

Magnetically Coupled Rodless Cylinder



Upgraded version of space saving magnetically coupled rodless cylinder

Basic type

Direct mount type

Series **CY3B/CY3R**

Series CY3B/CY3R

Improved durability

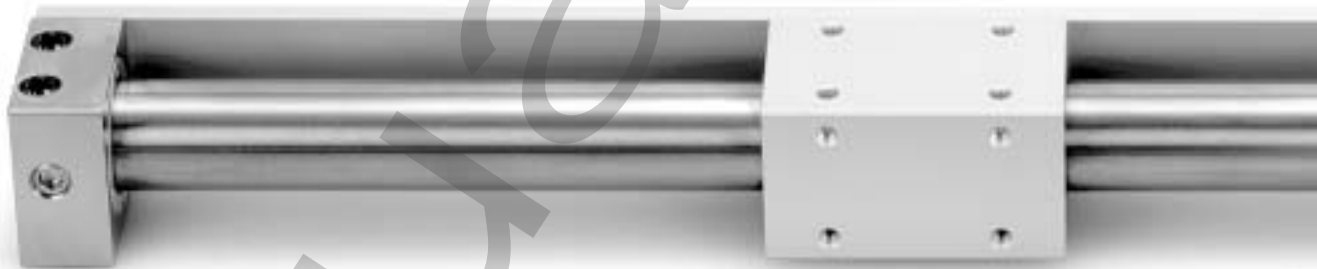
Improved bearing performance

A 70% longer wear ring length achieving an improvement in bearing performance compared to the CY1B.

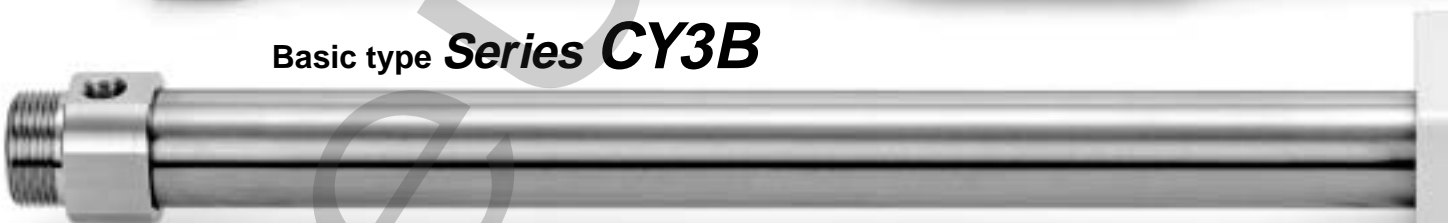
Improved lubrication by using a soft wiper

A special resin soft wiper is installed on the dust seal to achieve a ideal lubrication on the external surface of the cylinder tube.

Direct mount type **Series CY3R**



Basic type **Series CY3B**



NPT and G thread are standardized.

Variety of piping port thread expanded to 3 types

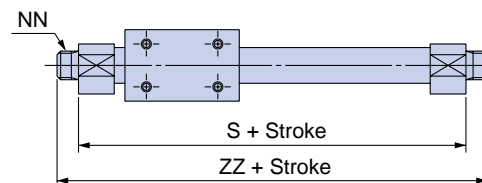
Cylinders with a bore ≥ 20 or larger, are now available with 3 types of piping port threads.

(Refer to "How to Order": CY3B series Page 7)
CY3R series Page 11)

Bore size (mm)	Thread type
15	M thread
20, 25, 32, 40	Rc thread
	NPT thread
	G thread

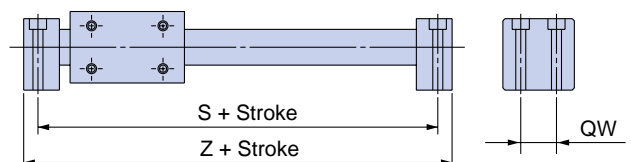
Mounting dimensions are identical with those of series CY1.

Series CY3B

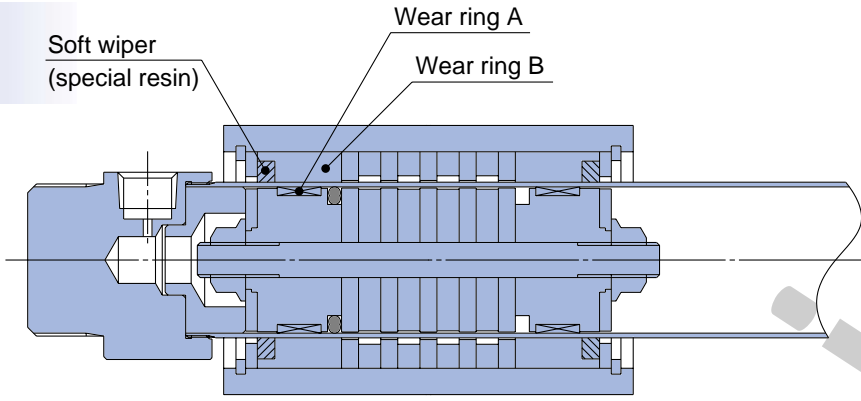


The mounting dimensions (in the drawing on the left) are identical with those of existing series CY1B/CY1R, allowing easy replacement.

Series CY3R



Upgraded version of saving magnetically rodless cylinder!



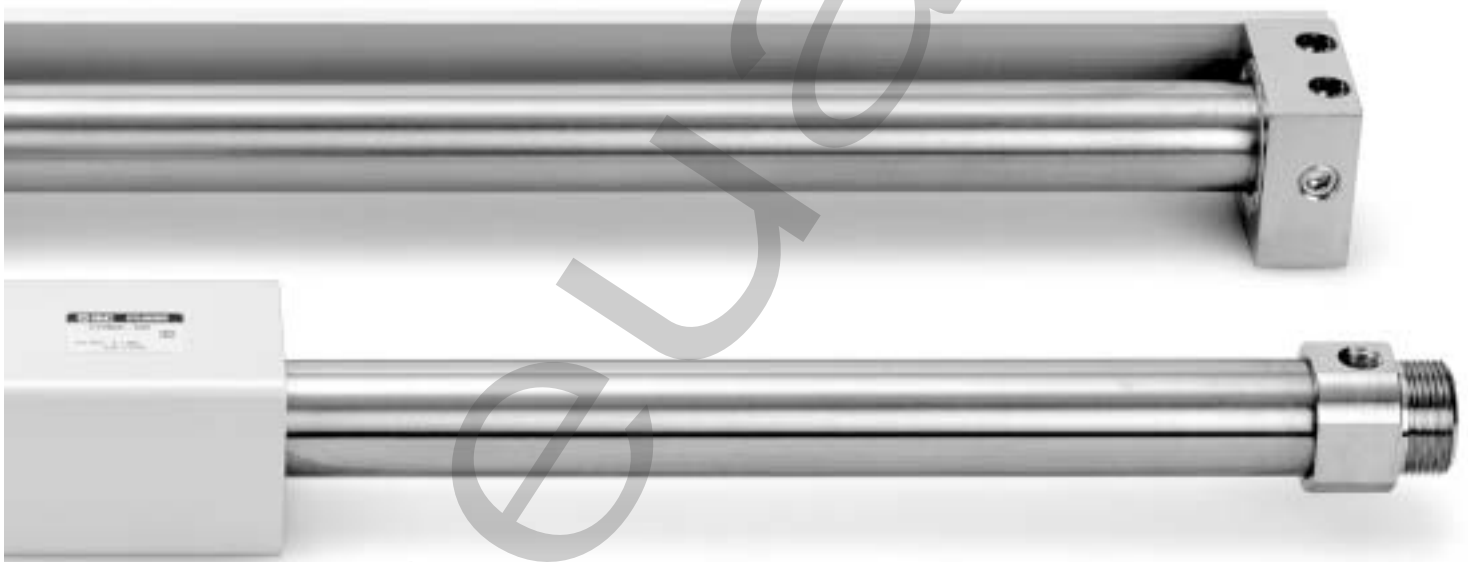
■ Series CY3B ■

Reduction of sliding resistance

Minimum operating pressure reduced by 30%

By using a soft wiper the minimum operating pressure is reduced by 30%.

(comparing CY3B40 and CY1B40)



Series variations



Series	Bore size	Standard stroke (mm)										Individual made to order products						
		50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000		
CY3B	∅15	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	∅20	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	∅25	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	∅32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
CY3R	∅40	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	∅15	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	∅20	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	∅25	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	∅32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	∅40	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	

Note) The mark ● indicates the available combination of bore size and standard stroke.

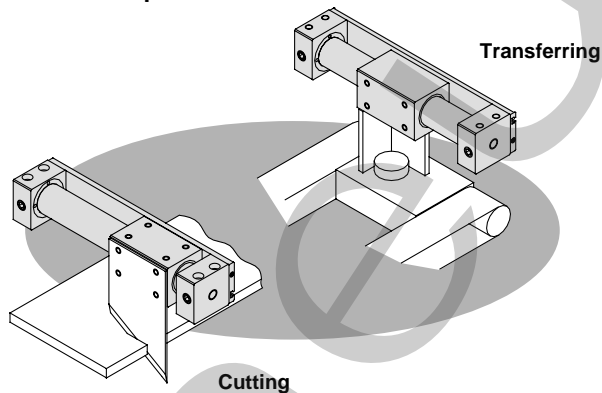
- Long stroke (2001mm and up) (XB11)
- Low speed specifications (7 to 50mm/s) (XB13)
- Hydro specifications (X116)
- Axial ports (X132)
- High speed specifications (X160)
- Helical insert thread specifications (X168)
- Added mounting tap positions for slider (X206)
- Oil-free exterior specifications (X210)
- Outside of cylinder tube with hard chrome plating (X322)
- Oil-free exterior specifications (with dust seal) (X324)
- With floating joint (XC57)

Availability of made to order products varies with the series (CY3B/R) and the bore size. For more information please refer page 20.

Series CY3B/CY3R Model Selection Criteria

Model selection point	Recommended cylinder		
	Appearance	Features	
<ul style="list-style-type: none"> ●When used with many different types of guides. ●When a long stroke is necessary. 	Types with guide	<p>Series CY3B Size/ø15, ø20, ø25, ø32, ø40</p> 	<ul style="list-style-type: none"> · A long stroke is possible.
<ul style="list-style-type: none"> ●When used with many different types of guides. ●When auto switches are added to the basic type. ●When used without a guide for a light load. (Application Example 1) ●When space is very limited. 		<p>Series CY3R Size/ø15, ø20, ø25, ø32, ø40</p> 	<ul style="list-style-type: none"> · Cylinder can be directly mounted. · Auto switches can be mounted, and there is no lurching from cylinder. · Non-rotation mechanism is available within the allowable range. · Piping can be concentrated with the centralized piping type. · External dimensions are compact. · Mounting can be performed on the top body surface or on one side surface.

Application example



Series CY3B/CY3R Model Selection Method



E: Kinetic energy of load (J)

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

Es: Allowable kinetic energy for intermediate stop using an air pressure circuit (J)

Fn: Allowable driving force (N)

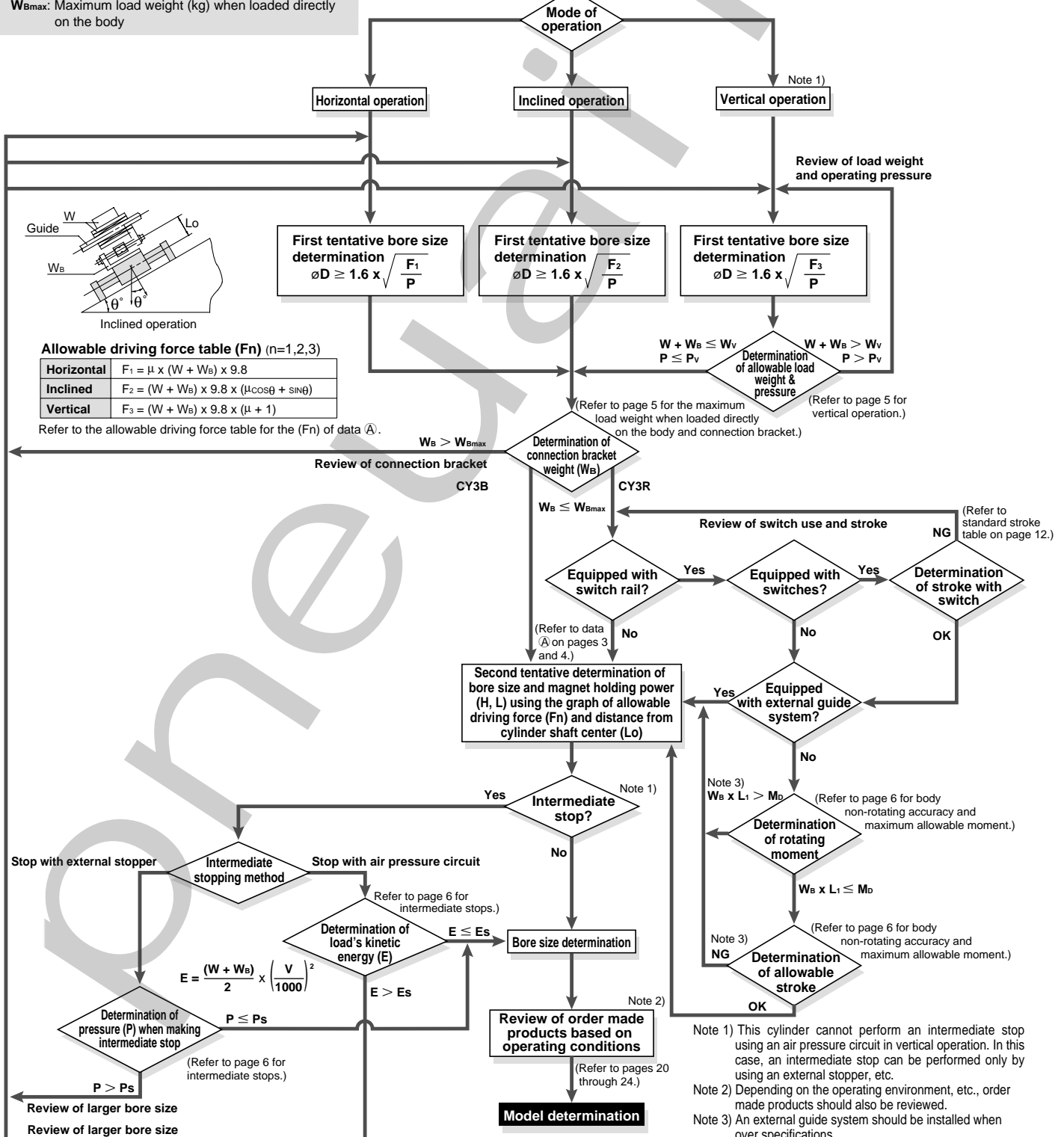
Mb: Maximum allowable moment (N-m) when a connection bracket, etc. is carried directly

Ps: Operating pressure limit for intermediate stop using an external stopper, etc. (MPa)

Pv: Maximum operating pressure for vertical operation (MPa)

Wbmax: Maximum load weight (kg) when loaded directly on the body

- Operating conditions**
- W: Load weight (kg)
 - Wb: Connection bracket weight (kg)
 - μ: Guide's coefficient of friction
 - Lc: Distance from cylinder shaft center to work piece point of application (cm)
 - L1: Distance from cylinder shaft center to connection fitting, etc.
 - Switches
 - P: Operating pressure (MPa)
 - V: Speed (mm/s)
 - Stroke (mm)
 - Mode of operation (horizontal, inclined, vertical)



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

Note 3) An external guide system should be installed when over specifications.

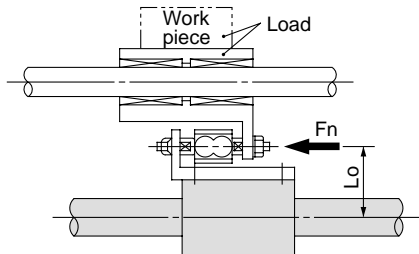
Series CY3B/CY3R Model Selection Method

Precautions on Design ①

Selection procedure

Selection procedure

1. Find the drive resisting force F_n (N) when moving the load horizontally.
2. Find the distance L_o (cm) from the point of the load where driving force is applied, to the center of the cylinder shaft.
3. Select the bore size and type of magnet holding force (types H, L) from L_o and F_n based on data ①.



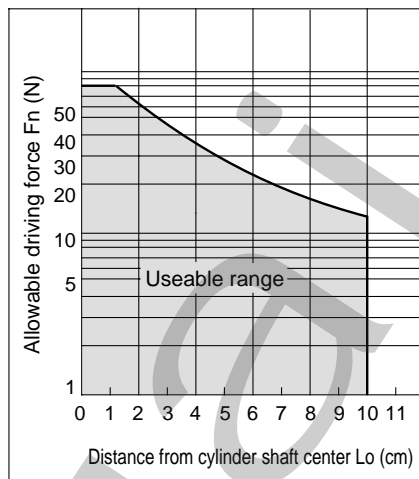
Selection example

Given a load drive resisting force of $F_n = 100$ (N) and a distance from the cylinder shaft center to the load application point of $L_o = 8$ cm, find the intersection point by extending upward from the horizontal axis of data ① where the distance from the shaft center is 8cm, and then extending to the side, find the allowable driving force on the vertical axis.

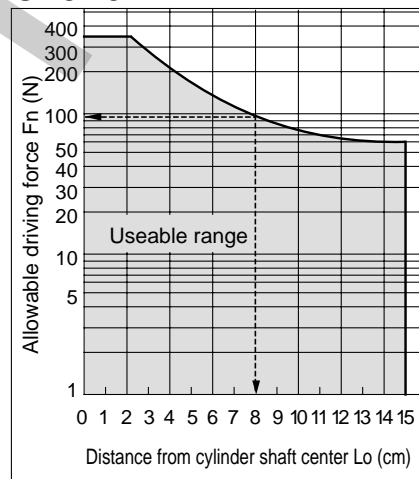
Models suitable to satisfy the requirement of 100 (N) are **CY3□32** or **CY3□40**.

<Data ①: Distance from cylinder shaft center — Allowable driving capacity>

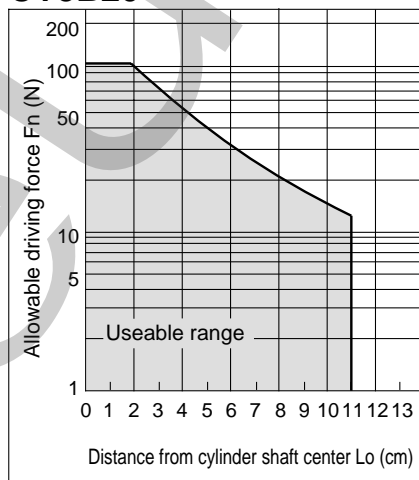
CY3B15



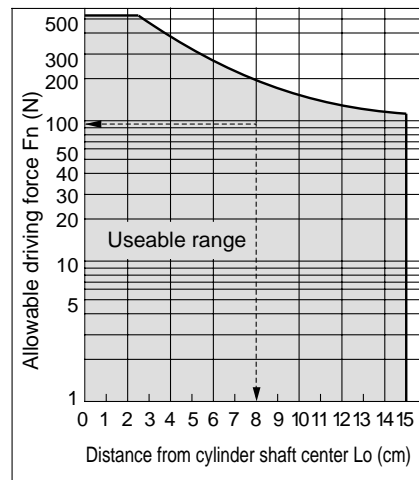
CY3B32



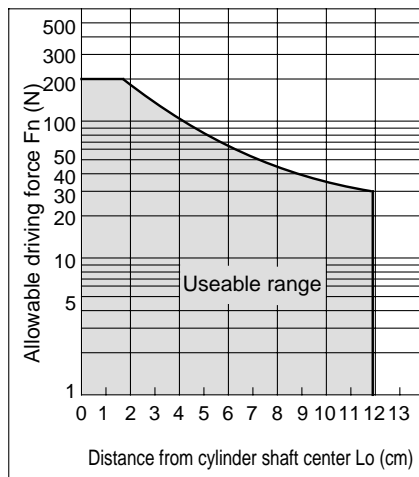
CY3B20



CY3B40



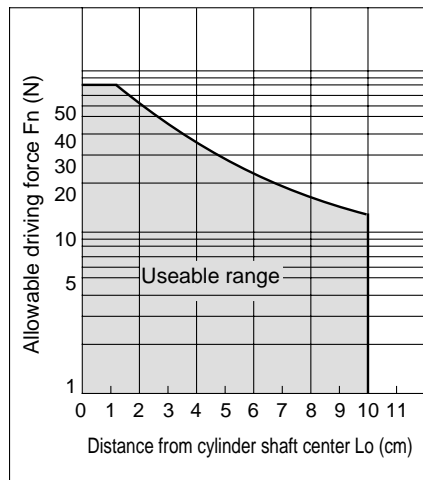
CY3B25



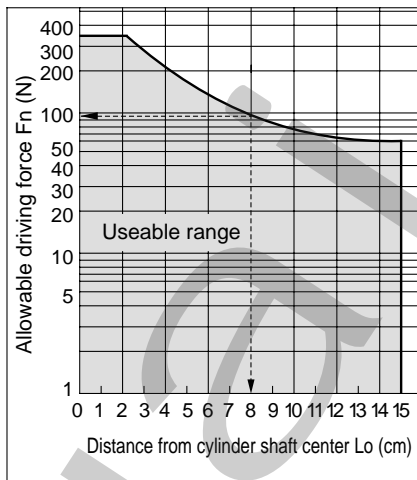
Precautions on Design ①

<Data ①: Distance from cylinder shaft center — Allowable driving capacity>

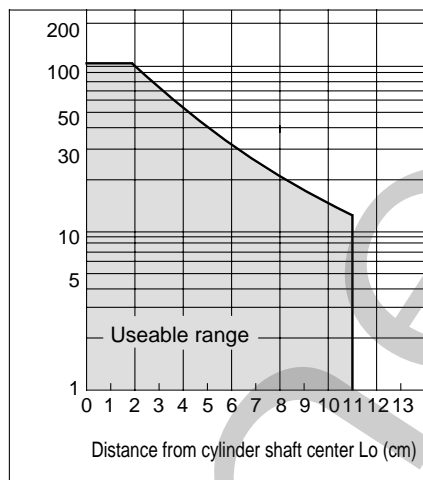
CY3R15



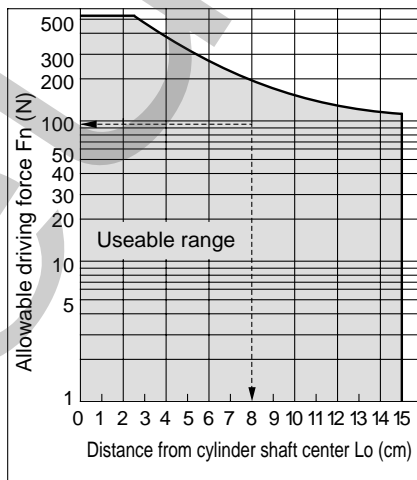
CY3R32



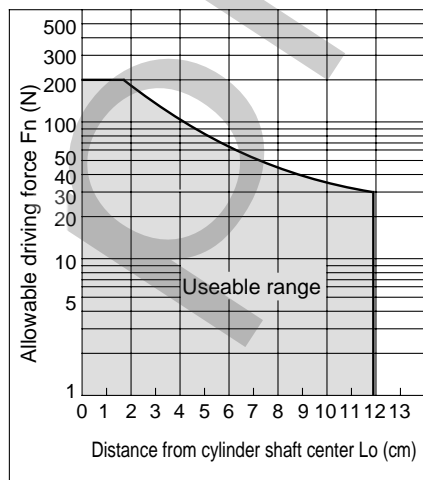
CY3R20



CY3R40



CY3R25

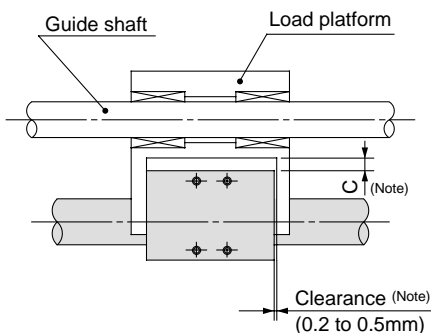


Series CY3B/CY3R Model Selection Method

Precautions on Design ②

Cylinder Dead Weight Deflection

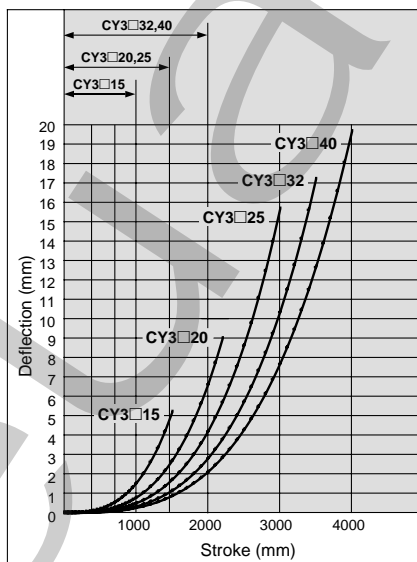
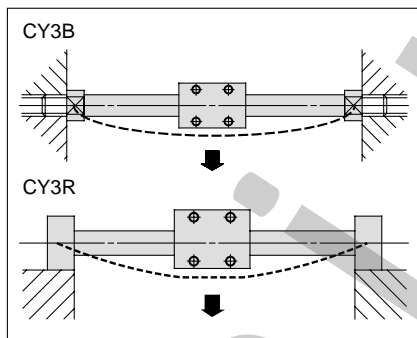
When the cylinder is mounted horizontally, deflection appears due to its own weight as shown in the data, and the longer the stroke is, the greater the amount of variation in the shaft center. Therefore, a connection method should be considered which can assimilate this deflection.



The above clearance amount is a reference value.

Note 1) According to the dead weight deflection in the figure on the right, provide clearance so that the cylinder does not touch the mounting surface or the load, etc., and is able to operate smoothly within the minimum operating pressure range for a full stroke. For more information, refer to instruction manual.

Note 2) In case of CY3R, install a stay, etc. to eliminate clearance between the body and the switch rail. For more information, refer to CY3R instruction manual.



*The above deflection data represent values at the time when the external sliding part moves to the middle of the stroke.

Max. Weight of Connection Bracket to the Body

Series CY3 is guided by an external axis (such as a linear guide) without directly mounting the load. When designing a metal bracket to connect the load, see to it that its weight will not exceed the value in the table below. Basically, guide the CY3R direct mounting type also with an external axis. (For connection methods, refer to Instruction Manual.)

Model	Max. connection bracket weight (W _{max}) (kg)
CY3□15	1.0
CY3□20	1.1
CY3□25	1.2
CY3□32	1.5
CY3□40	2.0

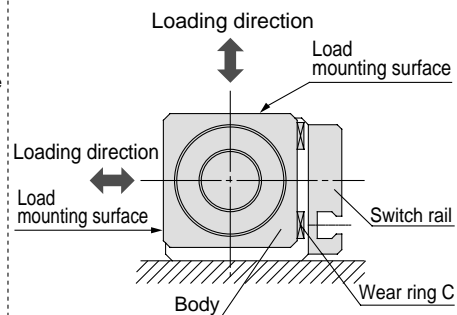
Consult P/A in case a bracket with weight exceeding the above value is to be mounted.

<CY3R>

Max. Load Weight when Loaded Directly on Body

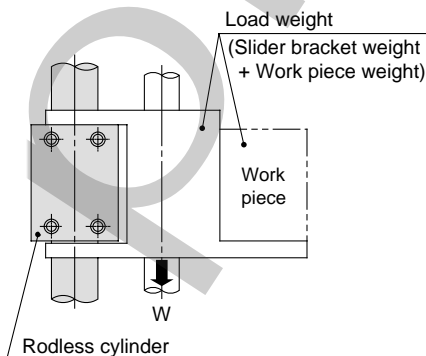
When the load is applied directly to the body, it should be no greater than the maximum values shown in the table below.

Model	Max. load weight (W _{max}) (kg)
CY3R15	1.0
CY3R20	1.1
CY3R25	1.2
CY3R32	1.5
CY3R40	2.0



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.



Bore size (mm)	Model	Allowable load weight (W _v) (kg)	Max. operating pressure (P _v) (MPa)
15	CY3□15	7.0	0.65
20	CY3□20	11.0	0.65
25	CY3□25	18.5	0.65
32	CY3□32	30.0	0.65
40	CY3□40	47.0	0.65

*Use caution, as there is a danger of breaking the magnetic coupling if operated above the maximum operating pressure.

Precautions on Design ③

Intermediate stop

(1) Intermediate stopping of load with an 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. 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)
15	CY3□15	0.65
20	CY3□20	0.65
25	CY3□25	0.65
32	CY3□32	0.65
40	CY3□40	0.65

(2) Intermediate stopping of load with an air pressure circuit

When performing an intermediate stop of 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.

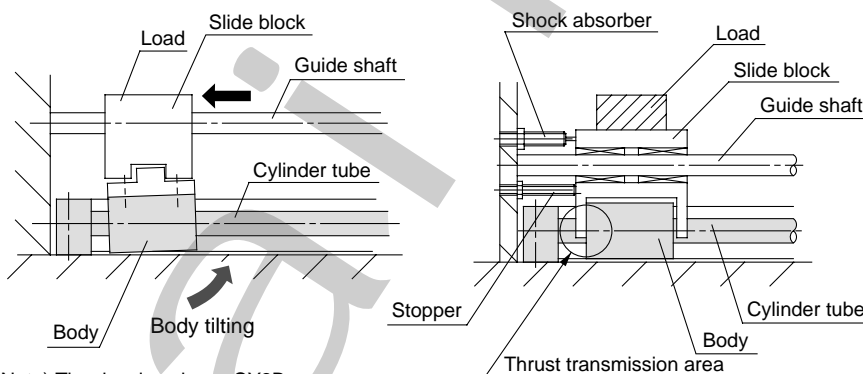
(Reference values)

Bore size (mm)	Model	Allowable kinetic energy for intermediate stop (Es) (J)
15	CY3□15	0.13
20	CY3□20	0.24
25	CY3□25	0.45
32	CY3□32	0.88
40	CY3□40	1.53

Stroke End Stopping Method

When stopping a load having a large inertial force at the stroke end, tilting of the body and damage to the bearings and cylinder tube may occur. (Refer to the left hand drawing below.)

As shown in the right hand drawing below, a shock absorber should be used together with the stopper, and thrust should also be transmitted from the center of the body so that tilting will not occur.

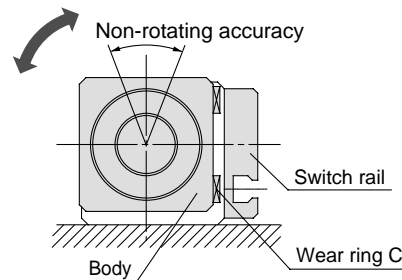


Note) The drawing shows CY3B.

<CY3R> 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 (β)	Max. allowable moment (M ₀) (N·m)	Note 2) Allowable stroke (mm)
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, but 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 5.

Magnetically
Coupled
Rodless
Cylinder

Series CY3B

Basic Type

How to Order

Basic type **CY3B** **25** **300**

Basic type

Bore size

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

Standard stroke
Refer to the standard strokes table below.

Port thread type

Symbol	Type	Bore size
Nil	M thread	15
	Rc	
TN	NPT	20, 25, 32, 40
TF	G	

Standard Stroke

Bore size (mm)	Standard stroke (mm)	Maximum stroke available (mm) ^{Note 1)}
15	50, 100, 150, 200, 250, 300, 350 400, 450, 500	1000
20	100, 150, 200, 250, 300, 350, 400, 450	1500 ^{Note 2)}
25, 32	500, 600, 700, 800	3000
40	100, 150, 200, 250, 300, 350, 400, 450 500, 600, 700, 800, 900, 1000	3000

Note 1) Contact P/A if the maximum stroke will be exceeded.

Note 2) Use series CY1B if the stroke exceeds 1500 mm with a tube inside diameter of 20 mm.

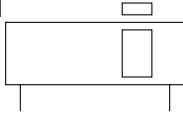
Magnetic Holding Force (N)

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

Specifications



JIS symbol



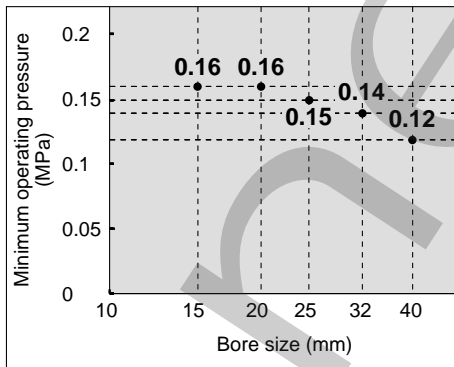
Fluid	Air
Proof pressure	1.05MPa
Max. operating pressure	0.7MPa
Min. operating pressure	Refer to the minimum operating pressure table.
Ambient and fluid temperature	-10 to 60°C
Piston speed	50 to 400mm/s
Cushion	Rubber bumper at both ends
Lubrication	Non-lube
Stroke length tolerance	0 to 250st: $+1.0$, 251 to 1000st: $+1.4$, 1001st to: $+1.8$
Mounting orientation	Unrestricted
Mounting nut (2 pcs.)	Standard equipment (accessory)



Made to Order specifications (Refer to pages 20 through 24 for details.)

Symbol	Specifications
-XB11	Long stroke (2001mm and up)
-XB13	Low speed specifications (7 to 50mm/s)
-X116	Hydro specifications
-X132	Axial ports
-X160	High speed specifications
-X168	Helical insert thread specifications
-X206	Added mounting tap positions for slider
-X210	Oil-free exterior specifications
-X322	Outside of cylinder tube with hard chrome plating
-X324	Oil-free exterior specifications (with dust seal)
-XC57	With floating joint

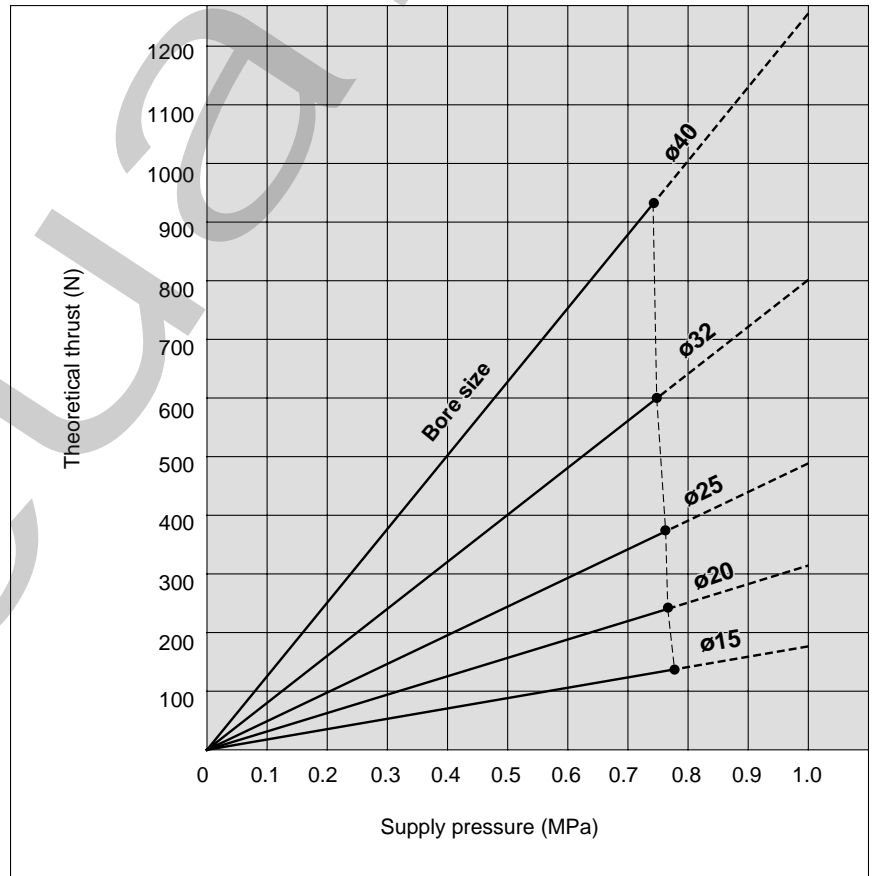
Minimum Operating Pressure



Theoretical Cylinder Thrust



When calculating the actual thrust, design should consider the minimum actuating pressure.



Main Material

Description	Material	Note
Head cover	Aluminum alloy	Electroless nickel plated
Cylinder tube	Stainless steel	
Body	Aluminum alloy	Hard anodized
Magnet	Rare earth magnet	

Weights

Bore size (mm)	15	20	25	32	40
Basic weight	0.275	0.351	0.672	1.287	2.070
Additional weight per 50mm of stroke	0.015	0.02	0.023	0.033	0.04

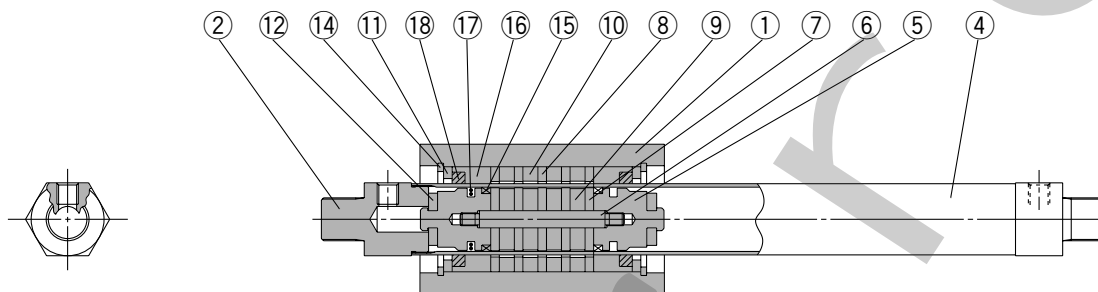
Calculation method
 /Example: CY3B32-500
 Basic weight 1.287kg
 Additional weight 0.033kg/50s
 Cylinder stroke 500st
 $1.287 + 0.033 \times 500 \div 50 = 1.617\text{kg}$

Series CY3B

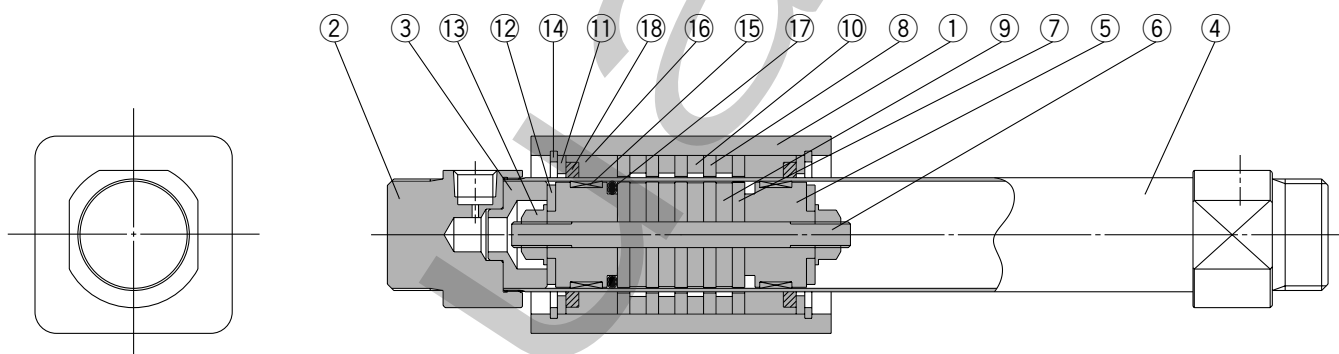
Construction

Basic type

CY3B15



CY3B20 to 40



Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Head cover	Aluminum alloy	Electroless Ni plated
3	End collar	Aluminum alloy	Chromate (ø15 is not available.)
4	Cylinder tube	Stainless steel	
5	Piston	Aluminum alloy	Chromate
6	Shaft	Stainless steel	
7	Piston side yoke	Rolled steel	Zinc chromate
8	External slider side yoke	Rolled steel	Zinc chromate
9	Magnet A	Rare earth magnet	
10	Magnet B	Rare earth magnet	
11	Spacer	Aluminum alloy	Chromate
12	Bumper	Urethane rubber	
13	Hexagon nut with flange	Carbon steel	Zinc chromate (ø15: not available. ø20: hexagon nut)
14	C type snap ring for hole	Carbon tool steel	Nickel plated
15	Wear ring A	Special resin	
16	Wear ring B	Special resin	
17	Piston seal	NBR	
18	Soft wiper	Special resin	

Replacement parts: Seal kits

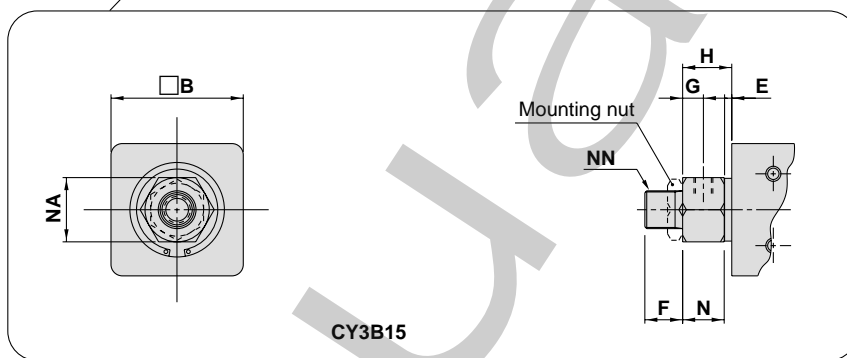
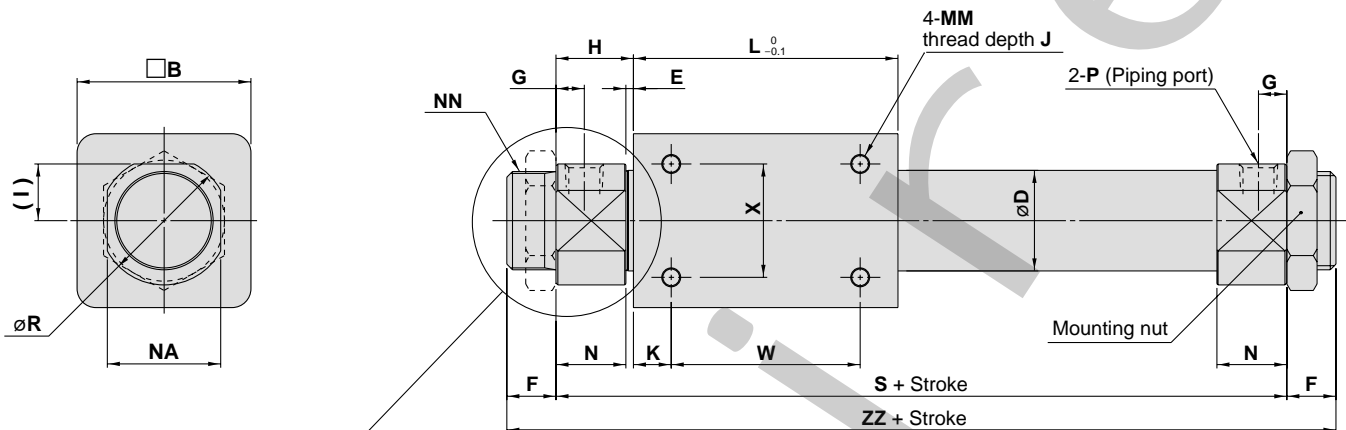
Bore size (mm)	Kits no.
15	CY3B15-PS
20	CY3B20-PS
25	CY3B25-PS
32	CY3B32-PS
40	CY3B40-PS

*Seal kits are sets consisting of numbers 15 through 18, and may be ordered using the order number to each bore size.

Dimensions

Basic type

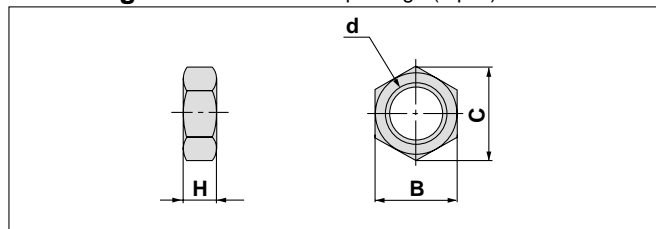
CY3B15 to 40



Model	B	D	E	F	G	H	I	J	K	L	MM	N	NA	NN	R	S	W	X	ZZ
CY3B15	35	16.6	3	10	5.5	13	—	6	11	57	M4 x 0.7	11	17	M10 x 1	—	83	35	19	103
CY3B20	36	21.6	2	13	7.5	20	12	6	8	66	M4 x 0.7	18	24	M20 x 1.5	28	106	50	25	132
CY3B25	46	26.4	2	13	7.5	20.5	15	8	10	70	M5 x 0.8	18.5	30	M26 x 1.5	34	111	50	30	137
CY3B32	60	33.6	2	16	8	22	18	8	15	80	M6 x 1	20	36	M26 x 1.5	40	124	50	40	156
CY3B40	70	41.6	3	16	11	29	23	10	16	92	M6 x 1	26	46	M32 x 2	50	150	60	40	182

Model	P (Piping port)		
	Nil	TN	TF
CY3B15	M5 x 0.8	—	—
CY3B20	Rc 1/8	NPT 1/8	G 1/8
CY3B25	Rc 1/8	NPT 1/8	G 1/8
CY3B32	Rc 1/8	NPT 1/8	G 1/8
CY3B40	Rc 1/4	NPT 1/4	G 1/4

Mounting nut/Included in the package (2 pcs).



Part No.	Applicable bore size (mm)	d	H	B	C
SNJ-016B	15	M10 x 1.0	4	14	16.2
SN-020B	20	M20 x 1.5	8	26	30
SN-032B	25, 32	M26 x 1.5	8	32	37
SN-040B	40	M32 x 2.0	10	41	47.3

Magnetically
Coupled
Rodless
Cylinder

Series CY3R

Direct Mount Type

How to Order

CY3R 25 300 Y7BW

Direct mount type

Piping type

Nil	Both sides piping type
G	Centralized piping type

Bore size

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

Port thread type

Symbol	Type	Bore size
Nil	M thread	15
	Rc	
TN	NPT	20, 25, 32, 40
TF	G	

Number of auto switches

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

Auto switch type

Nil	Without auto switch
-----	---------------------

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

*Refer to the table below for auto switch model numbers.

*The auto switch is packed together when shipped (unmounted).

Switch rail

Nil	With switch rail
N	Without switch rail

Note 1) A type with switch rail has built-in switch magnets.

Note 2) ø15 has built-in switch magnets even without switch rail.

Standard stroke

Refer to page 12 for standard stroke.

Applicable auto switches/

For ø15, ø20

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch models	Lead wire length (m)*			Applicable load		
					DC	AC		0.5 (Nil)	3 (L)	5 (Z)			
Reed switch	—	Grommet	No	2-wire	24V	5V, 12V	100V or less	A90	●	●	—	IC circuit	Relay PLC
			No	3-wire (NPN equiv.)		12V		100V	A93	●	●	—	—
Solid state switch	Diagnostic indication (2-color display)	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	F9N	●	●	○	IC circuit	Relay PLC
				3-wire (PNP)				F9P	●	●	○	—	
				2-wire				F9B	●	●	○	—	
				3-wire (NPN)				F9NW	●	●	○	IC circuit	
				3-wire (PNP)				F9PW	●	●	○	—	
				2-wire				F9BW	●	●	○	—	
				2-wire									

For ø25, ø32, ø40

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

*Lead wire length symbols: 0.5m..... Nil (Example) Y59B
3m..... L (Example) Y59BL
5m..... Z (Example) Y59BZ

**Solid state switches marked "○" are produced upon receipt of order.

Specifications



Fluid	Air
Proof pressure	1.05MPa
Max. operating pressure	0.7MPa
Min. operating pressure	Refer to the minimum operating pressure table.
Ambient and fluid temperature	-10 to 60°C
Piston speed ^{Note)}	50 to 500mm/s
Cushion	Rubber bumper at both ends
Lubrication	Non-lube
Stroke length tolerance	0 to 250st: $+1.0_0$, 251 to 1000st: $+1.4_0$, 1001st to : $+1.8_0$
Mounting	Direct mount type

Order Made Made to Order specifications (Refer to pages 20 through 24 for details.)

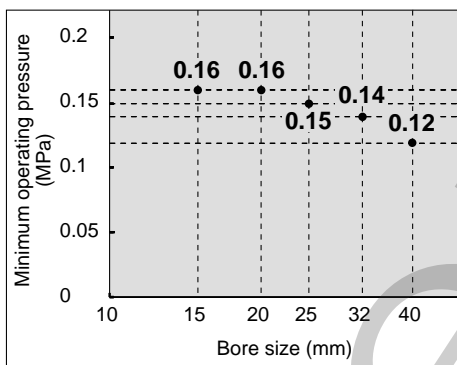
Symbol	Specifications
-X116	Hydro specifications
-X160	High speed specifications
-X168	Helical insert thread specifications
-X322	Outside of cylinder tube with hard chrome plating
-XC57	With floating joint

Note) When an auto switch is installed at an intermediate position of a type with auto switch, keep the maximum piston speed at 300 mm/s or below to ensure operation of relays or other devices.

Standard Strokes

Bore size (mm)	Standard stroke (mm)	Max. stroke ^{Note 1)} without switch (mm)	Max. stroke ^{Note 1)} with switch (mm)
15	50, 100, 150, 200, 250, 300	1000	750
	350, 400, 450, 500		
20	100, 150, 200, 250, 300, 350	1500	1000
	400, 450, 500, 600, 700, 800		
25	100, 150, 200, 250, 300, 350	1500	1200
	400, 450, 500, 600, 700, 800		
32	100, 150, 200, 250, 300, 350	2000	1500
	400, 450, 500, 600, 700, 800		
40	100, 150, 200, 250, 300, 350	2000	1500
	400, 450, 500, 600, 700, 800		

Minimum Operating Pressure



Note 1) Contact P/A if the maximum stroke will be exceeded.

Note 2) When installing the cylinder, refer to Selection Method (page 31) to handle the dead weight deflection.

Magnetic Holding Force (N)

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

Weights

Unit: kg

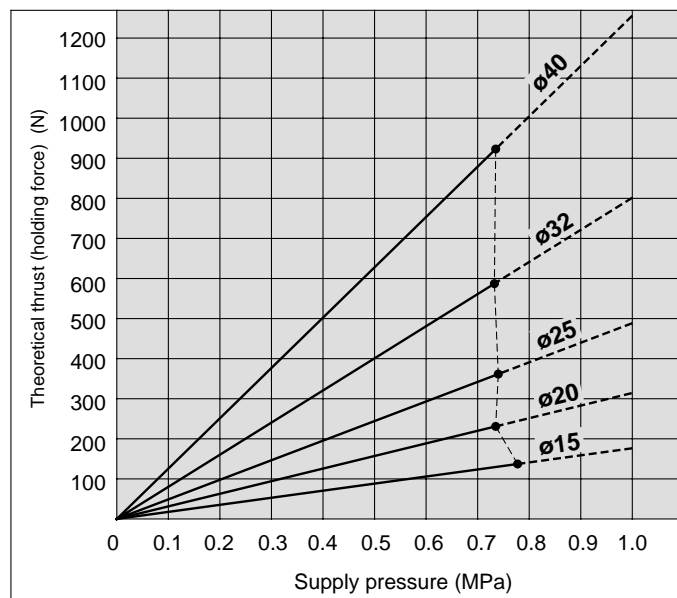
Item	Bore size (mm)	Bore size (mm)				
		15	20	25	32	40
Basic weight (at 0st)	CY3R CY3RG (with switch rail)	0.272	0.421	0.622	1.217	1.980
	CY3R (without switch rail)	0.225	0.351	0.542	1.097	1.820
Additional weight per 50mm of stroke (with switch rail)		0.04	0.051	0.056	0.076	0.093
Additional weight per 50mm of stroke (without switch rail)		0.015	0.02	0.023	0.033	0.04

Calculation method
 /Example: CY3R25-500 Basic weight.....0.622kg
 (with switch rail) Additional weight.....0.056kg/50s
 Cylinder stroke.....500st

$0.622 + 0.056 \times 500 \div 50 = 1.182$ (kg)

Theoretical Cylinder Thrust

Caution When calculating the actual thrust, design should consider the 12 minimum actuating pressure.

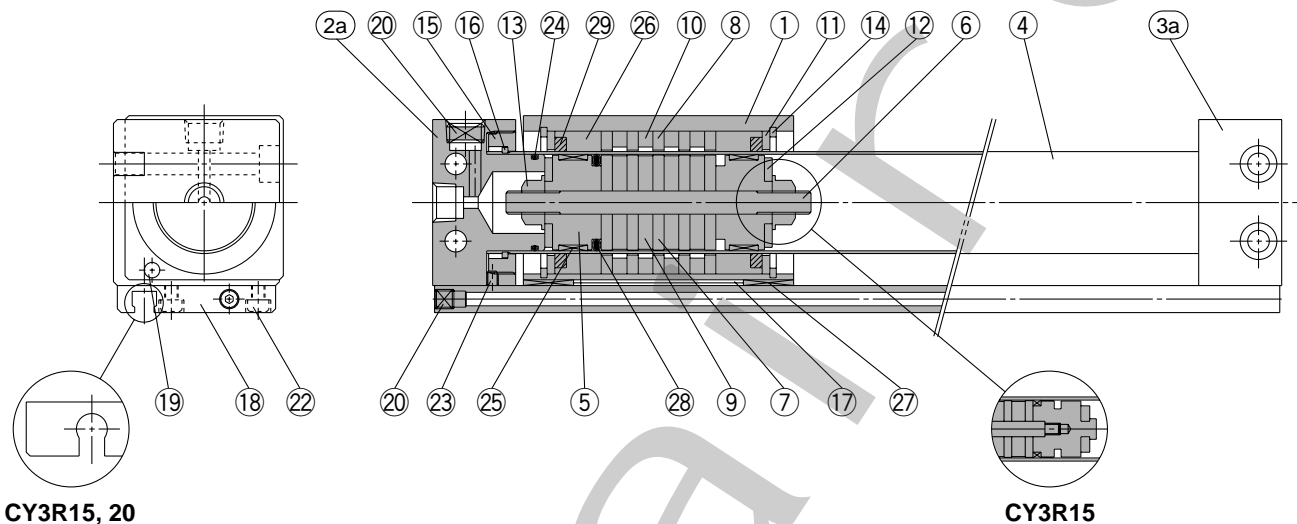


Series CY3R

Construction

Both sides piping type

CY3R15 to 40



Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2a	End cover A	Aluminum alloy	Electroless nickel plated
2b	End cover C	Aluminum alloy	Electroless nickel plated
3a	End cover B	Aluminum alloy	Electroless nickel plated
3b	End cover D	Aluminum alloy	Electroless nickel plated
4	Cylinder tube	Stainless steel	
5	Piston	ø15: Brass ø20 to ø40: Aluminum alloy	ø15: Electroless nickel plated ø20 to ø40: Chromate
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	Rare earth magnet	
10	Magnet B	Rare earth magnet	
11	Spacer	Aluminum alloy	Black anodized
12	Bumper	Urethane rubber	
13	Piston nut	Carbon steel	ø20 to ø40
14	Snap ring	Carbon tool steel	Nickel plated
15	Attachment ring	Aluminum alloy	Chromate
16	C type snap ring for shaft	Hard steel wire	
17	Magnetism shielding plate	Rolled steel plate	Chromated
18	Switch rail	Aluminum alloy	White anodized
19	Magnet	Rare earth magnet	
20	Hexagon socket head plug	Chromium steel	Nickel plated

No.	Description	Material	Note
21	Steel balls	Chromium steel	ø40: Hexagon socket head plug ø20: None
22	Hexagon socket head screw	Chromium steel	Nickel plated
23	Hexagon socket head set screw	Chromium steel	Nickel plated
24*	Cylinder tube Gasket	NBR	
25*	Wear ring A	Special resin	
26*	Wear ring B	Special resin	
27*	Wear ring C	Special resin	
28*	Piston seal	NBR	
29*	Soft wiper	Special resin	
30*	Switch rail Gasket	NBR	Both sides piping type: None

*Seal kits are sets consisting of numbers 24 through 30, and may be ordered using the order number to each bore size.

Replacement parts: Seal kits

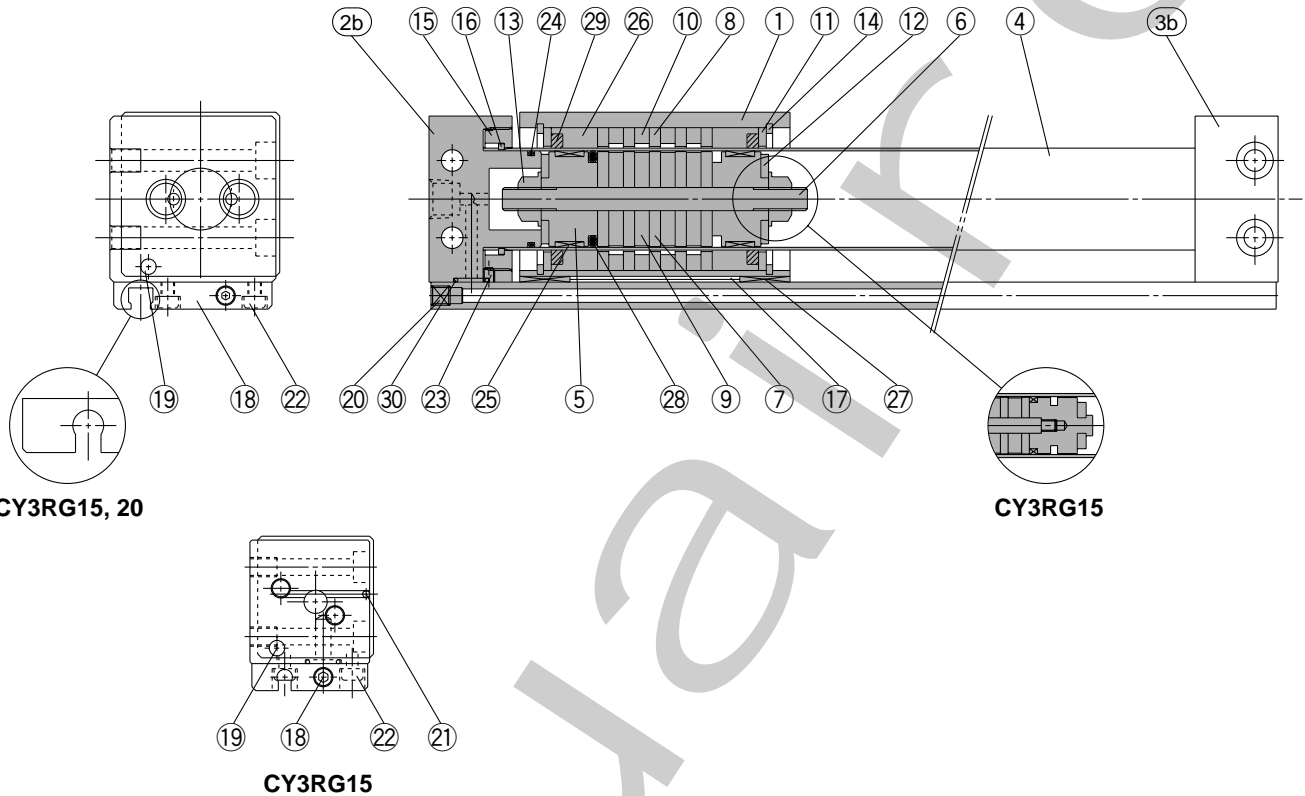
Bore size (mm)	Kits no.	Contents
15	CY3R15-PS	Numbers 24, 25, 26, 27, 28, 29, 30 above
20	CY3R20-PS	
25	CY3R25-PS	
32	CY3R32-PS	
40	CY3R40-PS	

*Seal kits are the same for both the both sides piping type and the centralized piping type.

Dimensions

Centralized piping type

CY3RG15 to 40

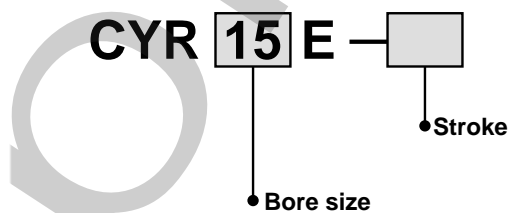


Replacement parts: Seal kits

Bore size (mm)	Kits no.	Contents
15	CY3R15-PS	Numbers 24, 25, 26, 27, 28, 29, 30 at the left
20	CY3R20-PS	
25	CY3R25-PS	
32	CY3R32-PS	
40	CY3R40-PS	

*Seal kits are the same for both the both sides piping type and the centralized piping type.

Switch Rail Accessory



Switch rail accessory kits

Bore size (mm)	Kits no.	Contents
15	CYR15E-□	Numbers ^{Note 2)} 17, 18, 20, 22, 27 at the left
20	For reed switch CYR20E-□	Numbers 17, 18, 20, 22, 27 at the left
	For solid state switch CYR20EN-□	
25	CYR25E-□	
32	CYR32E-□	
40	CYR40E-□	

Note 1) □ indicates to the stroke.

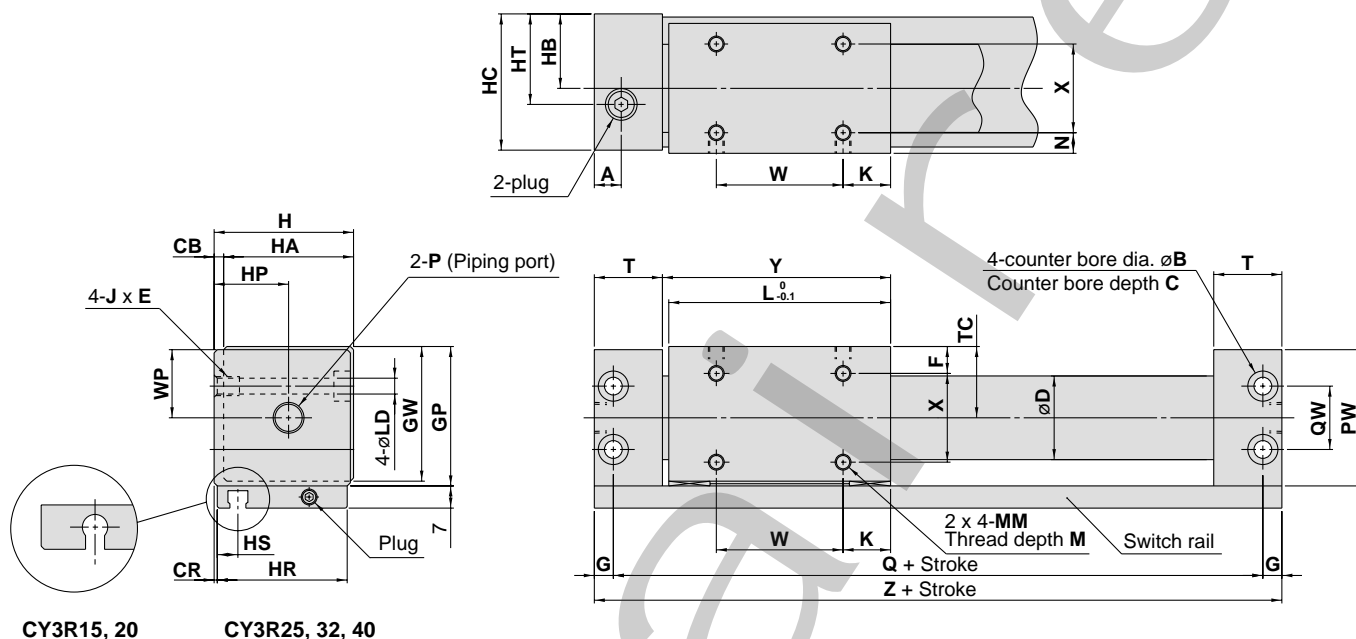
Note 2) A magnet is already in for ø15.

Series CY3R

Dimensions

Both sides piping type: $\varnothing 15$ to $\varnothing 40$

Note 1) This figure shows types with switch rail (no symbol).



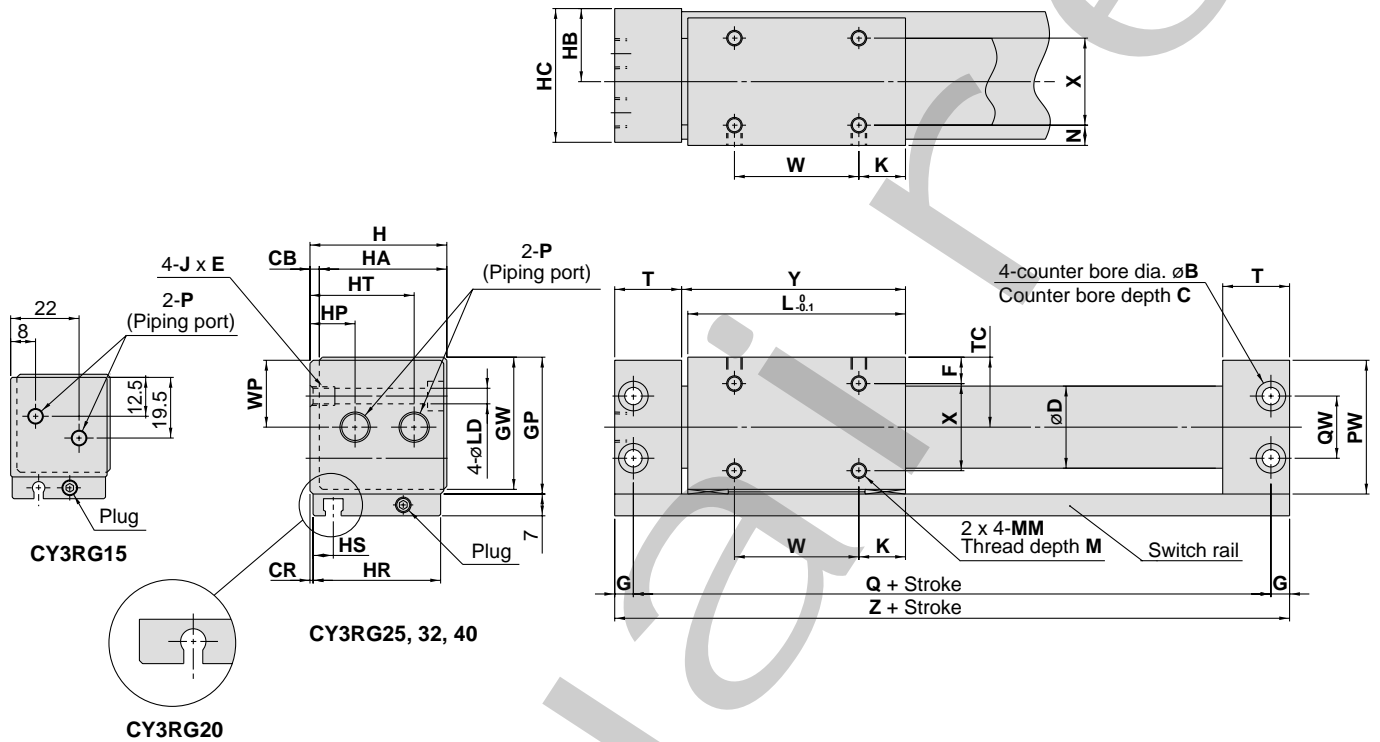
Model	A	B	C	CB	CR	D	F	G	GP	GW	H	HA	HB	HC	HP	HR	HS	HT	J x E	K
CY3R15	10.5	8	4.2	2	0.5	16.6	8	5	33	31.5	32	30	17	31	17	30	8.5	17	M5 x 0.8 x 7	14
CY3R20	9	9.5	5.2	3	1	21.6	9	6	39	37.5	39	36	21	38	24	36	7.5	24	M6 x 1 x 8	11
CY3R25	8.5	9.5	5.2	3	1	26.4	8.5	6	44	42.5	44	41	23.5	43	23.5	41	6.5	23.5	M6 x 1 x 8	15
CY3R32	10.5	11	6.5	3	1.5	33.6	10.5	7	55	53.5	55	52	29	54	29	51	7	29	M8 x 1.25 x 10	13
CY3R40	10	11	6.5	5	2	41.6	13	7	65	63.5	67	62	36	66	36	62	8	36	M8 x 1.25 x 10	15

Model	L	LD	M	MM	N	PW	Q	QW	T	TC	W	WP	X	Y	Z
CY3R15	53	4.3	5	M4 x 0.7	6	32	84	18	19	17	25	16	18	54.5	94
CY3R20	62	5.6	5	M4 x 0.7	7	38	95	17	20.5	20	40	19	22	64	107
CY3R25	70	5.6	6	M5 x 0.8	6.5	43	105	20	21.5	22.5	40	21.5	28	72	117
CY3R32	76	7	7	M6 x 1	8.5	54	116	26	24	28	50	27	35	79	130
CY3R40	90	7	8	M6 x 1	11	64	134	34	26	33	60	32	40	93	148

Model	P (Piping port)		
	Nil	TN	TF
CY3R15	M5 x 0.8	—	—
CY3R20	Rc 1/8	NPT 1/8	G 1/8
CY3R25	Rc 1/8	NPT 1/8	G 1/8
CY3R32	Rc 1/8	NPT 1/8	G 1/8
CY3R40	Rc 1/4	NPT 1/4	G 1/4

Dimensions

Centralized piping type: $\varnothing 15$ to $\varnothing 40$



Model	B	C	CB	CR	D	F	G	GP	GW	H	HA	HB	HC	HP	HR	HS	HT	J x E	K	L
CY3RG15	8	4.2	2	0.5	16.6	8	5	33	31.5	32	30	17	31	—	30	8.5	—	M5 x 0.8 x 7	14	53
CY3RG20	9.5	5.2	3	1	21.6	9	6	39	37.5	39	36	21	38	11	36	7.5	28	M6 x 1 x 8	11	62
CY3RG25	9.5	5.2	3	1	26.4	8.5	6	44	42.5	44	41	23.5	43	14.5	41	6.5	33.5	M6 x 1 x 8	15	70
CY3RG32	11	6.5	3	1.5	33.6	10.5	7	55	53.5	55	52	29	54	20	51	7	41	M8 x 1.25 x 10	13	76
CY3RG40	11	6.5	5	2	41.6	13	7	65	63.5	67	62	36	66	25	62	8	50	M8 x 1.25 x 10	15	90

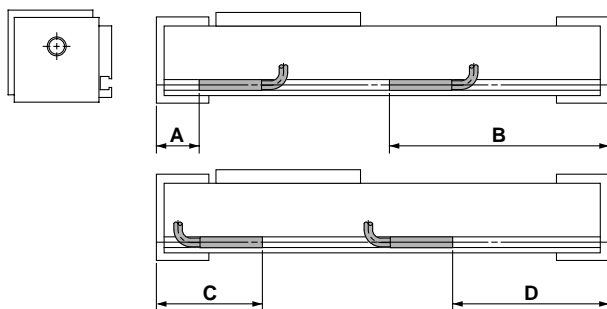
Model	LD	M	MM	N	PW	Q	QW	T	TC	W	WP	X	Y	Z
CY3RG15	4.3	5	M4 x 0.7	6	32	84	19	19	17	25	16	18	54.5	94
CY3RG20	5.6	5	M4 x 0.7	7	38	95	20.5	20.5	20	40	19	22	64	107
CY3RG25	5.6	6	M5 x 0.8	6.5	43	105	21.5	21.5	22.5	40	21.5	28	72	117
CY3RG32	7	7	M6 x 1	8.5	54	116	24	24	28	50	27	35	79	130
CY3RG40	7	8	M6 x 1	11	64	134	26	26	33	60	32	40	93	148

Model	P (Piping port)		
	Nil	TN	TF
CY3RG15	M5 x 0.8	—	—
CY3RG20	Rc 1/8	NPT 1/8	G 1/8
CY3RG25	Rc 1/8	NPT 1/8	G 1/8
CY3RG32	Rc 1/8	NPT 1/8	G 1/8
CY3RG40	Rc 1/4	NPT 1/4	G 1/4

Series CY3R

Auto Switch Proper Mounting Position for Stroke End Detection

(Reference dimension)



Auto Switch Operation Range

Auto switch model	Bore size (mm)				
	15	20	25	32	40
D-A9□	8	6	—	—	—
D-F9□, D-F9□W	5	4	—	—	—
D-Z7□, Z80	—	—	9	9	11
D-Y59□, Y7P D-Y7□W	—	—	6	6	6

*Switches cannot be mounted in some cases.
*Operating ranges are standards including hysteresis, and are not guaranteed. (variation on the order of ±30%)
Large variations may occur depending on the surrounding environment.

ø15, ø20 (mm)

Bore size (mm)	Applicable switch model							
	D-A9□				D-F9□, D-A9□W			
	A	B	C	D	A	B	C	D
15	17.5	76.5	—	56.5	21.5	72.5	—	60.5
20	19.5	87.5	39.5	67.5	23.5	83.5	35.5	71.5

Note 1) Auto switches cannot be installed in Area C in the case of ø15.

Note 2) Only non-magnetic material is permitted as the mounting surface of a ø20 cylinder.

ø25, ø32, ø40 (mm)

Bore size (mm)	Applicable switch model			
	D-Z7□, Z80, Y59□, D-Y7P, Y7□W			
	A	B	C	D
25	18	99	43	74
32	21.5	108.5	46.5	83.5
40	23.5	124.5	48.5	99.5

Note 1) 50mm is the minimum stroke available with 2 auto switches mounted.

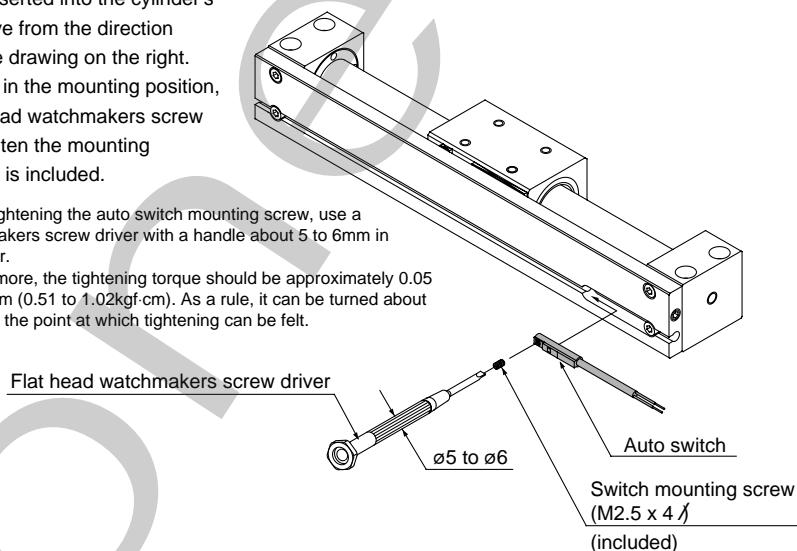
Note 2) The above dimensions are given as reference dimensions. Confirm installation with actual equipment.

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.

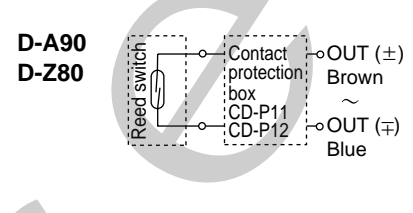
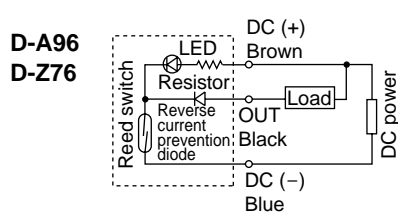
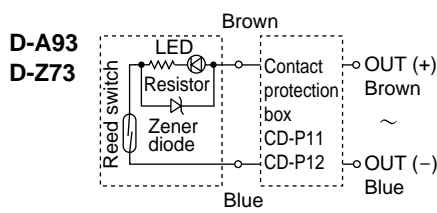
Furthermore, the tightening torque should be approximately 0.05 to 0.1N·m (0.51 to 1.02kgf·cm). As a rule, it can be turned about 90° past the point at which tightening can be felt.



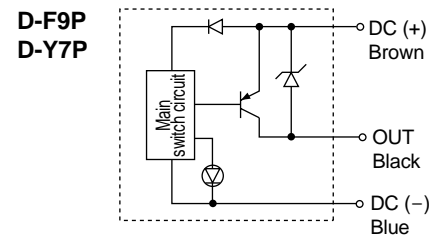
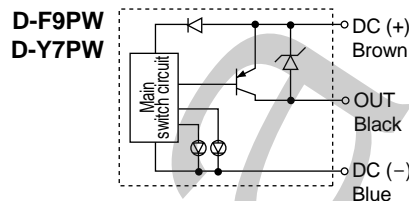
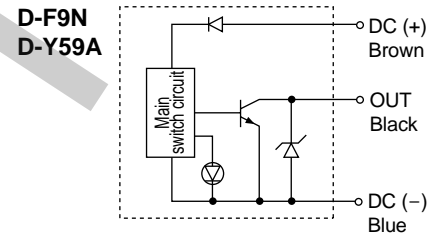
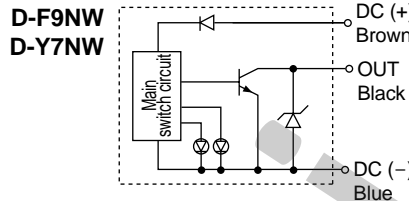
Auto Switch Specifications

- (1) Switches (switch rail) can be added to the standard type (without switch rail). The switch rail accessory type is mentioned on page 14, and can be ordered together with auto switches.
- (2) Refer to the separate disassembly instructions for switch magnet installation procedures.

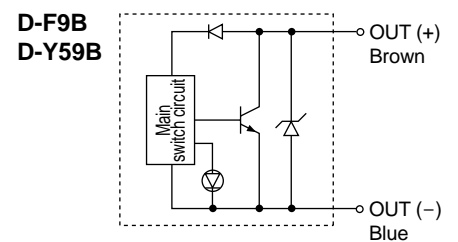
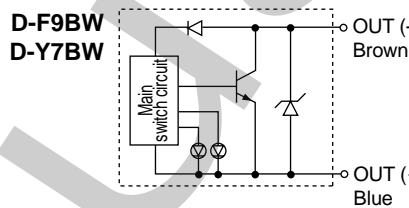
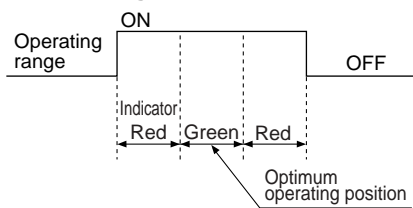
Reed Switch Internal Circuit



Solid State Switch Internal Circuit



Indicator light



Contact Protection Box/CD-P11, CD-P12

<Applicable switches>

D-A9, Z7, Z8

The above auto switches do not have built-in contact protection circuits.

1. The operating load is an induction load.
2. The length of wiring to the load is 5m or more.
3. The load voltage is 100VAC.

A contact protection box should be used in any of the above conditions.

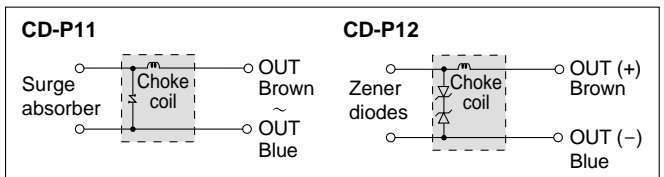
Contact protection box specifications

Part no.	CD-P11		CD-P12
Load voltage	100VAC or less	200VAC	24VDC
Max. load current	25mA	12.5mA	50mA

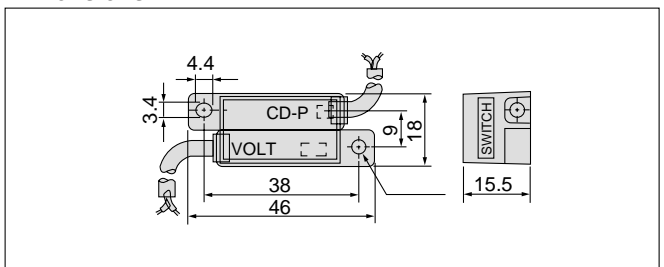
*Lead wire length — Switch contacts side 0.5m
Load connection side 0.5m



Internal circuit



Dimensions



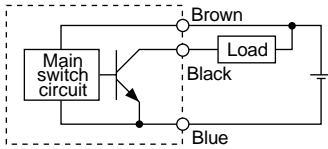
Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. The switch unit should be kept as close as possible to the contact protection box with a lead wire that is no more than 1 meter in length.

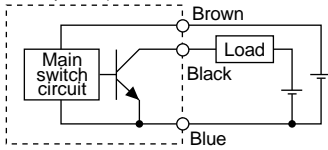
Auto Switch Connections and Examples

Basic Wiring

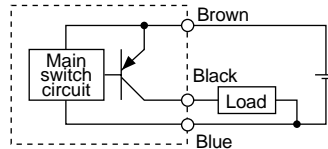
Solid state 3-wire, NPN



(Power supplies for switch and load are separate.)

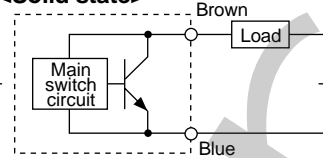


Solid state 3-wire, PNP



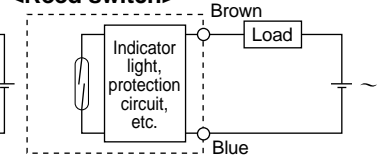
2-wire

<Solid state>



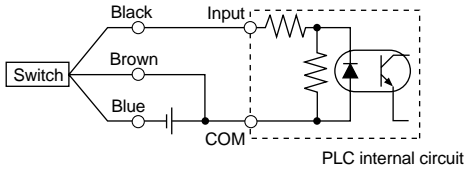
2-wire

<Reed switch>



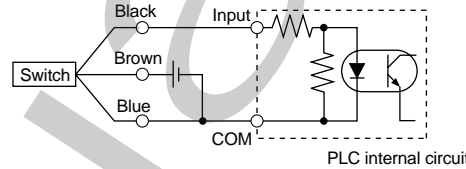
Examples of Connection to PLC

Sink input specifications 3-wire, NPN



PLC internal circuit

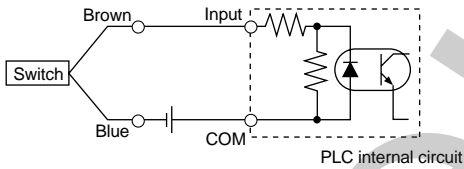
Source input specifications 3-wire, PNP



PLC internal circuit

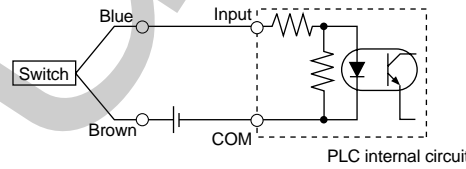
Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

2-wire



PLC internal circuit

2-wire

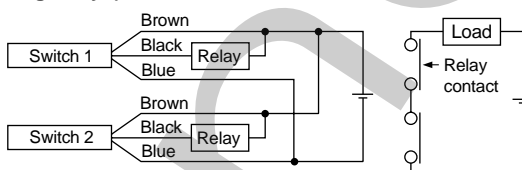


PLC internal circuit

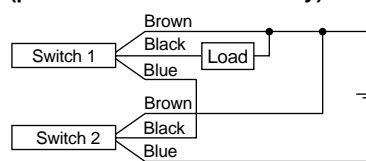
Connection Examples for AND (Series) and OR (Parallel)

3-wire

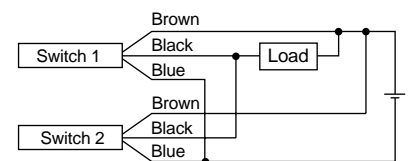
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

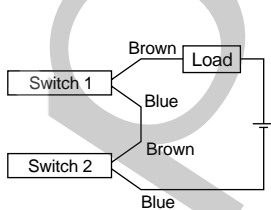


OR connection for NPN output



The indicator lights will light up when both switches are turned ON.

2-wire with 2 switch AND connection

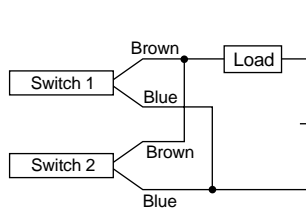


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \frac{\text{Power supply voltage}}{\text{Internal voltage drop}} - \text{Internal voltage drop} \times 2 \text{ pcs.} \\ &= 24\text{V} - 4\text{V} \times 2 \text{ pcs.} \\ &= 16\text{V} \end{aligned}$$

Example: Power supply is 24VDC
Internal voltage drop in switch is 4V

2-wire with 2 switch OR connection



<Solid state>

When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

<Reed switch>

Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes dim or not light up, because of dispersion and reduction of the current flowing to the switches.

$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \times \text{Load impedance} \\ &= 1\text{mA} \times 2 \text{ pcs.} \times 3\text{k}\Omega \\ &= 6\text{V} \end{aligned}$$

Example: Load impedance is 3kΩ
Leakage current from switch is 1mA

Series CY3B/CY3R

Made to Order Specifications

Contact P/A for detailed specifications, lead times and prices.

Symbol	Contents	Model	Bore size (mm)				
			15	20	25	32	40
-XB11	Long stroke (2001mm and up)	CY3B					
-XB13	Low speed cylinder (7 to 50mm/s)	CY3B	●	●	●	●	●
-X116	Hydro specifications	CY3B			●	●	●
		CY3R			●	●	●
-X132	Axial ports	CY3B	●	●	●	●	●
-X160	High speed specifications	CY3B		●	●	●	●
		CY3R		●	●	●	●
-X168	Helical insert thread specifications	CY3B		●	●	●	●
		CY3R		●	●	●	●
-X206	Added mounting tap positions for slider	CY3B	●	●	●	●	●
-X210	Oil-free exterior specifications	CY3B	●	●	●	●	●
-X322	Outside of cylinder tube with hard chrome plating	CY3B	●	●	●	●	●
		CY3R	●	●	●	●	●
-X324	Oil-free exterior specifications (with dust seal)	CY3B	●	●	●	●	●
-XC57	With floating joint	CY3B	●	●	●	●	●
		CY3R	●	●	●	●	●

POWER
AIRE

Series CY3B/CY3R

Made to Order Specifications 1

Contact P/A for detailed specifications, lead times and prices.

1 Long stroke (2001mm and up) -XB11

CY3B **Bore size** **Port thread type** **Stroke** -XB11

Long stroke (2001mm to 3000mm)

Specifications

Applicable series	CY3B
Bore size	ø25 to ø40
Applicable stroke	2001st to 3000st

Note 1) If the stroke exceeds 3000 mm, use XB11 specification of series CY1B.

2 Low speed (7 to 50mm/s) specifications -XB13

CY3B **Bore size** **Port thread type** **Stroke** -XB13

Very low speed (7 to 50mm/s) specifications

There is no sticking and slipping even at very low drive speeds of 7 to 50mm/s. Furthermore, there is no lurching at start up, allowing smooth drive through the entire stroke.

Specifications

Applicable series	CY3B
Bore size	ø15 to ø40
Piston speed	7 to 50 mm/s

3 Hydro specifications -X116

CY3B **Bore size** **Port thread type** **Stroke** -X116
CY3R

Hydro specifications

Suitable for precision low speed feeding, intermediate stopping and skip feeding of the cylinder.

Specifications

Applicable series	CY3B/CY3R
Bore size	ø25 to ø40
Fluid	Turbine oil
Piston speed	15 to 300mm/s

Note 1) Only piping on both sides is available with CY3R.

Note 2) When performing intermediate stops with an air-hydro circuit, set the kinetic energy of the load so that it does not exceed the allowable value. (Regarding the allowable value, refer to the section "Intermediate stops" for each series.)

4 Axial ports -X132

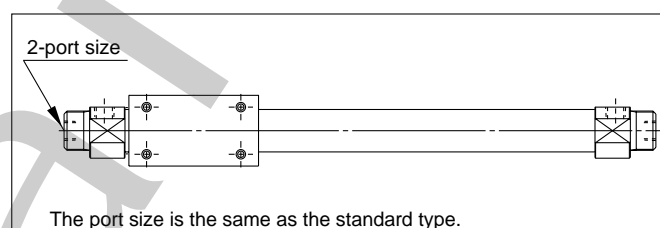
CY3B **Bore size** **Port thread type** **Stroke** -X132

Axial ports

The air supply port has been changed to an axial position on the head cover.

Specifications

Applicable series	CY3B
Bore size	ø15 to ø40



5 High speed specifications -X160

CY3B **Bore size** **Port thread type** **Stroke** -X160
CY3R

High speed specifications

Makes possible high speed piston drive of 1500mm/s (without load).

Specifications

Applicable series	CY3B/CY3R
Bore size	ø20 to ø40
Piston speed (no load)	1500mm/s

Note 1) When operating this cylinder at high speed, a shock absorber must be provided.

Note 2) Only piping on both sides is available with CY3R.

6 Helical insert thread specifications -X168

CY3B **Bore size** **Port thread type** **Stroke** -X168
CY3R

Helical insert thread specifications

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

Specifications

Applicable series	CY3B/CY3R
Bore size	ø20 to ø40

Series CY3B/CY3R

Made to Order Specifications 2

Contact P/A for detailed specifications, lead times and prices.

7 Added mounting tap positions for slider Symbol -X206

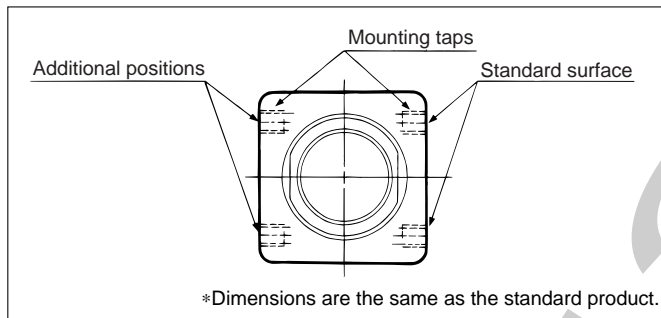
CY3B Bore size Port thread type Stroke - X206

Added mounting tap positions for slider

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

Specifications

Applicable series	CY3B
Bore size	ø15 to ø40



9 Outside of cylinder tube with hard chrome plating Symbol -X322

CY3B Bore size Port thread type Stroke - X322
CY3R

Outside of cylinder tube with hard chrome plating

The outside of the cylinder tube has been plated with hard chromium, reducing wear on the bearings.

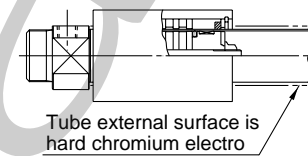
Specifications

Applicable series	CY3B/CY3R
Bore size	ø15 to ø40

*Be sure to provide shock absorption measures at the stroke end.

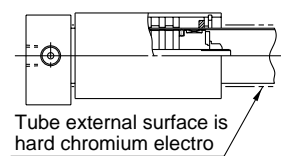
Construction

CY3B



Tube external surface is hard chromium electro

CY3R



Tube external surface is hard chromium electro

8 Oil-free exterior specifications Symbol -X210

CY3B Bore size Port thread type Stroke - X210

Oil-free exterior specifications

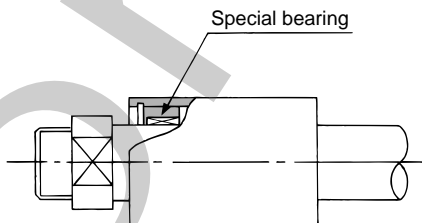
Suitable for environments where oils are not tolerated. A scraper is not installed. A separate version -X324 (with felt) has been prepared for cases in which dust, etc. is scattered throughout the environment.

Specifications

Applicable series	CY3B
Bore size	ø15 to ø40

Construction

CY3B



Special bearing

10 Oil-free exterior specifications (with dust seal) Symbol -X324

CY3B Bore size Port thread type Stroke - X324

Oil-free exterior specifications (with dust seal)

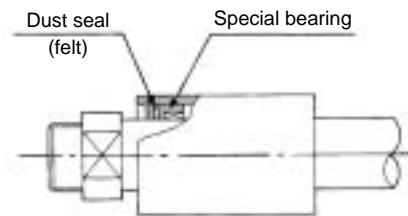
This unit has oil-free exterior specifications, with a felt dust seal provided on the cylinder body.

Specifications

Applicable series	CY3B
Bore size	ø15 to ø40

Construction

CY3B



Dust seal (felt)

Special bearing

Series CY3B/CY3R

Made to Order Specifications 3

Contact P/A for detailed specifications, lead times and prices.

11 With floating joint (CY3B)

Symbol
-XC57

CY3B Bore size Port thread type Stroke **-XC57**

With floating joint

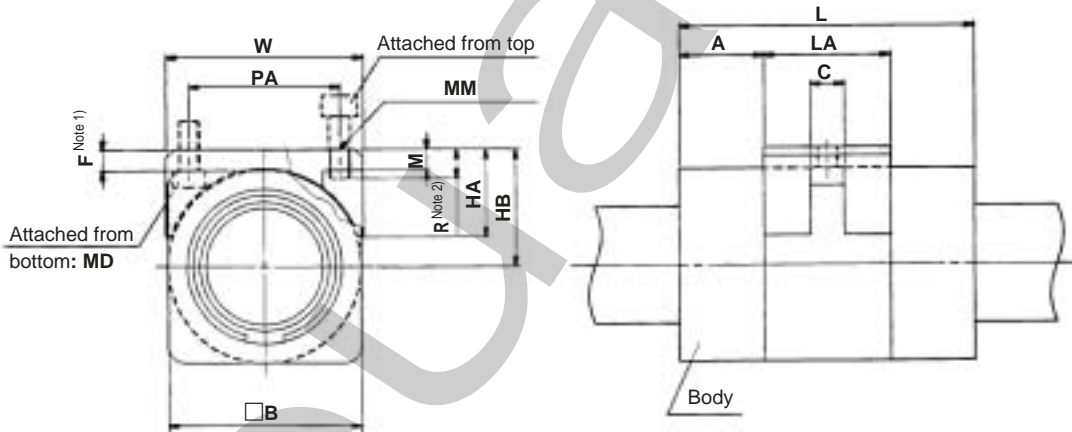
A special floating joint is added to the Series CY3B, and the number of connections to the guide on the other axis (the load side) is reduced. The attachment of the bolt to the floating joint and the load is not limited to the top or bottom.

Specifications

Bore size	ø15, ø20, ø25, ø32, ø40
-----------	-------------------------

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 P/A if necessary.

Dimensions



Model	A	B	C	F ^{Note 1)}	HA	HB	L	LA	MM	MD	M	PA	R ^{Note 2)}	W
CY3B15	16	35	6.5	5.5	16.5	23	57	25	M4 x 0.7	M3	4	25	6	36
CY3B20	18	36	6.5	5.5	17	23.5	66	30	M4 x 0.7	M3	4	27	6	37
CY3B25	20	46	8.0	5.5	21	28.5	70	30	M5 x 0.8	M4	5	36	7	47
CY3B32	22.5	60	9.5	6.0	27.5	36	80	35	M6 x 1.0	M5	6	47	8	61
CY3B40	26	70	9.5	6.0	28.5	41	92	40	M6 x 1.0	M5	6	55	8	71

Note 1) Dimension F provides a clearance of 1mm between the body and the floating joint, but does not consider dead weight deflection of the cylinder tube, etc. When put into operation, an appropriate value should be set which considers dead weight deflection and alignment variations with respect to the other axis. (Refer to the dead weight deflection table on page 5.)

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 floating cannot be maintained in some cases.

Series CY3B/CY3R

Made to Order Specifications 4

Contact P/A for detailed specifications, lead times and prices.

12 With floating joint (CY3R)

Symbol
-XC57

CY3R Bore size Port thread type Stroke **-XC57**

With floating joint

Specifications

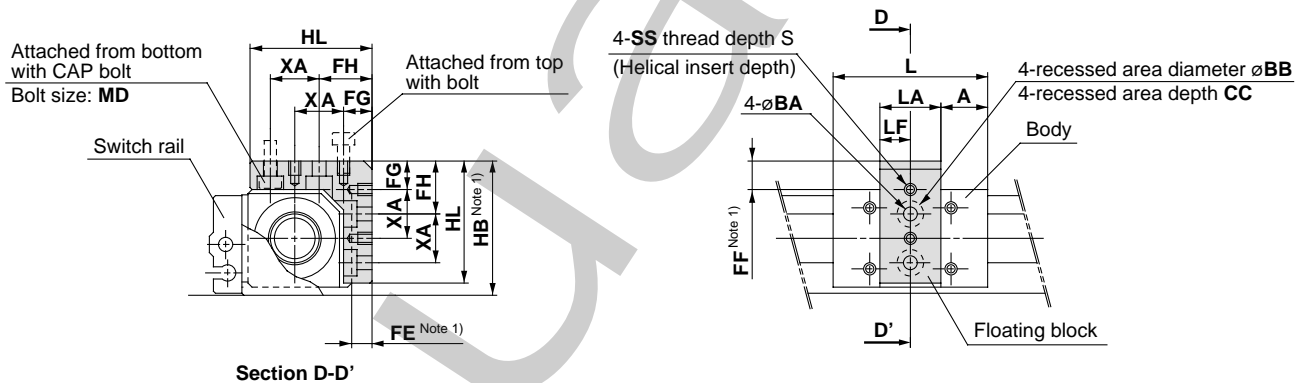
Bore size	ø15, ø20, ø25, ø32, ø40
-----------	-------------------------

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 P/A if necessary.

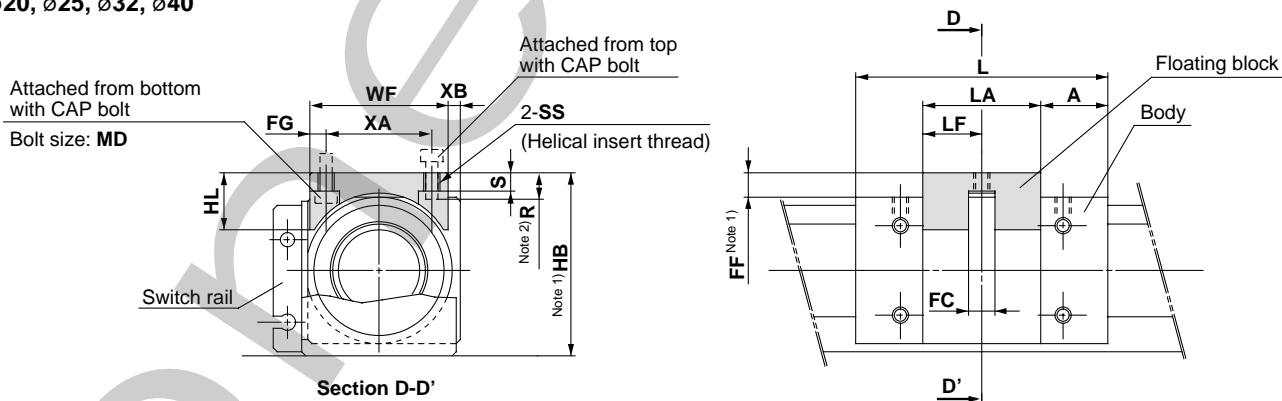
A special floating joint is added to the Series CY3R, and the number of connections to the guide on the other axis (the load side) is reduced. The attachment of the bolt to the floating joint and the load is not limited to the top or bottom.

Dimensions

ø15



ø20, ø25, ø32, ø40



Model	A	BA	BB	CC	FC	FE ^{Note1)}	FF ^{Note1)}	FG	FH	HB ^{Note1)}	HL	L	LA	LF	MD	R ^{Note2)}	S	SS	WF	XA	XB
CY3R□15	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 x 0.7	—	14	—
CY3R□20	16.5	—	—	—	6.5	—	6	4	—	45	14	62	29	14.5	M3	7	4.5	M4 x 0.7	34	26	3
CY3R□25	20.5	—	—	—	8	—	7	4	—	51	17	70	29	14.5	M4	8	5.5	M5 x 0.8	39	31	3
CY3R□32	21	—	—	—	9.5	—	7.5	4.5	—	62.5	22	76	34	17	M5	10	6.5	M6 x 1	50	41	3
CY3R□40	25.5	—	—	—	9.5	—	7.5	7.5	—	74.5	28	90	39	19.5	M5	10	6.5	M6 x 1	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 dead weight deflection of the cylinder tube, etc. When put into operation, an appropriate value should be set which considers dead weight deflection an alignment variations with respect to the other axis. (Refer to the dead weight deflection table on page 5.)

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 floating cannot be maintained in some cases.