $\sigma = \frac{13.6}{20} = 0.68$ is the result.

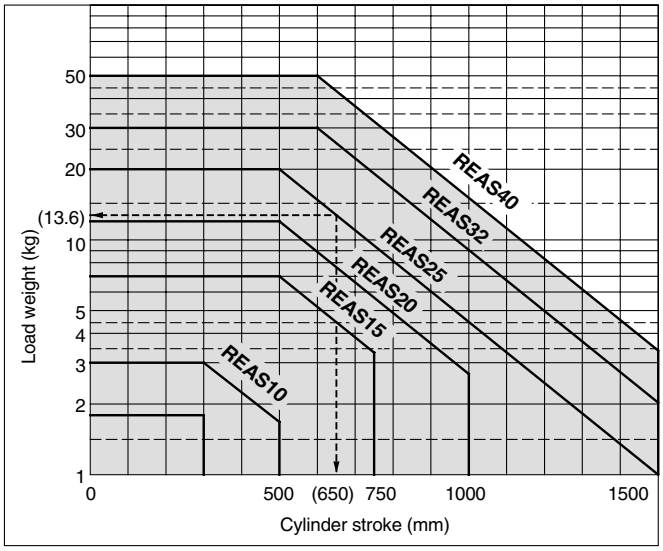
Calculation formula for σ (σ≤1)

ST: Stroke (mm)

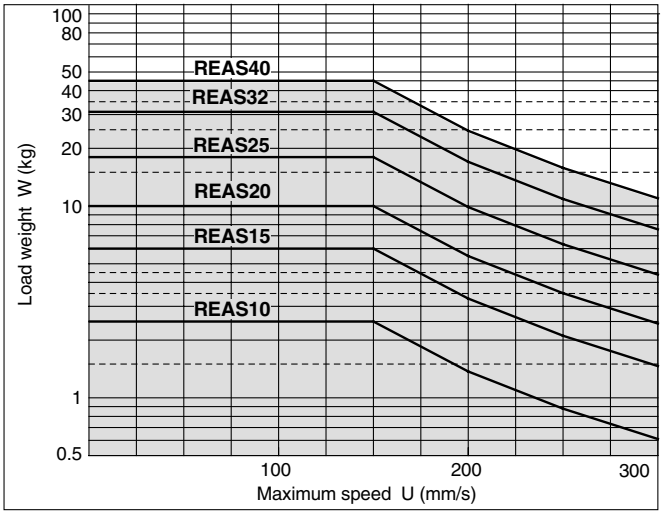
Model	REAS10	REAS15	REAS20
σ=	$\frac{10^{(0.86 - 1.3 \times 10^{-3} \times ST)}}{3}$	$\frac{10^{(1.5 - 1.3 \times 10^{-3} \times ST)}}{7}$	$\frac{10^{(1.71 - 1.3 \times 10^{-3} \times ST)}}{12}$

Model	REAS25	REAS32	REAS40
σ=	$\frac{10^{(1.98 - 1.3 \times 10^{-3} \times ST)}}{20}$	$\frac{10^{(2.26 - 1.3 \times 10^{-3} \times ST)}}{30}$	$\frac{10^{(2.48 - 1.3 \times 10^{-3} \times ST)}}{50}$

Note) Calculate with σ = 1 for all applications up to ø10–300mmST, ø15–500mmST, ø20–500mmST, ø25–500mmST, ø32–600mmST and ø40–600mmST.

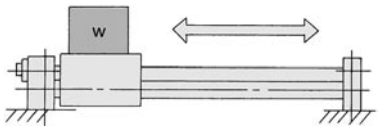


<Data Ⓑ: Maximum speed—— Load weight chart>



Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

1. Horizontal operation (floor mounting)

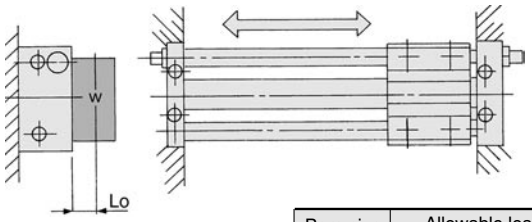


Maximum load weight (center of slide block) (kg)

Bore size (mm)	10	15	20	25	32	40
Max. load weight (kg)	3	7	12	20	30	50
Stroke (max)	to 300st	to 500st	to 500st	to 500st	to 600st	to 600st

The above maximum load weight values will change with the stroke length for each cylinder size, due to limitation from warping of the guide shafts. (Take note of the coefficient σ.) Moreover, depending on the operating direction, the allowable load weight may be different from the maximum load weight.

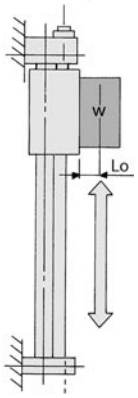
2. Horizontal operation (wall mounting)



Lo: Distance from mounting surface to load center of gravity (cm)

Bore size (mm)	Allowable load weight W_A (kg)
10	$\frac{\sigma \cdot 12.0}{8.4 + 2Lo}$
15	$\frac{\sigma \cdot 36.4}{10.6 + 2Lo}$
20	$\frac{\sigma \cdot 74.4}{12 + 2Lo}$
25	$\frac{\sigma \cdot 140}{13.8 + 2Lo}$
32	$\frac{\sigma \cdot 258}{17 + 2Lo}$
40	$\frac{\sigma \cdot 520}{20.6 + 2Lo}$

3. Vertical operation



Bore size (mm)	Allowable load weight W_A (kg)
10	$\frac{\sigma \cdot 4.16}{2.2 + Lo}$
15	$\frac{\sigma \cdot 13.23}{2.7 + Lo}$
20	$\frac{\sigma \cdot 26.8}{2.9 + Lo}$
25	$\frac{\sigma \cdot 44.0}{3.4 + Lo}$
32	$\frac{\sigma \cdot 88.2}{4.2 + Lo}$
40	$\frac{\sigma \cdot 167.8}{5.1 + Lo}$

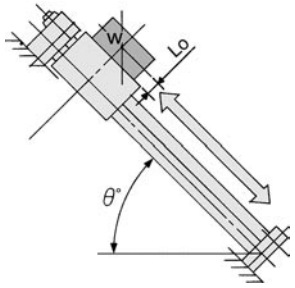
Lo: Distance from mounting surface to load center of gravity (cm)
Note) A safety factor should be considered to prevent dropping.

Series REAS
Model Selection 3

Design Parameters 2

Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

4. Inclined operation (in operating direction)



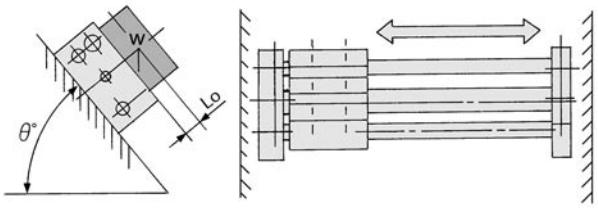
Angle	to 45j	to 60j	to 75j	to 90j
k	1	0.9	0.8	0.7

Angle coefficient (k): k = [to 45j (= θ)] = 1,
[to 60j] = 0.9,
[to 75j] = 0.8,
[to 90j] = 0.7

Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	Allowable load weight WA (kg)
10	$\frac{\sigma \cdot 10.5 \cdot K}{3.5\cos\theta + 2\,(2.2 + Lo)\sin\theta}$
15	$\frac{\sigma \cdot 35 \cdot K}{5\cos\theta + 2\,(2.7 + Lo)\sin\theta}$
20	$\frac{\sigma \cdot 72 \cdot K}{6\cos\theta + 2\,(2.9 + Lo)\sin\theta}$
25	$\frac{\sigma \cdot 120 \cdot K}{6\cos\theta + 2\,(3.4 + Lo)\sin\theta}$
32	$\frac{\sigma \cdot 210 \cdot K}{7\cos\theta + 2\,(4.2 + Lo)\sin\theta}$
40	$\frac{\sigma \cdot 400 \cdot K}{8\cos\theta + 2\,(5.1 + Lo)\sin\theta}$

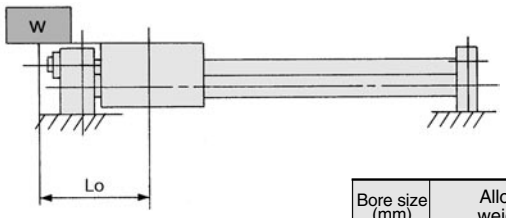
5. Inclined operation (at a right angle to operating direction)



Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	Allowable load weight WA (kg)
10	$\frac{\sigma \cdot 12.0}{4 + 2\,(2.2 + Lo)\sin\theta}$
15	$\frac{\sigma \cdot 36.4}{5.2 + 2\,(2.7 + Lo)\sin\theta}$
20	$\frac{\sigma \cdot 74.4}{6.2 + 2\,(2.9 + Lo)\sin\theta}$
25	$\frac{\sigma \cdot 140}{7 + 2\,(3.4 + Lo)\sin\theta}$
32	$\frac{\sigma \cdot 258}{8.6 + 2\,(4.2 + Lo)\sin\theta}$
40	$\frac{\sigma \cdot 520}{10.4 + 2\,(5.1 + Lo)\sin\theta}$

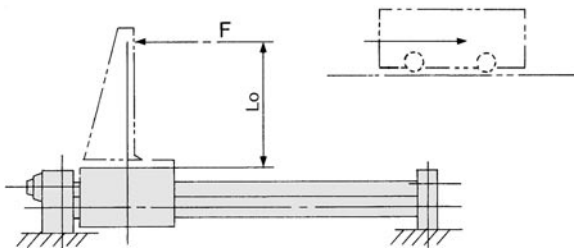
6. Load centre offset in operating direction (Lo)



Lo: Distance from slide block centre to load centre of gravity (cm)

Bore size (mm)	Allowable load weight WA (kg)
10	$\frac{\sigma \cdot 5.25}{Lo + 3.5}$
15	$\frac{\sigma \cdot 17.5}{Lo + 5.0}$
20	$\frac{\sigma \cdot 36}{Lo + 6.0}$
25	$\frac{\sigma \cdot 60}{Lo + 6.0}$
32	$\frac{\sigma \cdot 105}{Lo + 7.0}$
40	$\frac{\sigma \cdot 200}{Lo + 8.0}$

7. Horizontal operation (pushing load, pusher)

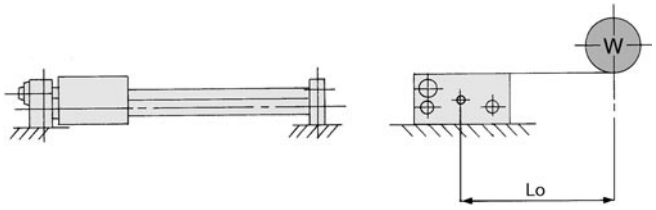


F: Drive (from slide block to position Lo) resistance force (kg)
Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	10	15	20
Allowable load weight WA (kg)	$\frac{\sigma \cdot 5.25}{2.2 + Lo}$	$\frac{\sigma \cdot 17.5}{2.7 + Lo}$	$\frac{\sigma \cdot 36}{2.9 + Lo}$

Bore size (mm)	25	32	40
Allowable load weight WA (kg)	$\frac{\sigma \cdot 60}{3.4 + Lo}$	$\frac{\sigma \cdot 105}{4.2 + Lo}$	$\frac{\sigma \cdot 200}{5.1 + Lo}$

8. Horizontal operation (load, lateral offset Lo)



Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	10	15	20
Allowable load weight WA (kg)	$\frac{\sigma \cdot 8.40}{4 + Lo}$	$\frac{\sigma \cdot 25.48}{5.2 + Lo}$	$\frac{\sigma \cdot 52.1}{6.2 + Lo}$

Bore size (mm)	25	32	40
Allowable load weight WA (kg)	$\frac{\sigma \cdot 98}{7.0 + Lo}$	$\frac{\sigma \cdot 180}{8.6 + Lo}$	$\frac{\sigma \cdot 364}{10.4 + Lo}$

Series REAS
Model Selection 4

Design Parameters 3

Vertical Operation

When operating a load vertically, it should be operated within the allowable load weights and maximum operating pressures shown in the table below. Use caution, as operating above the prescribed values may lead to dropping of the load.

Bore size (mm)	Model	Allowable load weight Wv (kg)	Max. operating pressure Pv (MPa)
10	**REAS10**	2.7	0.55
15	**REAS15**	7.0	0.65
20	**REAS20**	11.0	0.65
25	**REAS25**	18.5	0.65
32	**REAS32**	30.0	0.65
40	**REAS40**	47.0	0.65

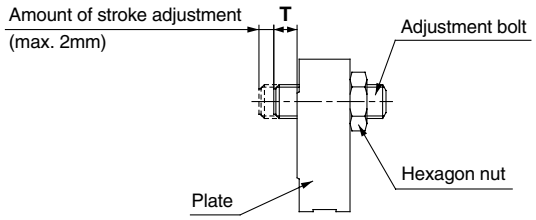
Note) Use caution, as there is a possibility of breaking the magnetic coupling if operated above the maximum operating pressure.

Stroke Adjustment

The adjustment bolt is adjusted to the optimum position for smooth acceleration and deceleration at the time of shipment, and should be operated at the full stroke. When stroke adjustment is necessary, the maximum amount of adjustment on one side is 2mm. (Do not adjust more than 2mm, as it will not be possible to obtain smooth acceleration and deceleration.)

Stroke Adjustment

Loosen the hexagon nut, and after performing the stroke adjustment from the plate side with a hexagon wrench, retighten and secure the hexagon nut.



Adjustment Bolt Position (at Shipment), Hexagon Nut Tightening Torque

Model	T (mm)	Tightening torque (N·m)
REAS10	1	1.67
REAS15	1	
REAS20	1.5	3.14
REAS25	1.5	10.8
REAS32	3	23.5
REAS40	2	

Intermediate Stops

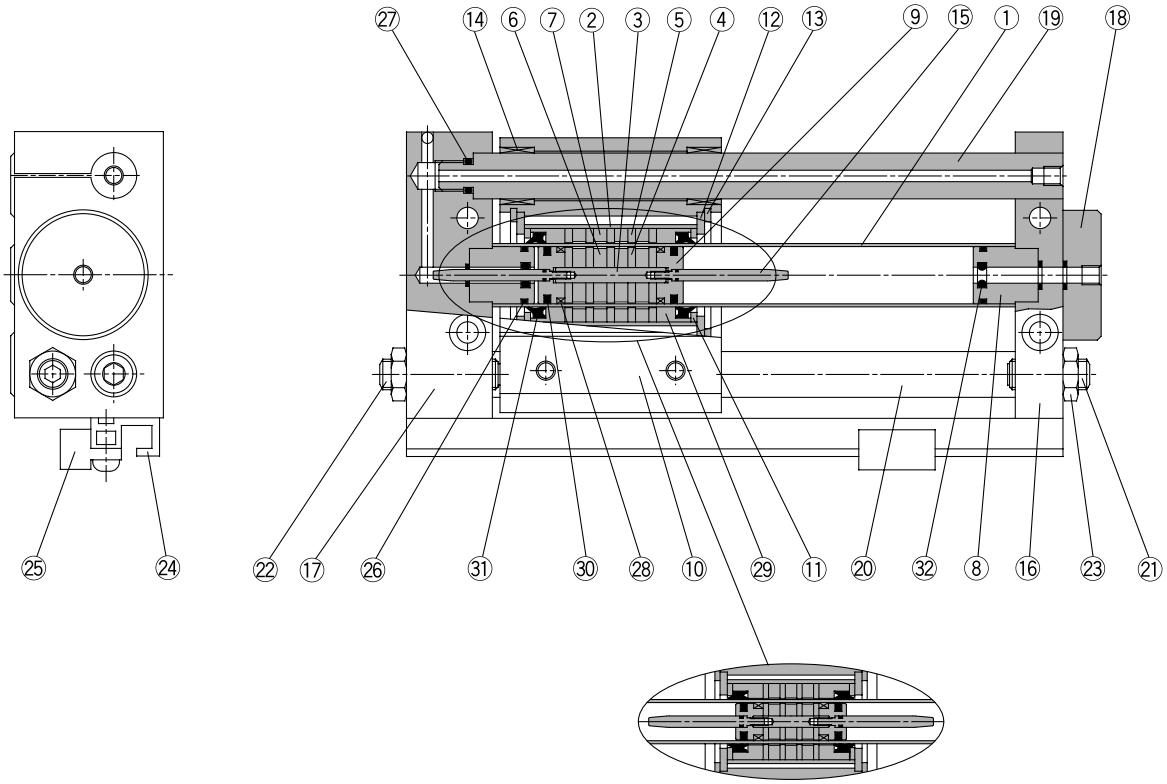
The cushion effect (smooth start-up, soft stop) exists only before the stroke end in the stroke ranges indicated in the table below.
The cushion effect (smooth start-up, soft stop) cannot be obtained in an intermediate stop or a return from an intermediate stop using an external stopper, etc.

Cushion stroke

Model	Stroke (mm)
REAS10	20
REAS15	25
REAS20	30
REAS25	30
REAS32	30
REAS40	35

Series REAS

Construction/ø10, ø15



REAS10

Parts list

No.	Description	Material	Note
1	**Cylinder tube**	Stainless steel	
2	**External slider tube**	Aluminum alloy	
3	**Shaft**	Stainless steel	
4	**Piston side yoke**	Rolled steel plate	Zinc chromated
5	**External slider side yoke**	Rolled steel plate	Zinc chromated
6	**Magnet A**	Rare earth magnet	
7	**Magnet B**	Rare earth magnet	
8	**Cushion seal holder**	Aluminum alloy	Anodized
9	**Piston**	Brass	Electroless nickel plated
10	**Slide block**	Aluminum alloy	Hard anodized
11	**Spacer**	Rolled steel plate	Nickel plated
12	**Slider spacer**	Rolled steel plate	Nickel plated
13	**Snap ring**	Carbon tool steel	Nickel plated
14	**Bushing**	Oil retaining bearing material	
15	**Cushion ring**	Stainless steel	
16	**Plate A**	Aluminum alloy	Hard anodized

Parts list

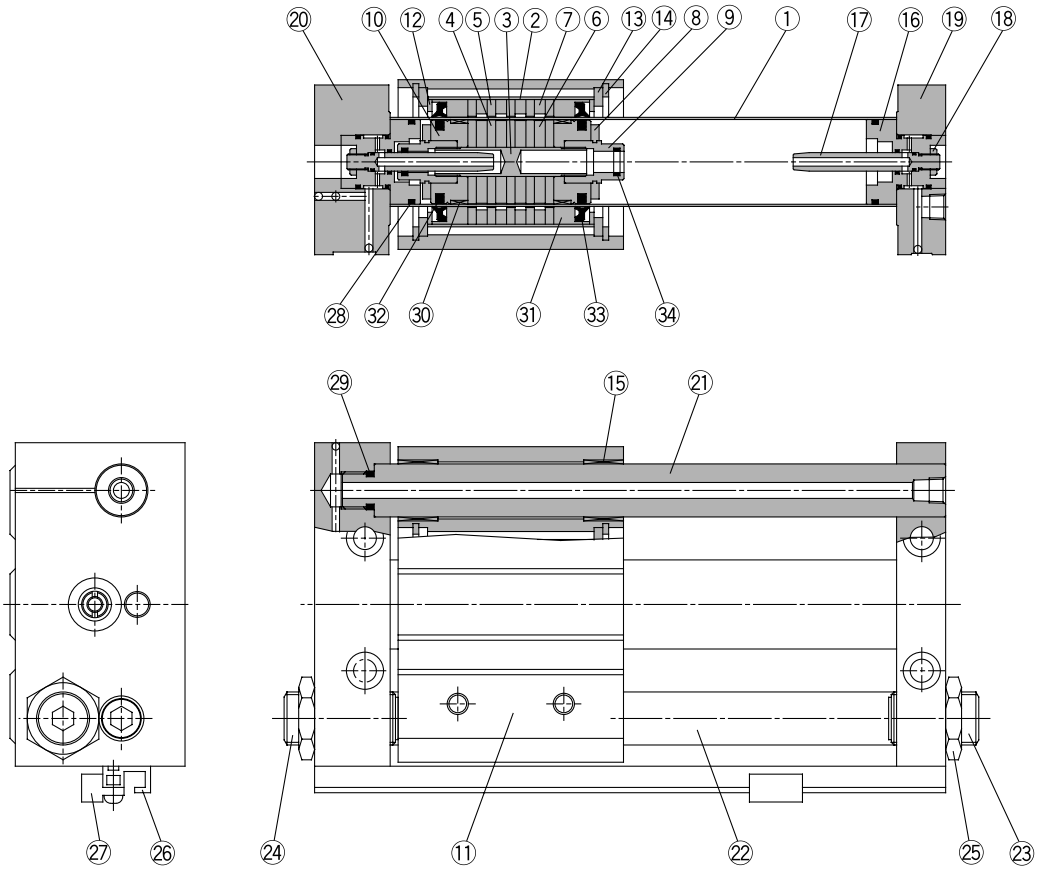
No.	Description	Material	Note
17	**Plate B**	Aluminum alloy	Hard anodized
18	**Port cover**	Aluminum alloy	Hard anodized
19	**Guide shaft A**	Carbon steel	Hard chrome plated
20	**Guide shaft B**	Carbon steel	Hard chrome plated
21	**Adjustment bolt A**	Chromium molybdenum steel	Nickel plated
22	**Adjustment bolt B**	Chromium molybdenum steel	Nickel plated
23	**Hexagon nut**	Carbon steel	Nickel plated
24	**Switch mounting rail**	Aluminum alloy	
25	**Auto switch**	–	
26*	**Cylinder tube gasket**	NBR	
27*	**Guide shaft gasket**	NBR	
28*	**Wear ring A**	Special resin	
29*	**Wear ring B**	Special resin	
30*	**Piston seal**	NBR	
31*	**Scraper**	NBR	
32*	**Cushion seal**	NBR	

* Seal kits are sets consisting of items 26 through 32 above, and can be ordered using the kit number for each bore size.

Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
10	**REAS10-PS**	Above numbers 26, 27, 28, 29, 30, 31, 32
15	**REAS15-PS**	

Construction/ø20 to ø40



Parts list

No.	Description	Material	Note
1	**Cylinder tube**	Stainless steel	
2	**External slider tube**	Aluminum alloy	
3	**Shaft**	Stainless steel	
4	**Piston side yoke**	Rolled steel plate	Zinc chromated
5	**External slider side yoke**	Rolled steel plate	Zinc chromated
6	**Magnet A**	Rare earth magnet	
7	**Magnet B**	Rare earth magnet	
8	**Bumper**	Urethane rubber	
9	**Cushion seal holder**	Aluminum alloy	Chromated
10	**Piston**	Aluminum alloy	Chromated
11	**Slide block**	Aluminum alloy	Hard anodized
12	**Spacer**	Rolled steel plate	Nickel plated
13	**Slider spacer**	Rolled steel plate	Nickel plated
14	**Snap ring**	Carbon tool steel	Nickel plated
15	**Bushing**	Oil retaining bearing material	
16	**Cushion ring holder**	Aluminum alloy	Anodized
17	**Cushion ring**	Brass	Electroless nickel plated (REAS32, 40)
		Stainless steel	REAS20, 25

Parts list

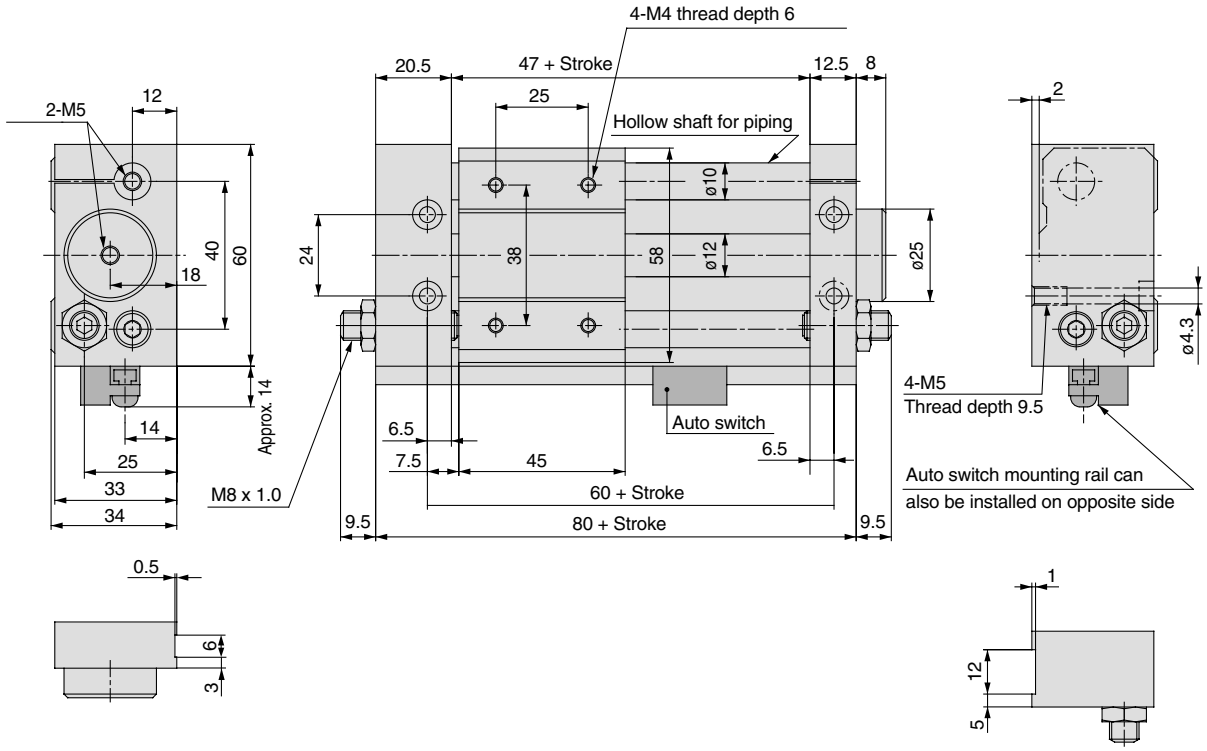
No.	Description	Material	Note
18	**Lock nut B**	Carbon steel	Nickel plated
19	**Plate A**	Aluminum alloy	Hard anodized
20	**Plate B**	Aluminum alloy	Hard anodized
21	**Guide shaft A**	Carbon steel	Hard chrome plated
22	**Guide shaft B**	Carbon steel	Hard chrome plated
23	**Adjustment bolt A**	Chromium molybdenum steel	Nickel plated
24	**Adjustment bolt B**	Chromium molybdenum steel	Nickel plated
25	**Hexagon nut**	Carbon steel	Nickel plated
26	**Switch mounting rail**	Aluminum alloy	
27	**Auto switch**	–	When equipped with auto switch
28*	**Cylinder tube gasket**	NBR	
29*	**Guide shaft gasket**	NBR	
30*	**Wear ring A**	Special resin	
31*	**Wear ring B**	Special resin	
32*	**Piston seal**	NBR	
33*	**Scraper**	NBR	
34*	**Cushion seal**	NBR	

* Seal kits are sets consisting of items 28 through 34 above, and can be ordered using the kit number for each bore size.

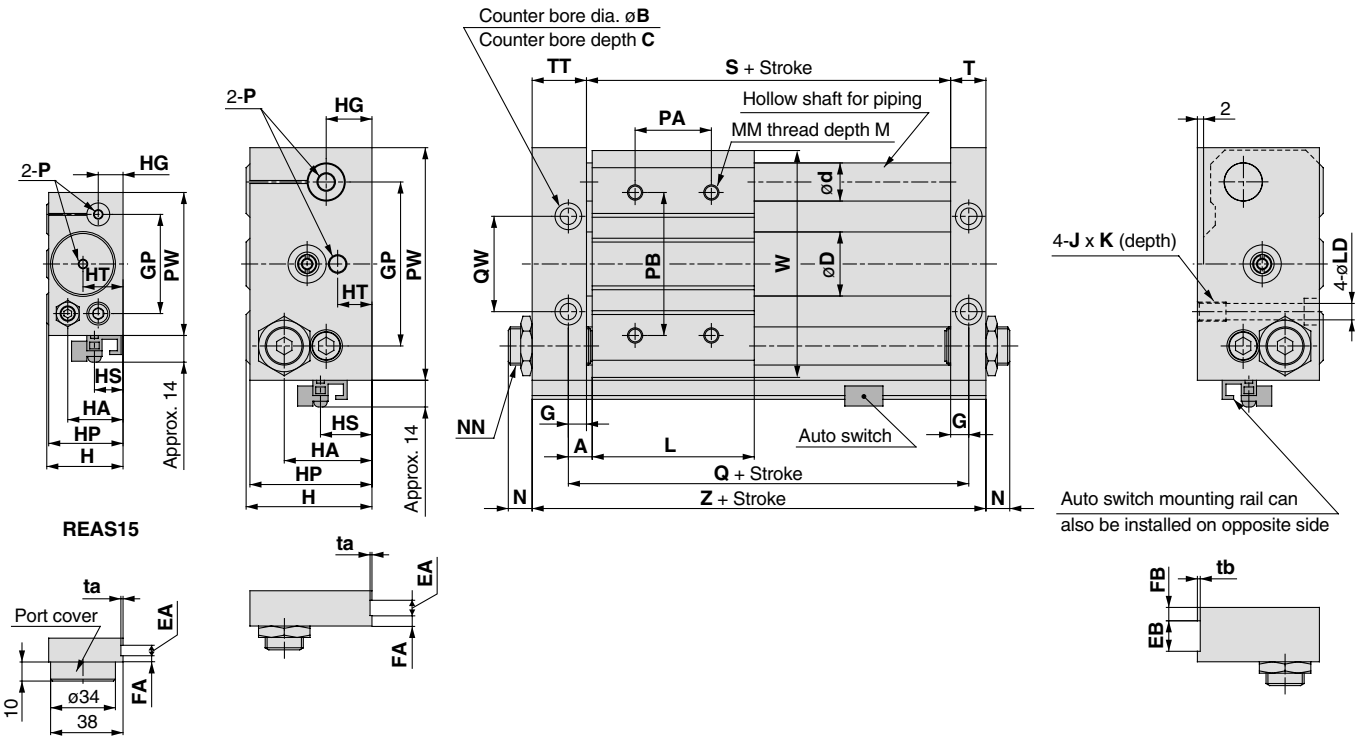
Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
20	**REAS20-PS**	Above numbers 28, 29, 30, 31, 32, 33, 34
25	**REAS25-PS**	
32	**REAS32-PS**	
40	**REAS40-PS**	

Dimensions/ø10



Dimensions/ø15 to ø40



(mm)

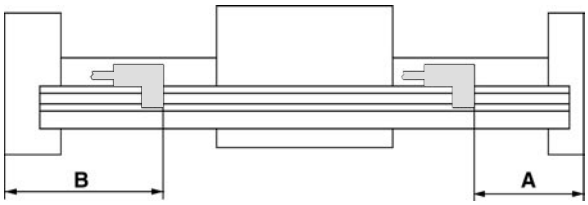
Model	A	B	C	D	d	EA	EB	FA	FB	G	GP	H	HA	HG
REAS15	7.5	9.5	5	16.6	12	6	13	3	6	6.5	52	40	29	13
REAS20	10	9.5	5	21.6	16	–	–	–	–	8.5	62	46	36	17
REAS25	10	11	6.5	26.4	16	8	14	4	7	8.5	70	54	40	20
REAS32	12.5	14	8	33.6	20	8	16	5	7	9.5	86	66	46	24
REAS40	12.5	14	8	41.6	25	10	20	5	10	10.5	104	76	57	25

Model	HP	HS	HT	J x K	L	LD	M	MM	N	NN
REAS15	39	15	21	M6 x 9.5	60	5.6	8	M5	7.5	M8 x 1.0
REAS20	45	25.5	10	M6 x 9.5	70	5.6	10	M6	9.5	M10 x 1.0
REAS25	53	23	10	M8 x 10	70	7	10	M6	11	M14 x 1.5
REAS32	64	27	17	M10 x 15	85	8.7	12	M8	11.5	M20 x 1.5
REAS40	74	31	14	M10 x 15	95	8.7	12	M8	10.5	M20 x 1.5

Model	P	PA*	PB	PW	Q	QW	S	T	TT	ta	tb	W	Z
REAS15	M5	30	50	75	75	30	62	12.5	22.5	0.5	1	72	97
REAS20	Rc 1/8	40	70	90	90	38	73	16.5	25.5	–	–	87	115
REAS25	Rc 1/8	40	70	100	90	42	73	16.5	25.5	0.5	1	97	115
REAS32	Rc 1/8	40	75	122	110	50	91	18.5	28.5	0.5	1	119	138
REAS40	Rc 1/4	65	105	145	120	64	99	20.5	35.5	1	1	142	155

* PA dimensions are for split from center.

Proper Auto Switch Mounting Position for Stroke End Detection



(mm)

Auto switch model / Bore size (mm)	Dimension A				Dimension B			
	D-A73/A80	D-A72 D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-J79C D-F7□V	D-F7□W/J79W D-F7□WV D-F7LF Note 1) D-F79F D-F7BAL	D-F7NTL	D-A73/A80	D-A72 D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-J79C D-F7□V	D-F7□W/J79W D-F7□WV D-F7LF Note 1) D-F79F D-F7BAL	D-F7NTL
10	35	35.5	39.5	40.5	45	44.5	40.5	39.5
15	34.5	35	39	40	62.5	62	58	57
20	64	64.5	68.5	69.5	50	49.5	45.5	44.5
25	44	44.5	48.5	49.5	71	70.5	66.5	65.5
32	55	55.5	59.5	59.5	83	82.5	78.5	77.5
40	61	61.5	65.5	65.5	94	93.5	89.5	88.5

Note1) Model D-F7LF cannot be mounted on bore size ø10.

Auto Switch Operating Range

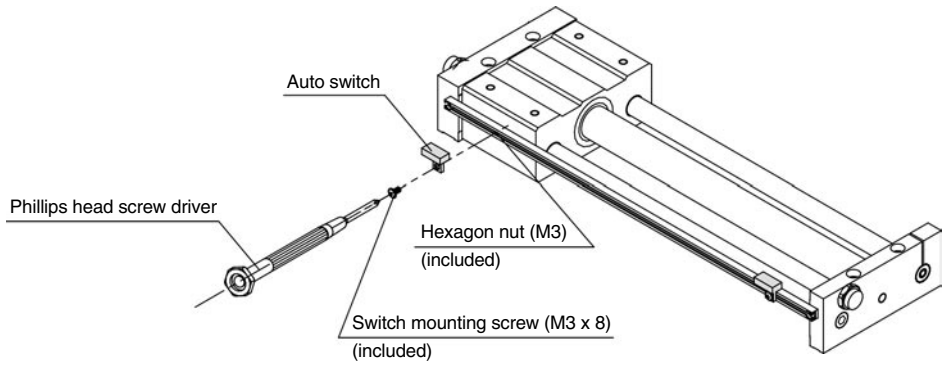
(mm)

Auto switch model / Bore size (mm)	D-A7□/A80 D-A7□H/A80H D-A73C/A80C	D-F7□/J79 D-J79C D-F7□V D-F7NTL D-F7□W/J79W D-F7□WV D-F7BAL	D-F7LF D-F79F
10	6	3	4.5
15	6	4	4.5
20	6	3	4.5
25	6	3	4.5
32	6	3	4.5
40	6	3.5	4.5

Note) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment. (variations on the order of ±30%)

Auto Switch Mounting

When mounting an auto switch, the switch mounting screw should be screwed into a hexagon nut (M3 x 0.5) which has been inserted into the groove of the switch rail. (The tightening torque should be about 0.05 to 0.1N·m.)



Sine Rodless Cylinder

Series REAL
Slider Type/Ball Bushing

How to Order

REA L 25 — 300 — A72 □

Sine rodless cylinder

Slider type (ball bushing)

Bore size

10	10mm	**25**	25mm
15	15mm	**32**	32mm
20	20mm	**40**	40mm

Auto switch type

Nil	Without auto switch

Note 1) Refer to the table below for applicable auto switch models.

Note 2) In cases without auto switches, there are switch rails only.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Standard stroke

Refer to the standard stroke table on page 4.3-36.

Applicable auto switches / Refer to "Auto Switch Guide" (E-274-A) for further details on auto switch units. Refer to page 5.3-2 for further details on auto switch units.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model: Electrical entry direction Perpendicular	Auto switch model: Electrical entry direction In-line	Lead wire length (m) Note 1) 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Applicable load	
Reed switches	—	Grommet	Yes	3 wire (NPN equiv.)	—	5V	—	—	**A76H**	●	●	—	—	IC circuit	—
				2 wire	—	—	200V	**A72**	**A72H**	●	●	—	—	—	Relay, PLC
					24V	12V	100V	**A73**	**A73H**	●	●	●	—		
			No			5V, 12V	100V or less	**A80**	**A80H**	●	●	—	—	IC circuit	
		Connector	Yes			12V	—	**A73C**	—	●	●	●	●	—	
			No			5V, 12V	24V or less	**A80C**	—	●	●	●	●	IC circuit	
Solid state switches	—	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	—	**F7NV**	**F79**	●	●	○	—	IC circuit	Relay, PLC
				3 wire (PNP)				**F7PV**	**F7P**	●	●	○	—		
				2 wire		12V		**F7BV**	**J79**	●	●	○	—	—	
		Connector						**J79C**	—	●	●	●	●		
	Diagnostic indication (2 colour indicator)	Grommet		3 wire (NPN)		5V, 12V		**F7NWV**	**F79W**	●	●	○	—	IC circuit	
				3 wire (PNP)				—	**F7PW**	●	●	○	—		
				2 wire		12V		**F7BWV**	**J79W**	●	●	○	—	—	
	Water resistant (2 colour indicator)							—	**F7BA**	—	●	○	—		
	With timer			3 wire (NPN)		5V, 12V		—	**F7NT**	—	●	○	—	IC circuit	
	With diagnostic output (2 colour indicator)			4 wire (NPN)				—	**F79F**	●	●	○	—		
	Latch type with diagnostic output (2 colour indicator)					—		—	Note 3) **F7LF**	●	●	○	—	—	

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) A80C
3m ..... L (Example) A80CL
5m ..... Z (Example) A80CZ
None ..... N (Example) A80CN

Note 2) Solid state auto switches marked with a "○" are produced upon receipt of order.

Note 3) Type D-F7LF cannot be mounted on bore size ø10.

Series REAL

Specifications

Fluid	Air
Proof pressure	1.05MPa
Maximum operating pressure	0.7MPa
Minimum operating pressure	0.18MPa
Ambient and fluid temperature	–10 to 60°C
Piston speed	50 to 300mm/s
Lubrication	Non-lube
Stroke length tolerance	0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st and up: $^{+1.8}_{0}$

Standard Strokes

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke (mm)
10	150, 200, 250, 300	500
15	150, 200, 250, 300, 350, 400 450, 500	750
20	200, 250, 300, 350, 400, 450 500, 600, 700, 800	1000
25		1500
32		
40	200, 250, 300, 350, 400, 450 500, 600, 700, 800, 900, 1000	1500

Note) Intermediate strokes can be arranged in 1mm increments.

Magnetic Holding Force

(N)

Bore size (mm)	**10**	**15**	**20**	**25**	**32**	**40**
Holding force	53.9	137	231	363	588	922

Weights

(kg)

Bore size (mm)	**10**	**15**	**20**	**25**	**32**	**40**
Basic weight	0.58	1.10	1.85	2.21	4.36	4.83
Additional weight per 50mm stroke	0.077	0.104	0.138	0.172	0.267	0.406

Calculation method/Example: REALS32-500
Basic weight ..... 4.36kg Additional weight ..... 0.267/50mm Cylinder stroke ... 500mm
4.36 + 0.267 x 500 ÷ 50 = 7.03kg

⚠ Specific Product Precautions

Operation

⚠ Warning

1. Be aware of the space between the plates and the slide block.

Take sufficient care as fingers and hands, etc., may be injured if caught while the cylinder is in operation.

2. Do not apply a load to a cylinder which is greater than the allowable value stated in the "model selection pages".

Mounting

⚠ Caution

1. Avoid operation with the external slider fixed to the mounting surface.

The cylinder should be operated with the plates fixed to the mounting surface.

2. Perform mounting so that the external slider will operate through the entire stroke at the minimum operating pressure.

If the mounting surface is not flat, the guides will be warped, increasing the minimum operating pressure and causing premature wear of the bearings. Therefore, mounting should be performed so that the external slider will operate through the entire stroke at the minimum operating pressure. A mounting surface with a high degree of flatness is desirable, but in cases where this is not possible, adjust with shims, etc.

Series REAL
Model Selection 1

Pv: Maximum operating pressure for vertical operation (MPa)
WA: Allowable load weight based on these operating conditions (kg)
Wv: Allowable load weight for vertical operation (kg)
σ: Stroke coefficient

$$\sigma = \frac{\text{Load weight within stroke}}{\text{Max. load weight}}$$

Operating conditions
- W: Load weight (kg)
- U: Maximum speed (mm/s)
- P: Operating pressure (MPa)
- Stroke (mm)
- L0: Distance from slide block mounting surface to work piece centre of gravity (cm)
- Mode of operation (horizontal, inclined, vertical)

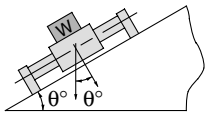
Mode of operation

- Horizontal operation
- Inclined operation
- Vertical operation

Review of load weight and operating pressure

First tentative bore size determination

- Horizontal: $\varnothing D \geq 1.6 \times \sqrt{\frac{W}{P}}$
- Inclined: $\varnothing D \geq 5.0 \times \sqrt{\frac{0.1 \times W\cos\theta + W\sin\theta}{P}}$
- Vertical: $\varnothing D \geq 5.0 \times \sqrt{\frac{0.1 \times W + W}{P}}$



Inclined operation

Determination of allowable load weight & pressure

W > Wv, P > Pv → Review of load weight and operating pressure

(Refer to page 4.3-41 for vertical operation.)

W ≤ Wv, P ≤ Pv

(Refer to page 4.3-39 for formulas to find σ.)

Calculate stroke coefficient (σ) with stroke and tentatively determined bore size

$$\sigma = \frac{\text{Load weight in stroke}}{\text{Maximum load weight}}$$

Select an example calculation for allowable weight based on cylinder mounting orientation

(Refer to pages 4.3-39 and 4.3-40.)

Calculate (WA) from the formula for the tentatively determined bore size

W > WA → Review of bore size, stroke and L0

W ≤ WA

(Refer to Data B on page 4.3-39.)

Second tentative determination of bore size from graph of maximum speed (U) and load weight (W)

(The larger bore size is selected from two tentative determinations.)

Bore size determination

Note 1)

Review of order made products based on operating conditions

Note 1) Depending on the operating environment, etc., order made products should also be reviewed.

(Refer to pages 4.3-86 through 4.3-90.)

Model determination

Series REAL
Model Selection 2

Design Parameters 1

How to Find σ when Selecting the Allowable Load Weight

Since the maximum load weight with respect to the cylinder stroke changes as shown in the table below, σ should be considered as a coefficient determined in accordance with each stroke.

Example) for REAL25−650

(1) Maximum load weight = 20kg

(2) Load weight for 650st = 13.6kg

(3) $\sigma = \frac{13.6}{20} = 0.68$ is the result.

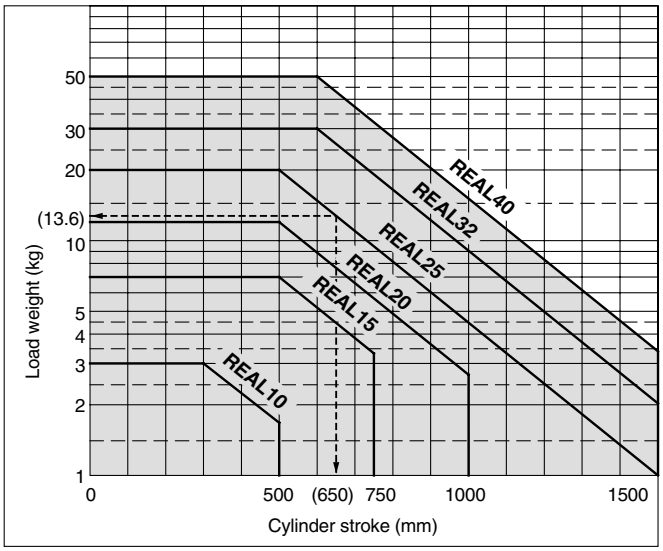
Calculation formula for σ (σ ≤ 1)

ST: Stroke (mm)

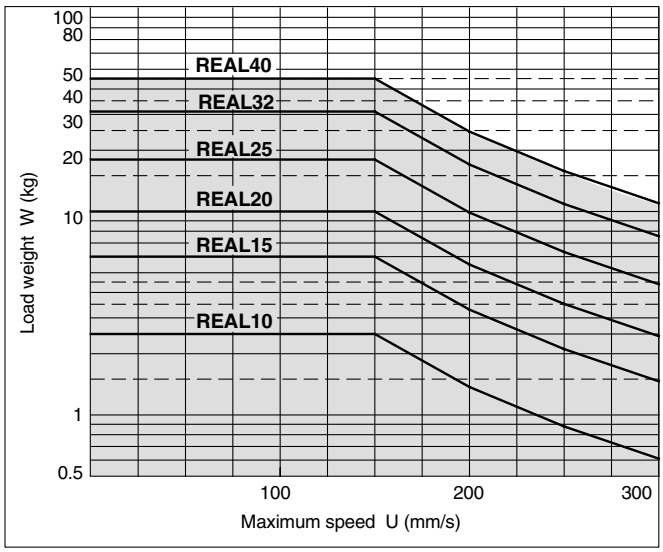
Model	REAL10	REAL15	REAL20
σ =	$\frac{10^{(0.86-1.3\times10^{-3}\times ST)}}{3}$	$\frac{10^{(1.5-1.3\times10^{-3}\times ST)}}{7}$	$\frac{10^{(1.71-1.3\times10^{-3}\times ST)}}{12}$

Model	REAL25	REAL32	REAL40
σ =	$\frac{10^{(1.98-1.3\times10^{-3}\times ST)}}{20}$	$\frac{10^{(2.26-1.3\times10^{-3}\times ST)}}{30}$	$\frac{10^{(2.48-1.3\times10^{-3}\times ST)}}{50}$

Note) Calculate with σ = 1 for all applications up to ø10–300mmST, ø15–500mmST, ø20–500mmST, ø25–500mmST, ø32–600mmST and ø40–600mmST.

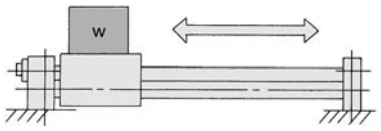


<Data B: Maximum speed —— Load weight chart>



Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

1. Horizontal operation (floor mounting)

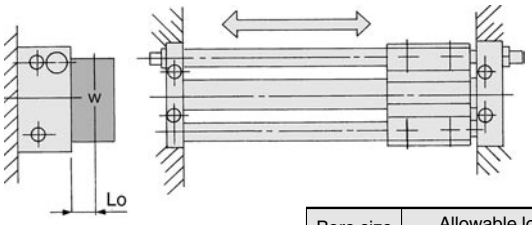


Maximum load weight (centre of slide block) (kg)

Bore size (mm)	10	15	20	25	32	40
Max. load weight (kg)	3	7	12	20	30	50
Stroke (max)	to 300st	to 500st	to 500st	to 500st	to 600st	to 600st

The above maximum load weight values will change with the stroke length for each cylinder size, due to limitation from warping of the guide shafts. (Take note of the coefficient σ.) Moreover, depending on the operating direction, the allowable load weight may be different from the maximum load weight.

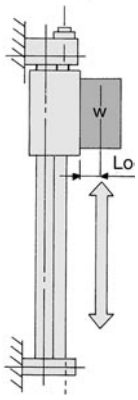
2. Horizontal operation (wall mounting)



Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	Allowable load weight W_A (kg)
10	$\frac{\sigma\cdot15.0}{8.9+2Lo}$
15	$\frac{\sigma\cdot45.5}{11.3+2Lo}$
20	$\frac{\sigma\cdot101}{13.6+2Lo}$
25	$\frac{\sigma\cdot180}{15.2+2Lo}$
32	$\frac{\sigma\cdot330}{18.9+2Lo}$
40	$\frac{\sigma\cdot624}{22.5+2Lo}$

3. Vertical operation



Bore size (mm)	Allowable load weight W_A (kg)
10	$\frac{\sigma\cdot5.00}{1.95+Lo}$
15	$\frac{\sigma\cdot15.96}{2.4+Lo}$
20	$\frac{\sigma\cdot31.1}{2.8+Lo}$
25	$\frac{\sigma\cdot54.48}{3.1+Lo}$
32	$\frac{\sigma\cdot112.57}{3.95+Lo}$
40	$\frac{\sigma\cdot212.09}{4.75+Lo}$

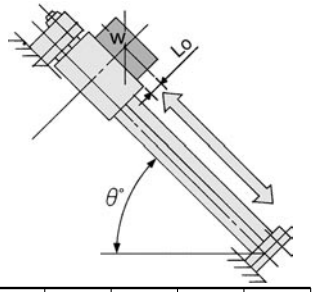
Lo: Distance from mounting surface to load centre of gravity (cm)
Note) A safety factor should be considered to prevent dropping.

Series REAL
Model Selection 3

Design Parameters 2

Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

4. Inclined operation (in operating direction)



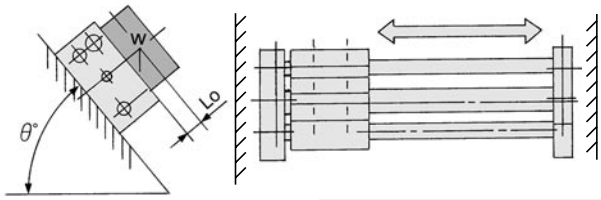
Angle	to 45j	to 60j	to 75j	to 90j
k	1	0.9	0.8	0.7

Angle coefficient (k): k = [to 45j (= θ)] = 1,
[to 60j] = 0.9,
[to 75j] = 0.8,
[to 90j] = 0.7

Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	Allowable load weight WA (kg)
10	$\frac{\sigma \cdot 10.2 \cdot K}{2.8\cos\theta + 2\,(1.95 + Lo)\sin\theta}$
15	$\frac{\sigma \cdot 31.1 \cdot K}{2.9\cos\theta + 2\,(2.4 + Lo)\sin\theta}$
20	$\frac{\sigma \cdot 86.4 \cdot K}{6\cos\theta + 2\,(2.8 + Lo)\sin\theta}$
25	$\frac{\sigma \cdot 105.4 \cdot K}{3.55\cos\theta + 2\,(3.1 + Lo)\sin\theta}$
32	$\frac{\sigma \cdot 178 \cdot K}{4\cos\theta + 2\,(3.95 + Lo)\sin\theta}$
40	$\frac{\sigma \cdot 361.9 \cdot K}{5.7\cos\theta + 2\,(4.75 + Lo)\sin\theta}$

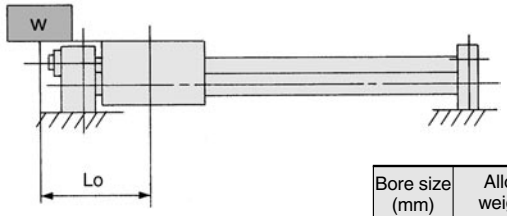
5. Inclined operation (at a right angle to operating direction)



Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	Allowable load weight WA (kg)
10	$\frac{\sigma \cdot 15}{5 + 2\,(1.95 + Lo)\sin\theta}$
15	$\frac{\sigma \cdot 45.5}{6.5 + 2\,(2.4 + Lo)\sin\theta}$
20	$\frac{\sigma \cdot 115}{8 + 2\,(2.8 + Lo)\sin\theta}$
25	$\frac{\sigma \cdot 180}{9 + 2\,(3.1 + Lo)\sin\theta}$
32	$\frac{\sigma \cdot 330}{11 + 2\,(3.95 + Lo)\sin\theta}$
40	$\frac{\sigma \cdot 624}{13 + 2\,(4.75 + Lo)\sin\theta}$

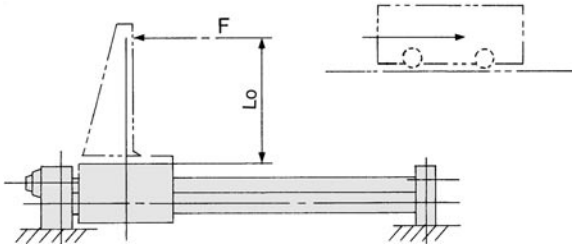
6. Load centre offset in operating direction (Lo)



Lo: Distance from slide block centre to load centre of gravity (cm)

Bore size (mm)	Allowable load weight WA (kg)
10	$\frac{\sigma \cdot 5.6}{Lo + 2.8}$
15	$\frac{\sigma \cdot 13.34}{Lo + 2.9}$
20	$\frac{\sigma \cdot 43.2}{Lo + 6}$
25	$\frac{\sigma \cdot 46.15}{Lo + 3.55}$
32	$\frac{\sigma \cdot 80}{Lo + 4}$
40	$\frac{\sigma \cdot 188.1}{Lo + 5.7}$

7. Horizontal operation (pushing load, pusher)

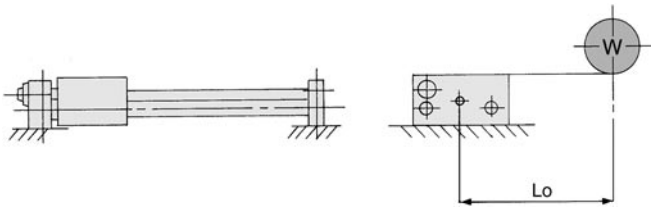


F: Drive (from slide block to position Lo) resistance force (kg)
Lo: Distance from mounting surface to load centre of gravity (cm)

Bore size (mm)	10	15	20
Allowable load weight (WA)(kg)	$\frac{\sigma \cdot 5.55}{1.95 + Lo}$	$\frac{\sigma \cdot 15.96}{2.4 + Lo}$	$\frac{\sigma \cdot 41.7}{2.8 + Lo}$

Bore size (mm)	25	32	40
Allowable load weight (WA)(kg)	$\frac{\sigma \cdot 58.9}{3.1 + Lo}$	$\frac{\sigma \cdot 106.65}{3.95 + Lo}$	$\frac{\sigma \cdot 228}{4.75 + Lo}$

8. Horizontal operation (load, lateral offset Lo)



Lo: Distance from centre of slide block to load's centre of gravity (cm)

Bore size (mm)	10	15	20
Allowable load weight (WA)(kg)	$\frac{\sigma \cdot 15}{5 + Lo}$	$\frac{\sigma \cdot 45.5}{6.5 + Lo}$	$\frac{\sigma \cdot 80.7}{8 + Lo}$

Bore size (mm)	25	32	40
Allowable load weight (WA)(kg)	$\frac{\sigma \cdot 144}{9 + Lo}$	$\frac{\sigma \cdot 275}{11 + Lo}$	$\frac{\sigma \cdot 520}{13 + Lo}$

Series REAL
Model Selection 4

Design Parameters 3

Vertical Operation

When operating a load vertically, it should be operated within the allowable load weights and maximum operating pressures shown in the table below.
Use caution, as operating above the prescribed values may lead to dropping of the load.

Bore size (mm)	Model	Allowable load weight Wv (kg)	Max. operating pressure Pv (MPa)
10	**REAL10**	2.7	0.55
15	**REAL15**	7.0	0.65
20	**REAL20**	11.0	0.65
25	**REAL25**	18.5	0.65
32	**REAL32**	30.0	0.65
40	**REAL40**	47.0	0.65

Note) Use caution, as there is a possibility of breaking the magnetic coupling if operated above the maximum operating pressure.

Intermediate Stops

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

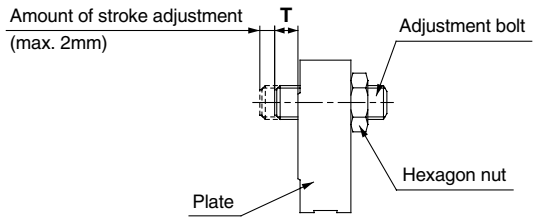
Model	Stroke (mm)
REAL10	20
REAL15	25
REAL20	30
REAL25	30
REAL32	30
REAL40	35

Stroke Adjustment

The adjustment bolt is adjusted to the optimum position for smooth acceleration and deceleration at the time of shipment, and should be operated at the full stroke. When stroke adjustment is necessary, the maximum amount of adjustment on one side is 2mm. (Do not adjust more than 2mm, as it will not be possible to obtain smooth acceleration and deceleration.)

Stroke Adjustment

Loosen the hexagon nut, and after performing the stroke adjustment from the plate side with a hexagon wrench, retighten and secure the hexagon nut.

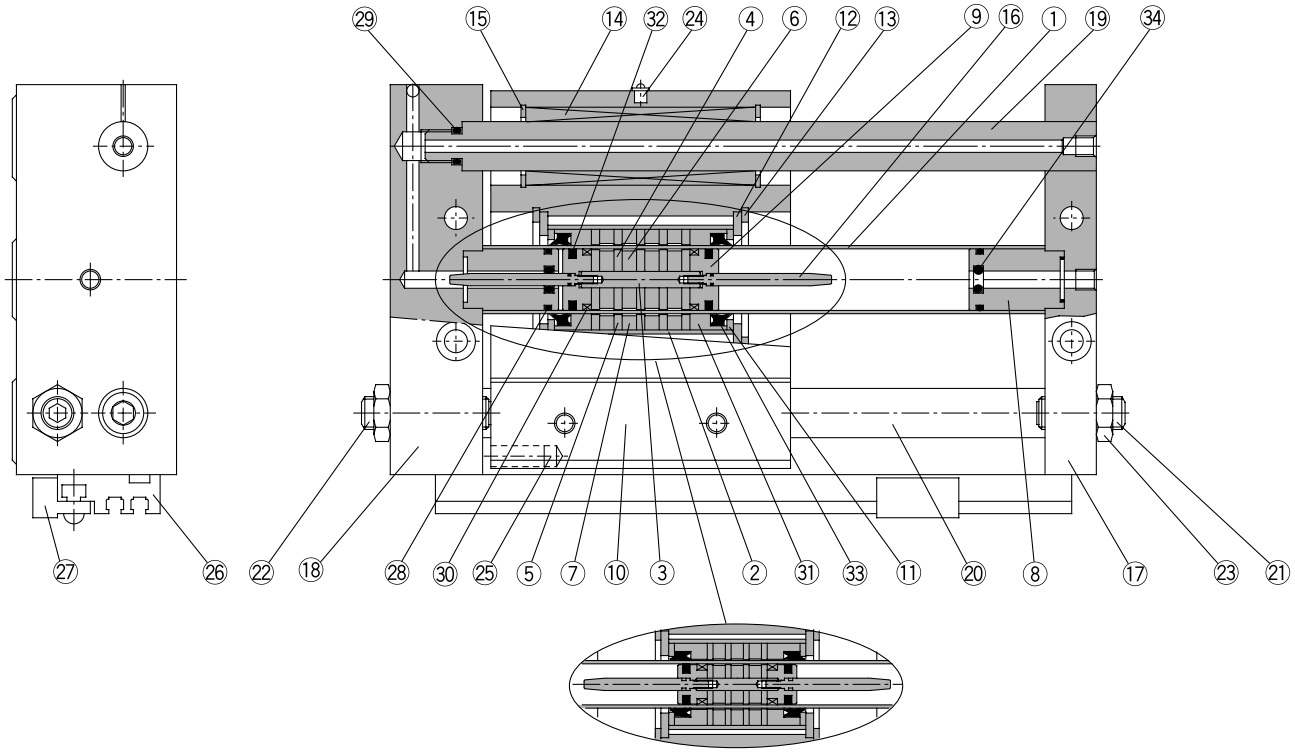


Adjustment Bolt Position (at Shipment), Hexagon Nut Tightening Torque

Model	T (mm)	Tightening torque (N·m)
REAL10	1	1.67
REAL15	1	
REAL20	1	3.14
REAL25	1	10.8
REAL32	1	23.5
REAL40	1	

Series REAL

Construction/ø10, ø15



REAL10

Parts list

No.	Description	Material	Note
1	**Cylinder tube**	Stainless steel	
2	**External slider tube**	Aluminum alloy	
3	**Shaft**	Stainless steel	
4	**Piston side yoke**	Rolled steel plate	Zinc chromated
5	**External slider side yoke**	Rolled steel plate	Zinc chromated
6	**Magnet A**	Rare earth magnet	
7	**Magnet B**	Rare earth magnet	
8	**Cushion seal holder**	Aluminum alloy	Anodized
9	**Piston**	Brass	Electroless nickel plated
10	**Slide block**	Aluminum alloy	Hard anodized
11	**Spacer**	Rolled steel plate	Nickel plated
12	**Slider spacer**	Rolled steel plate	Nickel plated
13	**Snap ring**	Carbon tool steel	Nickel plated
14	**Ball bushing**	–	
15	**Snap ring**	Carbon tool steel	Nickel plated
16	**Cushion ring**	Stainless steel	
17	**Plate A**	Aluminum alloy	Hard anodized

Parts list

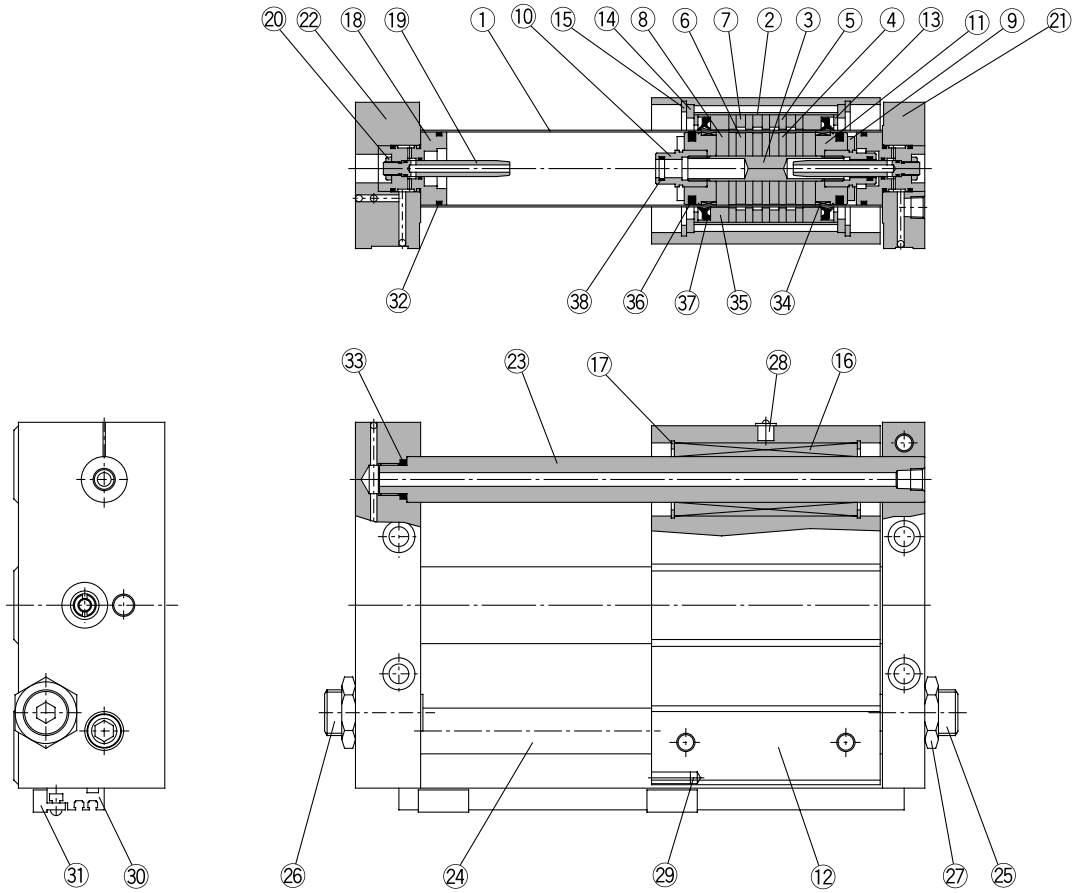
No.	Description	Material	Note
18	**Plate B**	Aluminum alloy	Hard anodized
19	**Guide shaft A**	Carbon steel	Hard chrome plated
20	**Guide shaft B**	Carbon steel	Hard chrome plated
21	**Adjustment bolt A**	Chromium molybdenum steel	Nickel plated
22	**Adjustment bolt B**	Chromium molybdenum steel	Nickel plated
23	**Hexagon nut**	Carbon steel	Nickel plated
24	**Nipple**	Carbon steel	Nickel plated (except REAL10)
25	**Magnet for auto switch**	Rare earth magnet	
26	**Switch mounting rail**	Aluminum alloy	
27	**Auto switch**	–	
28*	**Cylinder tube gasket**	NBR	
29*	**Guide shaft gasket**	NBR	
30*	**Wear ring A**	Special resin	
31*	**Wear ring B**	Special resin	
32*	**Piston seal**	NBR	
33*	**Scraper**	NBR	
34*	**Cushion seal**	NBR	

* Seal kits are sets consisting of items 28 through 34 above, and can be ordered using the kit number for each bore size.

Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
10	**REAS10-PS**	Above numbers 28, 29, 30, 31, 32, 33, 34
15	**REAS15-PS**	

Construction/ø20 to ø40



Parts list

No.	Description	Material	Note
1	**Cylinder tube**	Stainless steel	
2	**External slider tube**	Aluminum alloy	
3	**Shaft**	Stainless steel	
4	**Piston side yoke**	Rolled steel plate	Zinc chromated
5	**External slider side yoke**	Rolled steel plate	Zinc chromated
6	**Magnet A**	Rare earth magnet	
7	**Magnet B**	Rare earth magnet	
8	**Piston side spacer**	Aluminum alloy	Chromated
9	**Bumper**	Urethane rubber	
10	**Cushion seal holder**	Aluminum alloy	Chromated
11	**Piston**	Aluminum alloy	Chromated
12	**Slide block**	Aluminum alloy	Hard anodized
13	**Spacer**	Rolled steel plate	Nickel plated
14	**Slider spacer**	Carbon steel	Nickel plated
15	**Snap ring**	Carbon tool steel	Nickel plated
16	**Ball bushing**	–	
17	**Snap ring**	Carbon tool steel	Nickel plated
18	**Cushion ring holder**	Aluminum alloy	Anodized
19	**Cushion ring**	Brass	Electroless nickel plated (REAL32, 40)
		Stainless steel	REAL20, 25

Parts list

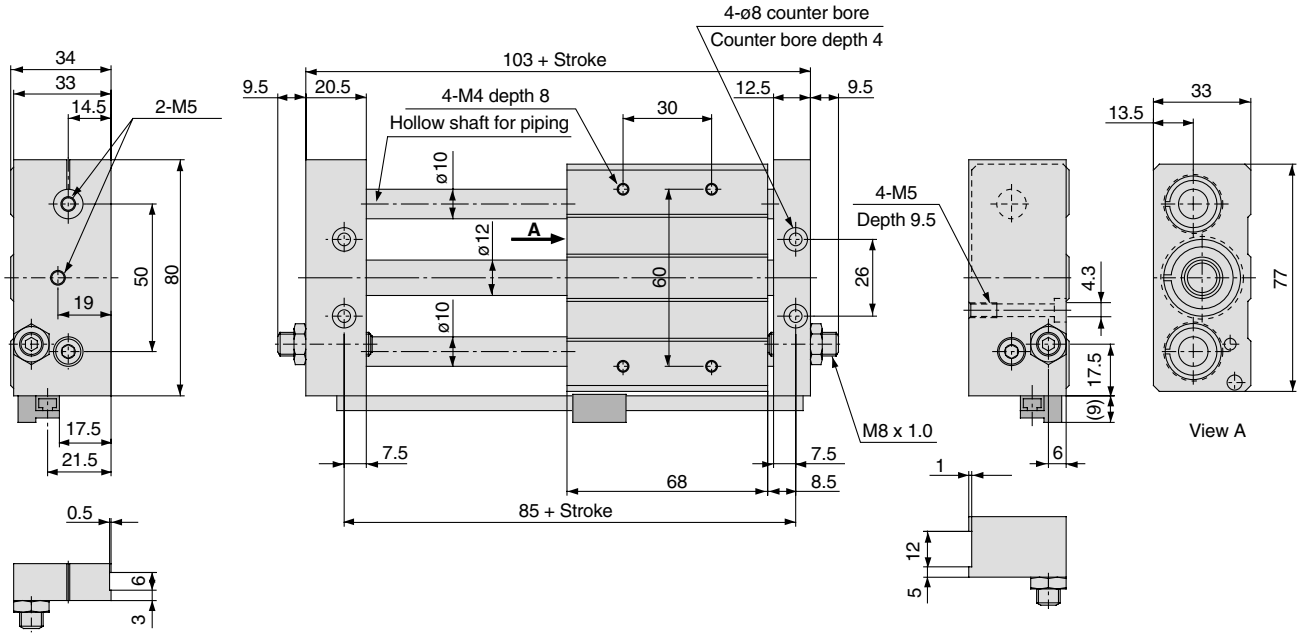
No.	Description	Material	Note
20	**Lock nut B**	Carbon steel	Nickel plated
21	**Plate A**	Aluminum alloy	Hard anodized
22	**Plate B**	Aluminum alloy	Hard anodized
23	**Guide shaft A**	Carbon steel	Hard chrome plated
24	**Guide shaft B**	Carbon steel	Hard chrome plated
25	**Adjustment bolt A**	Chromium molybdenum steel	Nickel plated
26	**Adjustment bolt B**	Chromium molybdenum steel	Nickel plated
27	**Hexagon nut**	Carbon steel	Nickel plated
28	**Nipple**	Brass	Nickel plated
29	**Magnet for auto switch**	Rare earth magnet	
30	**Switch mounting rail**	Aluminum alloy	
31	**Auto switch**	–	
32*	**Cylinder tube gasket**	NBR	
33*	**Guide shaft gasket**	NBR	
34*	**Wear ring A**	Special resin	
35*	**Wear ring B**	Special resin	
36*	**Piston seal**	NBR	
37*	**Scraper**	NBR	
38*	**Cushion seal**	NBR	

* Seal kits are sets consisting of items 32 through 38 above, and can be ordered using the kit number for each bore size.

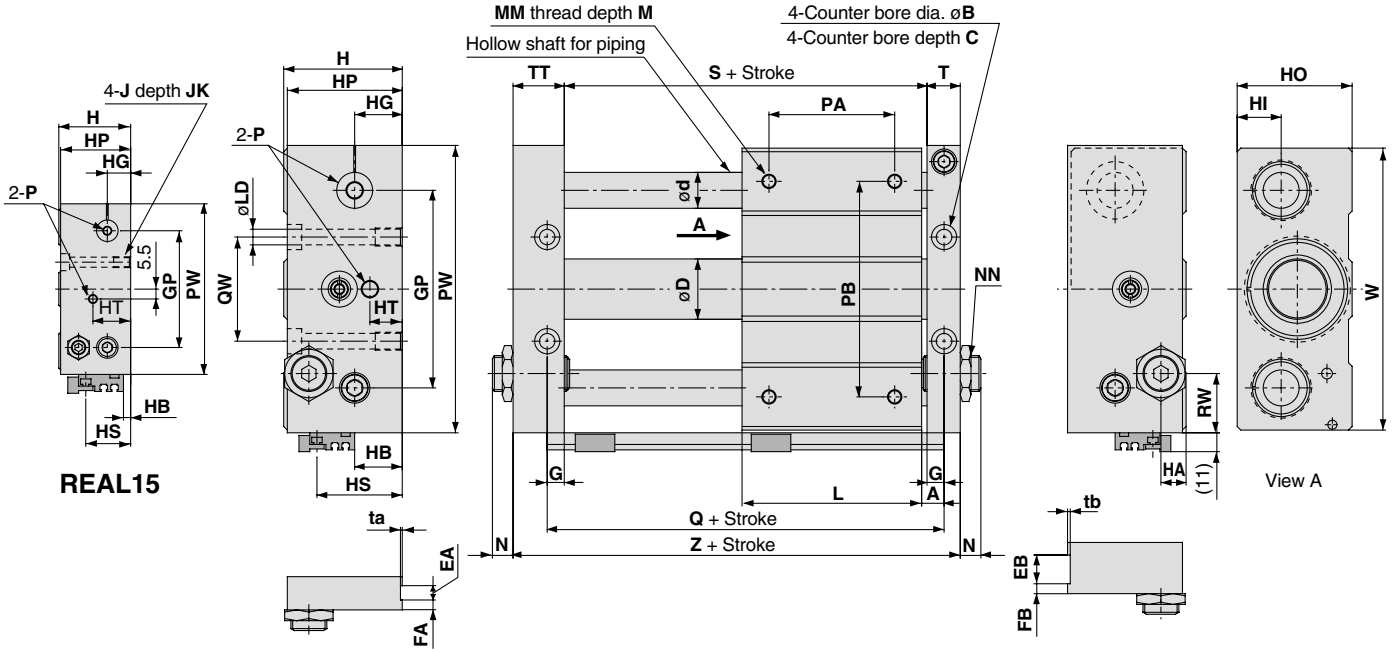
Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
20	**REAS20-PS**	Above numbers 32, 33, 34, 35, 36, 37, 38
25	**REAS25-PS**	
32	**REAS32-PS**	
40	**REAS40-PS**	

Dimensions/ø10



Dimensions/ø15 to ø40



(mm)

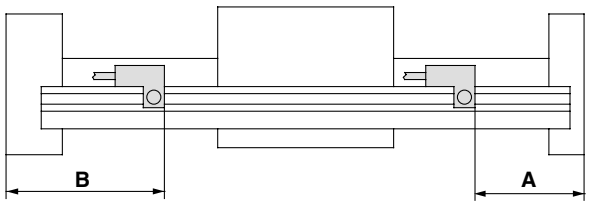
Model	A	B	C	D	d	EA	EB	FA	FB	G	GP	H	HA	HB	HG	HI	HO	HP
REAL15	7.5	9.5	5	16.6	12	6	13	3	6	6.5	65	40	6.5	4	16	14	38	39
REAL20	9.5	9.5	5	21.6	16	–	–	–	–	8.5	80	46	9	10	18	16	44	45
REAL25	9.5	11	6.5	26.4	16	8	14	4	7	8.5	90	54	9	18	23	21	52	53
REAL32	10.5	14	8	33.6	20	8	16	5	7	9.5	110	66	12	26.5	26.5	24.5	64	64
REAL40	11.5	14	8	41.6	25	10	20	5	10	10.5	130	78	12	35	30.5	28.5	76	74

Model	HS	HT	J	JK	L	LD	M	MM	N	NN	P	PA*	PB	PW
REAL15	25	21	M6	9.5	75	5.6	8	M5	7.5	M8 x 1.0	M5	45	70	95
REAL20	31	10	M6	10	86	5.6	10	M6	10	M10 x 1.0	Rc 1/8	50	90	120
REAL25	39	10	M8	10	86	7	10	M6	11	M14 x 1.5	Rc 1/8	60	100	130
REAL32	47.5	17	M10	15	100	9.2	12	M8	11.5	M20 x 1.5	Rc 1/8	70	120	160
REAL40	56	14	M10	15	136	9.2	12	M8	10.5	M20 x 1.5	Rc 1/4	90	140	190

* PA dimensions are for split from center.

Model	Q	QW	RW	S	T	TT	ta	tb	W	Z
REAL15	90	30	15	77	12.5	22.5	0.5	1.0	92	112
REAL20	105	40	28	88	16.5	25.5	–	–	117	130
REAL25	105	50	22	88	16.5	25.5	0.5	1.0	127	130
REAL32	121	60	33	102	18.5	28.5	0.5	1.0	157	149
REAL40	159	84	35	138	20.5	35.5	1.0	1.0	187	194

Proper Auto Switch Mounting Position for Stroke End Detection



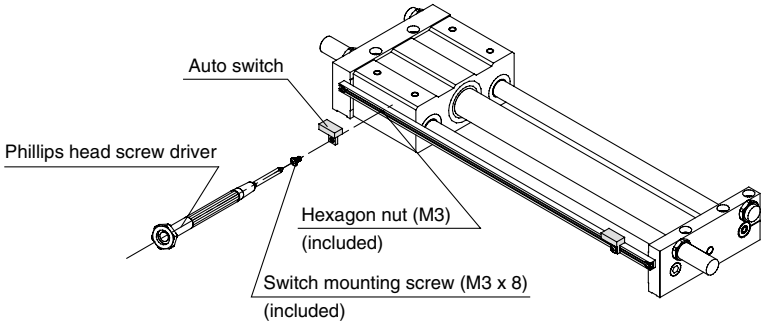
(mm)

Auto switch model / Bore size (mm)	Dimension A				Dimension B			
	D-A73/A80	D-A72 D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-J79C D-F7□V	D-F7□W/J79W D-F7□WV D-F7LF Note 1) D-F79F D-F7BAL	D-F7NTL	D-A73/A80	D-A72 D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-J79C D-F7□V	D-F7□W/J79W D-F7□WV D-F7LF Note 1) D-F79F D-F7BAL	D-F7NTL
10	58	58.5	62.5	63.5	45	44.5	40.5	39.5
15	65	65.5	69.5	70.5	47	46.5	42.5	41.5
20	76	76.5	80.5	81.5	54	53.5	49.5	48.5
25	76	76.5	80.5	81.5	54	53.5	49.5	48.5
32	92	92.5	96.5	97.5	57	56.5	52.5	51.5
40	130	130.5	134.5	135.5	64	63.5	59.5	58.5

Note1) Model D-F7LF cannot be mounted on bore size ø10.

Auto Switch Mounting

When mounting an auto switch, the switch mounting screw should be screwed into a hexagon nut (M3 x 0.5) which has been inserted into the groove of the switch rail. (The tightening torque should be about 0.05 to 0.1N·m.)



Auto Switch Operating range

(mm)

Auto switch model / Bore size (mm)	D-A7□/A80 D-A7□H/A80H D-A73C/A80C	D-F7□/J79 D-J79C D-F7□V D-F7NTL D-F7□W/J79W D-F7□WV D-F7BAL	D-F7LF D-F79F
10	6	3	4.5
15	6	4	4.5
20	6	3	4.5
25	6	3	4.5
32	6	3	4.5
40	6	3.5	4.5

Note) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment. (variations on the order of ±30%)

Sine Rodless Cylinder

Series REAH
High Precision Guide Type

How to Order

REA H [ ] 25 — 300 — Z73 [ ]

Sine rodless cylinder

High precision guide type

Guide

Symbol \ Bore size (mm)		10	15	20	25	32
Nil	1 axis	●	●	●	●	–
T	2 axes	–	–	–	●	●

Bore size

10	10mm
15	15mm
20	20mm
25	25mm
32	32mm

Standard stroke (mm)

Refer to the standard stroke table on page 4.3-48.

Auto switch type

Nil	Without auto switch

∗ Refer to the table below for auto switch models.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Applicable auto switches /

Refer to "Auto Switch Guide" (E-274-A) for further details on auto switch units.
Refer to page 5.3-2 for further details on auto switch units.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model		Lead wire length (m) Note 1)			Applicable load	
					DC		AC	Electrical entry direction: Perpendicular	Electrical entry direction: In-line	0.5 (Nil)	3 (L)	5 (Z)		
Reed switches	–	Grommet	Yes	3 wire (NPN equiv.)	–	5V	–	–	Z76	●	●	–	IC circuit	–
				2 wire	24V	12V	100V	–	Z73	●	●	●	–	Relay, PLC
			No			5V, 12V	100V or less	–	Z80	●	●	–	IC circuit	
Solid state switches	–	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	–	Y69A	Y59A	●	●	○	IC circuit	Relay, PLC
				3 wire (PNP)				Y7PV	Y7P	●	●	○		
				2 wire		12V		Y69B	Y59B	●	●	○	–	
	Diagnostic indication (2 colour indicator)			3 wire (NPN)		5V, 12V		Y7NWV	Y7NW	●	●	○	IC circuit	
				3 wire (PNP)				Y7PWV	Y7PW	●	●	○		
				2 wire		12V		Y7BWV	Y7BW	●	●	○	–	

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) Y59A
3m ..... L (Example) Y59AL
5m ..... Z (Example) Y59AZ

Note 2) Solid state auto switches marked with a "○" are produced upon receipt of order.

Series REAH

Specifications

Bore size (mm)	10	15	20	25	32
Fluid	Air				
Action	Double acting				
Maximum operating pressure	0.7MPa				
Minimum operating pressure	0.2MPa				
Proof pressure	1.05MPa				
Ambient and fluid temperature	–10 to 60°C				
Piston speed	70 to 300mm/s				
Lubrication	Non-lube				
Stroke length tolerance	0 to 1.8mm				
Piping type	Centralized piping				
Piping port size	M5 x 0.8		Rc 1/8		

Standard Strokes

Bore size (mm)	Number of axes	Standard stroke (mm)	Maximum manufacturable stroke (mm)
10	1 axis	150, 200, 300	500
15		150, 200, 300, 400, 500	750
20		200, 300, 400, 500, 600	1000
25		200, 300, 400, 500, 600, 800	1200
25	2 axes	200, 300, 400, 500, 600, 800, 1000	
32			1500

Note 1) Strokes exceeding the standard strokes are available as a special order.
Note 2) Intermediate strokes other than order made (refer to page 91 for XB10) are available by special order.

Weights

(kg)

Model	Standard stroke mm							
	150	200	300	400	500	600	800	1000
REAH10	1.2	1.3	1.6	–	–	–	–	–
REAH15	2.5	2.7	3.2	3.6	4.1	–	–	–
REAH20	–	3.5	4.0	4.4	4.9	5.4	–	–
REAH25	–	5.3	6.0	6.6	7.3	8.0	9.4	–
REAHT25	–	6.2	7.3	8.3	9.4	10.4	12.5	14.6
REAHT32	–	9.6	10.7	11.9	13.0	14.2	16.5	18.8

Magnetic Holding Force

(N)

Bore size (mm)	10	15	20	25	32
Holding force	53.9	137	231	363	588

Theoretical Output

(N)

Bore size (mm)	Piston area (mm²)	Operating pressure (MPa)					
		0.2	0.3	0.4	0.5	0.6	0.7
10	78	15	23	31	39	46	54
15	176	35	52	70	88	105	123
20	314	62	94	125	157	188	219
25	490	98	147	196	245	294	343
32	804	161	241	322	402	483	563

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²).

⚠ Specific Product Precautions

Mounting

⚠ Caution

1. The interior is protected to a certain extent by the top cover, however, when performing maintenance, etc., take care not to cause scratches or other damage to the cylinder tube, slide table or linear guide by striking them or placing objects on them.

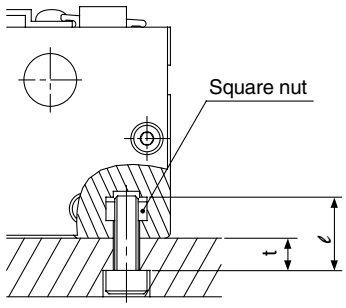
The bore and exterior of tubes are manufactured to precise tolerances, so that even a slight deformation can cause malfunction.

2. Since the slide table is supported by precision bearings, do not apply strong impacts or large moment, etc., when mounting work pieces.

3. Mounting of the cylinder body

The body is mounted using the square nuts, which are included, in the two T-slots on the bottom of the body. Refer to the table below for mounting bolt dimensions and tightening torque.

Model		REAH10	REAH15	REAH20	REAH25	REAHT25	REATH32
Bolt dimensions	Screw size	M4	M5		M6		M8
	Dimension t	ℓ-7	ℓ-8		ℓ-9		ℓ-12
Tightening torque	N·m	1.37	2.65		4.4		13.2



Operation

⚠ Caution

1. The unit can be used with a direct load within the allowable range, but when connecting to a load which has an external guide mechanism, careful alignment is necessary.

Since variation of the shaft center increases as the stroke becomes longer, a connection method should be devised which allows for this displacement.

2. Since the guide is adjusted at the time of shipment, unintentional movement of the adjustment setting should be avoided.

3. Contact SMC before operating in an environment where there will be contact with chips, dust (paper scraps, thread scraps, etc.) or cutting oil (gas oil, water, hot water, etc.).

4. Do not operate with the magnetic coupling out of position.

In case the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

Series REAH
Model Selection 1

Pv: Maximum operating pressure for vertical operation (MPa)
Wv: Allowable load weight for vertical operation (kg)
α: Load factor

$$\Sigma\alpha = \frac{\text{Load weight (W)}}{\text{Max. load weight (Wmax)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (Mmax)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Memax)}}$$

Operating conditions

- W: Load weight (kg)
- U: Maximum Speed (mm/s)
- P: Operating pressure (MPa)
- Stroke (mm)
- Position of work piece centre of gravity (m)
- Mode of operation (horizontal, inclined, vertical)

Mode of operation

Horizontal operation

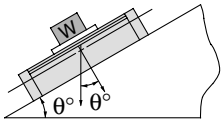
First tentative bore size determination

$$\varnothing D \geq 1.6 \times \sqrt{\frac{W}{P}}$$

Inclined operation

First tentative bore size determination

$$\varnothing D \geq 5.0 \times \sqrt{\frac{0.1 \times W\cos\theta + W\sin\theta}{P}}$$



Inclined operation

Vertical operation

First tentative bore size determination

$$\varnothing D \geq 5.0 \times \sqrt{\frac{0.1 \times W + W}{P}}$$

Review of load weight and operating pressure

W > Wv
P > Pv

Determination of allowable load weight & pressure

(Refer to page 4.3-53 for vertical operation.)

W ≤ Wv
P ≤ Pv

Review of operating conditions

Determination of load factor (Σα)

(Refer to page 4.3-51.)

$\Sigma\alpha > 1$

$\Sigma\alpha \leq 1$

(Refer to Data B on page 4.3-51.)

Second tentative determination of bore size from graph of maximum speed (U) and load weight (W).

Bore size determination

(The larger bore size is selected from two tentative determinations)

Note 1)

Review of order made products based on operating conditions

(Refer to pages 4.3-86 through 4.3-90.)

Model determination

Note 1) Depending on the operating environment, etc., order made products should also be reviewed.

Series REAH
Model Selection 2

Design Parameters 1

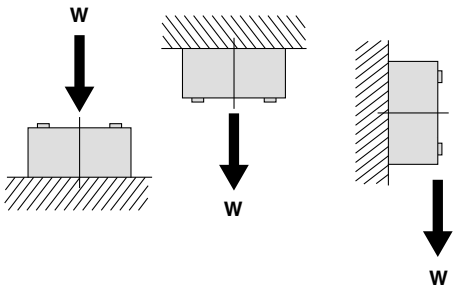
The maximum load weight and allowable moment will differ depending on the work piece mounting method , cylinder mounting orientation and piston speed.
A determination of suitability for use should be performed so that the total (Σαn) of the load factors (αn) for each weight and moment does not exceed 1.

$$\Sigma\alpha n = \frac{\text{Load weight (W)}}{\text{Max. load weight (Wmax)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (Mmax)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Memax)}} \leq 1$$

Load weight

Max. load weight (kg)

Model	W_{max}
REAH10	4
REAH15	9
REAH20	16
REAH25	25
REAHT25	
REAHT32	40

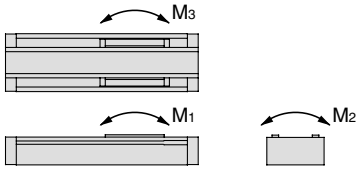


Moment

Allowable moment
(Static moment/Dynamic moment) (N·m)

Model	M_1	M_2	M_3
REAH10	1.5	2.5	1.5
REAH15	10	16	10
REAH20	13	16	13

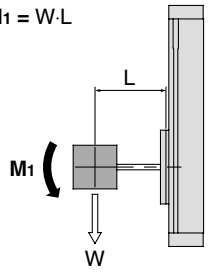
Model	M_1	M_2	M_3
REAH25	28	26	28
REAHT25	56	85	56
REAHT32	64	96	64



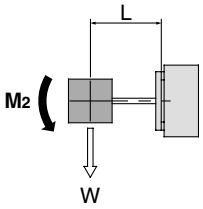
Static moment

Moment generated by the self weight of the load even when the cylinder is stopped

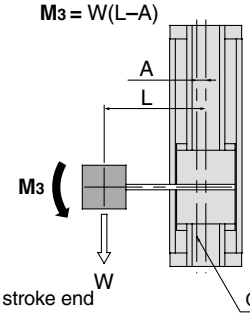
■ **Pitch moment**
$M_1 = W \cdot L$



■ **Roll moment**
$M_2 = W \cdot L$



■ **Yaw moment**
$M_3 = W(L-A)$



(mm)

Model	A
REAH10	15
REAH15	17.5
REAH20	19.5
REAH25	23.5
REAHT25	0*
REAHT32	0*

* Since there are 2 guides, the guides' central axis and the cylinder's central axis are the same.

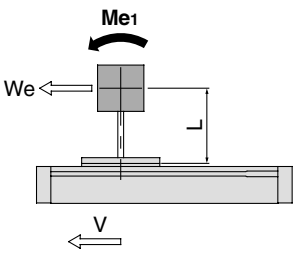
Dynamic moment

Moment generated by the load equivalent to the impact at the stroke end

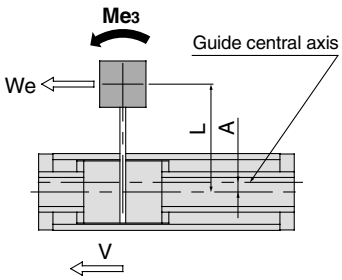
$We = 5 \times 10^{-3} \cdot W \cdot g \cdot U$

We: Load equivalent to impact [N]
W: Load weight [kg]
U: Maximum speed [mm/s]
g: Gravitational acceleration (approx. 9.8m/s²)

■ **Pitch moment**
$Me_1 = 1/3 \cdot We \cdot L$



■ **Yaw moment**
$Me_3 = 1/3 \cdot We(L-A)$

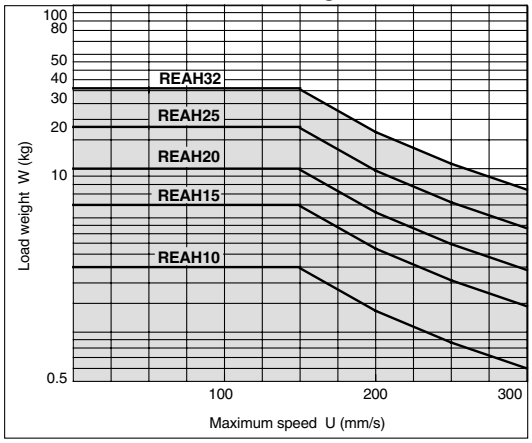


(mm)

Model	A
REAH10	15
REAH15	17.5
REAH20	19.5
REAH25	23.5
REAHT25	0*
REAHT32	0*

* Since there are 2 guides, the guides' central axis and the cylinder's central axis are the same.

<Data Ⓑ: Maximum speed Load weight chart>



Series REAH
Model Selection 3

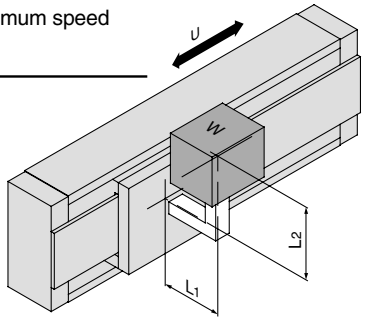
Selection Calculation

The selection calculation finds the load factors (αn) of the items below, where the total ($\Sigma\alpha n$) does not exceed 1.

$$\Sigma\alpha n = \alpha_1 + \alpha_2 + \alpha_3 \leq 1$$

Item	Load factor αn	Note
1. Max. load weight	α_1 = W/Wmax	Review W. Wmax is the maximum load weight.
2. Static moment	α_2 = M/Mmax	Review M_1, M_2, M_3. Mmax is the allowable moment.
3. Dynamic moment	α_3 = Me/Memax	Review Me_1, Me_3. Memax is the allowable moment.

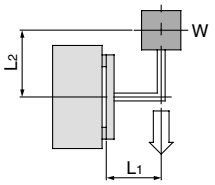
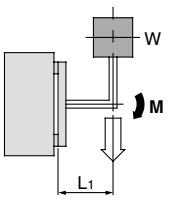
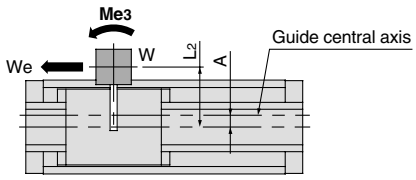
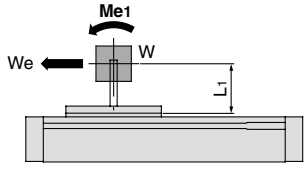
U: Maximum speed



Calculation examples

Operating conditions

Cylinder: REAH15
Mounting: Horizontal wall mounting
Maximum speed: U = 300 [mm/s]
Load weight: W = 1 [kg] (excluding weight of arm section)
L_1 = 200 [mm]
L_2 = 200 [mm]

Item	Load factor αn	Note
1. Maximum load weight 	α_1 = W/Wmax = 1/9 = **0.111**	Review W.
2. Static moment 	$M_2 = W \cdot L_1$ = 10·0.2 = 2 [N·m] $\alpha_2 = M_2/M_2$ max = 2/16 = **0.125** W = 1 [kg] = 10 [N]	Review M_2. Since M_1 & M_3 are not generated, review is unnecessary.
3. Dynamic moment 	We = 5 x 10^{-3}·W·g·U = 5 x 10^{-3}·19.8·300 = 15 [N] Me_3 = 1/3·We(L2-A) = 1/3·15·0.182 = 0.91 [N·m] α_3 = Me_3/Me_3max = 0.91/10 **= 0.091**	Review Me_3.
	Me_1 = 1 /3·We·L_1 = 1/3·15·0.2 = 0.1 [N·m] α_4 = Me_1/Me_1 max = 1/10 = **0.1**	Review Me_1.

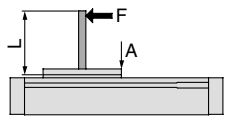
$\Sigma\alpha n = \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4$
= 0.111 + 0.125 + 0.091 + 0.10
= 0.427 Can be used based on $\Sigma\alpha n = 0.427 \leq 1$

Series REAH
Model Selection 4

Design Parameters 2

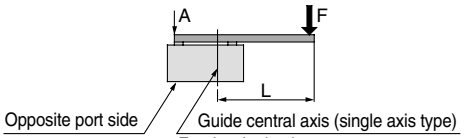
Table Deflection

Table deflection due to pitch moment load



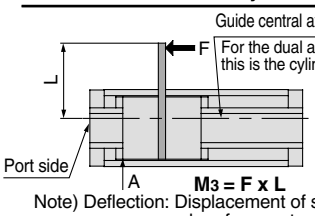
$M_1 = F \times L$

Table deflection due to roll moment load



$M_2 = F \times L$

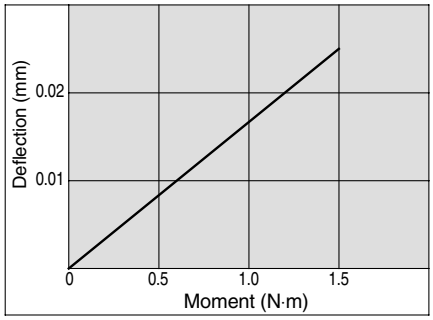
Table deflection due to yaw moment load



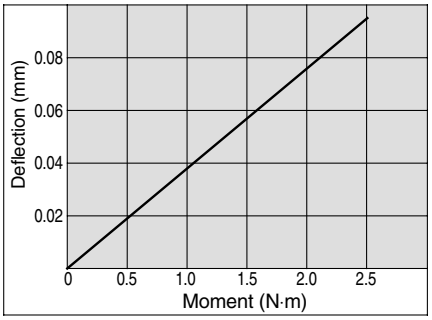
$M_3 = F \times L$

Note) Deflection: Displacement of section A when force acts on section F

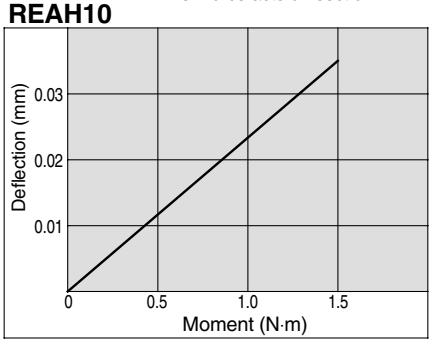
REAH10



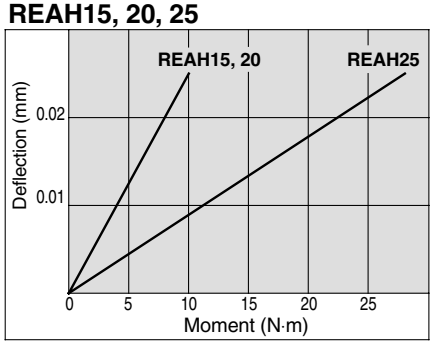
REAH10



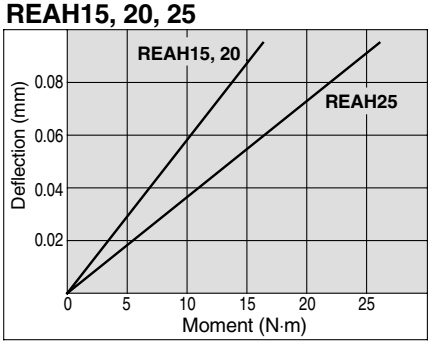
REAH10



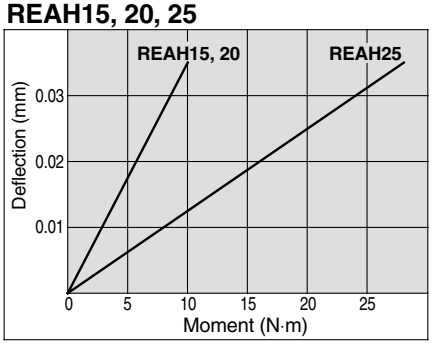
REAH15, 20, 25



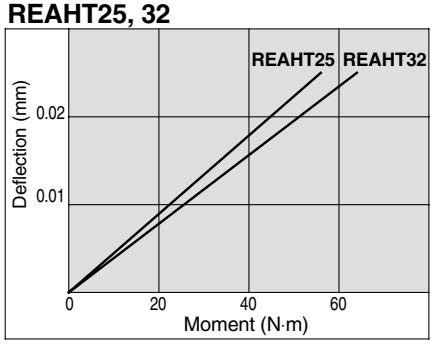
REAH15, 20, 25



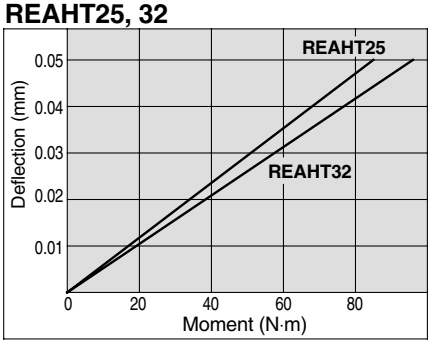
REAH15, 20, 25



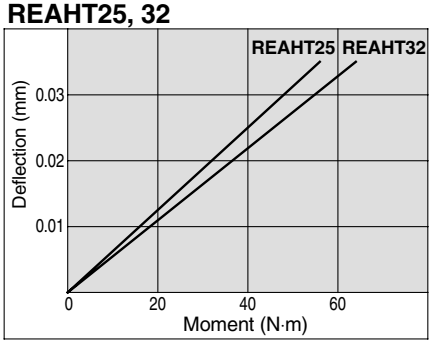
REAHT25, 32



REAHT25, 32



REAHT25, 32



Vertical Operation

When using in vertical operation, prevention of work piece dropping due to breaking of the magnetic coupling should be considered. The allowable load weight and maximum operating pressure should be as shown in the table below.

Model	Allowable load weight Wv (kg)	Max. operating pressure Pv (MPa)
REAH10	2.7	0.55
REAH15	7.0	0.65
REAH20	11.0	0.65
REAH25	18.5	0.65
REAHT25	18.5	0.65
REAHT32	30.0	0.65

Intermediate Stops

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

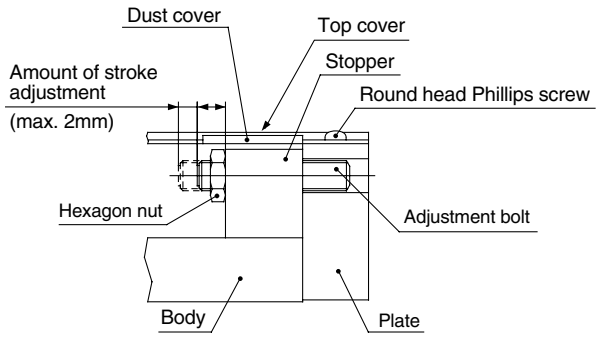
Model	Stroke (mm)
REAH10	20
REAH15	25
REAH20	30
REAH25	30
REAHT25	30
REAHT32	30

Stroke Adjustment

The adjustment bolt is adjusted to the optimum position for smooth acceleration and deceleration at the time of shipment, and should be operated at the full stroke. When stroke adjustment is necessary, the maximum amount of adjustment on one side is 2mm. (Do not adjust more than 2mm, as it will not be possible to obtain smooth acceleration and deceleration.)
Do not adjust based on the stopper's movement, as this can cause cylinder damage.

Stroke Adjustment

Loosen the round head Phillips screws, and remove the top covers and dust covers (4pcs.). Then loosen the hexagon nut, and after performing the stroke adjustment from the plate side with a hexagon wrench, retighten and secure the hexagon nut.



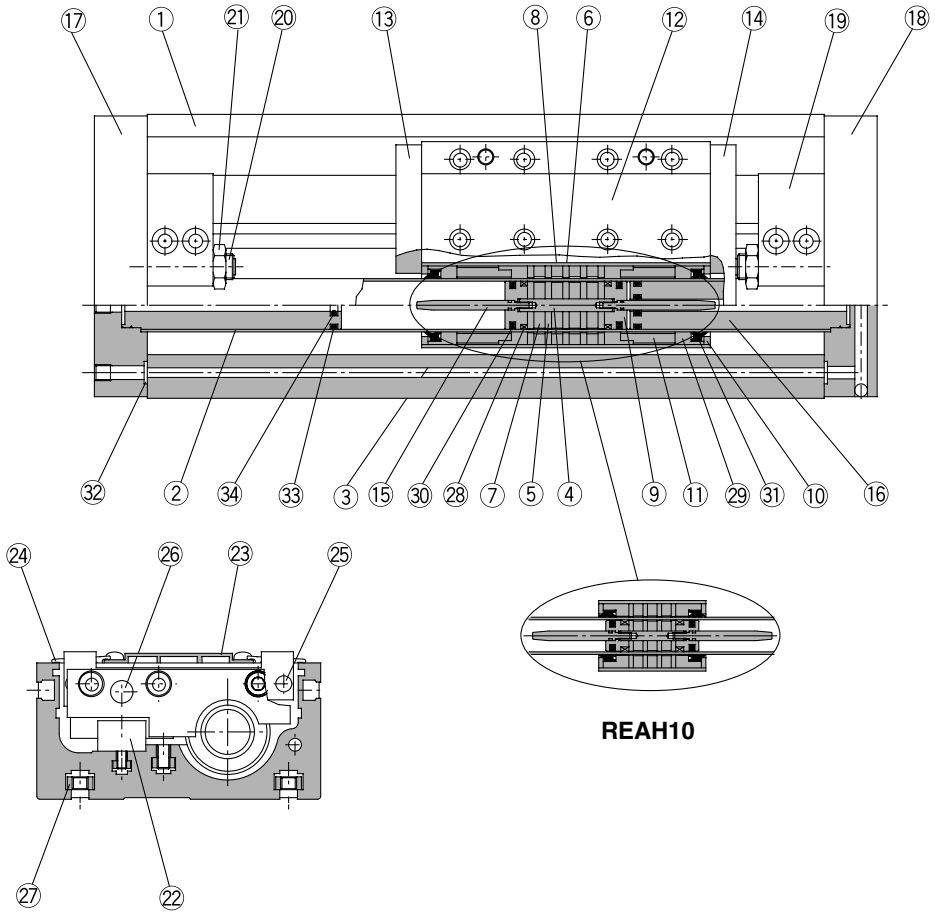
Adjustment Bolt Position (at Shipment), Hexagon Nut Tightening Torque

Model	T (mm)	Tightening torque (N·m)
REAH10	7	1.67
REAH15	7	
REAH20	7	
REAH25	9	3.14
REAHT25	9	
REAHT32	9	

After adjusting the stroke, replace the top covers and dust covers. Tighten the round head Phillips screws for securing the top covers with a torque of 0.58N·m.

Construction/ø10, ø15

Single axis type/REAH



REAH10

Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**External slider tube**	Aluminum alloy	
4	**Shaft**	Stainless steel	
5	**Piston side yoke**	Rolled steel plate	Zinc chromated
6	**External slider side yoke**	Rolled steel plate	Zinc chromated
7	**Magnet A**	Rare earth magnet	
8	**Magnet B**	Rare earth magnet	
9	**Piston**	Brass	Electroless nickel plated
10	**Spacer**	Rolled steel plate	Nickel plated
11	**Space ring**	Aluminum alloy	Chromated (except REAH10)
12	**Slide table**	Aluminum alloy	Hard anodized
13	**Side plate A**	Aluminum alloy	Hard anodized
14	**Side plate B**	Aluminum alloy	Hard anodized
15	**Cushion ring**	Stainless steel	
16	**Internal stopper**	Aluminum alloy	Anodized
17	**Plate A**	Aluminum alloy	Hard anodized

Parts list

No.	Description	Material	Note
18	**Plate B**	Aluminum alloy	Hard anodized
19	**Stopper**	Aluminum alloy	Anodized
20	**Adjustment bolt**	Chromium molybdenum steel	Nickel plated
21	**Hexagon nut**	Carbon steel	Nickel plated
22	**Linear guide**		
23	**Top cover**	Aluminum alloy	Hard anodized
24	**Dust cover**	Special resin	
25	**Magnet (for auto switch)**	Rare earth magnet	
26	**Parallel pin**	Carbon steel	Nickel plated
27	**Square nut for body mounting**	Carbon steel	Nickel plated (accessory)
28*	**Wear ring A**	Special resin	
29*	**Wear ring B**	Special resin	
30*	**Piston seal**	NBR	
31*	**Scraper**	NBR	
32*	**O-ring**	NBR	
33*	**O-ring**	NBR	
34*	**Cushion seal**	NBR	

* Seal kits are sets consisting of items 28 through 34 above, and can be ordered using the kit number for each bore size.

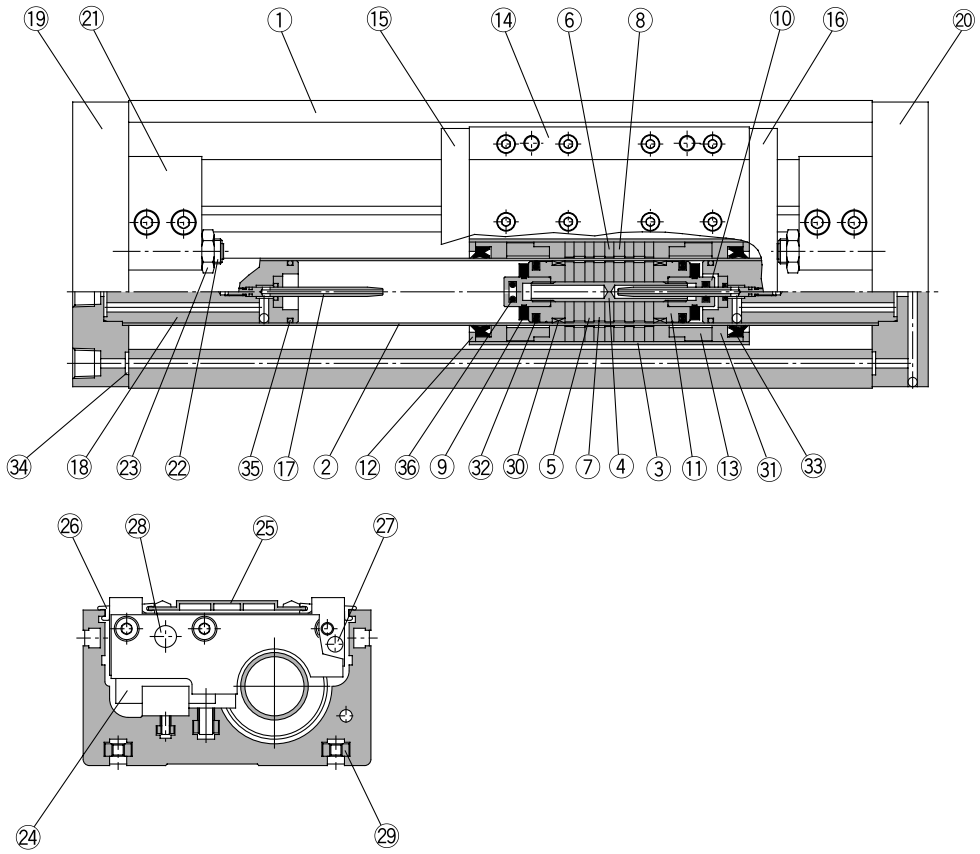
Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
10	**REAH10-PS**	Above numbers 28, 29, 30, 31, 32, 33, 34
15	**REAH15-PS**	

Series REAH

Construction/ø20, ø25

Single axis type/REAH



Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**External slider tube**	Aluminum alloy	
4	**Shaft**	Stainless steel	
5	**Piston side yoke**	Rolled steel plate	Zinc chromated
6	**External slider side yoke**	Rolled steel plate	Zinc chromated
7	**Magnet A**	Rare earth magnet	
8	**Magnet B**	Rare earth magnet	
9	**Bumper**	Urethane rubber	
10	**Cushion seal holder**	Aluminum alloy	Chromated
11	**Piston**	Aluminum alloy	Chromated
12	**Spacer**	Rolled steel plate	Nickel plated
13	**Space ring**	Aluminum alloy	Chromated
14	**Slide table**	Aluminum alloy	Hard anodized
15	**Side plate A**	Aluminum alloy	Hard anodized
16	**Side plate B**	Aluminum alloy	Hard anodized
17	**Cushion ring**	Stainless steel	
18	**Internal stopper**	Aluminum alloy	Anodized

Parts list

No.	Description	Material	Note
19	**Plate A**	Aluminum alloy	Hard anodized
20	**Plate B**	Aluminum alloy	Hard anodized
21	**Stopper**	Aluminum alloy	Anodized
22	**Adjustment bolt**	Chromium molybdenum steel	Nickel plated
23	**Hexagon nut**	Carbon steel	Nickel plated
24	**Linear guide**		
25	**Top cover**	Aluminum alloy	Hard anodized
26	**Dust cover**	Special resin	
27	**Magnet (for auto switch)**	Rare earth magnet	
28	**Parallel pin**	Carbon steel	Nickel plated
29	**Square nut for body mounting**	Carbon steel	Nickel plated (accessory)
30*	**Wear ring A**	Special resin	
31*	**Wear ring B**	Special resin	
32*	**Piston seal**	NBR	
33*	**Scraper**	NBR	
34*	**O-ring**	NBR	
35*	**O-ring**	NBR	
36*	**Cushion seal**	NBR	

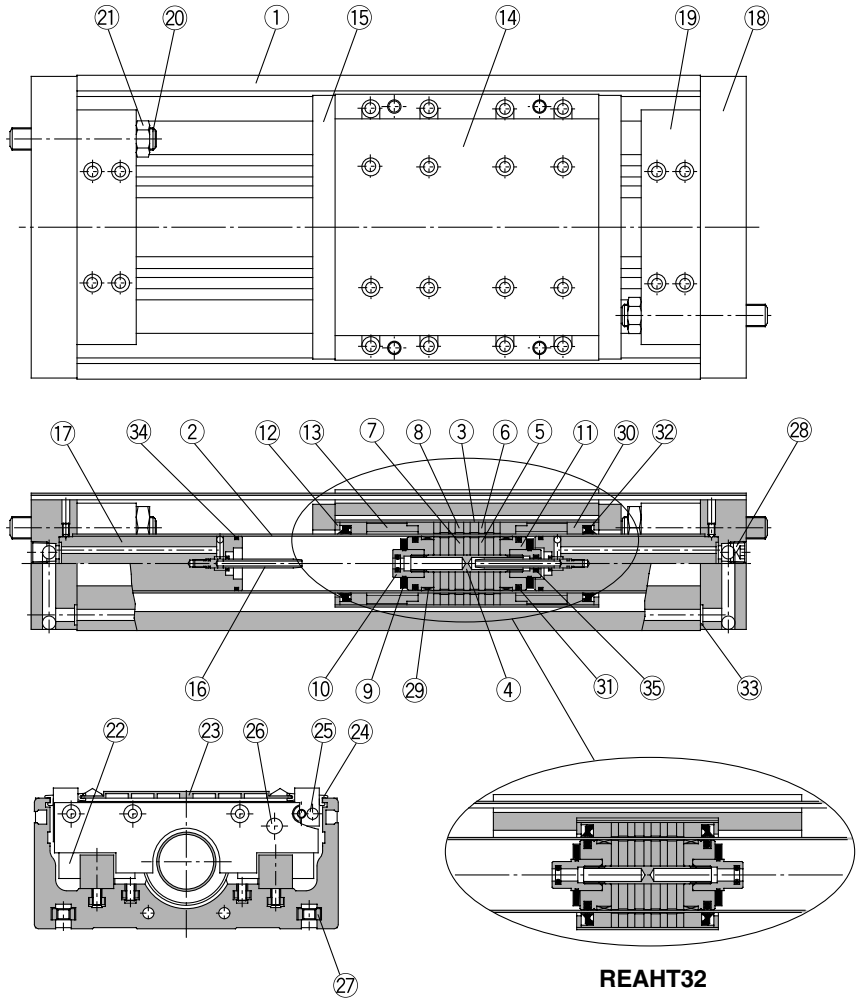
* Seal kits are sets consisting of items 30 through 36 above, and can be ordered using the kit number for each bore size.

Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
20	**REAH20-PS**	Above numbers 30, 31, 32, 33, 34, 35, 36
25	**REAH25-PS**	

Construction/ø25, ø32

Dual axis type/REAHT



REAHT32

Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**External slider tube**	Aluminum alloy	
4	**Shaft**	Stainless steel	
5	**Piston side yoke**	Rolled steel plate	Zinc chromated
6	**External slider side yoke**	Rolled steel plate	Zinc chromated
7	**Magnet A**	Rare earth magnet	
8	**Magnet B**	Rare earth magnet	
9	**Bumper**	Urethane rubber	
10	**Cushion seal holder**	Aluminum alloy	Chromated
11	**Piston**	Aluminum alloy	Chromated
12	**Spacer**	Rolled steel plate	Nickel plated
13	**Space ring**	Aluminum alloy	Chromated (except REAHT32)
14	**Slide table**	Aluminum alloy	Hard anodized
15	**Side plate**	Aluminum alloy	Hard anodized (except REAHT32)
16	**Cushion ring**	Brass	Electroless nickel plated (REAHT32)
		Stainless steel	REAHT25
17	**Internal stopper**	Aluminum alloy	Anodized

Parts list

No.	Description	Material	Note
18	**Plate**	Aluminum alloy	Hard anodized
19	**Stopper**	Aluminum alloy	Anodized
20	**Adjustment bolt**	Chromium molybdenum steel	Nickel plated
21	**Hexagon nut**	Carbon steel	Nickel plated
22	**Linear guide**		
23	**Top cover**	Aluminum alloy	Hard anodized
24	**Dust cover**	Special resin	
25	**Magnet (for auto switch)**	Rare earth magnet	
26	**Parallel pin**	Carbon steel	Nickel plated
27	**Square nut for body mounting**	Carbon steel	Nickel plated (accessory)
28	**Hexagon socket taper plug**	Carbon steel	Nickel plated
29*	**Wear ring A**	Special resin	
30*	**Wear ring B**	Special resin	
31*	**Piston seal**	NBR	
32*	**Scraper**	NBR	
33*	**O-ring**	NBR	
34*	**O-ring**	NBR	
35*	**Cushion seal**	NBR	

* Seal kits are sets consisting of items 29 through 35 above, and can be ordered using the kit number for each bore size.

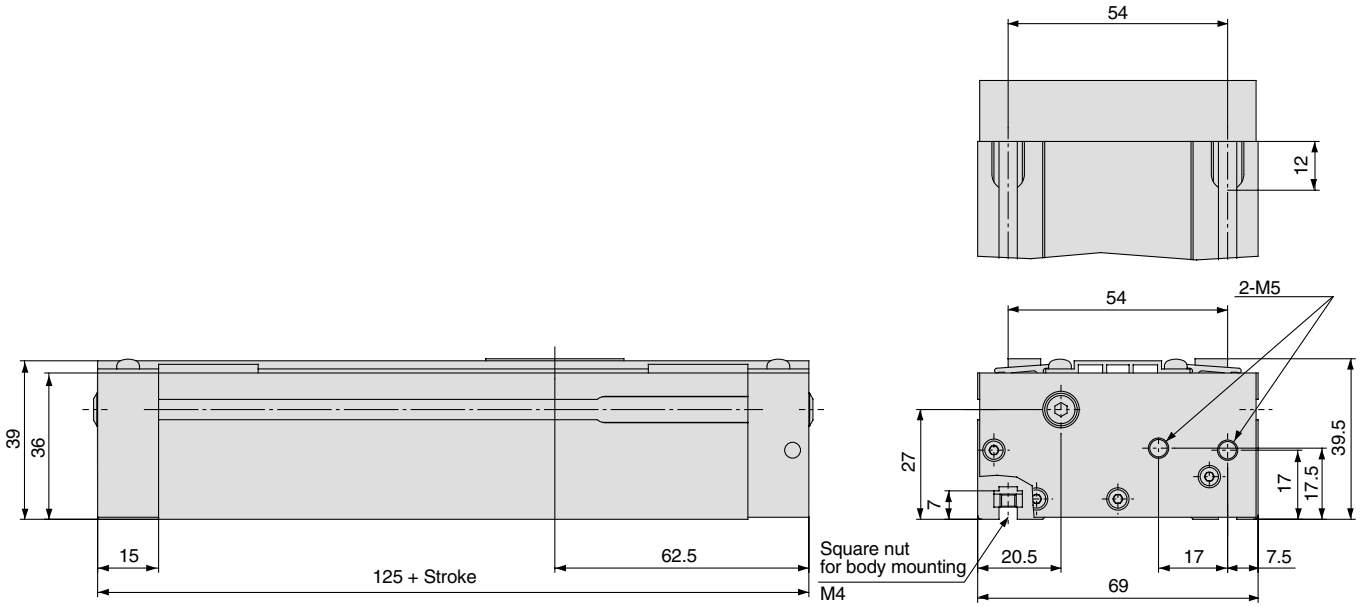
Replacement parts: Seal kits

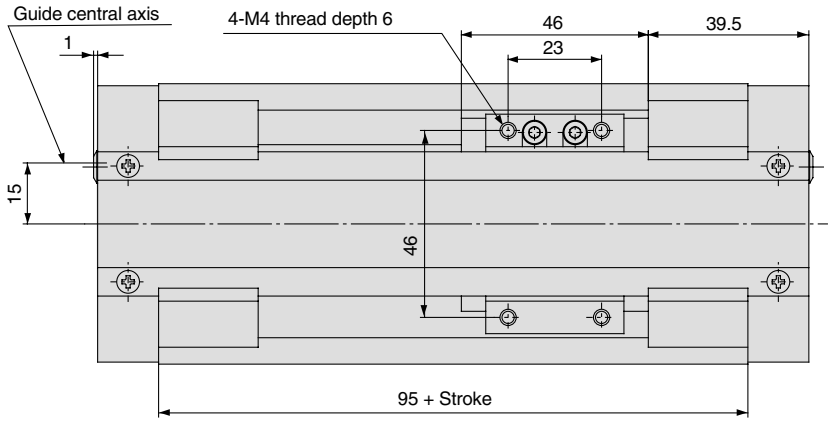
Bore size (mm)	Kit no.	Contents
25	**REAHT25-PS**	Above numbers
32	**REAHT32-PS**	29, 30, 31, 32, 33, 34, 35

Series REAH

Dimensions/ø10

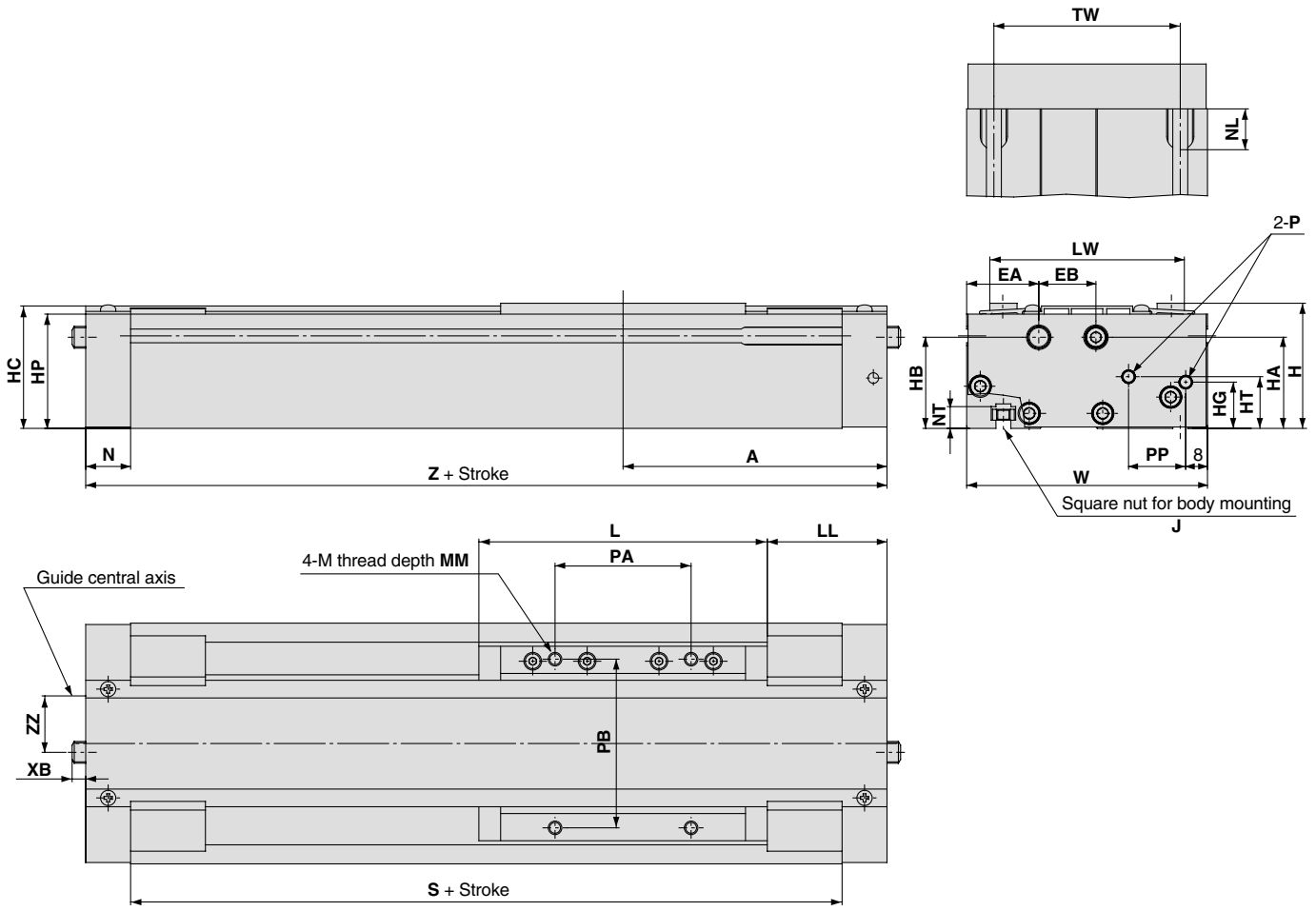
Single axis type/REAH





Dimensions/ø15, ø20, ø25

Single axis type/REAH



(mm)

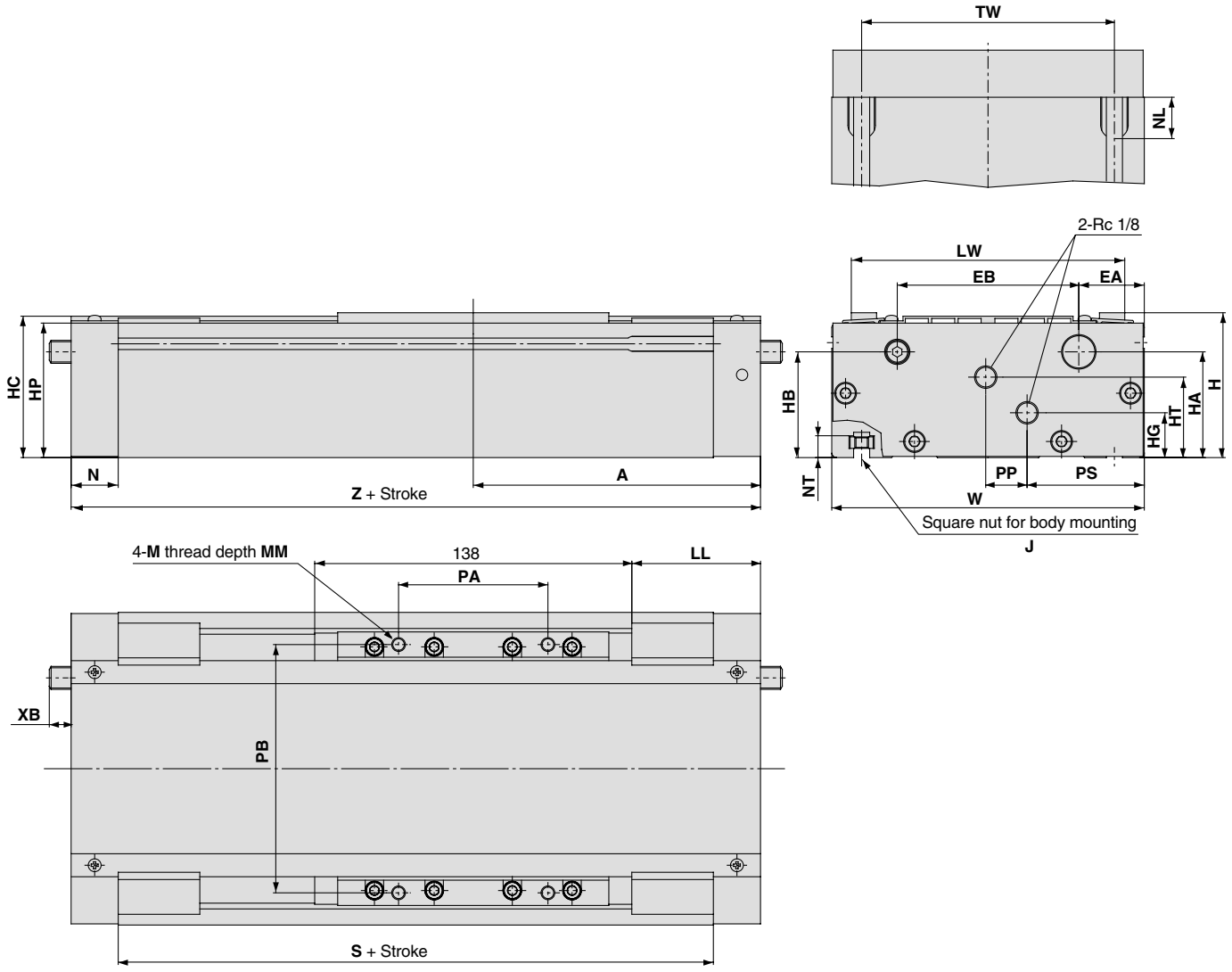
Model	A	EA	EB	H	HA	HB	HC	HG	HP	HT	J	L	LL	LW	M	MM
REAH15	97	26.5	21	46	33.5	33.5	45	17	42	19	M5	106	44	71.5	M5	8
REAH20	102.5	26.5	22	54	42.5	41.5	53	16	50	23.5	M5	108	48.5	75.5	M5	8
REAH25	125	29	24	63	46	46	61.5	25	58.5	28	M6	138	56	86	M6	10

Model	N	NL	NT	P	PA	PB	PP	S	TW	W	XB	Z	ZZ
REAH15	16.5	15	8	M5	50	62	21	161	65	88.5	–	194	17.5
REAH20	18	15	8	Rc 1/8	50	65	23	169	70	92.5	–	205	19.5
REAH25	20.5	18	9	Rc 1/8	65	75	27	209	75	103	9.5	250	23.5

Series REAH

Dimensions/ø25, ø32

Dual axis type/REAHT

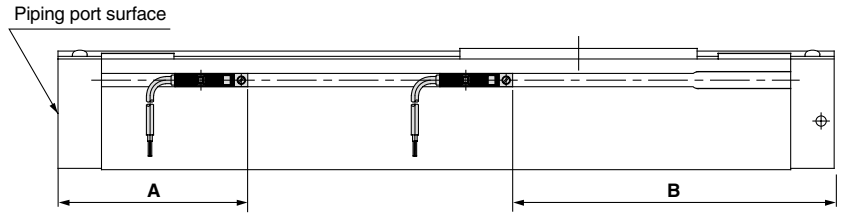


(mm)

Model	A	EA	EB	H	HA	HB	HC	HG	HP	HT	J	LL	LW	M	MM	N
REAHT25	125	28.5	79	63	46	46	61.5	19.5	58.5	35	M6	56	119	M6	10	20.5
REAHT32	132.5	30	90	75	52.5	57.5	72.5	25	69.5	43	M8	63.5	130	M8	12	23

Model	NL	NT	PA	PB	PP	PS	S	TW	W	XB	Z
REAHT25	18	9	65	108	18	51	209	110	136	9.5	250
REAHT32	22.5	12	66	115	14	61	219	124	150	2	265

Proper Auto Switch Mounting Position for Stroke End Detection



Proper auto switch mounting position

(mm)

Cylinder model \ Auto switch model	A			B		
	D-Z7□ D-Z80	D-Y7□W D-Y7□WV	D-Y5□ D-Y6□ D-Y7P D-Y7PV	D-Z7□ D-Z80	D-Y7□W D-Y7□WV	D-Y5□ D-Y6□ D-Y7P D-Y7PV
REAH10	65.5	65.5	65.5	59.5	59.5	59.5
REAH15	72	72	72	122	122	122
REAH20	77.5	77.5	77.5	127.5	127.5	127.5
REAH25	86	86	86	164	164	164
REAHT25	86	86	86	164	164	164
REAHT32	82	82	82	183	183	183

Auto switch operating range

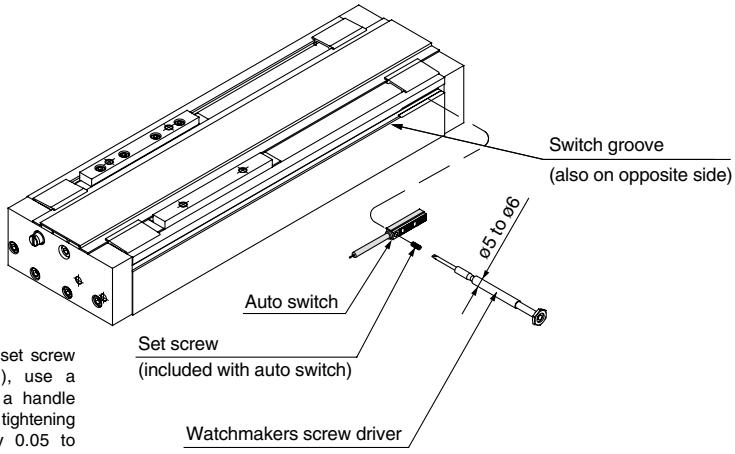
(mm)

Cylinder model \ Auto switch model	D-Z7□ D-Z80	D-Y7□W D-Y7□WV D-Y5□ D-Y6□ D-Y7P D-Y7PV
REAH10	8	6
REAH15	6	5
REAH20	6	5
REAH25	6	5
REAHT25	6	5
REAHT32	9	6

Note) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment. (variations on the order of ±30%)

Auto Switch Mounting

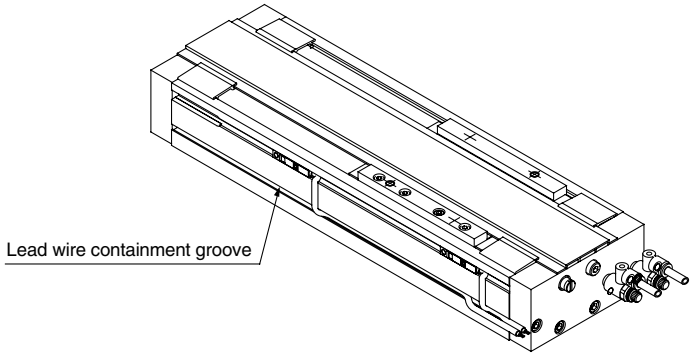
When mounting auto switches, they should be inserted into the cylinder's switch groove from the direction shown in the drawing on the right. After setting in the mounting position, use a flat head watchmakers screw driver to tighten the set screw which is included.



Note) When tightening the auto switch set screw (included with the auto switch), use a watchmakers screw driver with a handle about 5 to 6mm in diameter. The tightening torque should be approximately 0.05 to 0.1N·m.

Auto Switch Lead Wire Containment Groove

On models REAH20 and REAH25 a groove is provided on the side of the body (one side only) to contain auto switch lead wires. This should be used for placement of wiring.



Sine Rodless Cylinder

Series REBR
Direct Mount Type/ø15, ø25, ø32

How to Order

REB R 25 — 300 [ ] — Z73 [ ]

Sine rodless cylinder

Direct mount type

Bore size

15	15mm
25	25mm
32	32mm

Standard stroke
Refer to the standard stroke table on page 4.3-63.

Switch rails

Nil	With switch rails
N	Without switch rails

Note 1) When equipped with switch rails, magnets for switches are built in.

Note 2) In case of ø15, magnets for switches are built in even when not equipped with switches.

Auto switch type

Nil	Without auto switch

∗ Refer to the table below for auto switch models.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Applicable auto switches / Refer to "Auto Switch Guide" (E274-A) for further details on auto switch units.

For ø15

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model	Lead wire length (m) Note 1)			Applicable load	
					DC		AC		0.5 (Nil)	3 (L)	5 (Z)		
Reed switch	–	Grommet	No	2 wire	24V	5, 12V	100V or less	**A90**	●	●	–	IC circuit	Relay, PLC
			Yes			12V	100V	**A93**	●	●	–	–	
				3 wire (NPN equiv.)	–	5V	–	**A96**	●	●	–	IC circuit	–
Solid state switch	–	Grommet	Yes	3 wire (NPN)	24V	12V	–	**M9N**	●	●	–	–	Relay, PLC
				3 wire (PNP)				**M9P**	●	●	–		
				2 wire				**M9B**	●	●	–		

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) M9N
3m ..... L M9NL

For ø25, ø32

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model	Lead wire length (m) Note 1)			Applicable load	
					DC		AC		0.5 (Nil)	3 (L)	5 (Z)		
Reed switch	–	Grommet	Yes	3 wire	–	5V	–	**Z76**	●	●	–	IC circuit	–
				2 wire	24V	12V	100V	**Z73**	●	●	●	–	Relay, PLC
			No			5, 12V	100V or less	**Z80**	●	●	–	IC circuit	
Solid state switch	–	Grommet	Yes	3 wire (NPN)	24V	5, 12V	–	**Y59A**	●	●	○	IC circuit	Relay, PLC
				3 wire (PNP)				**Y7P**	●	●	○		
				2 wire		12V		**Y59B**	●	●	○	–	
	Diagnostic indication (2 colour indicator)			3 wire (NPN)		5, 12V		**Y7NW**	●	●	○	IC circuit	
				3 wire (PNP)				**Y7PW**	●	●	○		
				2 wire		12V		**Y7BW**	●	●	○	–	

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) Y59A
3m ..... L Y59AL
5m ..... Z Y59AZ

Note 2) Solid state auto switches marked with a "○" are produced upon receipt of order.

Specifications

Fluid	Air
Proof pressure	1.05MPa
Maximum operating pressure	0.7MPa
Minimum operating pressure	0.18MPa
Ambient and fluid temperature	–10 to 60°C
Piston speed	50 to 600mm/s
Lubrication	Non-lube
Stroke length tolerance	0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st and up: $^{+1.8}_{0}$
Mounting	Direct mount type

Standard Strokes

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke (mm)	Maximum stroke with switch (mm)
15	150, 200, 250, 300, 350, 400 450, 500	1000	750
25	200, 250, 300, 350, 400, 450 500, 600, 700, 800	2000	1500
32			

Note) Intermediate strokes can be arranged in 1mm increments.

Magnetic Holding Force

(N)

Bore size (mm)	**15**	**25**	**32**
Holding force	137	363	588

Weights

(kg)

Item \ Bore size (mm)		**15**	**25**	**32**
Basic weight (for 0st)	**REBR□ (with switch rail)**	0.277	0.660	1.27
	REBR□-□N (without switch rail)	0.230	0.580	1.15
Additional weight per 50mm stroke (when equipped with switch rail)		0.045	0.083	0.113
Additional weight per 50mm stroke (when not equipped with switch rail)		0.020	0.050	0.070

Calculation method/Example: REBR25-500 (with switch rail)
Basic weight ... 0.660kg, Additional weight ... 0.083kg/50mm, Cylinder stroke ... 500mm
0.660 + 0.083 x 500 ÷ 50 = 1.49kg

⚠ Specific Product Precautions

Mounting

⚠ Caution

1. Take care to avoid nicks or other damage on the outside surface of the cylinder tube.

This can lead to a damage of the scraper and wear ring, which in turn can cause malfunction.

2. Pay attention to the rotation of the external slider.

Rotation should be controlled by connecting it to another shaft (linear guide, etc.).

3. Do not operate with the magnetic coupling out of position.

In case the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

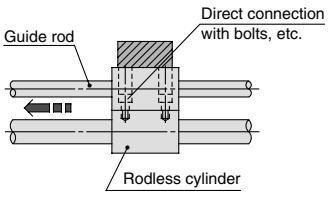
4. The cylinder is mounted with bolts through the mounting holes in the end covers. Be sure they are tightened securely.

5. Be sure that both end covers are secured to the mounting surface before operating the cylinder.

Avoid operation with the external slider secured to the surface.

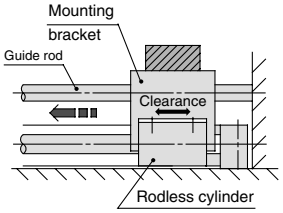
6. Do not apply a lateral load to the external slider.

When a load is mounted directly to the cylinder, variations in the alignment of each shaft centre cannot be offset, which results in the generation of a lateral load that can cause malfunction. The cylinder should be operated using a connection method which allows for shaft alignment variations and deflection due to the cylinder's own weight. A drawing of a recommended mounting is shown in Figure 2.



Variations in the load and cylinder shaft alignment cannot be offset and may result in a malfunction.

Figure 1.
Incorrect mounting



Shaft alignment variations are offset by providing clearance between the mounting bracket and cylinder. Moreover, the mounting bracket is extended above the cylinder shaft centre, so that the cylinder is not subjected to moment.

Figure 2.
Recommended mounting

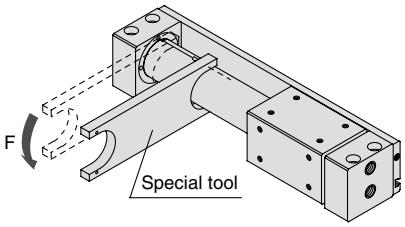
7. Use caution regarding the allowable load weight when operating in a vertical direction.

The allowable load weight when operating in a vertical direction (reference values on page 4.3-67) is determined by the model selection method. However, if a load greater than the allowable value is applied, the magnetic coupling may break and there is a possibility of dropping the load. When using this type of application, contact SMC regarding the operating conditions (pressure, load, speed, stroke, frequency, etc.).

Disassembly & Maintenance

⚠ Caution

1. Special tools are necessary for disassembly.



Special tool number list

No.	Applicable bore size (mm)
CYRZ-V	15
CYRZ-W	25, 32

Series REBR
Model Selection 1

Fn: Allowable driving force (N)
MD: Maximum allowable moment when connection fitting, etc., is directly loaded (N·m)
Pv: Maximum operating pressure for vertical operation (MPa)
WBmax: Maximum load weight when loaded directly on the body (kg)
Wv: Allowable load weight for vertical operation (kg)

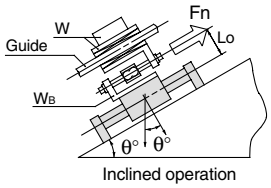
Operating conditions

- W: Load weight (kg)
- WB: Connection fitting weight (kg)
- μ: Guide's coefficient of friction
- Lo: Distance from cylinder shaft centre to work piece point of application (cm)
- L1: Distance from cylinder shaft centre to centre of gravity of connection fitting, etc. (mm)
- Presence of switches
- P: Operating pressure (MPa)
- U: Maximum Speed (mm/s)
- Stroke (mm)
- Mode of operation (horizontal, inclined, vertical)

Mode of operation

Horizontal operation | Inclined operation | Vertical operation

Review of load weight and operating pressure



Inclined operation

First tentative bore size determination $\varnothing D \geq 1.6 \times \sqrt{\frac{F_1}{P}}$

First tentative bore size determination $\varnothing D \geq 1.6 \times \sqrt{\frac{F_2}{P}}$

First tentative bore size determination $\varnothing D \geq 1.6 \times \sqrt{\frac{F_3}{P}}$

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	$F_3 = (W + W_B) \times 9.8 \times (\mu + 1)$

Refer to the allowable driving force table for (Fn) of data A.

Determination of allowable load weight & pressure

W + WB ≤ Wv, P ≤ Pv

W + WB > Wv, P > Pv

(See page 4.3-67 for maximum load weight when loaded directly on the body.)

(See page 4.3-67 for vertical operation.)

Determination of connection fitting weight (WB)

WB > WBmax: Review of connection fitting

WB ≤ WBmax

Review of switches and stroke

(See the standard stroke table on p.4.3-63.)

Presence of switch rails — Yes — Presence of switches — Yes — Determination of stroke with switches

NG

No | No | OK

(Refer to page 4.3-66 for data A.)

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

Presence of external guide system — Yes

No

(See page 4.3-68 for body non-rotating accuracy and maximum allowable moment.)

Note 2) WB x L1 > MD

Determination of rotational moment

WB x L1 ≤ MD

(See page 4.3-68 for body non-rotating accuracy and maximum allowable moment.)

(Refer to page 4.3-66 for data B.)

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

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

Bore size determination

Note 2) NG

Determination of allowable stroke

OK

Note 1)

Review of order made products based on operating conditions

(Refer to pages 4.3-86 through 4.3-90.)

Model determination

Note 1) Depending on the operating environment, etc., order made products should also be reviewed.

Note 2) An external guide system should be used if the specification is exceeded.

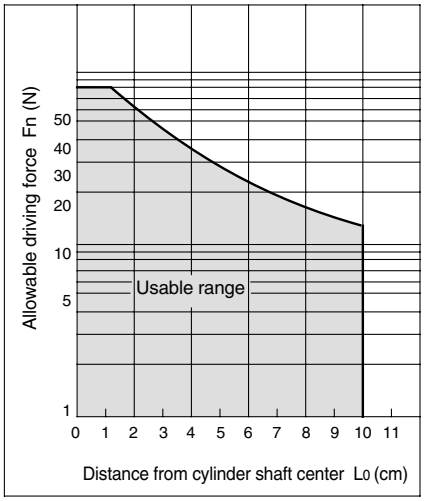
Series REBR
Model Selection 2

Design Parameters 1

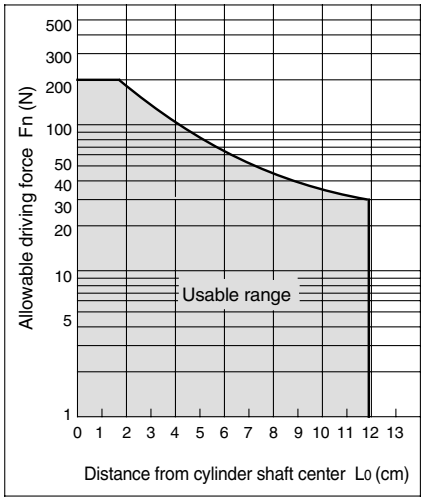
Selection Method

<Data A: Distance from cylinder shaft centre ——— Allowable driving capacity>

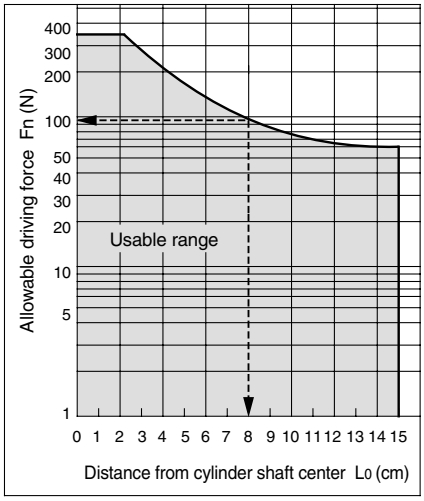
REBR15



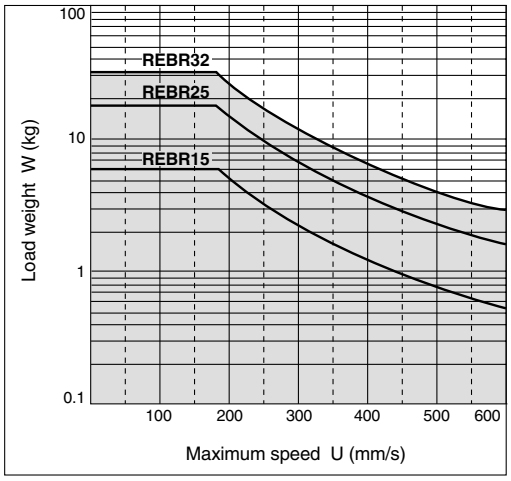
REBR25



REBR32



<Data B: Maximum speed ——— Load weight chart >

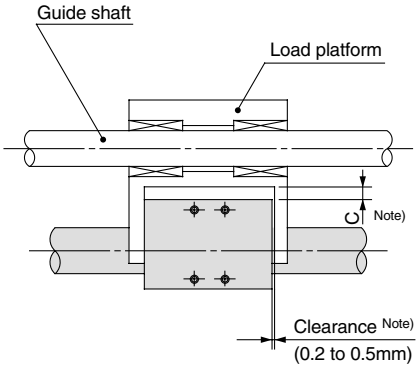


Series REBR
Model Selection 3

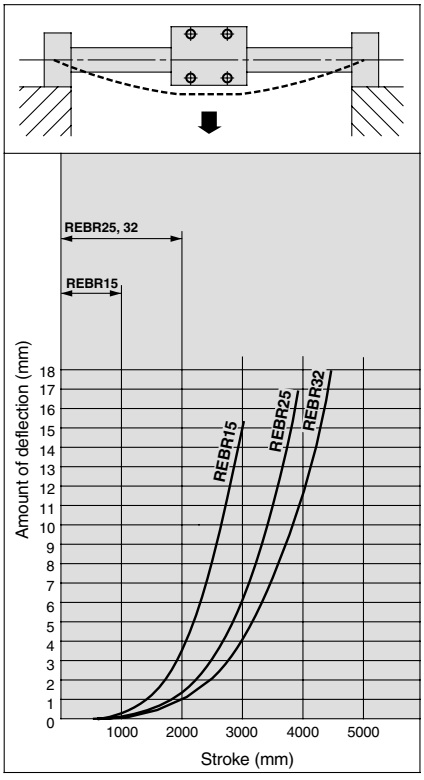
Design Parameters 2

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. Therefore, a connection method should be considered which allows for this variation as shown in the drawing.



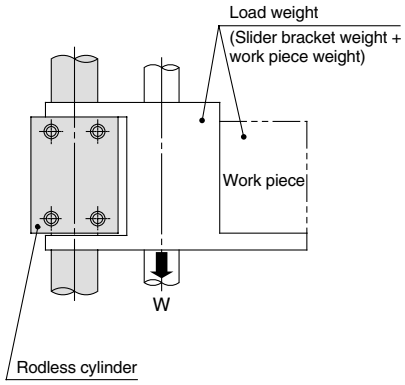
Note) Referring to the self weight deflection in the figure below, provide clearance so that the cylinder is able to operate smoothly through the full stroke within the minimum operating pressure range, without touching the mounting surface or the load, etc.



∗ The above deflection data indicate values when the external slider has moved to the middle of the stroke.

Vertical Operation

The load should be guided by a ball type bearing (LM guide, etc.). If a slide bearing is used, sliding resistance will increase due to the load weight and moment, and this can cause malfunction.



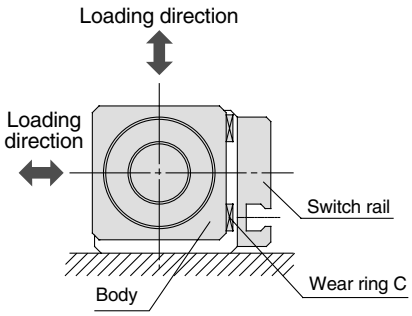
Cylinder bore size (mm)	Model	Allowable load weight Wv (kg)	Max. operating pressure Pv (MPa)
15	**REBR15**	7.0	0.65
25	**REBR25**	18.5	0.65
32	**REBR32**	30.0	0.65

Note) Use caution, as operation above the maximum operating pressure can result in breaking of the magnetic coupling.

Maximum Load Weight when Loaded Directly on Body

When the load is applied directly to the body, it should be no greater than the maximum values shown in the table below.

Model	Maximum load weight WBmax (kg)
REBR 15	1.0
REBR 25	1.2
REBR 32	1.5



Series REBR
Model Selection 4

Design Parameters 3

Intermediate Stops

The cushion effect (smooth start-up, soft stop) exists only before the stroke 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.

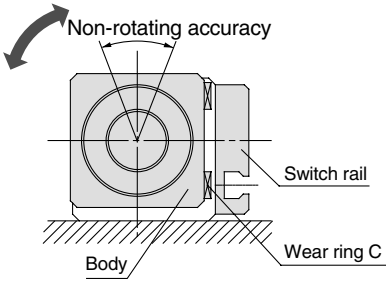
Cushion Stroke

Model	Stroke (mm)
REBR15	25
REBR25	30
REBR32	30

Body Non-rotating Accuracy and Maximum Allowable Moment (with Switch Rail) (Reference Values)

Reference values for non-rotating accuracy and maximum allowable moment at stroke end are indicated below.

Bore size (mm)	Non-rotating accuracy (°)	Max. allowable moment (M_D) (N·m)	Allowable stroke (mm) Note 2)
15	4.5	0.15	200
25	3.7	0.25	300
32	3.1	0.40	400

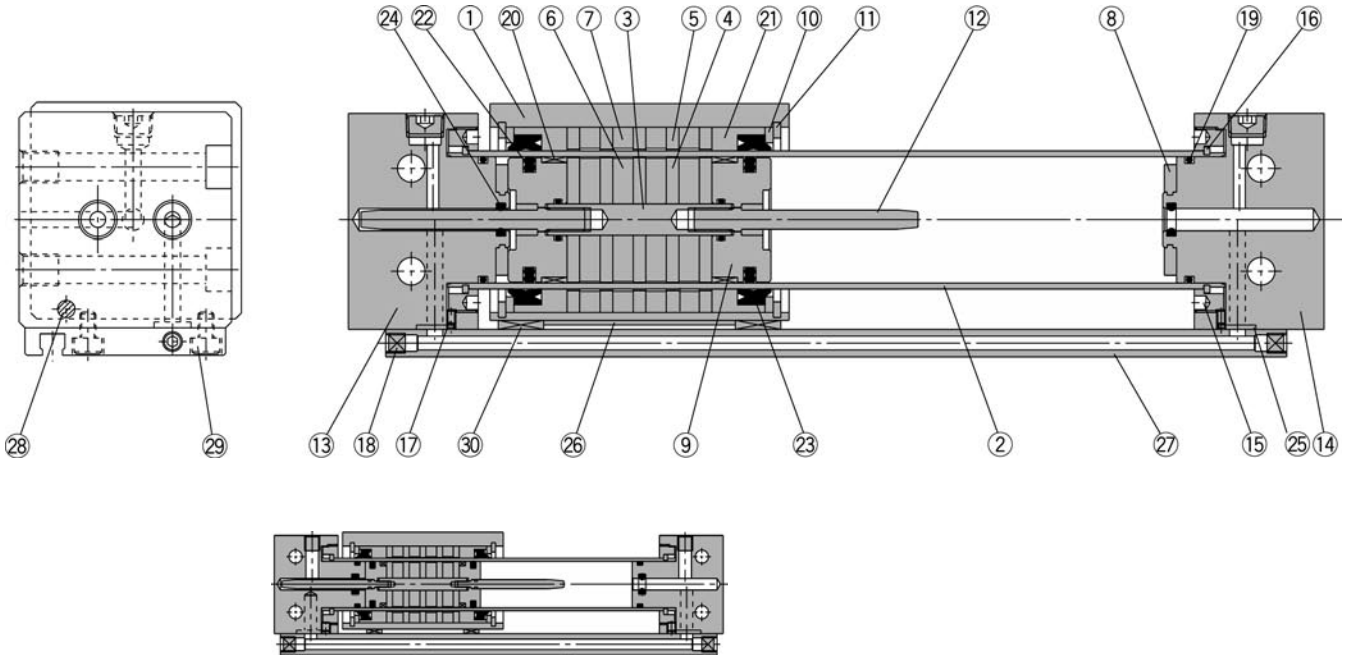


Note 1) Avoid operations where rotational torque (moment) is applied. In such a case, the use of an external guide is recommended.

Note 2) The above reference values will be satisfied within the allowable stroke ranges. However, caution is necessary because as the stroke becomes longer the inclination (rotation angle) within the stroke can be expected to increase.

Note 3) When a load is applied directly to the body, the loaded weight should be no greater than the allowable load weights on page 4.3-67.

Construction/ø15, ø25, ø32



REBR15

Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**Shaft**	Stainless steel	
4	**Piston side yoke**	Rolled steel plate	Zinc chromated
5	**External slider side yoke**	Rolled steel plate	Zinc chromated
6	**Magnet A**	Rare earth magnet	
7	**Magnet B**	Rare earth magnet	
8	**Bumper**	Urethane rubber	Except REBR15
9	**Piston**	Aluminum alloy	Chromated
10	**Spacer**	Rolled steel plate	Nickel plated
11	**Snap ring**	Carbon tool steel	Nickel plated
12	**Cushion ring**	Stainless steel	REBR15, 25: Compound electroless nickel plated
		Brass	REBR32: Compound electroless nickel plated
13	**End cover A**	Aluminum alloy	Hard anodized
14	**End cover B**	Aluminum alloy	Hard anodized
15	**Attachment ring**	Aluminum alloy	Hard anodized
16	**C type snap ring for shaft**	Hard steel wire	Nickel plated (REBR15)
		Stainless steel	REBR25,32
17	**Hexagon socket head set screw**	Chromium steel	Nickel plated
18	**Hexagon socket head plug**	Chromium steel	Nickel plated
19	**Cylinder tube gasket**	NBR	

Parts list

No.	Description	Material	Note
20	**Wear ring A**	Special resin	
21	**Wear ring B**	Special resin	
22	**Piston seal**	NBR	
23	**Scraper**	NBR	
24	**Cushion seal**	NBR	
25	**Switch rail gasket**	NBR	
26	**Magnetic shielding plate**	Rolled steel plate	Chromated
27	**Switch rail**	Aluminum alloy	Clear anodized
28	**Magnet**	Rare earth magnet	
29	**Hexagon socket head screw**	Chromium steel	Nickel plated
30	**Wear ring C**	Special resin	

Replacement parts: Seal kits

Bore size (mm)	Kit no.	Content
15	**REBR15-PS**	Above numbers 19, 20, 21, 22, 23, 24, 25, 30
25	**REBR25-PS**	
32	**REBR32-PS**	

Switch Rail Accessory Kits

CYR 25 E — ☐

Bore size ● **Stroke**

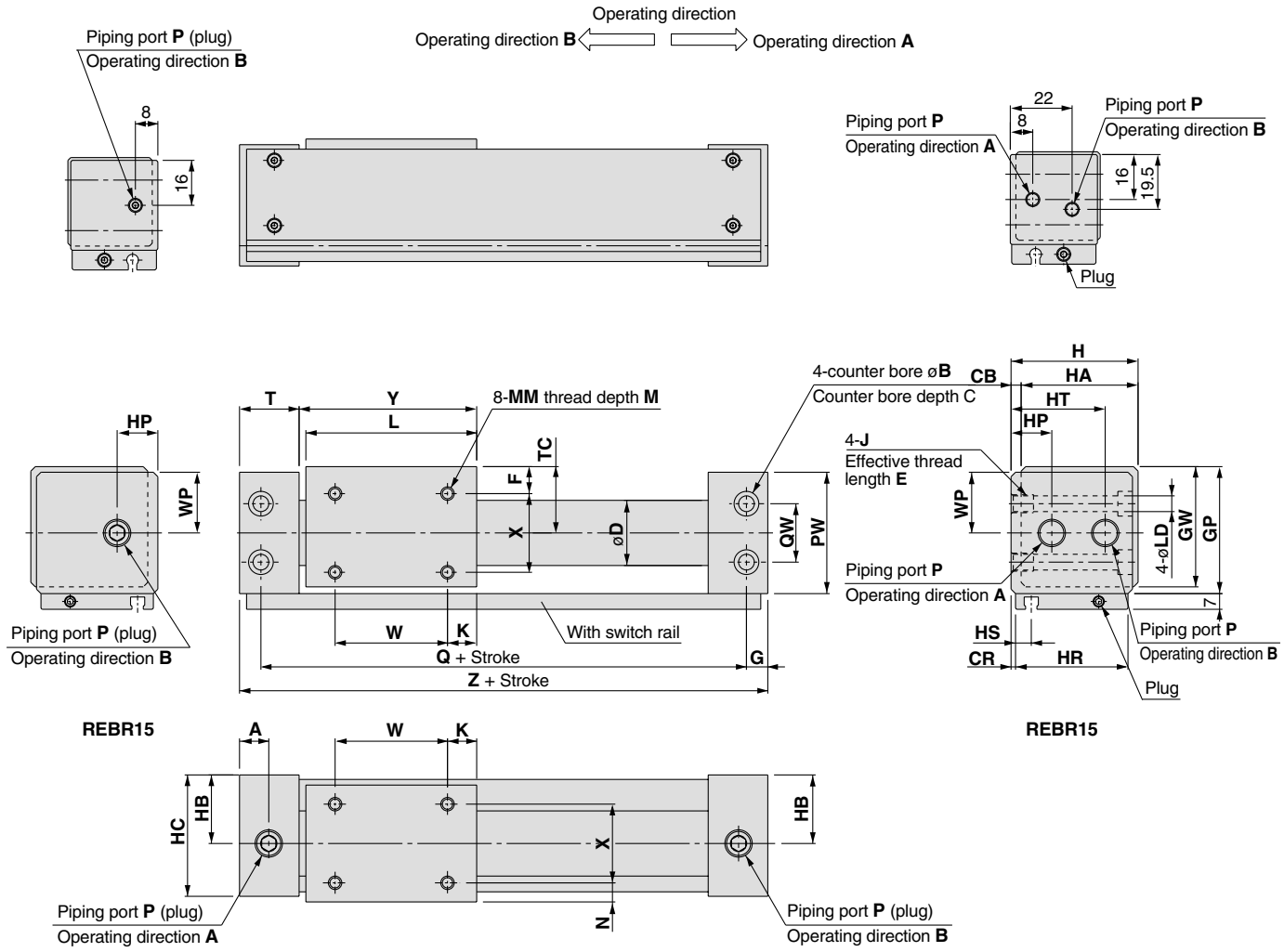
Switch rail accessory kits

Bore size (mm)	Kit no.	Content
15	**CYR15E-☐**	Above numbers 26, 27, 28, 29, 30
25	**CYR25E-☐**	
32	**CYR32E-☐**	

Note 1) ☐ indicates the stroke.
Note 2) ø15 has internal magnets in the body.

Series REBR

Dimensions/ø15, ø25, ø32



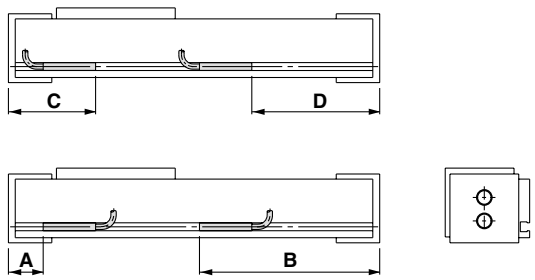
(mm)

Model	A	B	C	CB	CR	D	F	G	GP	GW	H	HA	HB	HC	HP	HR	HS	HT
REBR15	12.5	8	4.2	2	0.5	17	8	5	33	31.5	32	30	17	31	—	30	8.5	—
REBR25	12.5	9.5	5.2	3	1	27.8	8.5	10	44	42.5	44	41	23.5	43	14.5	41	6.5	23.5
REBR32	19.5	11	6.5	3	1.5	35	10.5	16	55	53.5	55	52	29	54	20	51	7	29

Model	J x E	K	L	LD	M	MM	N	P	PW	Q	QW	T	TC	W	WP
REBR15	M5 x 7	14	53	4.3	5	M4	6	M5	32	84	18	21	17	25	—
REBR25	M6 x 8	15	70	5.6	6	M5	6.5	Rc 1/8	43	105	20	25.5	22.5	40	21.5
REBR32	M8 x 10	13	76	7	7	M6	8.5	Rc 1/8	54	116	26	33	28	50	27

Model	X	Y	Z
REBR15	18	54.5	98
REBR25	28	72	125
REBR32	35	79	148

Proper Auto Switch Mounting Position for Stroke End Detection



ø15 (mm)

Bore size (mm) \ Auto switch model	A		B		C		D	
	D-A9□	D-M9□	D-A9□	D-M9□	D-A9□	D-M9□	D-A9□	D-M9□
15	17.5	21.5	76.5	72.5	—	—	56.5	60.5

Note) Auto switches cannot be installed in Area C in the case of ø15.

ø25, ø32 (mm)

Bore size (mm) \ Auto switch model	A		B		C		D	
	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W
25	22	22	101	103	47	47	78	78
32	30.5	30.5	117.5	117.5	55.5	55.5	92.5	92.5

Auto Switch Operation Range

(mm)

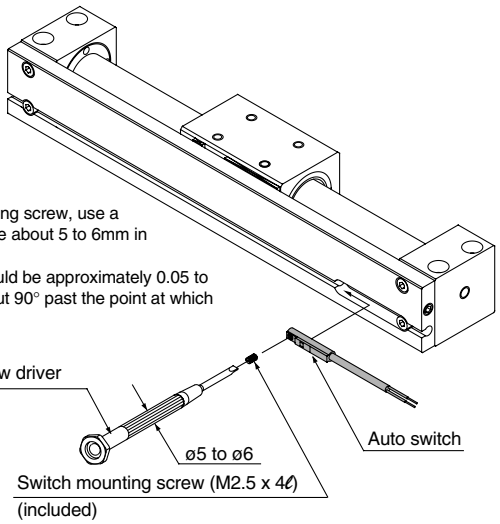
Bore size (mm) \ Auto switch model	D-A9□	D-M9□	D-Z7□ D-Z8□	D-Y5□ D-Y7□ D-Y7□W
15	8	5	—	—
25	—	—	9	7
32	—	—	9	6

Note 1) Switches cannot be mounted in some cases.

Note 2) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment (variation on the order of ±30%).

Auto Switch Mounting

When mounting auto switches, they should be inserted into the cylinder's switch groove from the direction shown in the drawing on the right. After setting in the mounting position, use a flat head watchmakers screw driver to tighten the mounting screw which is included.



Note) When tightening the auto switch mounting screw, use a watchmakers screw driver with a handle about 5 to 6mm in diameter.
Furthermore, the tightening torque should be approximately 0.05 to 0.1N·m. As a rule, it can be turned about 90° past the point at which tightening can be felt.

Auto Switch Specifications

(1) Switches (switch rail) can be added to the standard type (without switch rail). Switch rail accessory kits are mentioned on page 4.3-69 and can be ordered together with auto switches.

(2) Refer to the separate disassembly instructions for switch magnet installation procedures.

Sine Rodless Cylinder

Series REBH
High Precision GuideType

How to Order

REB H ☐ 25 — 300 — Z73 ☐

Sine rodless cylinder

High precision guide type

Guide

Symbol \ Bore size (mm)		15	25	32
Nil	1 axis	●	●	—
T	2 axes	—	●	●

Bore size

15	15mm
25	25mm
32	32mm

Standard stroke (mm)

Refer to the standard stroke table on page 4.3-73.

Auto switch type

Nil	Without auto switch

∗ Refer to the table below for auto switch models.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Applicable auto switches / Refer to "Auto Switch Guide" (E-274-A) for further details on auto switch units.
Refer to page 5.3-2 for further details on auto switch units.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model		Lead wire Note 1) length (m)			Applicable load	
					DC		AC	Electrical entry direction		0.5 (Nil)	3 (L)	5 (Z)		
								Perpendicular	In-line					
Reed switches	–	Grommet	Yes	3 wire (NPN equiv.)	–	5V	–	–	Z76	●	●	–	IC circuit	–
			No	2 wire	24V	12V	100V	–	Z73	●	●	●	–	Relay, PLC
						5V, 12V	100V or less	–	Z80	●	●	–	IC circuit	
Solid state switches	–	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	–	Y69A	Y59A	●	●	○	IC circuit	Relay, PLC
				3 wire (PNP)				Y7PV	Y7P	●	●	○		
				2 wire		12V		Y69B	Y59B	●	●	○	–	
	Diagnostic indication (2 colour indicator)			3 wire (NPN)		5V, 12V		Y7NWV	Y7NW	●	●	○	IC circuit	
				3 wire (PNP)				Y7PWV	Y7PW	●	●	○		
				2 wire		12V		Y7BWV	Y7BW	●	●	○	–	

Note 1) Lead wire length symbol 0.5m ..... Nil (Example) Y59A
3m ..... L (Example) Y59AL
5m ..... Z (Example) Y59AZ

Note 2) Solid state auto switches marked with a "○" are produced upon receipt of order.

Specifications

Bore size (mm)	15	25	32
Fluid	Air		
Action	Double acting		
Maximum operating pressure	0.7MPa		
Minimum operating pressure	0.2MPa		
Proof pressure	1.05MPa		
Ambient and fluid temperature	–10 to 60°C		
Piping type	70 to 600mm/s		
Lubrication	Non-lube		
Stroke length tolerance	0 to 1.8mm		
Piping type	Centralized piping		
Piping port size	M5 x 0.8	Rc 1/8	

Standard Strokes

Bore size (mm)	Number of axes	Standard stroke (mm)	Maximum manufacturable stroke (mm)
15	1 axis	150, 200, 300, 400, 500	750
25		200, 300, 400, 500, 600, 800	1200
25	2 axes	200, 300, 400, 500, 600, 800, 1000	
32			1500

Note 1) Strokes exceeding the standard strokes are available as a special order.
Note 2) Intermediate strokes other than order made (refer to page 4.7-90 for XB10) are available by special order.

Weights

(kg)

Model	Standard stroke mm							
	150	200	300	400	500	600	800	1000
REBH15	2.5	2.7	3.2	3.6	4.1	—	—	—
REBH25	—	5.3	6.0	6.6	7.3	8.0	9.4	—
REBHT25	—	6.2	7.3	8.3	9.4	10.4	12.5	14.6
REBHT32	—	9.6	10.7	11.9	13.0	14.2	16.5	18.8

Magnetic Holding Force

(N)

Bore size (mm)	15	25	32
Holding force	137	363	588

Theoretical Output

(N)

Bore size (mm)	Piston area (mm²)	Operating pressure (MPa)					
		0.2	0.3	0.4	0.5	0.6	0.7
15	176	35	52	70	88	105	123
25	490	98	147	196	245	294	343
32	804	161	241	322	402	483	563

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²).

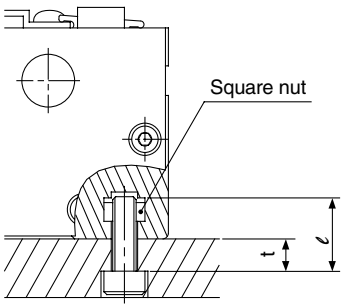
⚠ Specific Product Precautions

Mounting

⚠ Caution

1. **The interior is protected to a certain extent by the top cover, however, when performing maintenance, etc., take care not to cause scratches or other damage to the cylinder tube, slide table or linear guide by striking them or placing objects on them.**
   The bore and exterior of tubes are manufactured to precise tolerances, so that even a slight deformation can cause malfunction.
2. **Since the slide table is supported by precision bearings, do not apply strong impacts or large moment, etc., when mounting work pieces.**
3. **Mounting of the cylinder body**
   The body is mounted using the square nuts, which are included, in the two T-slots on the bottom of the body. Refer to the table below for mounting bolt dimensions and tightening torque.

Model		REBH15	REBH25	REBHT25	REBHT32
Bolt dimensions	Screw size	M5	M6		M8
	Dimension t	ℓ-8	ℓ-9		ℓ-12
Tightening torque	N·m	2.65	4.4		13.2



Operation

⚠ Caution

1. **The unit can be used with a direct load within the allowable range, but when connecting to a load which has an external guide mechanism, careful alignment is necessary.**
   Since variation of the shaft center increases as the stroke becomes longer, a connection method should be devised which allows for this displacement.
2. **Since the guide is adjusted at the time of shipment, unintentional movement of the adjustment setting should be avoided.**
3. **Contact SMC before operating in an environment where there will be contact with chips, dust (paper scraps, thread scraps, etc.) or cutting oil (gas oil, water, hot water, etc.).**
4. **Do not operate with the magnetic coupling out of position.**
   In case the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

Series REBH
Model Selection 1

Pv: Maximum operating pressure for vertical operation (MPa)
Wv: Allowable load weight for vertical operation (kg)
α: Load factor

$$\Sigma\alpha = \frac{\text{Load weight (W)}}{\text{Max. load weight (Wmax)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (Mmax)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Memax)}}$$

Operating conditions

- W: Load weight (kg)
- U: Maximum Speed (mm/s)
- P: Operating pressure (MPa)
- Stroke (mm)
- Position of work piece centre of gravity (m)
- Mode of operation (horizontal, inclined, vertical)

Mode of operation

Horizontal operation

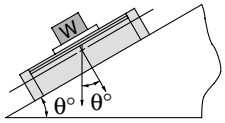
First tentative bore size determination

$$\varnothing D \geq 1.6 \times \sqrt{\frac{W}{P}}$$

Inclined operation

First tentative bore size determination

$$\varnothing D \geq 5.0 \times \sqrt{\frac{0.1 \times W\cos\theta + W\sin\theta}{P}}$$



Inclined operation

Vertical operation

First tentative bore size determination

$$\varnothing D \geq 5.0 \times \sqrt{\frac{0.1 \times W + W}{P}}$$

Determination of allowable load weight & pressure

W > Wv
P > Pv

Review of load weight and operating pressure

W ≤ Wv
P ≤ Pv

(Refer to page 4.3-79 for vertical operation.)

Determination of load factor (Σα)

(Refer to page 4.3-76.)

Σα > 1 **Review of operating conditions**

$$\Sigma\alpha = \frac{\text{Load weight (W)}}{\text{Max. load weight (Wmax)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (Mmax)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Memax)}}$$

Σα ≤ 1

(Refer to Data B on page 4.3-77.)

Second tentative determination of bore size from graph of maximum speed (U) and load weight (W).

Bore size determination

(The larger bore size is selected from two tentative determinations)

Note 1)

Review of order made products based on operating conditions

Note 1) Depending on the operating environment, etc., order made products should also be reviewed.

(Refer to pages 4.3-86 through 4.3-90.)

Model determination

Series REBH
Model Selection 2

Design Parameters 1

The maximum load weight and allowable moment will differ depending on the work piece mounting method , cylinder mounting orientation and piston speed.
A determination of suitability for use should be performed so that the total ($\Sigma\alpha n$) of the load factors (αn) for each weight and moment does not exceed 1.

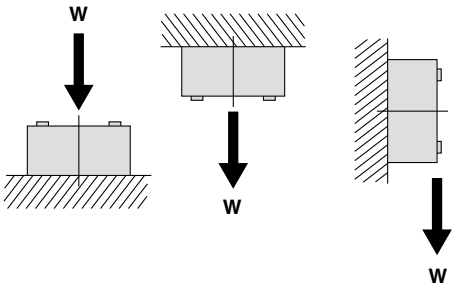
$$\Sigma\alpha n = \frac{\text{Load weight (W)}}{\text{Max. load weight (Wmax)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (Mmax)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Memax)}} \leq 1$$

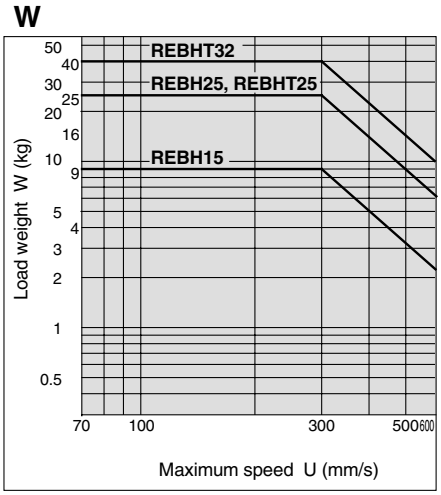
Design Parameters

Load weight

Max. load weight (kg)

Model	W_{max}
REBH15	9
REBH25	25
REBHT25	
REBHT32	40





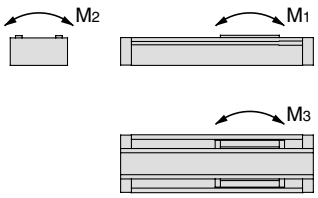
<Graph 1>

Moment

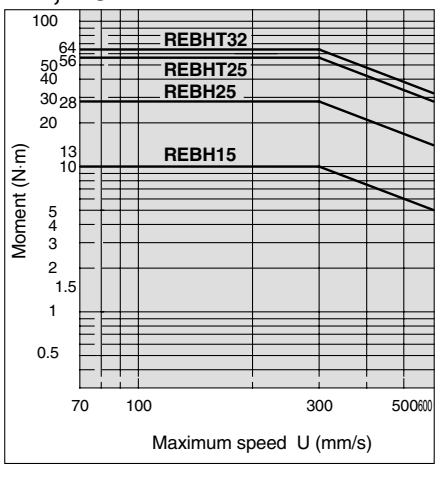
Allowable moment
(Static moment/Dynamic moment)

(N·m)

Model	M_1	M_2	M_3
REBH15	10	16	10
REBH25	28	26	28
REBHT25	56	85	56
REBHT32	64	96	64

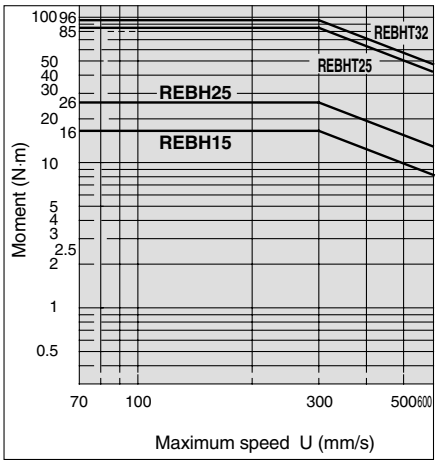


M1, M3



<Graph 2>

M2

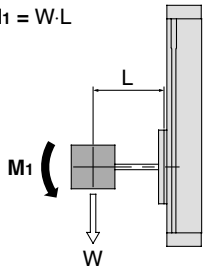


<Graph 3>

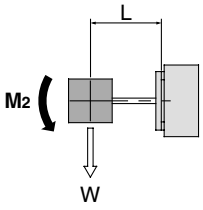
Static moment

Moment generated by the self weight of the load even when the cylinder is stopped

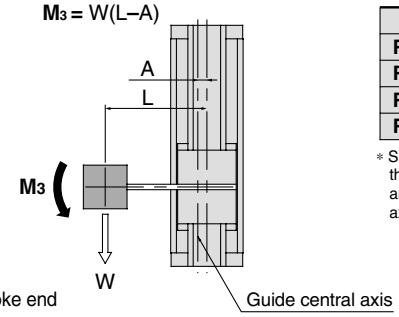
■ **Pitch moment**
$M_1 = W \cdot L$



■ **Roll moment**
$M_2 = W \cdot L$



■ **Yaw moment**
$M_3 = W(L-A)$



(mm)

Model	A
REBH15	17.5
REBH25	23.5
REBHT25	0*
REBHT32	0*

* Since there are 2 guides, the guides' central axis and the cylinder's central axis are the same.

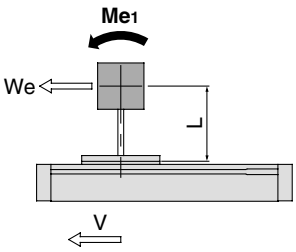
Dynamic moment

Moment generated by the load equivalent to the impact at the stroke end

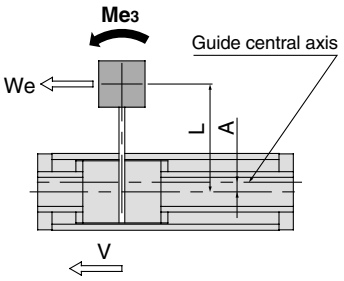
$We = 5 \times 10^{-3} \cdot W \cdot g \cdot U$

We : Load equivalent to impact [N]
W : Load weight [kg]
U : Maximum speed [mm/s]
g : Gravitational acceleration (9.8m/s²)

■ **Pitch moment**
$Me_1 = 1/3 \cdot We \cdot L$



■ **Yaw moment**
$Me_3 = 1/3 \cdot We(L-A)$

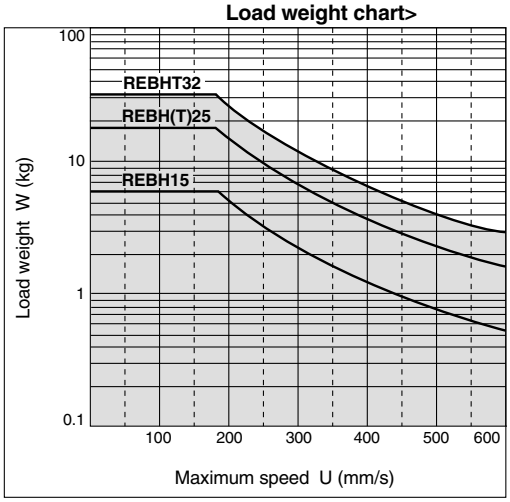


(mm)

Model	A
REBH15	17.5
REBH25	23.5
REBHT25	0*
REBHT32	0*

* Since there are 2 guides, the guides' central axis and the cylinder's central axis are the same.

<Data B: Maximum speed Load weight chart>



Series REBH
Model Selection 3

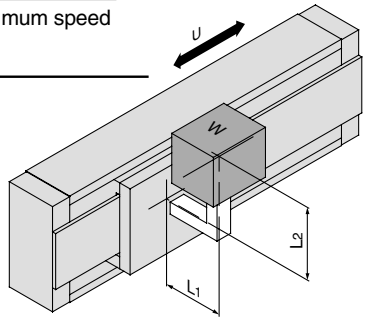
Selection Calculation

The selection calculation finds the load factors (αn) of the items below, where the total ($\Sigma\alpha n$) does not exceed 1.

$$\Sigma\alpha n = \alpha_1 + \alpha_2 + \alpha_3 \leq 1$$

Item	Load factor αn	Note
1. Max. load weight	α_1 = W/Wmax	Review W. Wmax is the maximum load weight.
2. Static moment	α_2 = M/Mmax	Review M_1, M_2, M_3. Mmax is the allowable moment.
3. Dynamic moment	α_3 = Me/Memax	Review Me_1, Me_3. Memax is the allowable moment.

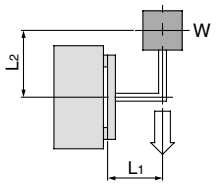
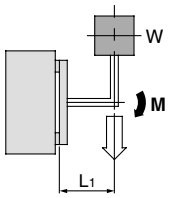
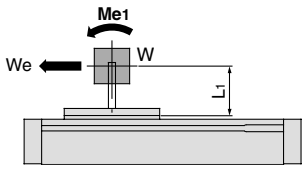
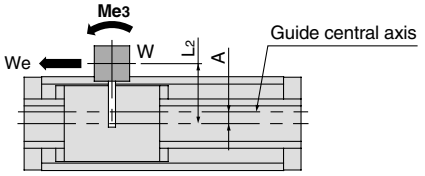
U: Maximum speed



Calculation examples

Operating conditions

Cylinder: REBH15
Mounting: Horizontal wall mounting
Maximum speed: U = 500 [mm/s]
Load weight: W = 1 [kg] (excluding weight of arm section)
L_1 = 200 [mm]
L_2 = 200 [mm]

Item	Load factor αn	Note
1. Maximum load weight 	α_1 = W/Wmax = 1/3 = **0.111** = **0.333**	Review W. (For Wmax, find the value in <Graph 2> when U = 500mm/s.)
2. Static moment 	M_2 = W·L_1 = 10·0.2 = 2 [N·m] α_2 = M_2/M_2 max = 2/16 = **0.125** W = 1 [kg] = 10 [N]	Review M_2. Since M_1 & M_3 are not generated, review is unnecessary.
3. Dynamic moment  	We = 5 x 10^{-3}·W·g·U = 5 x 10^{-3}·1.9.8·500 = 25 [N] Me_3 = 1/3·We(L_2-A) = 1/3·25·0.182 = 1.52 [N·m] α_3 = Me_3/Me_3max = 1.52/6 **= 0.25**	Review Me_3. (For Memax, find the value in <Graph 2> when U = 500mm/s.)
	Me_1 = 1 /3·We·L_1 = 1/3·25·0.2 = 1.6 [N·m] α_4 = Me_1/Me_1 max = 1.6/6 = **0.27**	Review Me_1. (For Memax, find the value in <Graph 2> when U = 500mm/s.)

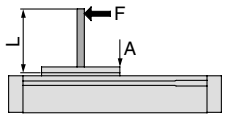
$\Sigma\alpha n = \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4$
= 0.333 + 0.125 + 0.25 + 0.27
= 0.978 Can be used based on $\Sigma\alpha n$ = 0.978 ≤ 1.

Series REBH
Model Selection 4

Design Parameters 2

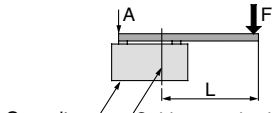
Table Deflection

Table deflection due to pitch moment load



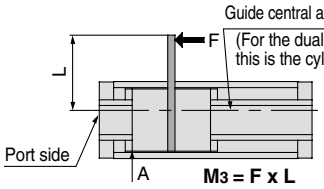
$M_1 = F \times L$

Table deflection due to roll moment load



$M_2 = F \times L$

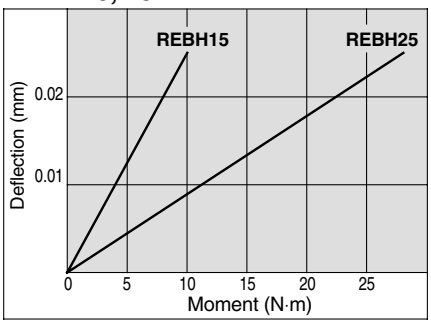
Table deflection due to yaw moment load



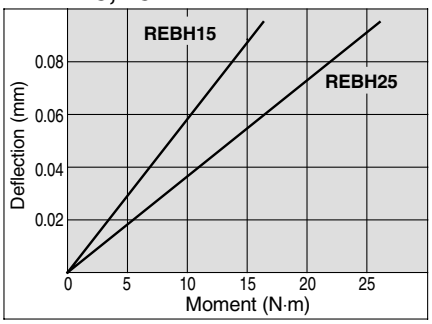
$M_3 = F \times L$

Note) Deflection: Displacement of section A when force acts on section F

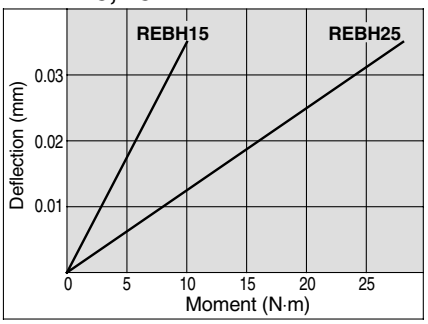
REBH15, 25



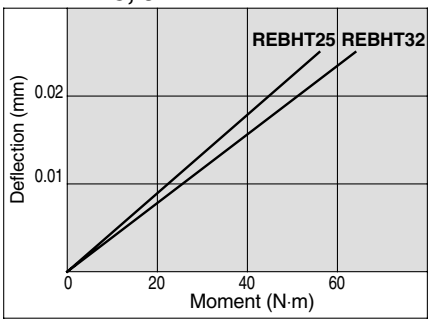
REBH15, 25



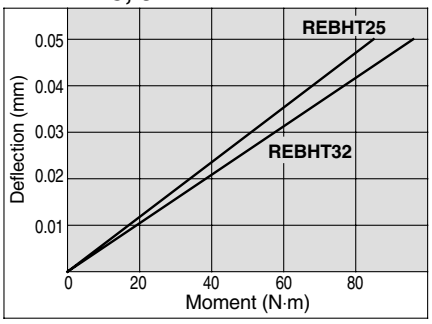
REBH15, 25



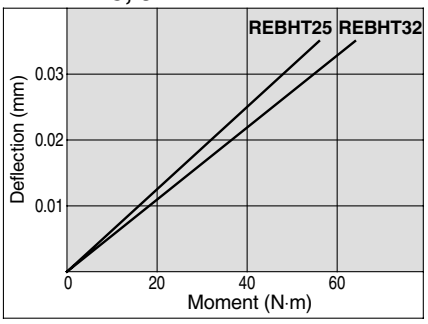
REBHT25, 32



REBHT25, 32



REBHT25, 32



Vertical Operation

When using in vertical operation, prevention of work piece dropping due to breaking of the magnetic coupling should be considered. The allowable load weight and maximum operating pressure should be as shown in the table below.

Model	Allowable load weight Wv (kg)	Max. operating pressure Pv (MPa)
REBH15	7.0	0.65
REBH25	18.5	0.65
REBHT25	18.5	0.65
REBHT32	30.0	0.65

Intermediate Stops

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)
REBH15	25
REBH25	30
REBHT25	30
REBHT32	30

Series REBH

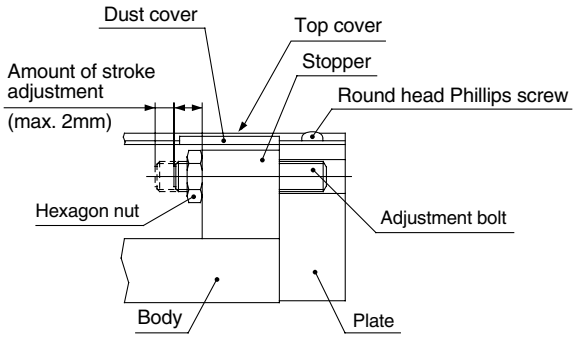
Stroke Adjustment

The adjustment bolt is adjusted to the optimum position for smooth acceleration and deceleration at the time of shipment, and should be operated at the full stroke. When stroke adjustment is necessary, the maximum amount of adjustment on one side is 2mm. (Do not adjust more than 2mm, as it will not be possible to obtain smooth acceleration and deceleration.)

Do not adjust based on the stopper's movement, as this can cause cylinder damage.

Stroke Adjustment

Loosen the round head Phillips screws, and remove the top covers and dust covers (4pcs.). Then loosen the hexagon nut, and after performing the stroke adjustment from the plate side with a hexagon wrench, retighten and secure the hexagon nut.



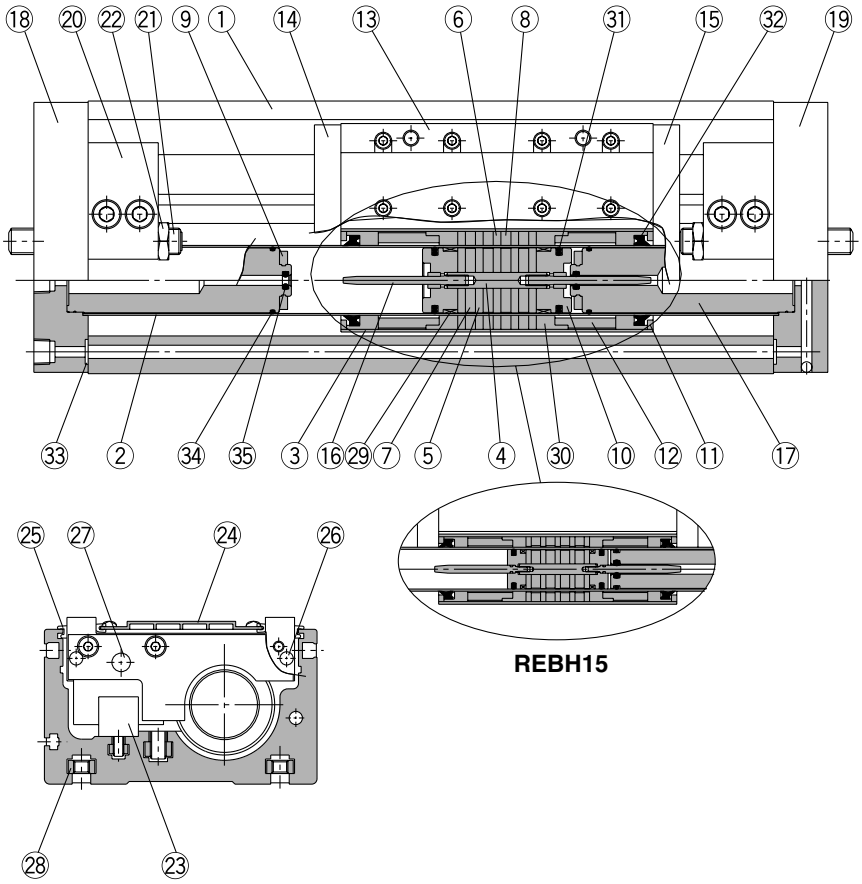
Adjustment Bolt Position (at Shipment), Hexagon Nut Tightening Torque

Model	T (mm)	Tightening torque (N·m)
REBH15	7	1.67
REBH25	9	3.14
REBHT25	9	
REBHT32	9	

After adjusting the stroke, replace the top covers and dust covers. Tighten the round head Phillips screws for securing the top covers with a torque of 0.58N·m.

Construction/ø15, ø25

Single axis type/REBH



REBH15

Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**External slider tube**	Aluminum alloy	
4	**Shaft**	Stainless steel	
5	**Piston side yoke**	Rolled steel plate	Zinc chromated
6	**External slider side yoke**	Rolled steel plate	Zinc chromated
7	**Magnet A**	Rare earth magnet	
8	**Magnet B**	Rare earth magnet	
9	**Bumper**	Urethane rubber	Except REBH15
10	**Piston**	Aluminum alloy	Chromated
11	**Spacer**	Rolled steel plate	Nickel plated
12	**Space ring**	Aluminum alloy	Chromated
13	**Slide table**	Aluminum alloy	Hard anodized
14	**Side plate A**	Aluminum alloy	Hard anodized
15	**Side plate B**	Aluminum alloy	Hard anodized
16	**Cushion ring**	Stainless steel	Compound electroless nickel plated
17	**Internal stopper**	Aluminum alloy	Anodized
18	**Plate A**	Aluminum alloy	Hard anodized

Parts list

No.	Description	Material	Note
19	**Plate B**	Aluminum alloy	Hard anodized
20	**Stopper**	Aluminum alloy	Anodized
21	**Adjustment bolt**	Chromium molybdenum steel	Nickel plated
22	**Hexagon nut**	Carbon steel	Nickel plated
23	**Linear guide**		
24	**Top cover**	Aluminum alloy	Hard anodized
25	**Dust cover**	Special resin	
26	**Magnet (for auto switch)**	Rare earth magnet	
27	**Parallel pin**	Carbon steel	Nickel plated
28	**Square nut for body mounting**	Carbon steel	Nickel plated (accessory)
29	**Wear ring A**	Special resin	
30	**Wear ring B**	Special resin	
31	**Piston seal**	NBR	
32	**Scraper**	NBR	
33	**O-ring**	NBR	
34	**O-ring**	NBR	
35	**Cushion seal**	NBR	

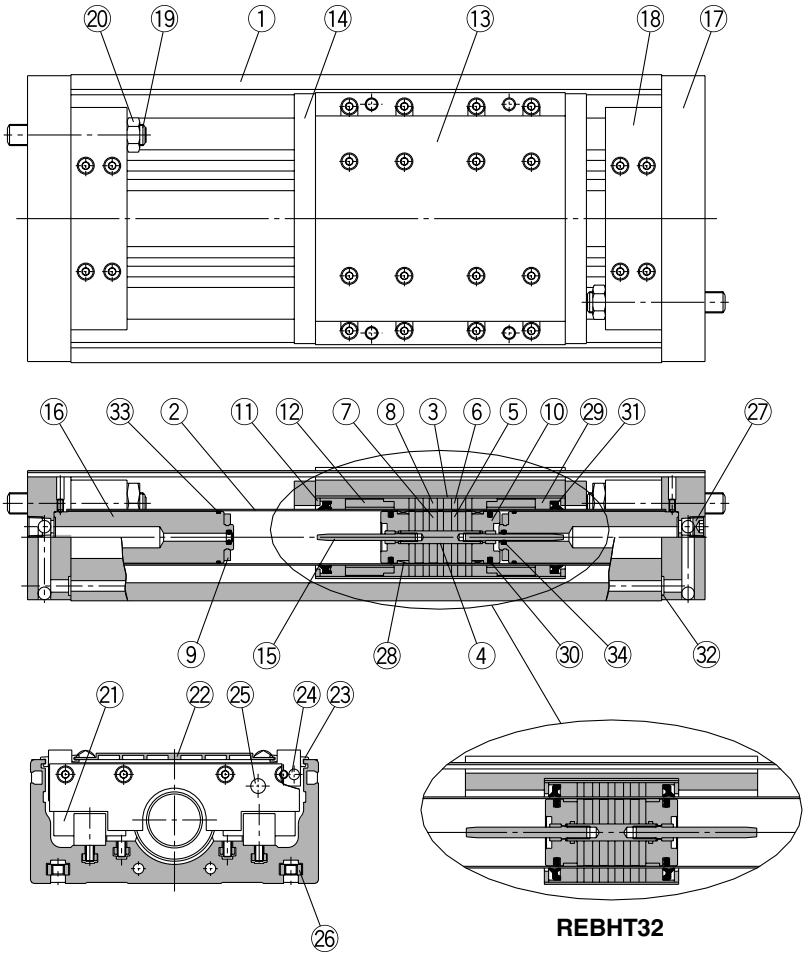
Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
10	**REBH15-PS**	Above numbers 29, 30, 31, 32, 33, 34, 35
15	**REBH25-PS**	

Series REBH

Construction/ø25, ø32

Dual axis type/REBHT



REBHT32

Parts list

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Cylinder tube**	Stainless steel	
3	**External slider tube**	Aluminum alloy	
4	**Shaft**	Stainless steel	
5	**Piston side yoke**	Rolled steel plate	Zinc chromated
6	**External slider side yoke**	Rolled steel plate	Zinc chromated
7	**Magnet A**	Rare earth magnet	
8	**Magnet B**	Rare earth magnet	
9	**Bumper**	Urethane rubber	
10	**Piston**	Aluminum alloy	Chromated
11	**Spacer**	Rolled steel plate	Nickel plated
12	**Space ring**	Aluminum alloy	Chromated (except REBHT32)
13	**Slide table**	Aluminum alloy	Hard anodized
14	**Side plate**	Aluminum alloy	Hard anodized (except REBHT32)
15	**Cushion ring**	Stainless steel	REBHT25 — Compound electroless nickel plated
		Brass	REBHT32 — Compound electroless nickel plated
16	**Internal stopper**	Aluminum alloy	Anodized
17	**Plate**	Aluminum alloy	Hard anodized

Parts list

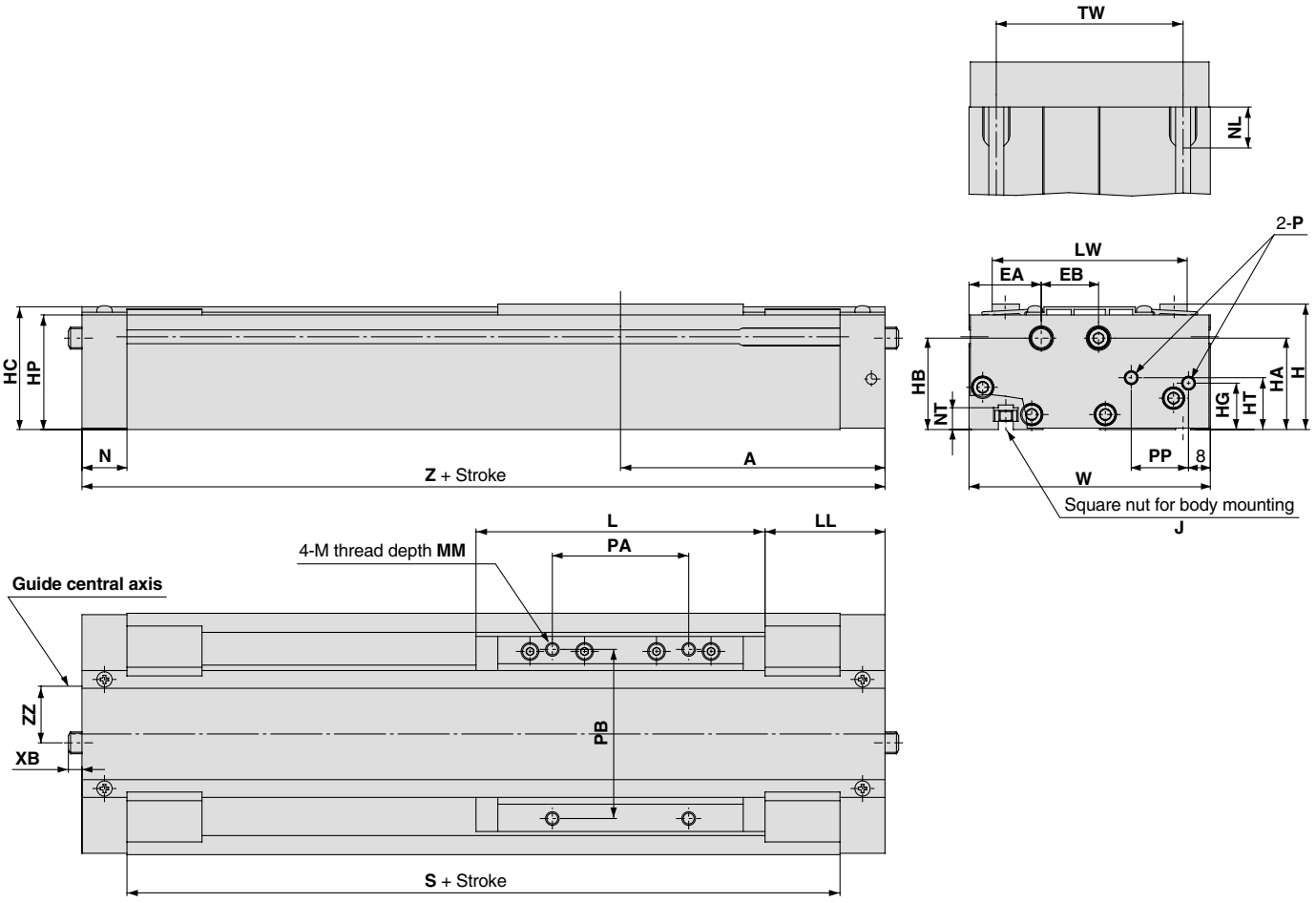
No.	Description	Material	Note
18	**Stopper**	Aluminum alloy	Anodized
19	**Adjustment bolt**	Chromium molybdenum steel	Nickel plated
20	**Hexagon nut**	Carbon steel	Nickel plated
21	**Linear guide**		
22	**Top cover**	Aluminum alloy	Hard anodized
23	**Dust cover**	Special resin	
24	**Magnet (for auto switch)**	Rare earth magnet	
25	**Parallel pin**	Carbon steel	Nickel plated
26	**Square nut for body mounting**	Carbon steel	Nickel plated (accessory)
27	**Hexagon socket head taper plug**	Carbon steel	Nickel plated
28	**Wear ring A**	Special resin	
29	**Wear ring B**	Special resin	
30	**Piston seal**	NBR	
31	**Scraper**	NBR	
32	**O-ring**	NBR	
33	**O-ring**	NBR	
34	**Cushion seal**	NBR	

Replacement parts: Seal kits

Bore size (mm)	Kit no.	Contents
25	**REBHT25-PS**	Above numbers 28, 29, 30, 31, 32, 33, 34
32	**REBHT32-PS**	

Dimensions/ø15, ø25

Single axis type/REBH



(mm)

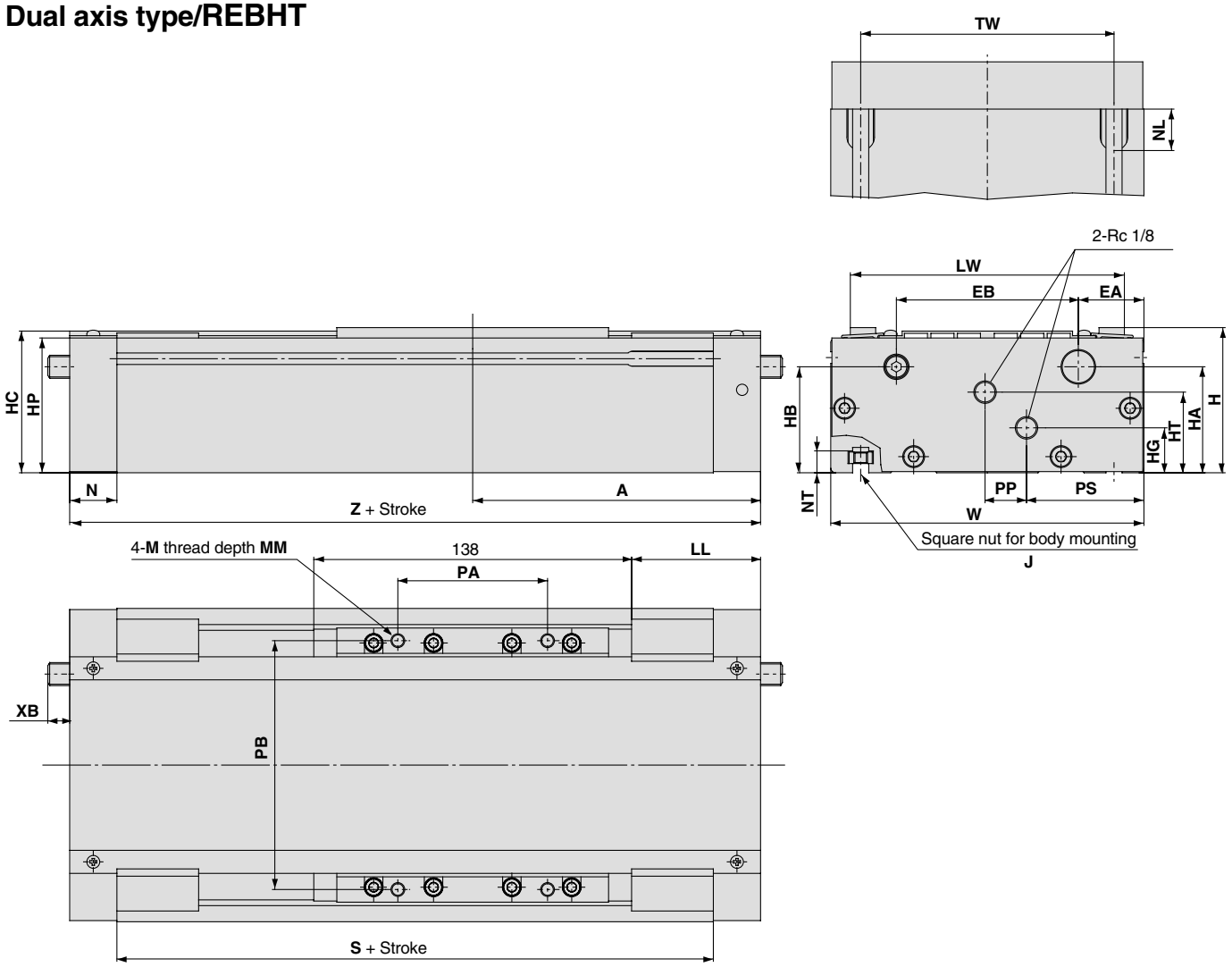
Model	A	EA	EB	H	HA	HB	HC	HG	HP	HT	J	L	LL	LW	M	MM
REBH15	97	26.5	21	46	33.5	33.5	45	17	42	19	M5	106	44	71.5	M5	8
REBH25	125	29	24	63	46	46	61.5	25	58.5	28	M6	138	56	86	M6	10

Model	N	NL	NT	P	PA	PB	PP	S	TW	W	XB	Z	ZZ
REBH15	16.5	15	8	M5	50	62	21	161	65	88.5	—	194	17.5
REBH25	20.5	18	9	Rc 1/8	65	75	27	209	75	103	9.5	250	23.5

Series REBH

Dimensions/ø25, ø32

Dual axis type/REBHT

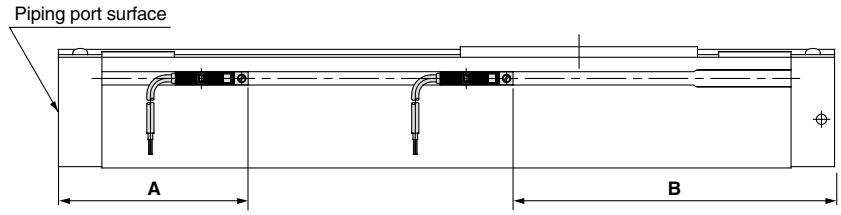


(mm)

Model	A	EA	EB	H	HA	HB	HC	HG	HP	HT	J	LL	LW	M	MM	N
REBHT25	125	28.5	79	63	46	46	61.5	19.5	58.5	35	M6	56	119	M6	10	20.5
REBHT32	132.5	30	90	75	52.5	57.5	72.5	25	69.5	43	M8	63.5	130	M8	12	23

Model	NL	NT	PA	PB	PP	PS	S	TW	W	XB	Z
REBHT25	18	9	65	108	18	51	209	110	136	9.5	250
REBHT32	22.5	12	66	115	14	61	219	124	150	2	265

Proper Auto Switch Mounting Position for Stroke End Detection



Proper auto switch mounting position

(mm)

Auto switch model / Cylinder model	A			B		
	D-Z7□ D-Z80	D-Y7□W D-Y7□WV	D-Y5□ D-Y6□ D-Y7P D-Y7PV	D-Z7□ D-Z80	D-Y7□W D-Y7□WV	D-Y5□ D-Y6□ D-Y7P D-Y7PV
REBH15	72	72	72	122	122	122
REBH25	86	86	86	164	164	164
REBHT25	86	86	86	164	164	164
REBHT32	82	82	82	183	183	183

Auto switch operating range

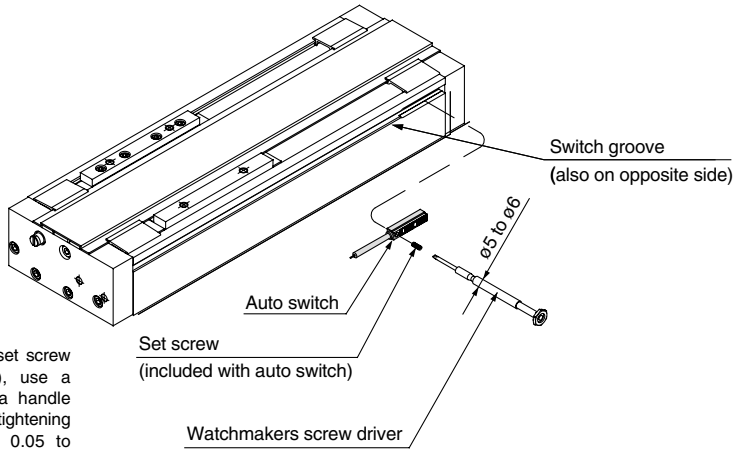
(mm)

Auto switch model / Cylinder model	D-Z7□ D-Z80	D-Y7□W D-Y7□WV D-Y5□ D-Y6□ D-Y7P D-Y7PV
REBH15	6	5
REBH25	6	5
REBHT25	6	5
REBHT32	9	6

Note) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment. (variations on the order of ±30%)

Auto Switch Mounting

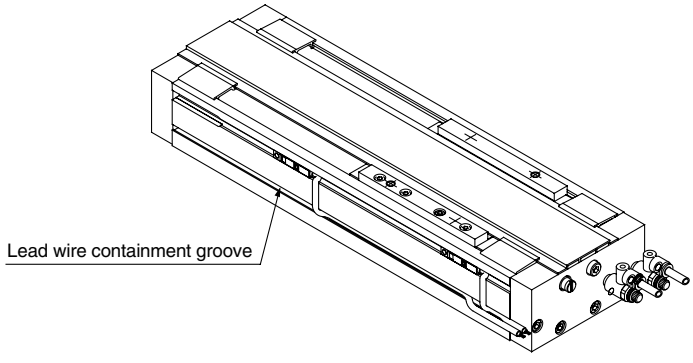
When mounting auto switches, they should be inserted into the cylinder's switch groove from the direction shown in the drawing on the right. After setting in the mounting position, use a flat head watchmakers screw driver to tighten the set screw which is included.



Note) When tightening the auto switch set screw (included with the auto switch), use a watchmakers screw driver with a handle about 5 to 6mm in diameter. The tightening torque should be approximately 0.05 to 0.1N·m.

Auto Switch Lead Wire Containment Groove

On model REBH25 a groove is provided on the side of the body (one side only) to contain auto switch lead wires. This should be used for placement of wiring.

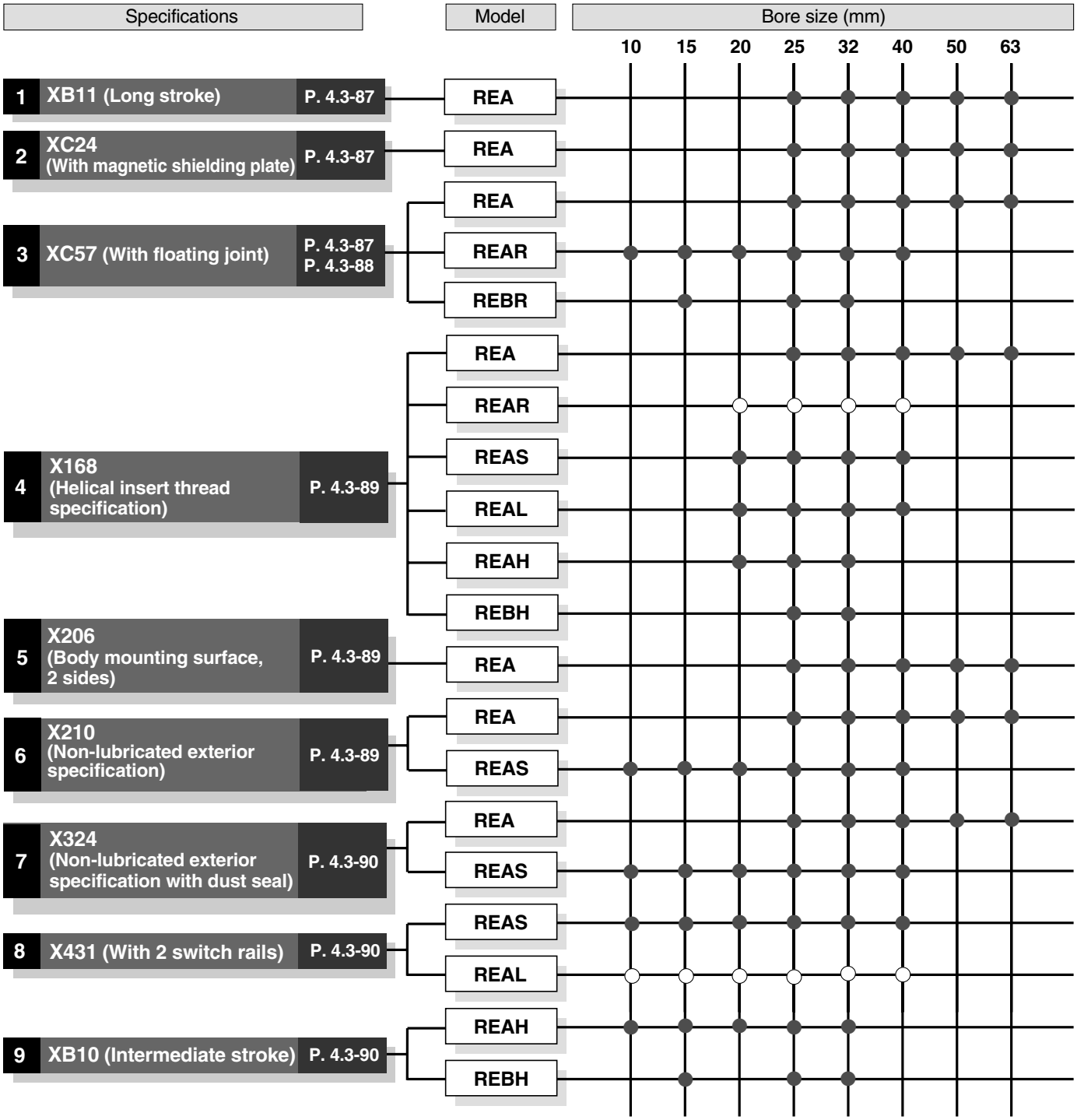


Series REA/REB
Individual Order Made Specifications

Order Made

Contact SMC for detailed specifications, lead times and prices, etc.

Order made product application table



Note) The applicable series and bore sizes of products are indicated by the "●" symbol. Contact SMC regarding products with the "○" symbol.

Series REA
Order Made Specifications 1

Contact SMC for detailed specifications, lead times and prices, etc.

1 Long stroke (2001mm and up) — Symbol -XB11

REA | Bore size | Stroke | XB11

Long stroke (2001mm and up)

When the stroke exceeds 2000mm (2001mm and up)

Specifications

Applicable series	REA
Bore size	ø25 to ø63
Applicable stroke	2001mm and up

2 With magnetic shielding plate — Symbol -XC24

REA | Bore size | Stroke | XC24

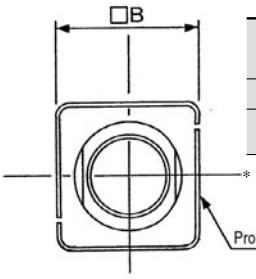
With magnetic shielding plate

Shields against leakage of magnetic flux from the external slider.

Specifications

Applicable series	REA
Bore size	ø25 to ø63

Dimensions



(mm)

Bore size (mm)	25	32	40	50	63
□B	48	62	72	88	102
Standard dimension (□B)	46	60	70	86	100

* Dimensions other than those in the table above are the same as the basic type. Refer to page 4.3-11.

3 — Symbol -XC57

REA | Bore size | Stroke | XC57

With floating joint

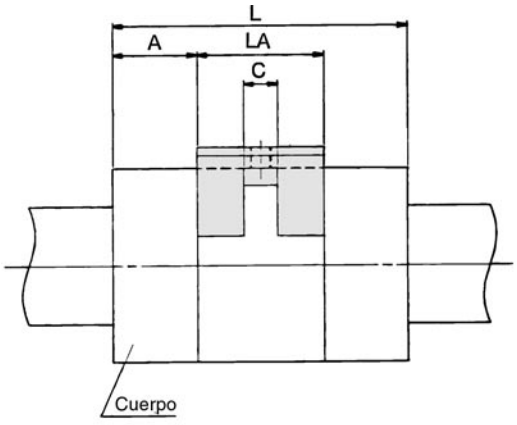
A special floating joint is added to the Series REA, and the labour for connections to the guide on the other axis (the load side) is reduced.
The attachment of the bolt to the floating joint and the load is not limited to the top or bottom.

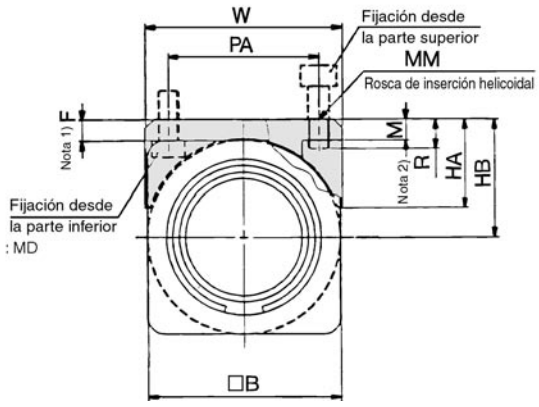
Specifications

Fluid	Air
Cylinder bore size	ø25, ø32, ø40, ø50, ø63
Max. operating pressure	0.7MPa
Min. operating pressure	0.18MPa
Piston speed	50 to 300mm/s
Mounting orientation	Free
Auto switch	Not mountable

Note) Since the body of this cylinder is designed for connection with a floating joint, and cannot be connected to the bodies of standard products, contact SMC if necessary.

Construction/Dimensions





(mm)

Model	A	□B	C	F Note 1)	HA	HB	L	LA	MM	MD	M	PA	R Note 2)	W
REA25	20	46	8.0	5.5	21	28.5	70	30	M5	M4	5	36	7	47
REA32	22.5	60	9.5	6.0	27.5	36	80	35	M6	M5	6	47	8	61
REA40	26	70	9.5	6.0	28.5	41	92	40	M6	M5	6	55	8	71
REA50	35	86	11	6.0	35	49	110	40	M8	M6	8	65	11	87
REA63	36	100	18	7.0	42	57	122	50	M8	M6	10	80	11	101

Note 1) Dimension F provides a clearance of 1mm between the body and the floating joint, but does not consider self weight deflection of the cylinder tube, etc. When put into operation, an appropriate value should be set which considers self weight deflection and alignment variations with respect to the other axis. (Refer to the self weight deflection table on page 4.3-9.)

Note 2) Use caution when attached from the top and operated at or above dimension R, because the end of the screw will contact the body, and a floating condition will not be maintained in some cases.

Series REA/REB
Order Made Specifications 2

Contact SMC for detailed specifications, lead times and prices, etc.

Order Made

3 With floating joint (REAR/REBR) Cont'd

Symbol **-XC57**

REAR / REBR — Bore size — Stroke — **XC57**

With floating joint

A special floating joint is added to the Series REAR, and the labour for connections to the guide on the other axis (the load side) is reduced.
The attachment of the bolt to the floating joint and the load is not limited to the top or bottom.

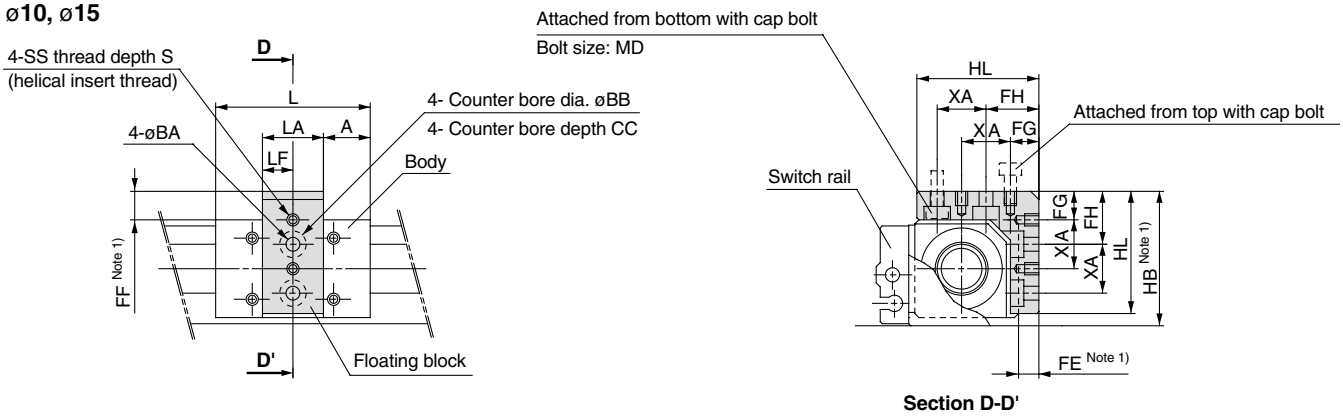
Specifications

	REAR	REBR
Fluid	Air	
Cylinder bore size	ø10, ø15, ø20, ø25, ø32, ø40	ø15, ø25, ø32
Max. operating pressure	0.7MPa	
Min. operating pressure	0.18MPa	
Piston speed	50 to 300mm/s	50 to 600mm/s
Mounting	Direct mount type	
Auto switch	Mountable	

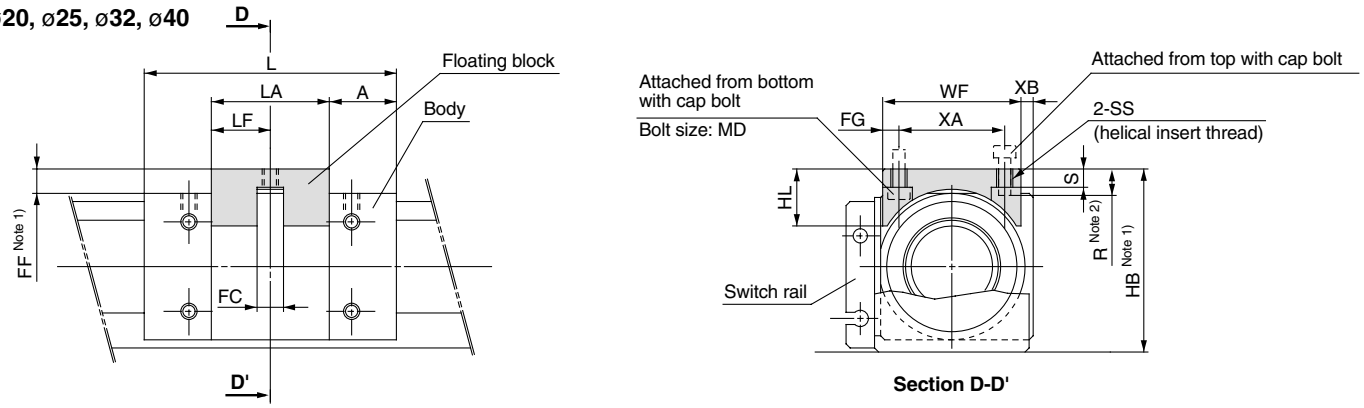
Note) Since the body of this cylinder is designed for connection with a floating joint, and cannot be connected to the bodies of standard products, contact SMC if necessary.

Construction/Dimensions

ø10, ø15



ø20, ø25, ø32, ø40



(mm)

Bore size	A	BA	BB	CC	FC	FE Note 1)	FF Note 1)	FG	FH	HB Note 1)	HL	L	LA	LF	MD	R Note 2)	S	SS	WF	XA	XB
ø10	11.5	3.4	6.5	3.3	—	5	7	7	13	33	30	38	15	7.5	M3	—	3.5	M3	—	12	—
ø15	18	4.5	8	4.4	—	4.5	6.5	7.5	14.5	38.5	35.5	53	17	8.5	M4	—	4.5	M4	—	14	—
ø20	16.5	—	—	—	6.5	—	6	4	—	45	14	62	29	14.5	M3	7	4.5	M4	34	26	3
ø25	20.5	—	—	—	8	—	7	4	—	51	17	70	29	14.5	M4	8	5.5	M5	39	31	3
ø32	21	—	—	—	9.5	—	7.5	4.5	—	62.5	22	76	34	17	M5	10	6.5	M6	50	41	3
ø40	25.5	—	—	—	9.5	—	7.5	7.5	—	74.5	28	90	39	19.5	M5	10	6.5	M6	60	45	3

Note 1) FE, FF and HB provide a clearance of 1mm between the body and the floating joint, but do not consider self weight deflection of the cylinder tube, etc. When put into operation, an appropriate value should be set which considers self weight deflection and alignment variations with respect to the other axis. (Refer to the self weight deflection table on pages 4.3-17 and 4.3-67.)

Note 2) Use caution when attached from the top and operated at or above dimension R, because the end of the screw will contact the body, and a floating condition will not be maintained in some cases.

Series REA/REB
Order Made Specifications 3

Contact SMC for detailed specifications, lead times and prices, etc.

4 Helical insert thread specification

Symbol: -X168

REA
REAS
REAL
REAH
REBH

Bore size — Stroke — X168

X168: Helical insert thread specification

The standard mounting threads have been changed to helical insert specifications.

Specifications

Applicable series	REA, REAS, REAL, REAH, REBH
Bore size	REA: ø25 to ø63 REAS, REAL: ø20 to ø40 REAH: ø20 to ø32 REBH: ø25 to ø32

The mounting thread positions and size are the same as standard.

5 Additional mounting tap positions for slider

Symbol: -X206

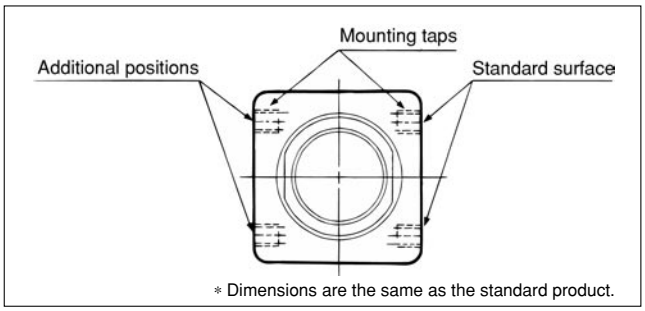
REA — Bore size — Stroke — X206

X206: Additional mounting tap positions for slider

Mounting taps have been added on the surface opposite the standard positions.

Specifications

Applicable series	REA
Bore size	ø25 to ø63



∗ Dimensions are the same as the standard product.

6 Non-lubricated exterior specification

Symbol: -X210

REA
REAS

Bore size — Stroke — X210

X210: Non-lubricated exterior specification

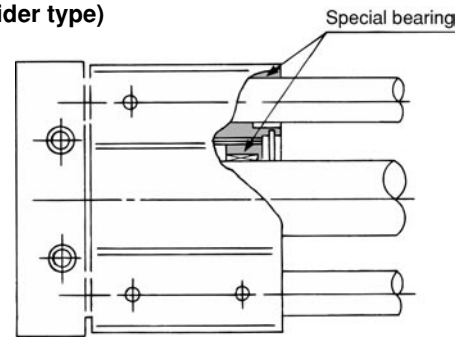
Suitable for environments where oils are not tolerated. A scraper is not installed. A separate version -X324 (with dust seal) is available for cases in which dust, etc., is scattered throughout the environment.

Specifications

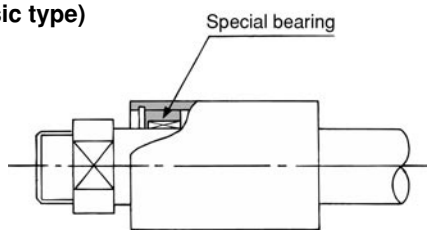
Applicable series		REA, REAS
Bore size	REA	ø25 to ø63
	REAS	ø10 to ø40

Construction

REAS (slider type)



REA (basic type)



Series REA/REB
Order Made Specifications 4

Contact SMC for detailed specifications, lead times and prices, etc.

7 Non-lubricated exterior specification (with dust seal) -X324

Symbol: -X324

REA / REAS — Bore size — Stroke — X324

Non-lubricated exterior specification (with dust seal)

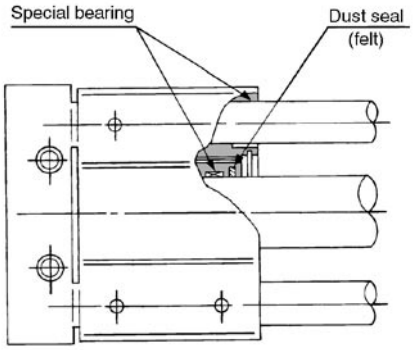
This unit has non-lubricated exterior specifications, with a felt dust seal provided on the cylinder body.

Specifications

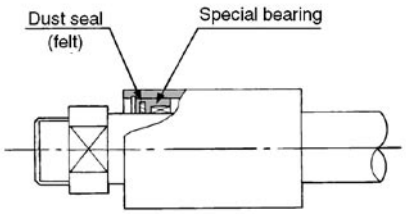
Applicable series		REA, REAS
Bore size	REA	ø25 to ø63
	REAS	ø10 to ø40

Construction

REAS (slider type)



REA (basic type)



8 Switch rail mounting on both sides (with 2pcs.) -X431

Symbol: -X431

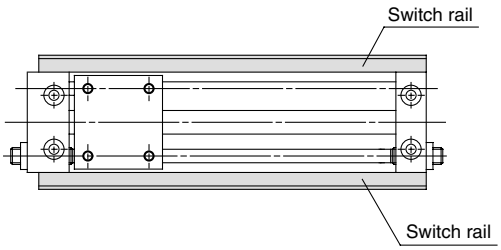
REAS — Bore size — Stroke — X431

Switch rail mounting on both sides (with 2pcs.)

Effective in cases with switches when the stroke is short.

Specifications

Applicable series	REAS
Bore size	ø10 to ø40



9 Intermediate stroke -XB10

Symbol: -XB10

REAH / REBH — Bore size — Stroke — XB10

(Refer to table below.) — Intermediate stroke

Strokes

Bore size	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	650	700	750	800	850	900	950	1000
REAH10	●	○	●	○	○	○	●																				
REBH15	●	○	●	○	○	○	●	○	○	○	●	○	○	○	●												
REAH20			●	○	○	○	●	○	○	○	●	○	○	○	●	○	○	○	●								
REBH25			●	—	○	—	●	—	○	—	●	—	○	—	●	—	○	—	●	○	○	○	●				
REBHT25			●	—	○	—	●	—	○	—	●	—	○	—	●	—	○	—	●	○	○	○	●	○	○	○	●
REBHT32			●	—	○	—	●	—	○	—	●	—	○	—	●	—	○	—	●	○	○	○	●	○	○	○	●

● : Standard strokes
○ : Strokes available with -XB10
— : Not available

Series REA/REB
Specific Product Precautions 1

Be sure to read before handling.

Disassembly and Maintenance

⚠ Warning

1. Use caution as the attractive force of the magnets is very strong.

When removing the external slider and piston slider from the cylinder tube for maintenance, etc., handle with caution, since the magnets installed in each slider have a very strong attractive force.

⚠ Caution

1. Use caution when removing the external slider, as the piston slider will be directly attracted to it.

When removing the external slider or piston slider from the cylinder tube, first force the sliders out of their magnetically coupled positions, and then remove them individually when there is no longer any holding force. If they are removed while still magnetically coupled, they will be directly attracted to one another and will not come apart.

2. Do not disassemble the magnetic components (piston slider, external slider).

This can cause a loss of holding force and malfunction.

3. When disassembling to replace the seals and wear ring, refer to the separate disassembly instructions.

4. Note the direction of the external slider and piston slider.

Since the external slider and piston slider are directional for size ø10, refer to the drawings below when performing disassembly or maintenance. Put the external slider and piston slider together, and insert the piston slider into the cylinder tube so that they will have the correct positional relationship as shown in Figure 1. If they align as shown in Figure 2, reinsert the piston slider only, after turning it around 180°. If the direction is not correct, it will be impossible to obtain the specified holding force.

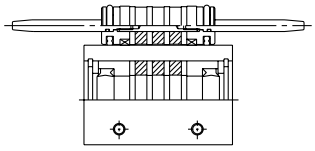


Figure 1. Correct position

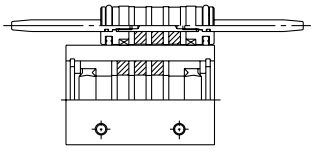


Figure 2. Incorrect position

5. During disassembly, use caution in handling the cushion ring.

The cushion ring is a precision part, and any deformation, etc., can cause malfunction or poor performance.

Speed adjustment

⚠ Caution

1. SMC's "throttle" type speed controllers (Series AS) are recommended for speed adjustment. (Refer to Table 3.)

2. Speed adjustment is possible with meter-in/meter-out type speed controllers, but it may not be possible to obtain the cushion effect (smooth start-up, soft stop).

3. In case of other than horizontal mounting, it is recommended that the system have a reduced pressure supply circuit installed at its lower side. (This is also effective as a countermeasure against start-up delay on an upward stroke, and for air conservation.)

Table 3. Recommended speed controllers

Bore size (mm)	Model		
	Elbow type	Straight type	In-line type
10	AS1201F-M5-04-X214	AS1301F-M5-04-X214	AS1001F-04-X214
15	AS1201F-M5-04-X214	AS1301F-M5-04-X214	AS1001F-04-X214
20	AS2201F-01-06-X214	AS2301F-01-06-X214	AS2001F-06-X214
25	AS2201F-01-06-X214	AS2301F-01-06-X214	AS2001F-06-X214
32	AS2201F-01-06-X214	AS2301F-01-06-X214	AS2001F-06-X214
40	AS2201F-02-06-X214	AS2301F-02-06-X214	AS2001F-06-X214
50	AS3201F-02-08-X214	AS3301F-02-08-X214	AS3001F-08-X214
63	AS3201F-02-08-X214	AS3301F-02-08-X214	AS3001F-08-X214

Adjustment of Cushion Effect (Smooth Start-up, Soft Stop)

⚠ Caution

The cushion cannot be adjusted.
There is no cushion needle adjustment of the kind found on conventional cushion mechanisms.