Slider Type/Ball Bushing Bearing

CY1L Series

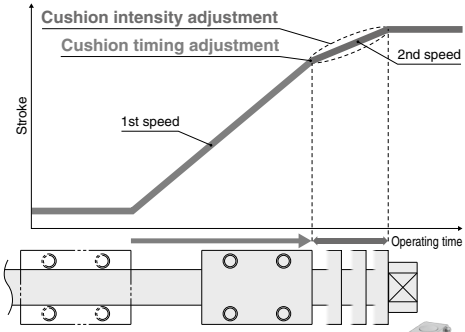
ø6, ø10, ø15, ø20, ø25, ø32, ø40

Related Products

Deceleration Controller DAS Series

Click here for details

2-speed control reduces cycle time Allows for the impact relaxation of the stroke end

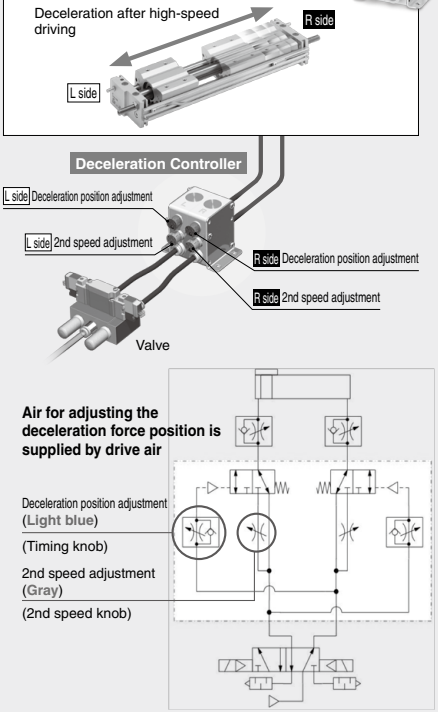


Allows for the 2-speed control of cylinders

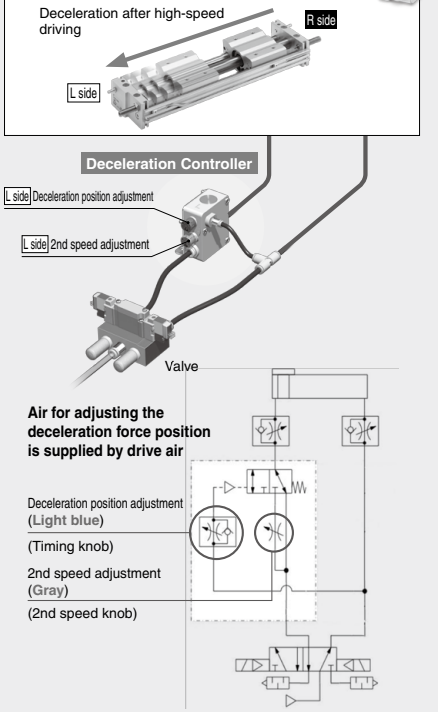
The deceleration position (cushion timing) and 2nd speed (cushion intensity) can be adjusted.

■ Piping Example

For double-end



For single-end



Variations

Mounting	Body size	Applicable tubing O.D.										Bore size
		Metric size					Inch size					
		4	6	8	10	12	5/32"	1/4"	5/16"	3/8"	1/2"	
	5	●	●	●	●	●	●	●	●	●	●	ø10 to ø40
	7				●	●	●	●	●	●	●	Up to ø100

Model Selection

E: Kinetic energy of load (J)

$$E = \frac{W}{2} \cdot \left(\frac{V}{1000}\right)^2$$

Es: Allowable kinetic energy for intermediate stop using an air pressure circuit (J)
Ps: Operating pressure limit for intermediate stop using an external stopper, etc. (MPa)
Pv: Maximum operating pressure for vertical operation (MPa)
WA: Allowable load mass based on these operating conditions (kg)
Wv: Allowable load mass for vertical operation (kg)
FA: Allowable drive resisting force at pusher (kg)
σ: Stroke coefficient

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

Operating Conditions

- **W: Load mass (kg)**
- **V: Speed (mm/s)**
- **P: Operating pressure (MPa)**
- **Stroke (mm)**
- **Lo: Distance from slide block mounting surface to workpiece center of gravity (cm)**
- **Mode of operation (Horizontal, Inclined, Vertical)**
- **F: Drive resisting force (kg)**

Mode of operation

Horizontal operation | Inclined operation | Vertical operation (Note 1)

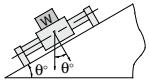
Review of load mass and operating pressure

First tentative bore size determination

Horizontal: $\phi D \geq 1.6 \times \sqrt{\frac{W}{P}}$

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

Vertical: $\phi D \geq 5.0 \times \sqrt{\frac{0.1 \times W + W}{P}}$



Inclined operation

Determination of allowable load mass & pressure

$W > Wv$, $P > Pv$ → (For vertical operation, refer to page 1229.)

$W \leq Wv$, $P \leq Pv$

(For method to find σ, refer to page 1227.)

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

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

Select an example calculation for allowable mass based on cylinder mounting orientation.

(Refer to pages 1227 and 1228.)

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

$W > W_A$, $F > F_A$ → Review of bore size, stroke and Lo

$W \leq W_A$, $F \leq F_A$

Review with magnet holding force (H)

Intermediate stop? (Note 1)

Yes → Intermediate stopping method

Stop with external stopper → Tentative determination of L type

Stop with air pressure circuit → (For intermediate stops, refer to page 1229.)

None

Determination of kinetic energy of load (E)

$E > Es$ → Tentative determination of L type

$E \leq Es$ → Bore size determination

$$E = \frac{W}{2} \cdot \left(\frac{V}{1000}\right)^2$$

$E > Es$

Determination of pressure (P) when making intermediate stop

$P > Ps$ → Tentative determination of L type

$P \leq Ps$ → (For intermediate stops, refer to page 1229.)

$P > Ps$ → Tentative determination of H type

Review of larger bore size | Tentative determination of H type

Note 1) This cylinder cannot perform an intermediate stop using an air pressure circuit in vertical operation. In this case, an intermediate stop can be performed only by using an external stopper, etc.

Note 2) Made-to-order products should be considered, too, depending on an operating environment, etc.

Bore size determination

Note 2) Consider made-to-order products, depending on an operating condition.

(Refer to page 1231.)

Model selected

Caution on Design (1)

How to Find σ when Selecting the Allowable Load Mass

Since the maximum load mass 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) CY1L25□-650

(1) Maximum load mass = 20 kg

(2) Load mass for 650 st = 13.6 kg

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

Calculation Formula for σ (σ ≤ 1)

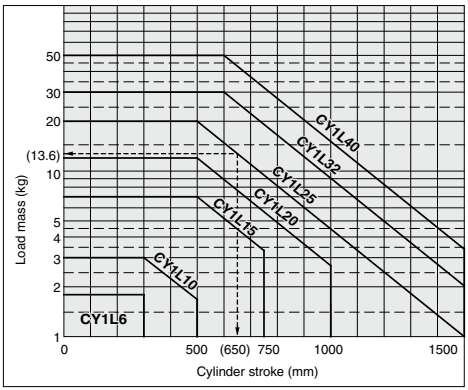
ST: Stroke (mm)

Model	CY1L6	CY1L10	CY1L15
σ =	1	$\frac{10^{(0.86 - 1.3 \times 10^{-3} \times ST)}}{3}$	$\frac{10^{(1.5 - 1.3 \times 10^{-3} \times ST)}}{7}$

Model	CY1L20	CY1L25	CY1L32
σ =	$\frac{10^{(1.71 - 1.3 \times 10^{-3} \times ST)}}{12}$	$\frac{10^{(1.98 - 1.3 \times 10^{-3} \times ST)}}{20}$	$\frac{10^{(2.26 - 1.3 \times 10^{-3} \times ST)}}{30}$

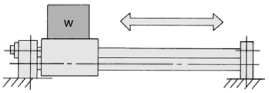
Model	CY1L40
σ =	$\frac{10^{(2.48 - 1.3 \times 10^{-3} \times ST)}}{50}$

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



Examples of Allowable Load Mass Calculation Based on Cylinder Mounting Orientation

1. Horizontal Operation (Floor mounting)



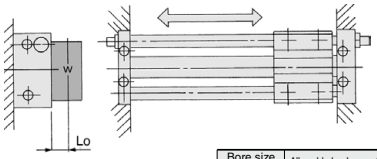
Maximum Load Mass (Center of slide block) (kg)

Bore size (mm)	6	10	15	20	25	32	40
Max. load mass (kg)	1.8	3	7	12	20	30	50
Stroke (Max)	Up to 300 st	Up to 300 st	Up to 500 st	Up to 500 st	Up to 500 st	Up to 600 st	Up to 600 st

The above maximum load mass 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 mass may be different from the maximum load mass.

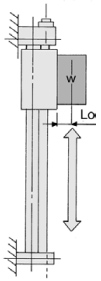
2. Horizontal Operation (Wall mounting)



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

Bore size (mm)	Allowable load mass (W_A) (kg)
6	$\frac{\sigma \cdot 6.48}{6.8 + 2\mathbf{Lo}}$
10	$\frac{\sigma \cdot 15.0}{8.9 + 2\mathbf{Lo}}$
15	$\frac{\sigma \cdot 45.5}{11.3 + 2\mathbf{Lo}}$
20	$\frac{\sigma \cdot 101}{13.6 + 2\mathbf{Lo}}$
25	$\frac{\sigma \cdot 180}{15.2 + 2\mathbf{Lo}}$
32	$\frac{\sigma \cdot 330}{18.9 + 2\mathbf{Lo}}$
40	$\frac{\sigma \cdot 624}{22.5 + 2\mathbf{Lo}}$

3. Vertical Operation



Bore size (mm)	Allowable load mass (W_V) (kg)
6	$\frac{\sigma \cdot 1.53}{1.6 + \mathbf{Lo}}$
10	$\frac{\sigma \cdot 5.00}{1.95 + \mathbf{Lo}}$
15	$\frac{\sigma \cdot 15.96}{2.4 + \mathbf{Lo}}$
20	$\frac{\sigma \cdot 31.1}{2.8 + \mathbf{Lo}}$
25	$\frac{\sigma \cdot 54.48}{3.1 + \mathbf{Lo}}$
32	$\frac{\sigma \cdot 112.57}{3.95 + \mathbf{Lo}}$
40	$\frac{\sigma \cdot 212.09}{4.75 + \mathbf{Lo}}$

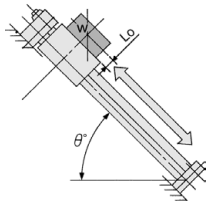
Lo: Distance from mounting surface to load center of gravity (cm)

Note) Operating pressure should be equal to or less than the maximum operating pressure in the article, "Vertical Operation" listed on page 1229.

Caution on Design (2)

Example of Allowable Load Mass Calculation Based on Cylinder Mounting Orientation

4. Inclined Operation (In operating direction)



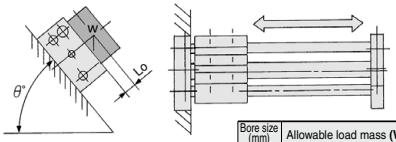
Angle	up to 45°	up to 60°	up to 75°	up to 90°
k	1	0.9	0.8	0.7

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

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

Bore size (mm)	Allowable load mass **(W_A)** (kg)
6	$\frac{\sigma \cdot 4.05 \cdot K}{1.7 \cos\theta + 2\,(1.6 + \mathbf{Lo})\sin\theta}$
10	$\frac{\sigma \cdot 10.2 \cdot K}{2.8 \cos\theta + 2\,(1.95 + \mathbf{Lo})\sin\theta}$
15	$\frac{\sigma \cdot 31.1 \cdot K}{2.9 \cos\theta + 2\,(2.4 + \mathbf{Lo})\sin\theta}$
20	$\frac{\sigma \cdot 86.4 \cdot K}{6 \cos\theta + 2\,(2.8 + \mathbf{Lo})\sin\theta}$
25	$\frac{\sigma \cdot 105.4 \cdot K}{3.55 \cos\theta + 2\,(3.1 + \mathbf{Lo})\sin\theta}$
32	$\frac{\sigma \cdot 178 \cdot K}{4 \cos\theta + 2\,(3.95 + \mathbf{Lo})\sin\theta}$
40	$\frac{\sigma \cdot 361.9 \cdot K}{5.7 \cos\theta + 2\,(4.75 + \mathbf{Lo})\sin\theta}$

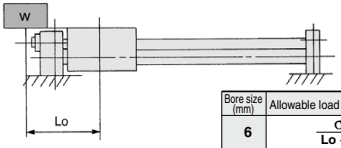
5. Inclined Operation (At a right angle to operating direction)



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

Bore size (mm)	Allowable load mass **(W_A)** (kg)
6	$\frac{\sigma \cdot 6.48}{3.6 + 2\,(1.6 + \mathbf{Lo})\sin\theta}$
10	$\frac{\sigma \cdot 15}{5 + 2\,(1.95 + \mathbf{Lo})\sin\theta}$
15	$\frac{\sigma \cdot 45.5}{6.5 + 2\,(2.4 + \mathbf{Lo})\sin\theta}$
20	$\frac{\sigma \cdot 115}{8 + 2\,(2.8 + \mathbf{Lo})\sin\theta}$
25	$\frac{\sigma \cdot 180}{9 + 2\,(3.1 + \mathbf{Lo})\sin\theta}$
32	$\frac{\sigma \cdot 330}{11 + 2\,(3.95 + \mathbf{Lo})\sin\theta}$
40	$\frac{\sigma \cdot 624}{13 + 2\,(4.75 + \mathbf{Lo})\sin\theta}$

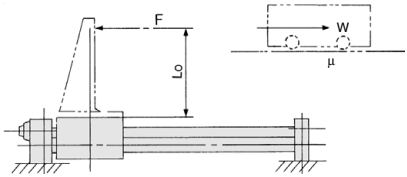
6. Load Center Offset in Operating Direction (Lo)



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

Bore size (mm)	Allowable load mass **(W_A)** (kg)
6	$\frac{\sigma \cdot 2}{\mathbf{Lo} + 1.7}$
10	$\frac{\sigma \cdot 5.6}{\mathbf{Lo} + 2.8}$
15	$\frac{\sigma \cdot 13.34}{\mathbf{Lo} + 2.9}$
20	$\frac{\sigma \cdot 43.2}{\mathbf{Lo} + 6}$
25	$\frac{\sigma \cdot 46.15}{\mathbf{Lo} + 3.55}$
32	$\frac{\sigma \cdot 80}{\mathbf{Lo} + 4}$
40	$\frac{\sigma \cdot 188.1}{\mathbf{Lo} + 5.7}$

7. Horizontal Operation (Pushing load, Pusher)

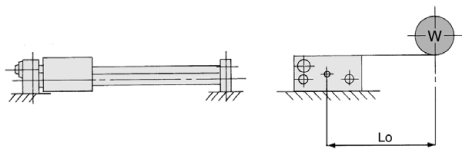


F: Drive (from slide block to position **Lo**) resistance force W x μ (kg)
Lo: Distance from mounting surface to load center of gravity (cm)
μ: Friction coefficient

Bore size (mm)	**6**	**10**	**15**	**20**
Allowable drive resisting force **(F_A)** (kg)	$\frac{\sigma \cdot 2.72}{1.6 + \mathbf{Lo}}$	$\frac{\sigma \cdot 5.55}{1.95 + \mathbf{Lo}}$	$\frac{\sigma \cdot 15.96}{2.4 + \mathbf{Lo}}$	$\frac{\sigma \cdot 41.7}{2.8 + \mathbf{Lo}}$

Bore size (mm)	**25**	**32**	**40**
Allowable drive resisting force **(F_A)** (kg)	$\frac{\sigma \cdot 58.9}{3.1 + \mathbf{Lo}}$	$\frac{\sigma \cdot 106.65}{3.95 + \mathbf{Lo}}$	$\frac{\sigma \cdot 228}{4.75 + \mathbf{Lo}}$

8. Horizontal Operation (Load, Lateral offset Lo)



Lo: Distance from center of side block to load's center of gravity (cm)

Bore size (mm)	**6**	**10**	**15**	**20**
Allowable load mass **(W_A)** (kg)	$\frac{\sigma \cdot 6.48}{3.6 + \mathbf{Lo}}$	$\frac{\sigma \cdot 15}{5 + \mathbf{Lo}}$	$\frac{\sigma \cdot 45.5}{6.5 + \mathbf{Lo}}$	$\frac{\sigma \cdot 80.7}{8 + \mathbf{Lo}}$

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

Caution on Design (3)

Vertical Operation

When operating a load vertically, it should be operated within the allowable load mass and maximum operating pressures shown in the table below.
Use caution, as operating above the prescribed values may lead to dropping of the load.
When the cylinder is mounted vertically or sidelong, sliders may move downwards due to the self-weight or workpiece mass. If an accurate stopping position is required at the stroke end or the middle-stroke, use an external stopper to secure accurate positioning.

Bore size (mm)	Model	Allowable load mass **(Wv)** (kg)	Maximum operating pressure **(Pv)** (MPa)
6	**CY1L 6H**	1.0	0.55
10	**CY1L10H**	2.7	0.55
15	**CY1L15H**	7.0	0.65
	CY1L15L	4.1	0.40
20	**CY1L20H**	11.0	0.65
	CY1L20L	7.0	0.40
25	**CY1L25H**	18.5	0.65
	CY1L25L	11.2	0.40
32	**CY1L32H**	30.0	0.65
	CY1L32L	18.2	0.40
40	**CY1L40H**	47.0	0.65
	CY1L40L	29.0	0.40

Note 1) Use caution, since the magnetic coupling may be dislocated if it is used over the maximum operating pressure.
Note 2) Allowable load mass above indicates the maximum load mass when loaded. The actual loadable mass must be determined referring to the flow chart in the Model Selection 1.

Intermediate Stop

1. Intermediate stopping of load with an external stopper, etc.

When stopping a load in mid-stroke using an external stopper (adjusting bolt, etc.), operate within the operating pressure limits shown in the table below. Use caution, as operation at a pressure exceeding these limits can result in breaking of the magnetic coupling.

Bore size (mm)	Model	Operating pressure limit for intermediate stop **(Ps)** (MPa)
6	**CY1L 6H**	0.55
10	**CY1L10H**	0.55
15	**CY1L15H**	0.65
	CY1L15L	0.40
20	**CY1L20H**	0.65
	CY1L20L	0.40
25	**CY1L25H**	0.65
	CY1L25L	0.40
32	**CY1L32H**	0.65
	CY1L32L	0.40
40	**CY1L40H**	0.65
	CY1L40L	0.40

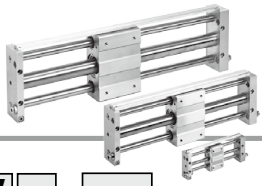
2. Intermediate stopping of load with an air pressure circuit

When stopping a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. Use caution, as operation when exceeding the allowable value can result in breaking of the magnetic coupling.

(Reference values)

Bore size (mm)	Model	Allowable kinetic energy for intermediate stop **(Es)** (J)
6	**CY1L 6H**	0.007
10	**CY1L10H**	0.03
15	**CY1L15H**	0.13
	CY1L15L	0.076
20	**CY1L20H**	0.24
	CY1L20L	0.16
25	**CY1L25H**	0.45
	CY1L25L	0.27
32	**CY1L32H**	0.88
	CY1L32L	0.53
40	**CY1L40H**	1.53
	CY1L40L	0.95

Magnetically Coupled Rodless Cylinder
Slider Type: Ball Bushing Bearing
CY1L Series
ø6, ø10, ø15, ø20, ø25, ø32, ø40



How to Order

Ball Bushing Bearing **CY1L** **25** **H** – **300** – **J79W** –

Slider type (Ball bushing bearing)

Bore size

6	6 mm	**25**	25 mm
10	10 mm	**32**	32 mm
15	15 mm	**40**	40 mm
20	20 mm		

Port thread type

Symbol	Type	Bore size
Nil	M thread	ø6, ø10, ø15
	Rc	ø20, ø25, ø32, ø40
TN	NPT	
TF	G	

Magnetic holding force
Refer to page 1231 for specifications.

Standard stroke
Refer to "Standard Stroke" on page 1231.

Adjustment type

Nil	With adjusting bolt
B	With shock absorbers (2 pcs.)
BS	With shock absorber (With plate A) ∗ Installed on side A at time of shipment.

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

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

Refer to page 1231 for details.

Shock Absorbers

Type	Bore size (mm)				
	6	**10, 15**	**20**	**25**	**32, 40**
Standard (shock absorber RB series)	RB0805		RB1006	RB1411	RB2015
Shock absorber soft type RJ series type (-XB22)	RJ0805	RJ0806H	RJ1007H	RJ1412H	—

∗ The shock absorber service life is different from that of the CY1L cylinder. Refer to "Specific Product Precautions" for each shock absorber for the replacement period.
∗ The shock absorber soft type RJ series type (-XB22) is a made to order specification. For details, refer to page 1468.

Applicable Auto Switches/Refer to pages 1289 to 1383 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m) ∗: 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	**F7NV**	**F79**	●	●	○	–	○	IC circuit	Relay, PLC
				3-wire (PNP)			**F7PV**	**F7P**	●	●	○	–	○		
				2-wire	12 V		**F7BV**	**J79**	●	●	○	–	○	—	
		Connector					**J79C**	**—**	●	●	●	●	–		
	Diagnostic indication (2-color indicator)	Grommet		3-wire (NPN)	5 V, 12 V		**F7NWV**	**F79W**	●	●	○	–	○	IC circuit	
				3-wire (PNP)			**—**	**F7PW**	●	●	○	–	○		
				2-wire	12 V		**F7BWV**	**J79W**	●	●	○	–	○	—	
	Water resistant (2-color indicator)						**F7BAV**∗∗	**F7BA**∗∗	–	●	○	–	○		
	With diagnostic output (2-color indicator)			4-wire (NPN)	5 V, 12 V		**—**	**F79F**	●	●	○	–	○	IC circuit	
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**—**	**A76H**	●	●	–	–	–	IC circuit	—
				2-wire	—	—	200 V	**A72**	**A72H**	●	●	–	–	–	—	Relay, PLC
					24 V	12 V	100 V	**A73**	**A73H**	●	●	●	–	–		
			No			5 V, 12 V	100 V or less	**A80**	**A80H**	●	●	–	–	–	IC circuit	
		Connector	Yes			12 V	—	**A73C**	**—**	●	●	●	●	–	—	
			No			5 V, 12 V		**A80C**	**—**	●	●	●	●	–	IC circuit	

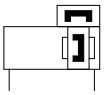
∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.

∗ Lead wire length symbols: 0.5 m····· Nil (Example) J79W
3 m····· L (Example) J79WL
5 m····· Z (Example) J79WZ
None····· N (Example) J79CN

∗ Solid state auto switches marked with "○" are produced upon receipt of order.

• Since there are other applicable auto switches than listed, refer to page 1234 for details.
• For details about auto switches with pre-wired connector, refer to pages 1358 and 1359.
∗ Auto switches are shipped together, (but not assembled).

Symbol
Rubber bumper
(Magnet type)



Easy piping and wiring

Hollow shafts are used, and centralization of ports on one side makes piping easy.
Auto switches can be mounted through the use of special switch rails.

Shock absorbers and adjusting bolt are standard equipment

Impacts at stroke end due to high speed use can be absorbed, and fine adjustment of the stroke is possible.

Made to Order

Made to Order: Individual Specifications
(For details, refer to pages 1252 and 1253.)

Symbol	Specifications
-X116	Hydro specifications
-X168	Helical insert thread specifications
-X322	Outside of cylinder tube with hard chrome plated
-X431	Auto switch rails on both side faces (with 2 pcs.)

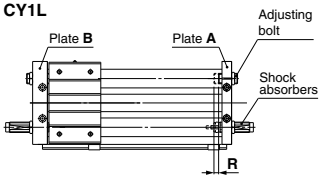
Made to Order Specifications

Click here for details

Symbol	Specifications
-XB9	Low speed cylinder (15 to 50 mm/s)
-XB13	Low speed cylinder (7 to 50 mm/s)
-XB22	Shock absorber soft type RJ series type

Amount of Adjustment by Adjusting Bolt

CY1L



Bore size (mm)	Amount of adjustment by adjusting bolt: **R**(mm)	
	Single side	Both sides
6	6	12
10	5.5	11
15	3.5	7
20	5.5	11
25	5	10
32	5.5	11
40	4.5	9

∗ Since the cylinder is in an intermediate stop condition when stroke adjustment is performed, use caution regarding the operating pressure and the kinetic energy of the load.
∗ The amount of adjustment for adjustment bolts is the total amount when adjusted on both plate ends. For the adjustment on a single plate end, the amount of adjustment is half of the figures in the table above.
∗ Adjust the stroke adjustment with an adjustment bolt. It cannot be adjusted by a shock absorber.

Specifications

Bore size (mm)		6	10	15	20	25	32	40
Fluid		Air						
Proof pressure		1.05 MPa						
Maximum operating pressure		0.7 MPa						
Minimum operating pressure		0.18 MPa						
Ambient and fluid temperature		–10 to 60°C (No freezing)						
Piston speed ∗		50 to 500 mm/s						
Cushion		Rubber bumper/Shock absorber						
Lubrication		Not required (Non-lube)						
Stroke length tolerance (mm)		0 to 250 st: $^{+1.0}_{0}$, 251 to 1000 st: $^{+1.4}_{0}$, 1001 st and up: $^{+1.8}_{0}$						
Holding force (N)	**Type H**	19.6	53.9	137	231	363	588	922
	Type L	–	–	81.4	154	221	358	569
Standard equipment		Auto switch mounting rail						

∗ In the case of setting an auto switch at the intermediate position, the maximum piston speed is subject to restrict for detection upon the response time of a load (Relays, Sequence controller, etc.).

Standard Stroke

Bore size (mm)	Standard stroke (mm)	Maximum available stroke (mm)
6	50, 100, 150, 200	300
10	50, 100, 150, 200, 250, 300	500
15	50, 100, 150, 200, 250, 300, 350 400, 450, 500	750
20	100, 150, 200, 250, 300, 350 400, 450, 500, 600, 700, 800	1000
25		1500
32		
40	100, 150, 200, 250, 300, 350 400, 450, 500, 600, 700, 800 900, 1000	1500

Note) Intermediate stroke is available in 1 mm increments.

Weight

(kg)

Number of magnets \ Bore size (mm)		6	10	15	20	25	32	40
Basic weight	**CY1L□H**	0.324	0.580	1.10	1.85	2.21	4.36	4.83
	CY1L□L	—	—	1.02	1.66	2.04	4.18	4.61
Additional weight per each 50mm of stroke		0.044	0.077	0.104	0.138	0.172	0.267	0.406

Calculation
(Example) **CY1L32H-500**
• Basic weight ···· 4.36 kg • Additional weight ····· 0.267/50 st • Cylinder stroke ····· 500 st
4.36 + 0.267 x 500 ÷ 50 = 7.03 kg

Shock Absorber Specifications

Refer to the RB series in the **Web Catalog** for the details on shock absorbers.

Applicable rodless cylinder		**6 CY1L10 15**	**CY1L20**	**CY1L25**	**CY1L 32 40**
Shock absorber model		**RB0805**	**RB1006**	**RB1411**	**RB2015**
Maximum energy absorption: (J)		0.98	3.92	14.7	58.8
Stroke absorption: (mm)		5	6	11	15
Collision speed: (m/s)		0.05 to 5			
Max. operating frequency: (cycle/min) ∗		80	70	45	25
Ambient temperature range		–10 to 80 °C			
Spring force: (N)	Extended	1.96	4.22	6.86	8.34
	Retracted	3.83	6.18	15.3	20.50

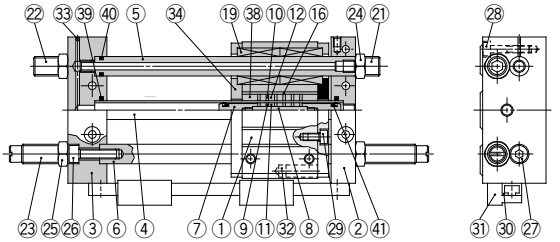
∗ It denotes the values at the maximum energy absorption per one cycle. Therefore, the operating frequency can be increased according to the energy absorption.

The shock absorber service life is different from that of the CY1L cylinder. Refer to the Specific Product Precautions for the replacement period.

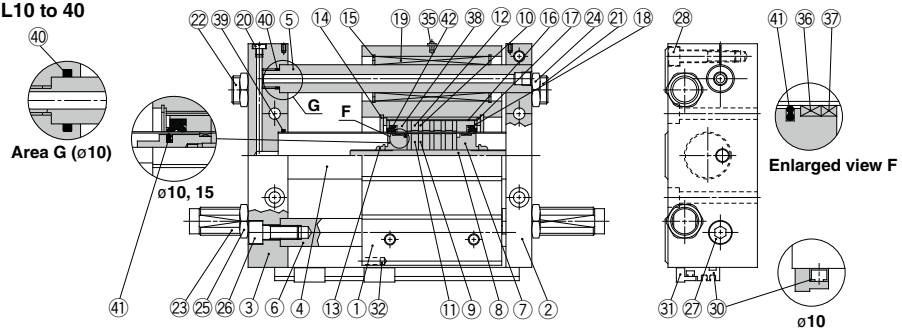
Construction

Slider type/Ball bushing bearing

CY1L6



CY1L10 to 40



Component Parts

No.	Description	Material	Note
1	**Slide block**	Aluminum alloy	Anodized
2	**Plate A**	Aluminum alloy	Anodized
3	**Plate B**	Aluminum alloy	Anodized
4	**Cylinder tube**	Stainless steel	
5	**Guide shaft A**	Carbon steel	Hard chrome plated
6	**Guide shaft B**	Carbon steel	Hard chrome plated
7	**Piston**	Aluminum alloy Note 1)	Chromated
8	**Shaft**	Stainless steel	
9	**Piston side yoke**	Rolled steel	Zinc chromated
10	**External slider side yoke**	Rolled steel	Zinc chromated
11	**Magnet A**	——	
12	**Magnet B**	——	
13	**Piston nut**	Carbon steel	Zinc chromated ø25 to ø40
14	**Retaining ring**	Carbon tool steel	Phosphate coated
15	**Retaining ring**	Carbon tool steel	Phosphate coated
16	**External slider tube**	Aluminum alloy	
17	**Slider spacer**	Rolled steel	Nickel plated
18	**Spacer**	Rolled steel	Nickel plated
19	**Ball bushing**	——	
20	**Plug**	Brass	Nickel plated ø25 to ø40 only
21	**Adjusting bolt A**	Chromium molybdenum steel	Nickel plated
22	**Adjusting bolt B**	Chromium molybdenum steel	Nickel plated
23	**Shock absorber**	——	
24	**Hexagon nut**	Carbon steel	Nickel plated
25	**Hexagon nut**	Carbon steel	Nickel plated
26	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated
27	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated
28	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated

Note 1) Brass for ø6

No.	Description	Material	Note
29	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated
30	**Switch mounting rail**	Aluminum alloy	
31	**Auto switch**	——	
32	**Magnet for auto switch**	——	
33	**Steel ball**	——	ø6, ø10, ø15 only
34	**Side cover**	Carbon steel	ø6 only
35	**Grease cup**	Carbon steel	ø15 or larger
36 *	**Wear ring A**	Special resin	
37 *	**Wear ring**	Special resin	
38 *	**Wear ring B**	Special resin	
39 *	**Cylinder tube gasket**	NBR	
40 *	**Guide shaft gasket**	NBR	
41 *	**Piston seal**	NBR	
42 *	**Scraper**	NBR	

Replacement Parts: Seal Kit

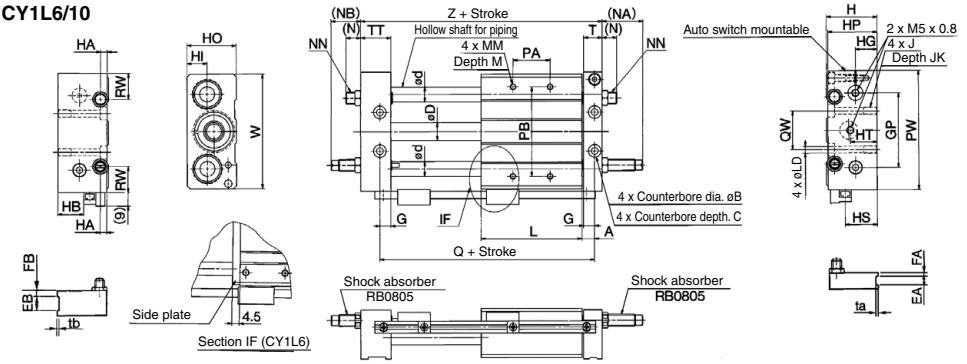
Bore size (mm)	Kit no.	Contents
6	CY1S6-PS-N	Set of nos. above ㊳, ㊴, ㊵, ㊶
10	CY1L10-PS-N	Set of nos. above ㊳, ㊴, ㊵, ㊶, ㊷
15	CY1L15-PS-N	Set of nos. above ㊱, ㊲, ㊳, ㊴, ㊵, ㊶, ㊷
20	CY1L20-PS-N	
25	CY1L25-PS-N	
32	CY1L32-PS-N	
40	CY1L40-PS-N	

Note 1) Seal kit includes ㊳, ㊴, ㊵, ㊶ for ø6. ㊱, ㊳ to ㊷ are for ø10, ø15. ㊱ to ㊷ are for ø20 to ø40. Order the seal kit, based on each bore size.
Note 2) ø6: Same for CY1S6
Note 3) For bore size ø10, wear ring A cannot be replaced.
* Seal kit includes a grease pack (ø6, ø10: 5 and 10 g, ø15 to ø40: 10 g). Order with the following part number when only the grease pack is needed.
Grease pack part no. for ø6, ø10: GR-F-005 (5 g) for external sliding parts, **GR-S-010** (10 g) for tube interior
Grease pack part no. for ø15 to ø40: GR-S-010 (10 g)

Dimensions

Slider type/Ball bushing bearing

CY1L6/10



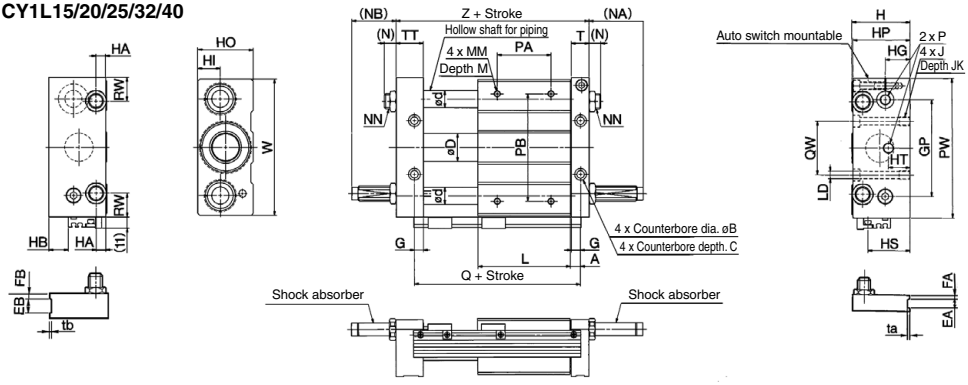
(mm)

Model	A	B	C	D	d	EA	EB	FA	FB	G	GP	H	HA	HB	HG	HI	HO	HP	HS	HT	J	JK
CY1L6	7	6.5	3	7.6	8	—	—	—	—	6	36	27	5	10	11	9	25	26	14	16	M4 x 0.7	6.5
CY1L10	8.5	8	4	12	10	6	12	3	5	7.5	50	34	6	17.5	14.5	13.5	33	33	21.5	18	M5 x 0.8	9.5

Model	L	LD	M	MM	(N)	(NA)	(NB)	NN	PA*	PB	PW	Q	QW	RW	T	TT	ta	tb	W	Z
CY1L6	40	3.5	6	M4 x 0.7	11	30	24	M8 x 1.0	24	40	60	54	20	12	10	16	—	—	56	68
CY1L10	68	4.3	8	M4 x 0.7	10.5	27	19	M8 x 1.0	30	60	80	85	26	17.5	12.5	20.5	0.5	1.0	77	103

∗ PA dimensions are for split from center.

CY1L15/20/25/32/40



(mm)

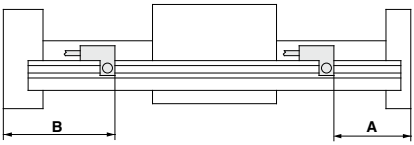
Model	A	B	C	D	d	EA	EB	FA	FB	G	GP	H	HA	HB	HG	HI	HO	HP	HS	HT	J	JK	L	LD
CY1L15	7.5	9.5	5	16.6	12	6	13	3	6	6.5	65	40	6.5	4	16	14	38	39	25	16	M6 x 1.0	9.5	75	5.6
CY1L20	9.5	9.5	5.2	21.6	16	—	—	—	—	8.5	80	46	9	10	18	16	44	45	31	20	M6 x 1.0	10	86	5.6
CY1L25	9.5	11	6.5	26.4	16	8	14	4	7	8.5	90	54	9	18	23	21	52	53	39	20	M8 x 1.25	10	86	7
CY1L32	10.5	14	8	33.6	20	8	16	5	7	9.5	110	66	12	26.5	26.5	24.5	64	64	47.5	25	M10 x 1.5	15	100	9.2
CY1L40	11.5	14	8	41.6	25	10	20	5	10	10.5	130	78	12	35	30.5	28.5	76	74	56	30	M10 x 1.5	15	136	9.2

Model	M	MM	(N)	(NA)	(NB)	NN	P	PA*	PB	PW	Q	QW	RW	T	ta	tb	TT	W	Z	Shock absorber
CY1L15	8	M5 x 0.8	8.5	27	17	M8 x 1.0	M5 x 0.8	45	70	95	90	30	15	12.5	0.5	1.0	22.5	92	112	RB0805
CY1L20	10	M6 x 1.0	10.5	29	20	M10 x 1.0	Rc 1/8	50	90	120	105	40	28	16.5	—	—	25.5	117	130	RB1006
CY1L25	10	M6 x 1.0	12.5	49	40	M14 x 1.5	Rc 1/8	60	100	130	105	50	22	16.5	0.5	1.0	25.5	127	130	RB1411
CY1L32	12	M8 x 1.25	13.5	52	42	M20 x 1.5	Rc 1/8	70	120	160	121	60	33	18.5	0.5	1.0	28.5	157	149	RB2015
CY1L40	12	M8 x 1.25	12.5	51	36	M20 x 1.5	Rc 1/4	90	140	190	159	84	35	20.5	1.0	1.0	35.5	187	194	

∗ PA dimensions are for split from center.

Auto Switch Mounting

Proper Auto Switch Mounting Position (Detection at stroke end)



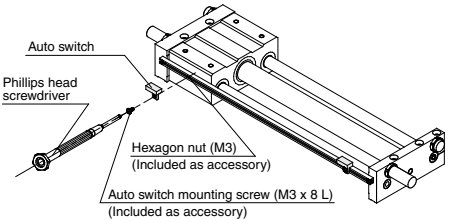
(mm)

Bore size (mm)	Applicable auto switch					
	D-A73/A80		D-A72 D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-F7□V/J79C D-F7□W/J79W D-F7□WV D-F7BA/F7BAV D-F79F		D-F7NT	
	A	B	A	B	A	B
6	23	45	23.5	44.5	28.5	39.5
10	58	45	58.5	44.5	63.5	39.5
15	65	47	65.5	46.5	70.5	41.5
20	76	54	76.5	53.5	81.5	48.5
25	76	54	76.5	53.5	81.5	48.5
32	92	57	92.5	56.5	97.5	51.5
40	130	64	130.5	63.5	135.5	58.5

Note 1) 50 mm is the minimum stroke available with 2 auto switches mounted.
Note 2) Adjust the auto switch after confirming the operating conditions in the actual setting.

Mounting of Auto Switch

When mounting an auto switch, the auto switch mounting screw should be screwed into a hexagon nut (M3 x 0.5) which has been inserted into the groove of the switch mounting rail. (Tightening torque: Approx. 0.5 to 0.7 N•m)



Mounting brackets are required when ordering an auto switch separately or when ordering additional auto switches.
BQ-1 mounting brackets can be used.
[BQ-1 details]
· Auto switch mounting screw (M3 x 8L)
· Square nut (M3)
* Although the shape is different from the hexagon nut which has already been inserted into the switch mounting rail groove, it can be used to mount the auto switch.

Operating Range

(mm)

Auto switch model	Bore size						
	6	10	15	20	25	32	40
D-A7□/A8□	6	6	6	6	6	6	6
D-F7□/J7□	3	3	4	3	3	3	3.5
D-F79F	4.5	4.5	4.5	4.5	4.5	4.5	4.5

* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion)
There may be the case it will vary substantially depending on an ambient environment.

Other than the models listed in "How to Order", the following auto switches are applicable.
For detailed specifications, refer to page 1340.

Type	Model	Electrical entry (Fetching direction)	Features
Solid state auto switch	D-F7NT	Grommet (In-line)	With timer

* With pre-wired connector is available for D-F7NT type, too.
For details, refer to pages 1358 and 1359.

CY1L Series
Specific Product Precautions

Be sure to read this before handling the products. Refer to page 8 for safety instructions and pages 9 to 18 for actuator and auto switch precautions.

Operation

⚠Warning

1. Be aware of the space between the plates and the slide block.
Take sufficient care to avoid getting your hands or fingers caught when the cylinder is operated.

2. Do not apply a load to a cylinder which is greater than the allowable value stated in the "Model Selection" pages.
This may cause malfunctions.

3. Do not use the cylinder in an environment where the cylinder is expose to moisture, adhesive foreign matter, dust or liquid such as water or cutting fluid.
Consider a special order product if the cylinder is to be used in an environment that deteriorates the lubrication of the cylinder sliding parts.

4. When applying grease to the cylinder, use the grease that has already been applied to the product. Grease packs are available if needed.

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. Make sure that the cylinder mounting surface is a flatness of 0.2 mm or less.
If the flatness of the cylinder mounting surface is not appropriate, 2 guide shafts may be twisted. This may adversely affect the operating conditions and shorten the service life due to the increase of sliding resistance and the early abrasion of bearings.
The cylinder mounting surface must be a flatness of 0.2 mm or less, and the cylinder must be mounted as it smoothly operates through the full stroke at the minimum operating pressure (0.18 MPa or less).

Service Life and Replacement Period of Shock Absorber

⚠Caution

1. Allowable operating cycle under the specifications set in this catalog is shown below.
1.2 million times RB08□□
2 million times RB10□□ to RB2725

Note) Specified service life (suitable replacement period) is the value at room temperature (20 to 25°C).
The period may vary depending on the temperature and other conditions. In some cases the absorber may need to be replaced before the allowable operating cycle above.

Disassembly and Maintenance

⚠Warning

1. Use caution as the attractive power 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. Use caution to the direction of the external slider and the piston slider.
Since the external slider and piston slider are directional for ø6, ø10 and holding force type L, refer to the figures 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 Fig. (1). If they align as shown in Fig. (2), insert the piston slider after turning it around 180°. If the direction is not correct, it will be impossible to obtain the specified holding force.

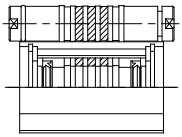


Fig. (1) Correct position

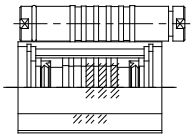


Fig. (2) Incorrect position

Example of ø15 with holding force type L

Linear Guide Type

CY1H Series

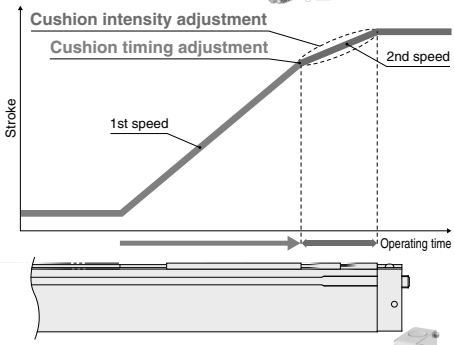
Single Axis Type: ø10, ø15, ø20, ø25/Double Axis Type: ø25, ø32

Related Products

Deceleration Controller DAS Series

Click here for details

2-speed control reduces cycle time Allows for the impact relaxation of the stroke end

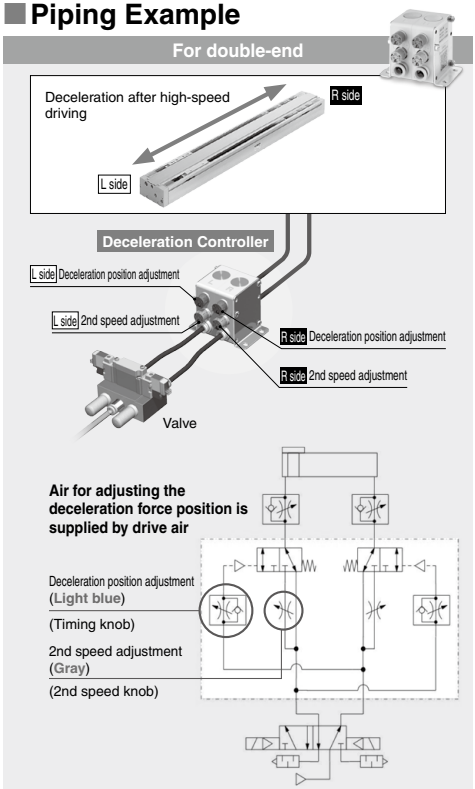


Allows for the 2-speed control of cylinders

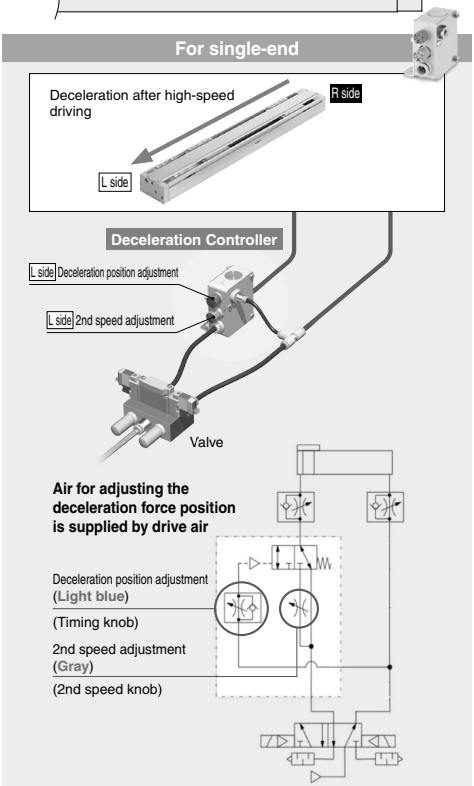
The deceleration position (cushion timing) and 2nd speed (cushion intensity) can be adjusted.

Piping Example

For double-end



For single-end



Variations

Mounting	Body size	Applicable tubing O.D.										Bore size
		Metric size					Inch size					
		4	6	8	10	12	5/32"	1/4"	5/16"	3/8"	1/2"	
	5	●	●	●	●	●	●	●	●	●	●	ø10 to ø40
	7				●	●			●	●	●	Up to ø100

Model Selection

E: Kinetic energy of load (J)

$$E = \frac{W}{2} \cdot \left(\frac{V}{1000}\right)^2$$

Es: Allowable kinetic energy for intermediate stop using an air pressure circuit (J)
Ps: Operating pressure limit for intermediate stop using an external stopper, etc. (MPa)
Pv: Maximum operating pressure for vertical operation (MPa)
Wv: Allowable load mass for vertical operation (kg)
α: Load factor

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

Operating Conditions

- **W: Load mass (kg)** • **V: Speed (mm/s)**
- **P: Operating pressure (MPa)** • **Stroke (mm)**
- **Position of workpiece center of gravity (m)**
- **Mode of operation (Horizontal, Inclined, Vertical)**

Mode of operation

Horizontal operation

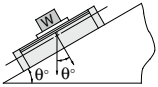
First tentative bore size determination

$$\text{øD} \geq 1.6 \times \sqrt{\frac{W}{P}}$$

Inclined operation

First tentative bore size determination

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



Inclined operation

Vertical operation Note 1)

First tentative bore size determination

$$\text{øD} \geq 5.0 \times \sqrt{\frac{0.1 \times W + W}{P}}$$

Determination of allowable load mass & pressure

W > Wv
P > Pv

(For vertical operation, refer to page 1241.)

W ≤ Wv
P ≤ Pv

Review of load mass and operating pressure

(Refer to page 1239.)

Determination of load factor (Σα)

Σα > 1 **Review of operating conditions**

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

Σα ≤ 1

Intermediate stop? Note 1)

Yes

Intermediate stopping method

Stop with external stopper

Stop with air pressure circuit

(For intermediate stops, refer to page 1241.)

Determination of kinetic energy of load (E)

$$E = \frac{W}{2} \cdot \left(\frac{V}{1000}\right)^2$$

E > Es **Review of larger bore size**

E ≤ Es

None

Bore size determination

Note 2)

Consider made-to-order products, depending on an operating condition.

(Refer to page 1243.)

Model selected

Determination of pressure (P) when making intermediate stop

P > Ps **Review of larger bore size and operating pressure**

P ≤ Ps

(For intermediate stops, refer to page 1241.)

Note 1) This cylinder cannot perform an interm ediate stop using an pneumatic circuit in vertical operation.
In this case, an intermediate stop can be performed only by using an external stopper, etc.

Note 2) Made-to-order products should be considered, too, depending on an operating environment, etc.

Caution on Design (1)

The maximum load mass and allowable moment will differ depending on the workpiece mounting method, cylinder mounting orientation and piston speed. A determination of usability is performed based on the operating limit values in the graphs with respect to operating conditions, but the total ($\Sigma\alpha n$) of the load factors (αn) for each mass and moment should not exceed 1.

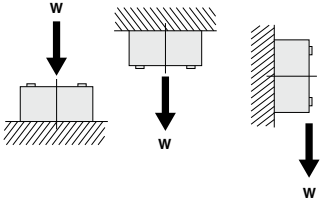
$$\Sigma\alpha n = \frac{\text{Load mass (W)}}{\text{Maximum load mass (W max)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (M max)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Me max)}} \leq 1$$

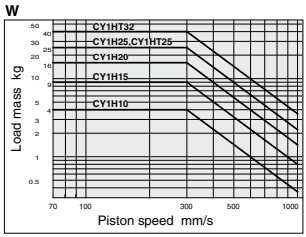
Wmax, Mmax and Me max values are according to graph (1), (2) and (3) below.

Load Mass

Maximum Load Mass (kg)

Model	W_{max}
CY1H10	4.0
CY1H15	9.0
CY1H20	16.0
CY1H25	25.0
CY1HT25	
CY1HT32	40.0



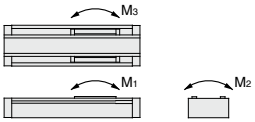


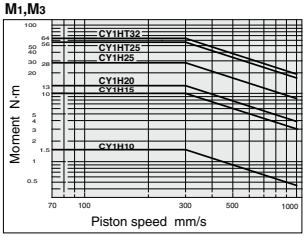
Graph (1)

Moment

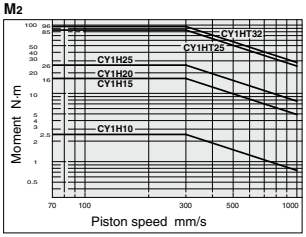
Allowable Moment (Static moment/Dynamic moment) (N·m)

Model	M1	M2	M3	Model	M1	M2	M3
CY1H10	1.5	2.5	1.5	**CY1H25**	28	26	28
CY1H15	10	16	10	**CY1HT25**	56	85	56
CY1H20	13	16	13	**CY1HT32**	64	96	64





Graph (2)

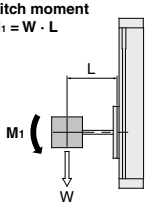


Graph (3)

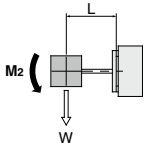
Static Moment

Moment generated by the workpiece weight even when the cylinder is stopped

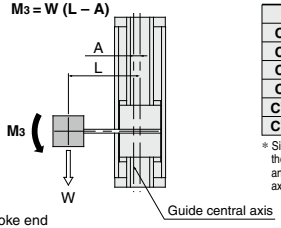
■ **Pitch moment**
$M_1 = W \cdot L$



■ **Roll moment**
$M_2 = W \cdot L$



■ **Yaw moment**
$M_3 = W (L - A)$



(mm)

Model	A
CY1H10	15
CY1H15	17.5
CY1H20	19.5
CY1H25	23.5
CY1HT25	0*
CY1HT32	0*

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

Dynamic Moment

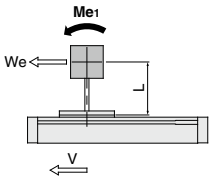
Moment generated by the load equivalent to impact at the stroke end

$We = \delta \cdot W \cdot V$
$V = 1.4\,Va$

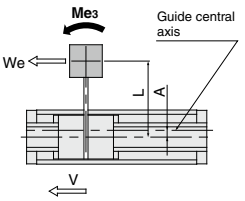
We: Load equivalent to impact [N]
δ: Bumper coefficient
With adjusting bolt (standard) = 4/100
With shock absorber = 1/100
W: Load mass [kg]
V: Collision speed [mm/s]
Va: Average speed [mm/s]

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

* **Average load coefficient**



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



(mm)

Model	A
CY1H10	15
CY1H15	17.5
CY1H20	19.5
CY1H25	23.5
CY1HT25	0*
CY1HT32	0*

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

Selection Calculation

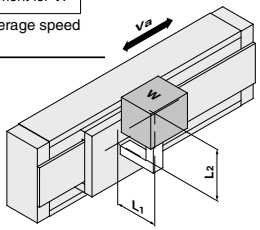
The selection calculation finds the load factors (αn) of the items below, where the total ($\Sigma\alpha n$) does not exceed 1.

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

Item	Load factor αn	Note
1. Max. load mass	α_1 **= W/Wmax**	Examine **W**. **Wmax** is the max. load mass for **Va**.
2. Static moment	α_2 **= M/Mmax**	Examine **M1, M2, M3**. **Mmax** is the allowable moment for **Va**.
3. Dynamic moment	α_3 **= Me/Memax**	Examine **Me1, Me3**. **Memax** is the allowable moment for **V**.

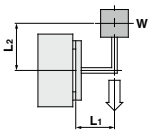
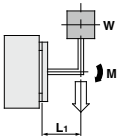
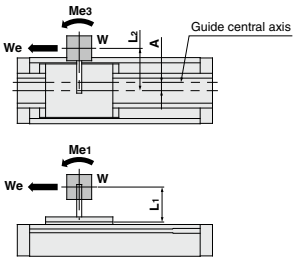
V : Collision speed **Va** : Average speed

Calculation Example



Operating Conditions

Cylinder: **CY1H15**
Cushion: Standard (Adjusting bolt)
Mounting: Horizontal wall mounting
Speed (average): **Va** = 300 [mm/s]
Load mass: **W** = 1 [kg] (excluding mass of arm section)
L1 = 50 [mm]
L2 = 50 [mm]

Item	Load factor αn	Note
1 Maximum load mass 	α_1 **= W/Wmax** = 1/9 **= 0.111**	Examine **W**. Find the value of **Wmax** when **Va** = 300 mm/s from Graph (1).
2 Static moment 	M_2 = **W · L1** = 10 · 0.05 = 0.5 [N·m] α_2 = **M2/M2 max** = 0.5/16 **= 0.031** **W** = 1 [kg] = 10 [N]	Examine **M2**. Since **M1** & **M3** are not generated, investigation is unnecessary. Find the value **M2 max** when **Va** = 300 mm/s from Graph (3).
3 Dynamic moment 	From **V** = 1.4 **Va** **We** = δ · **W** · **V** = 4/100 · 10 · 1.4 · 300 = 168 [N] **Me3** = 1/3 · **We** (**L2 – A**) = 1/3 · 168 · 0.032 = 1.8 [N·m] α_3 = **Me3/Me3 max** = 1.8/7.2 **= 0.250**	Examine **Me3**. Find the load equivalent to impact **We**. Damper coefficient δ = 4/100 (urethane damper) Find the value of **Me3 max** when **V** = 1.4 and **Va** = 420 mm/s from Graph (2).
	Me1 = 1/3 · **We** · **L1** = 1/3 · 168 · 0.05 = 2.8 [N·m] α_4 = **Me1/Me1 max** = 2.8/7.2 **= 0.389**	Examine **Me1**. From above, **We** = 168 Find the value of **Me3 max** when **V** = 1.4 and **Va** = 420 mm/s from Graph (2).

$\Sigma\alpha n = \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4$
= 0.111 + 0.031 + 0.250 + 0.389
= 0.781

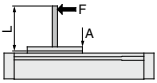
Can be used based on $\Sigma\alpha n = 0.781 \leq 1$

Caution on Design (2)

Table Deflection Note)

Table Displacement due to Pitch Moment Load

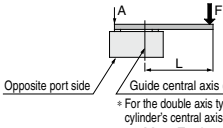
Displacement of Section A when force acts on Section F



$M_1 = F \times L$

Table Displacement due to Roll Moment Load

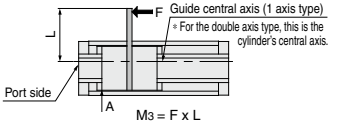
Displacement of Section A when force acts on Section F



$M_2 = F \times L$

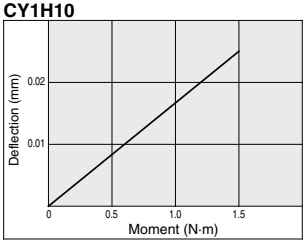
Table Displacement due to Yaw Moment Load

Displacement of Section A when force acts on Section F

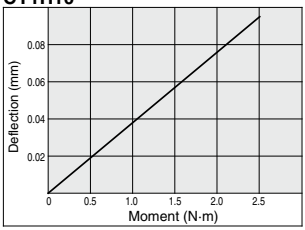


$M_3 = F \times L$

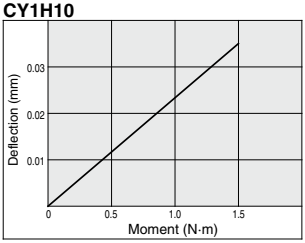
CY1H10



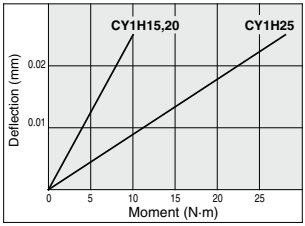
CY1H10



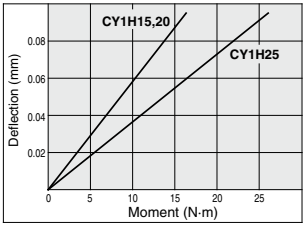
CY1H10



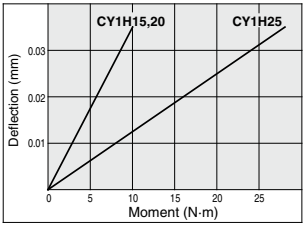
CY1H15/20/25



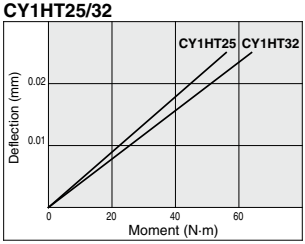
CY1H15/20/25



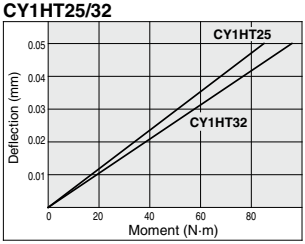
CY1H15/20/25



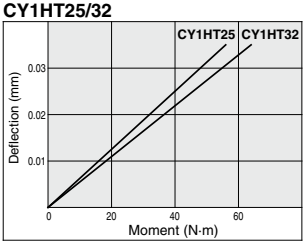
CY1HT25/32



CY1HT25/32



CY1HT25/32



Note) Indicates the displacement (rigidity) on the slide table from the position where the reaction force is generated when the torque is applied to the slide table. (Rference values)

Vertical Operation

When using in vertical operation, prevention of workpiece dropping due to breaking of the magnetic coupling should be considered. The allowable load mass and maximum operating pressure should be as shown in the table below.
When the cylinder is mounted vertically or sidelong, sliders may move downwards due to the self-weight or workpiece mass. If an accurate stopping position is required at the stroke end or the middle-stroke, use an external stopper to secure accurate positioning.

Model	Allowable load mass **(Wv)** (kg)	Maximum operating pressure **Pv** (MPa)
CY1H10	2.7	0.55
CY1H15	7.0	0.65
CY1H20	11.0	0.65
CY1H25	18.5	0.65
CY1HT25	18.5	0.65
CY1HT32	30.0	0.65

Intermediate Stop

(1) Intermediate Stopping of Load with External Stopper, etc.

When stopping a load in mid-stroke using an external stopper, etc.,operate within the operating pressure limits shown in the table below. The magnetic coupling will break if operated at a pressure exceeding these limits.

Model	Operating pressure limit for intermediate stop **Ps** (MPa)
CY1H10	0.55
CY1H15	0.65
CY1H20	0.65
CY1H25	0.65
CY1HT25	0.65
CY1HT32	0.65

(2) Intermediate Stopping of Load with Air Pressure Circuit

When stopping a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. The magnetic coupling will break if the allowable value is exceeded.

Model	Allowable kinetic energy for intermediate stop **Es** (J)
CY1H10	0.03
CY1H15	0.13
CY1H20	0.24
CY1H25	0.45
CY1HT25	0.45
CY1HT32	0.88

Magnetically Coupled Rodless Cylinder
Linear Guide Type
CY1H Series
Single axis: ø10, ø15, ø20, ø25/Double axis: ø25, ø32

How to Order

CY1H □ **25** □ – **300** □ – **Y7BW** □ – □

Linear guide type

Guide

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

Bore size

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

Port thread type

Symbol	Type	Bore size
Nil	M thread	ø10, ø15
	Rc	
TN	NPT	ø20, ø25, ø32
TF	G	

Standard stroke (mm)
Refer to "Standard Stroke" on page 1243.

Adjustment type

Nil	With adjusting bolt
B	With shock absorbers (2 pcs.)
BS	With shock absorber (1 pc. on port side)

∗ The adjusting bolt is installed even when B or BS is selected.(Except ø10)

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

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

Made to Order
Refer to page 1243 for details.

Shock Absorbers

Model	Type	Bore size (mm) 10	15	20	25	32
CY1H	Standard (shock absorber RB series)	RB0805	RB0806	RB1006	RB1411	—
	Shock absorber soft type RJ series type (-XB22)	RJ0806H		RJ1007H	RJ1412H	—
CY1HT	Standard (shock absorber RB series)	—	—	—	RB1411	RB2015
	Shock absorber soft type RJ series type (-XB22)	—	—	—	RJ1412H	—

∗ The shock absorber service life is different from that of the CY1H cylinder. Refer to "Specific Product Precautions" for each shock absorber for the replacement period.
∗ The shock absorber soft type RJ series type (-XB22) is a made to order specification. For details, refer to page 1468.

Applicable Auto Switches/Refer to pages 1289 to 1383 for further information on auto switches.

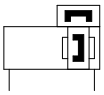
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		AC	Auto switch model: Electrical entry direction Perpendicular	In-line	Lead wire length (m)∗ 0.5 (Nil)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**Y69A**	**Y59A**	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**Y7PV**	**Y7P**	●	●	○	○		
				2-wire		12 V		**Y69B**	**Y59B**	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		**Y7NWV**	**Y7NW**	●	●	○	○	IC circuit	
				3-wire (PNP)				**Y7PWV**	**Y7PW**	●	●	○	○		
				2-wire		12 V		**Y7BWV**	**Y7BW**	●	●	○	○	—	
	Water resistant (2-color indicator)							—	**Y7BA**∗∗	—	●	○	○		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	—	**Z76**	●	●	–	–	IC circuit	—
			—	2-wire	24 V	12 V	100 V	—	**Z73**	●	●	●	–	—	Relay, PLC
						5 V, 12 V	100 V or less	—	**Z80**	●	●	–	–	IC circuit	

∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.
∗ Lead wire length symbols: 0.5 m····· Nil (Example) Y7BW
3 m····· L (Example) Y7BWL
5 m····· Z (Example) Y7BWZ
∗ Solid state auto switches marked with "○" are produced upon receipt of order.

• For details about auto switches with pre-wired connector, refer to pages 1358 and 1359.
• Normally closed (NC = b contact) solid state auto switches (D-Y7G/Y7H types) are also available. Refer to page 1310 for details.
∗ Auto switches are shipped together, (but not assembled).

Symbol

Rubber bumper
(Magnet type)



Made to Order

Made to Order: Individual Specifications
(For details, refer to pages 1252.)

Symbol	Specifications
-X168	Helical insert thread specifications

Made to Order Specifications

Click here for details

Symbol	Specifications
-XB10	Intermediate stroke (Using exclusive body)
-XB11	Long stroke
-XB22	Shock absorber soft type RJ series type

Theoretical Output

(N)

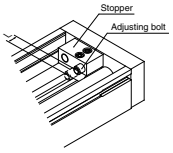
Bore size (mm)	Piston area (mm²)	Operating pressure (MPa)					
		0.2	0.3	0.4	0.5	0.6	0.7
10	78	15	23	31	39	46	54
15	176	35	52	70	88	105	123
20	314	62	94	125	157	188	219
25	490	98	147	196	245	294	343
32	804	161	241	322	402	483	563

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

Amount of Adjustment by Adjusting Bolt

Stroke adjustment on one side of 15 mm (CY1H10/15/20) or 30 mm (CY1H25, CY1HT25, CY1HT32) can be performed with the adjustment bolt, but when the amount of adjustment exceeds 3 mm, the magnetic coupling may be broken depending on the operating conditions. Therefore, operation should conform to the intermediate stop conditions on page 1241.

Do not adjust strokes by moving the stopper, as this can cause cylinder damage.



(mm)

Model	Stroke adjustment range L
CY1H10, CY1H15, CY1H20	0 to 15
CY1H25, CY1HT25, CY1HT32	0 to 30

Specifications

Bore size (mm)	10	15	20	25	32
Fluid	Air				
Action	Double acting				
Maximum operating pressure	0.7 MPa				
Minimum operating pressure	0.2 MPa				
Proof pressure	1.05 MPa				
Ambient and fluid temperature	–10 to 60°C (No freezing)				
Piston speed	70 to 500 mm/s				
Cushion (External stopper)	Urethane bumpers on both ends (Standard), Shock absorber (Option)				
Lubrication	Not required (Non-lube)				
Stroke length tolerance	0 to 1.8 mm				
Holding force (N)	53.9	137	231	363	588
Piping	Centralized piping type				
Piping port size	M5 x 0.8		Rc 1/8		

Standard Stroke

Bore size (mm)	Number of axes	Standard stroke (mm) Note)	Maximum available stroke (mm)
10	1 axis	100, 200, 300	500
15		100, 200, 300, 400, 500	750
20		100, 200, 300, 400, 500, 600	1000
25		100, 200, 300, 400, 500, 600, 800	1200
25	2 axis	100, 200, 300, 400, 500, 600, 800, 1000	
32			1500

Note) Strokes are manufacturable in 1 mm increments up to the maximum strokes. Suffix "-XB10" to the end of the part number for intermediate strokes excluding standard strokes and "XB11" for strokes exceeding standard strokes up to the manufacturable maximum strokes.

Weight

(kg)

Model	Standard stroke (mm)							
	100	200	300	400	500	600	800	1000
CY1H10	1.0	1.3	1.6	—	—	—	—	—
CY1H15	2.2	2.7	3.2	3.6	4.1	—	—	—
CY1H20	3.0	3.5	4.0	4.4	4.9	5.4	—	—
CY1H25	4.6	5.3	6.0	6.6	7.3	8.0	9.4	—
CY1HT25	5.1	6.2	7.3	8.3	9.4	10.4	12.5	14.6
CY1HT32	8.4	9.6	10.7	11.9	13.0	14.2	16.5	18.8

Shock Absorber Specifications

Refer to the RB series in the **Web Catalog** for the details on shock absorbers.

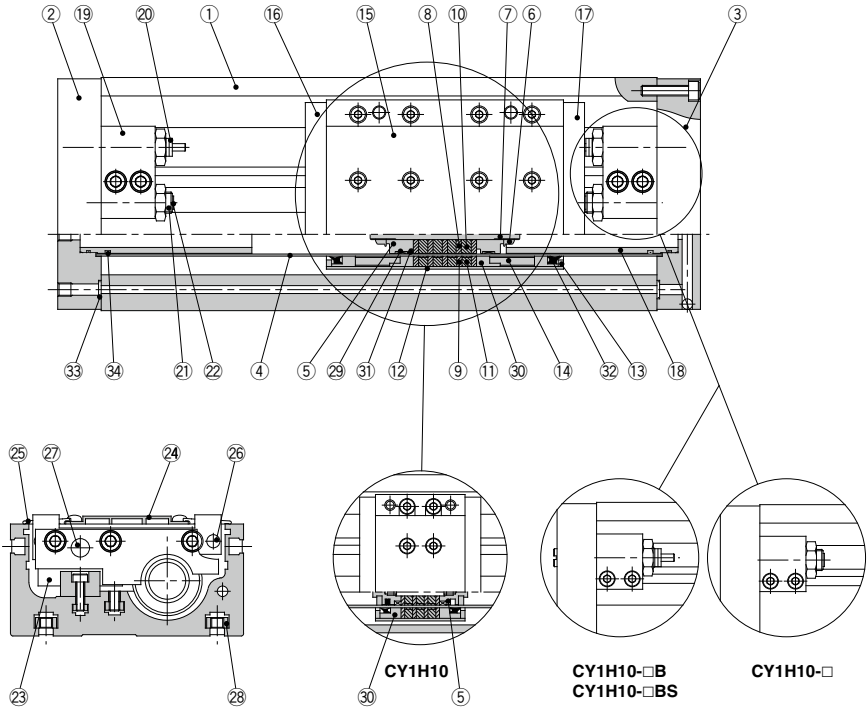
Applicable cylinder size (mm)		10	15	20	25	32
Shock absorber model		RB0805	RB0806	RB1006	RB1411	RB2015
Maximum energy absorption (J)		0.98	2.94	3.92	14.7	58.8
Stroke absorption (mm)		5	6	6	11	15
Collision speed (m/s) *		0.05 to 5				
Max. operating frequency (cycle/min)		80		70	45	25
Spring force (N)	**Extended**	1.96		4.22	6.86	8.34
	Retracted	3.83	22	6.18	15.30	20.50
Weight (g)		15		25	65	150

* It denotes the values at the maximum energy absorption per one cycle. Therefore, the operating frequency can be increased according to the energy absorption.

The shock absorber service life is different from that of the CY1H cylinder. Refer to the Specific Product Precautions for the replacement period.

Construction Note)

Single axis type / CY1H



Component Parts

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Plate A**	Aluminum alloy	Anodized
3	**Plate B**	Aluminum alloy	Anodized
4	**Cylinder tube**	Stainless steel	
5	**Piston**	Aluminum alloy	Chromated
6	**Piston nut**	Carbon steel	Zinc chromated (Except CY1H10/15)
7	**Shaft**	Stainless steel	
8	**Piston side yoke**	Rolled steel plate	Zinc chromated
9	**External slider side yoke**	Rolled steel plate	Zinc chromated
10	**Magnet A**	—	
11	**Magnet B**	—	
12	**External slider tube**	Aluminum alloy	
13	**Spacer**	Rolled steel plate	Nickel plated
14	**Space ring**	Aluminum alloy	Chromated (Except CY1H10)
15	**Slide table**	Aluminum alloy	Anodized
16	**Side plate A**	Aluminum alloy	Anodized
17	**Side plate B**	Aluminum alloy	Anodized
18	**Internal stopper**	Aluminum alloy	Anodized
19	**Stopper**	Aluminum alloy	Anodized
20	**Shock absorber**	—	RB series
21	**Adjusting bolt**	Chrome molybdenum steel	Nickel plated
22	**Adjusting bumper**	Urethane rubber	
23	**Linear guide**	—	
24	**Top cover**	Aluminum alloy	Anodized
25	**Dust cover**	Special resin	
26	**Magnet (For auto switch)**	—	
27	**Parallel pin**	Carbon steel	Nickel plated
28	**Square nut for body mounting**	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	

Note) 4 square nuts for body mounting are included regardless of strokes.

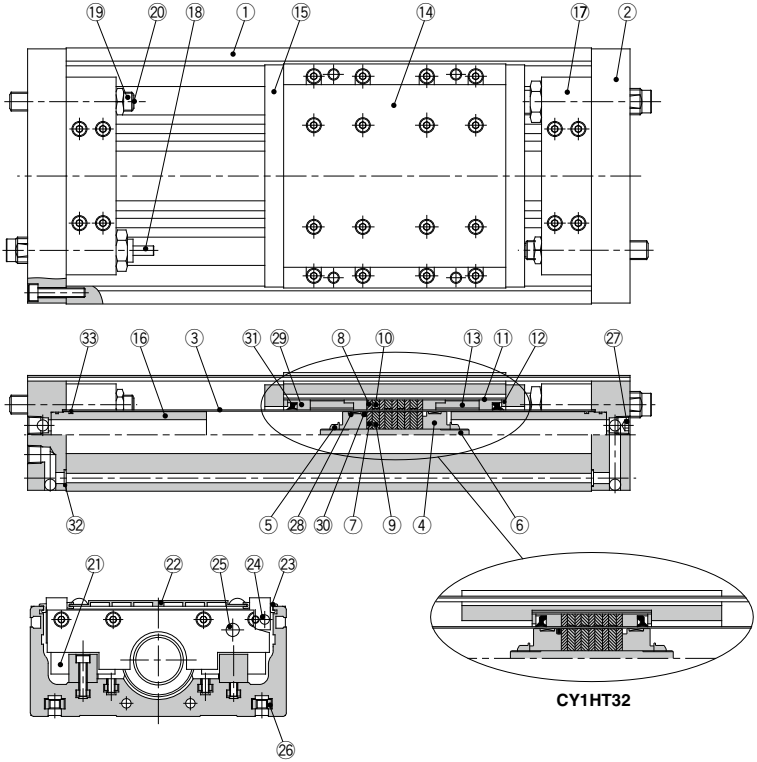
Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
10	CY1H10-PS	Set of the above nos. ㉚, ㉛, ㉜, ㉝, ㉞
15	CY1H15-PS	Set of the above nos. ㉙, ㉚, ㉛, ㉜, ㉝, ㉞
20	CY1H20-PS	
25	CY1H25-PS	

Note 1) Seal kit includes ㉙ to ㉞. Order the seal kit, based on each bore size.
Note 2) For bore size ø10, wear ring A cannot be replaced.
∗ Seal kit includes a grease pack (ø10: 5 and 10 g, ø15 to ø25: 10 g).
Order with the following part number when only the grease pack is needed.
Grease pack part no. for ø10: GR-F-005 (5 g) for external sliding parts,
GR-S-010 (10 g) for tube interior
Grease pack part no. for ø15 to ø25: GR-S-010 (10 g)

Construction

Double axis type / CY1HT



CY1HT32

Component Parts

No.	Description	Material	Material
1	**Body**	Aluminum alloy	Anodized
2	**Plate**	Aluminum alloy	Anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston**	Aluminum alloy	Chromated
5	**Piston nut**	Carbon steel	Zinc chromated
6	**Shaft**	Stainless steel	
7	**Piston side yoke**	Rolled steel plate	Zinc chromated
8	**External slider side yoke**	Rolled steel plate	Zinc chromated
9	**Magnet A**	—	
10	**Magnet B**	—	
11	**External slider tube**	Aluminum alloy	
12	**Spacer**	Rolled steel plate	Nickel plated
13	**Space ring**	Aluminum alloy	Chromated (Except CY1HT32)
14	**Slide table**	Aluminum alloy	Anodized
15	**Side plate**	Aluminum alloy	Anodized (Except CY1HT32)
16	**Internal stopper**	Aluminum alloy	Anodized
17	**Stopper**	Aluminum alloy	Anodized
18	**Shock absorber**	—	RB series
19	**Adjusting bolt**	Chrome molybdenum steel	Nickel plated
20	**Adjusting bumper**	Urethane rubber	
21	**Linear guide**	—	
22	**Top cover**	Aluminum alloy	Anodized
23	**Dust cover**	Special resin	
24	**Magnet (For auto switch)**	—	
25	**Parallel pin**	Stainless steel	

No.	Description	Material	Material
26	**Square nut for body mounting**	Carbon steel	Nickel plated
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	

Note) 4 square nuts for body mounting are included regardless of strokes.

Replacement Parts: Seal Kit

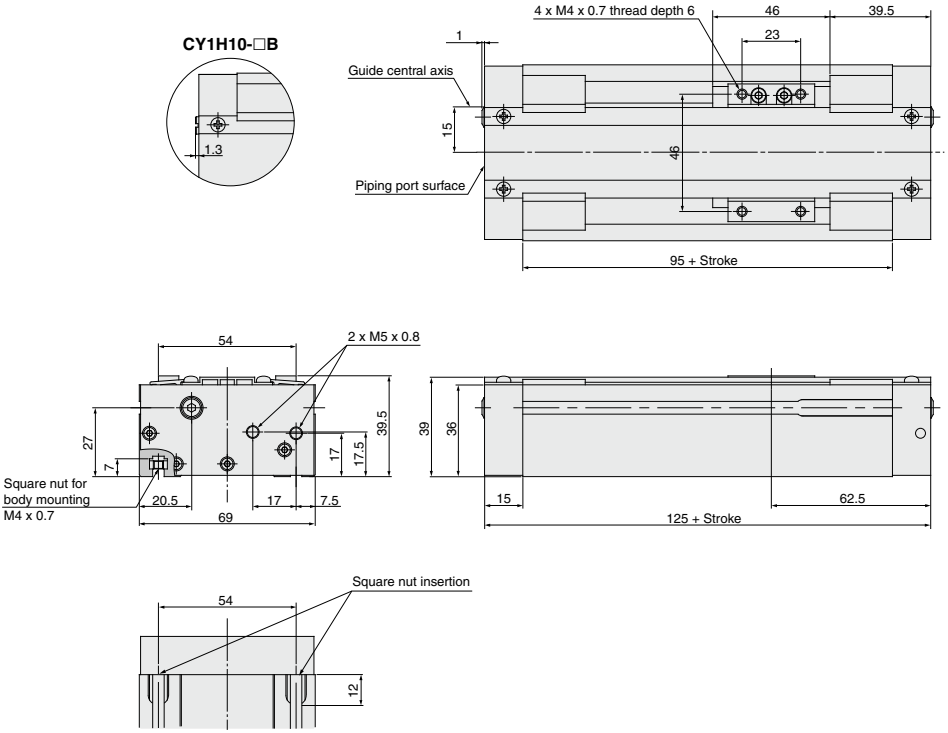
Bore size (mm)	Kit no.	Contents
25	CY1HT25-PS	Set of the above nos. ㉘, ㉙, ㉚, ㉛, ㉜, ㉝
32	CY1HT32-PS	

* Seal kit includes ㉘ to ㉝. Order the seal kit, based on each bore size.
* Seal kit includes a grease pack (10 g).
Order with the following part number when only the grease pack is needed.
Grease pack part no.: GR-S-010 (10 g)

Dimensions

Single axis type / Ø10

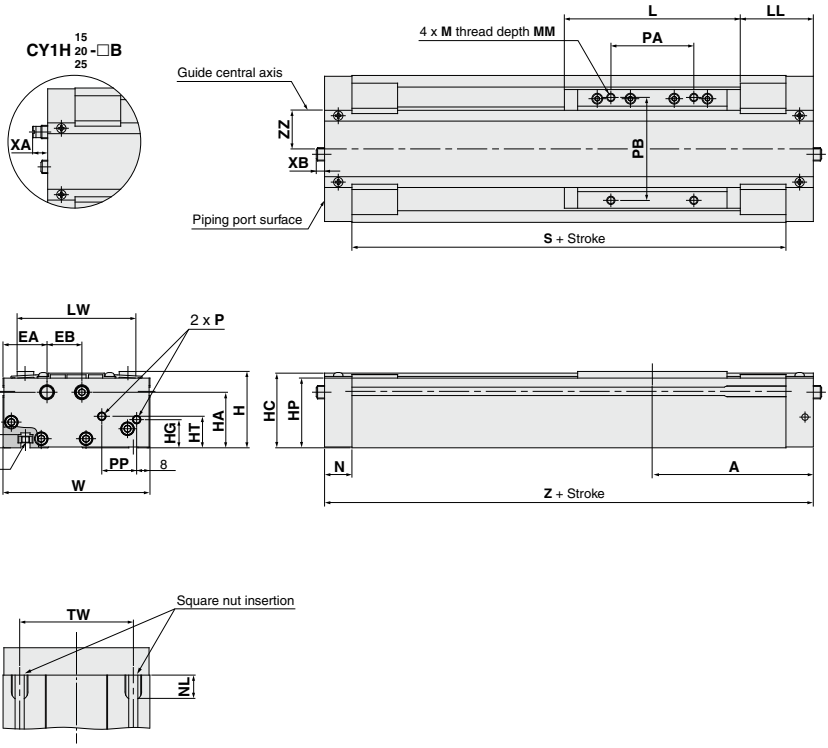
CY1H10



Dimensions

Single axis type / ø15, ø20, ø25

CY1H15/20/25



(mm)

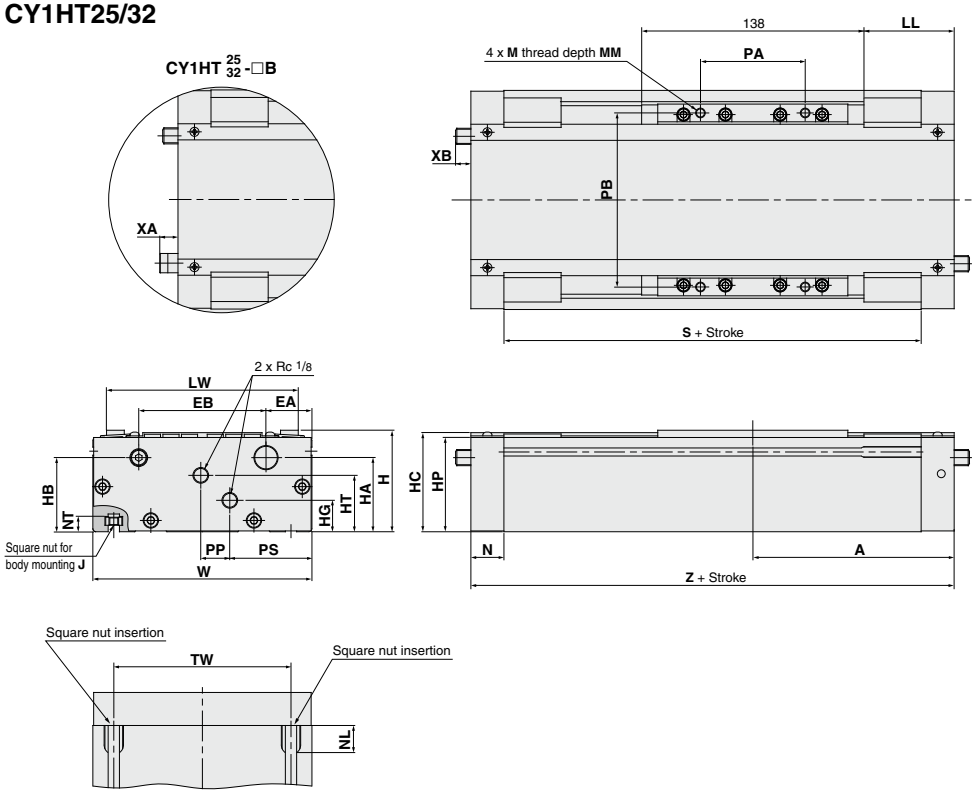
Model	A	EA	EB	H	HA	HB	HC	HG	HP	HT	J	L	LL	LW	M	MM	N	NL	NT
CY1H15	97	26.5	21	46	33.5	33.5	45	17	42	19	M5 x 0.8	106	44	71.5	M5 x 0.8	8	16.5	15	8
CY1H20	102.5	26.5	22	54	42.5	41.5	53	16	50	23.5	M5 x 0.8	108	48.5	75.5	M5 x 0.8	8	18	15	8
CY1H25	125	29	24	63	46	46	61.5	25	58.5	28	M6 x 1.0	138	56	86	M6 x 1.0	10	20.5	18	9

Model	P	PA	PB	PP	S	TW	W	XA	XB	Z	ZZ
CY1H15	M5 x 0.8	50	62	21	161	65	88.5	—	—	194	17.5
CY1H20	Rc1/8	50	65	23	169	70	92.5	—	—	205	19.5
CY1H25	Rc1/8	65	75	27	209	75	103	11.3	9.5	250	23.5

Dimensions

Double axis type: / Ø25, Ø32

CY1HT25/32



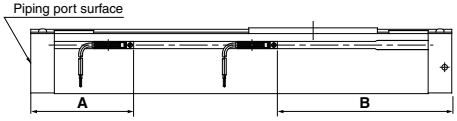
(mm)

Model	A	EA	EB	H	HA	HB	HC	HG	HP	HT	J	LL	LW	M	MM	N	NL	NT	PA
CY1HT25	125	28.5	79	63	46	46	61.5	19.5	58.5	35	M6 x 1.0	56	119	M6 x 1.0	10	20.5	18	9	65
CY1HT32	132.5	30	90	75	52.5	57.5	72.5	25	69.5	43	M8 x 1.25	63.5	130	M8 x 1.25	12	23	22.5	12	66

Model	PB	PP	PS	S	TW	W	XA	XB	Z
CY1HT25	108	18	51	209	110	136	11.3	9.5	250
CY1HT32	115	14	61	219	124	150	9.7	2	265

CY1H Series
Auto Switch Mounting

Proper Auto Switch Mounting Position (Detection at stroke end)



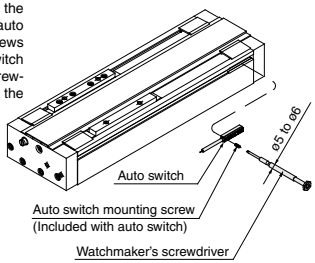
Cylinder model	Applicable auto switch	
	D-Z7□/ Z80/ Y5□/ Y6□/ Y7□	
	A	B
CY1H10	65.5	59.5
CY1H15	72	122
CY1H20	77.5	127.5
CY1H25	86	164
CY1HT25	86	164
CY1HT32	82	183

∗ 50 mm is the minimum stroke available with 2 auto switches mounted.

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Mounting of Auto Switch

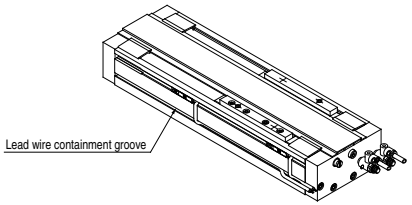
To install the auto switch, insert the auto switch into the installation groove of the cylinder from the direction shown in the drawing on the right, and tighten the auto switch mounting screws attached to the auto switch with a watchmaker's screwdriver after setting the mounting position.



Note) Use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm to tighten the auto switch mounting screws (attached to the auto switch).
The tightening torque should be 0.05 to 0.1 N•m.

Auto Switch Lead Wire Containment Groove

On models CY1H20 and CY1H25 a groove is provided on the side of the body (one side only) to contain auto switch lead wires. This should be used for management of wiring.



Operating Range

(mm)

Cylinder model	Auto switch model	Bore size				
		10	15	20	25	32
CY1H	D-Z7□/ Z80	8	6	6	6	—
	D-Y5□/ Y6□/ Y7□	6	5	5	5	—
CY1HT	D-Z7□/ Z80	—	—	—	6	9
	D-Y5□/ Y6□/ Y7□	—	—	—	5	6

∗ Some auto switches cannot be mounted.

∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion)
There may be the case it will vary substantially depending on an ambient environment.

CY1H Series
Specific Product Precautions 1

Be sure to read this before handling the products. Refer to page 8 for safety instructions and pages 9 to 18 for actuator and auto switch precautions.

Operation

⚠Warning

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

Take sufficient care to avoid getting your hands or fingers caught when the cylinder is operated.

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

This may cause malfunctions.

3. Consider a special order product if the cylinder is to be used in an environment that deteriorates the lubrication of the cylinder sliding parts.

4. When applying grease to the cylinder, use the grease that has already been applied to the product. Grease packs are available if needed.

⚠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. This unit can be operated without lubrication. If lubrication is performed, use turbine oil Class 1 (with no additives), ISO VG32. (Machine oil and spindle oil cannot be used.)

4. Do not use the cylinder in an environment where the cylinder is expose to moisture, adhesive foreign matter, dust or liquid such as water or cutting fluid.

Consider a special order product if the cylinder is to be used in an environment that deteriorates the lubrication of the cylinder sliding parts.

5. 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).

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

This can cause a loss of holding power and malfunction.

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.

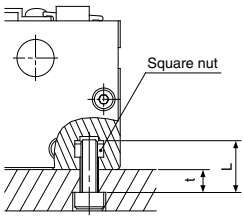
Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation.

2. Because the slider is supported by precision bearings, take care not to apply strong impacts or excessive moments to the table when loading a workpiece.

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		CY1H10	CY1H15	CY1H20	CY1H25	CY1HT25	CY1HT32
Bolt dimensions	Thread size	M4 x 0.7	M5 x 0.8		M6 x 1.0		M8 x 1.25
	Dimension t	L-7	L-8	L-8	L-9		L-12
Tightening torque	N · m	1.37	2.65		4.4		13.2



Service Life and Replacement Period of Shock Absorber

⚠Caution

1. Allowable operating cycle under the specifications set in this catalog is shown below.

1.2 million times RB08□□

2 million times RB10□□ to RB2725

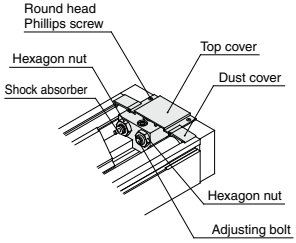
Note) Specified service life (suitable replacement period) is the value at room temperature (20 to 25°C).
The period may vary depending on the temperature and other conditions. In some cases the absorber may need to be replaced before the allowable operating cycle above.

Specific Product Precautions 2

Be sure to read this before handling the products. Refer to page 8 for safety instructions and pages 9 to 18 for actuator and auto switch precautions.

Stroke Adjustment Method

Loosen the round head Phillips Screws, and remove the top cover and dust covers (4 pcs.).



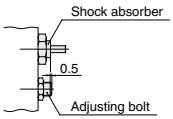
Loosen the hexagon nut, adjust the stroke with a hexagon wrench from the plate side, and secure by retightening the hexagon nut. When there is a shock absorber, loosenthe hexagon nut, adjust the stroke, and then retighten the hexagon nut.
Adjustment should be performed to make effective use of the shock absorber's absorption capacity, with its position relative to the adjustment bolt as shown in the figure to the right.

⚠ Caution

1. If the effective stroke of the shock absorber is shortened by the stroke adjustment, its absorption capacity will be drastically reduced. Therefore, the adjusting bolt should be secured at a position where it projects about 0.5 mm farther than the shock absorber.

Lock Nut Tightening Torque N·m

Model	For shock absorber	For adjusting bolt
CY1H10	1.67	1.67
CY1H15		
CY1H20	3.14	
CY1H25	10.8	3.14
CY1HT25		
CY1HT32	23.5	



After completing the above adjustment, replace the top cover and dust covers back into place.
The round head Phillips screws for securing the top cover should be tightened with a torque of 0.58 N·m.

CY1L/H Series
Made to Order: Individual Specifications

Please contact SMC for detailed dimensions, specifications and lead times.

Made to Order

Applicable Series

No.	Symbol	Specifications/Description	Slider type	
			Ball bushing type **CY1L**	High precision guide type **CY1H**
1	**-X116**	Hydro specifications	●(ø25 to ø40)	—
2	**-X168**	Helical insert thread specifications	●(ø20 to ø40)	●(ø20 to ø32)
3	**-X322**	Outside of cylinder tube with hard chrome plated	●(ø15 to ø40)	—
4	**-X431**	Auto switch rails on both side faces (With 2 pcs.)	●(ø6 to ø40)	—

1 Hydro Specifications

Symbol -X116

This type is applicable for precision constant speed feed, intermediate stop and skip feed.

[Slider type]

CY1L [Bore size] [Magnetic holding force] – [Stroke] [Damper type] – [Switch] – X116

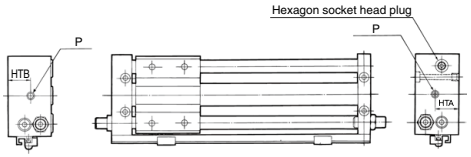
Hydro specifications

Specifications

Type	Slider type
Bore size	Slider type CY1L25 to 40
Fluid	Turbine oil
Piston speed	15 to 300 mm/s

Note) Piping is from each plate on both sides.

Dimensions



(mm)

Model	HTA	HTB	P	Throttle dia.
CY1L25	20	23	Rc 1/8	8.2
CY1L32	24	26.5	Rc 1/8	8.2
CY1L40	25	30.5	Rc 1/4	11

∗ Dimensions other than the above are the same as the standard type.

2 Helical Insert Thread Specifications

Symbol -X168

CY1L / CY1H [Bore size] [Magnetic holding force] – [Stroke] – X168

Helical insert thread specifications

Helical insert thread is used for standard mounting thread.

Specifications

Applicable Series	**CY1L/CY1H**
Bore size	CY1L : ø20 to ø40 CY1H: ø20 to ø32

3 Outside of Cylinder Tube with Hard Chrome Plated

Symbol -X322

CY1L [Bore size] [Magnetic holding force] – [Stroke] – X322

Outside of cylinder tube with hard chrome plated

The cylinder tube outer circumference is plated with hard chrome, which further reduces bearing abrasion.

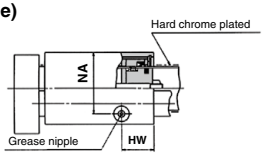
Note) The slider type (slide block) is provided with a greasing port.

Specifications

Applicable Series	Bore size (mm)
CY1L	ø15 to ø40

Construction/Dimensions

CY1L (Slider type)



(mm)

Bore size (mm)	CY1L	
	NA	**HW**
15	33.0	37.5
20	38.0	43.0
25	43.0	43.0
32	50.0	50.0
40	61.0	68.0

SMC

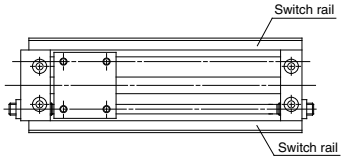
Symbol
-X431

4 Auto Switch Rails on Both Side Faces (With 2 pcs.)

CY1L [Bore size] [Magnetic holding force] — [Stroke] — **X431**

Auto switch rails on both side faces (With 2 pcs.)

This auto switch is effective in the case of short strokes.



Specifications

Applicable Series	CY1L
Bore size	ø6 to ø40

Bore size (mm)	Applicable stroke (mm)
6	20 to
10 **15** **20** **25**	25 to
32 **40**	35 to