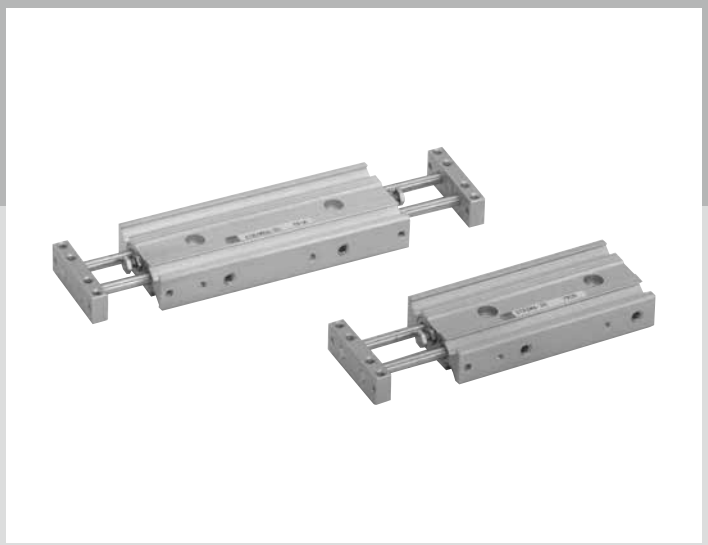
STR2

Twin rod cylinder

ø6/ø10/ø16/ø20/ø25/ø32



Overview

Guided twin rod cylinder for pick & place device.
The twin rod mechanism can improve the non-rotating accuracy and also double the thrust.

Features

High level of non-rotating accuracy

Two single rod cylinders fixed to the end plate in parallel. High non-rotating accuracy, not requiring rotation-stop.

Bearing options

Metal bush bearing and ball bearing are available. Select an appropriate one for your application.

Space saving

Detection switch fits neatly into cylinder body. Simple design makes elegant use of space.

Ultra-compact is available.

The ultra-compact of ø6 bore size has been added to the series.
The series offers more choices than ever.

Piping ports can be installed on either side.

Piping ports can be installed on the right or left side. Connect pipes according to the configuration.

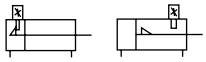
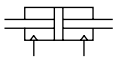
Easy to install

A reamed hole for parallel pin has been provided. Maintenance and removal are that much simpler.

CONTENTS

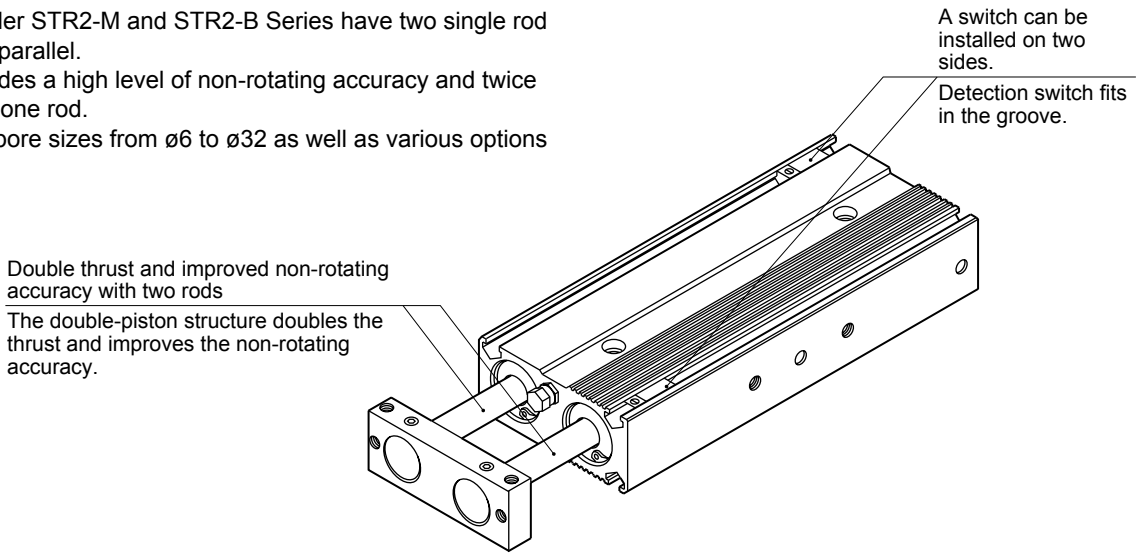
Series variation

Twin rod cylinder STR2 Series

Variation	Model No. JIS symbol	Bore size (mm)	Standard stroke length (mm)							
			10	20	30	40	50	60	70	
Double acting/ standard	STR2-$^{M}_{B}$ 	ø6/ø10	●	●	●	●	●			
		ø16/ø20/ø25/ø32	●	●	●	●	●	●	●	
Double acting/ position locking	STR2-$^{M}_{B}$Q 	ø16/ø20/ø25/ø32	●	●	●	●	●	●	●	
Double acting/ low speed	STR2-$^{M}_{B}$O 	ø6/ø10	●	●	●	●	●			
		ø16/ø20/ø25/ø32	●	●	●	●	●	●	●	
Double acting/fine speed	STR2-$^{M}_{B}$F 	ø10	●	●	●	●	●			
		ø16/ø20/ø25/ø32	●	●	●	●	●	●	●	
Double acting/ double rod	STR2-$^{M}_{B}$D 	ø6/ø10	●	●	●	●	●			
		ø16/ø20/ø25/ø32	●	●	●	●	●	●	●	

Product introduction

CKD twin rod cylinder STR2-M and STR2-B Series have two single rod cylinders jointed in parallel.
This structure provides a high level of non-rotating accuracy and twice the thrust of that of one rod.
The series has six bore sizes from ø6 to ø32 as well as various options and variations.



●: Standard, ◎: Option, ○: Made to order, : Not available

Stroke length (mm)				Min. stroke length (mm)	Max. stroke length (mm)	Custom stroke length (per mm)	Available stroke length (mm)	Bearing		Option				Switch	Page
								Metal bush bearing	Ball bearing	End plate material: steel	Copper and PTFE free	Piping port position on the 180° opposite side	Rear piping		
	80	90	100					M	B	F	P6	O	R		
				5	50	1	100	●	●	◎	◎	◎	◎	◎	580
	●	●	●		100		200	●	●	◎	◎	◎	◎		
	●	●	●	5	100	-	-	●	●	◎	○	◎		◎	592
				5	50	1	100	●	●	◎		◎	○	◎	602
	●	●	●		100		200	●	●	◎		◎	○		
				5	50	1	100	●	●	◎		○	◎	◎	610
	●	●	●		100		200	●	●	◎		○	◎		
				5	50	-	-	●	●	◎	○	◎		◎	612
	●	●	●		100			●	●	◎	○	◎			

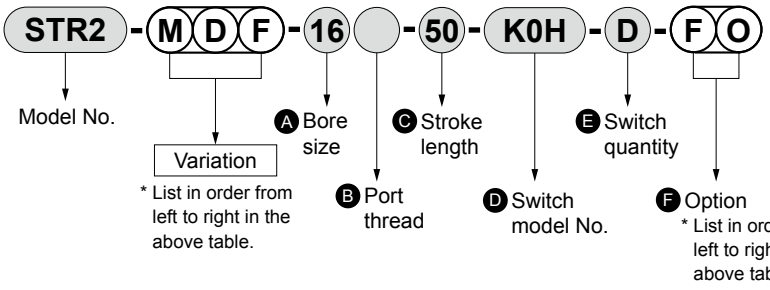
Variation and option selection table (metal bush bearing)

● : Standard
◎ : Option
○ : Available (made-to-order product)
△ : Available depending on conditions (Contact CKD.)
× : Not available

Category		Category	Variation					Port thread		Option						
			Double acting basic (metal bush)	Double rod	Position locking	Low speed	Fine speed	NPT1/8	G1/8	Steel plate specified	Copper and PTFE free	Clean-room specifications (exhaust port)	Clean-room specifications (vacuum treatment)	Piping port position on the 180° opposite side	Rear piping	
		Code	M	D	Q	O	F	N	G	F	P6	P72	P73	O	R	
Variation	Double acting basic (metal bush)	M		◎	◎	◎	◎	○	○	◎	◎	○	○	◎	◎	
	Double rod	D			○	○	○	○	○	◎	○	△	△	◎	×	
	Position locking	Q				×	×	○	○	◎	○	△	△	◎	×	
	Low speed	O					×	○	○	◎	×	○	○	◎	○	
	Fine speed	F						○	○	◎	×	○	○	○	◎	
Port thread	NPT	N							×	○	○	○	○	○	○	
	G	G								○	○	○	○	○	○	
Option	End plate material: steel	F									◎	○	○	○	○	
	Copper and PTFE free	P6										*1	*1	○	○	
	Clean-room specifications (exhaust port)	P72											×	○	×	
	Clean-room specifications (vacuum treatment)	P73												○	×	
	Piping port position on the 180° opposite side	O													×	
	Rear piping	R														
Accy.	Cylinder switch	Listed separately	◎	◎	◎	◎	◎	○	○	◎	◎	◎	◎	◎	◎	

*1: Refer to “Components for Clean Room Specifications” No. CB-033SA for the clean room specifications (P72, P73, P52, P53).

[Example of model No.]



Model: Twin rod cylinder
● Variations : Metal bush bearing, double rod, fine speed
A Bore size : ø16 mm
B Port thread : Rc thread
C Stroke length : 50 mm
D Switch model No. : Reed KOH switch, lead wire 1 m
E Switch quantity : 2
F Option : End plate material (steel), piping port position on the 180° opposite side

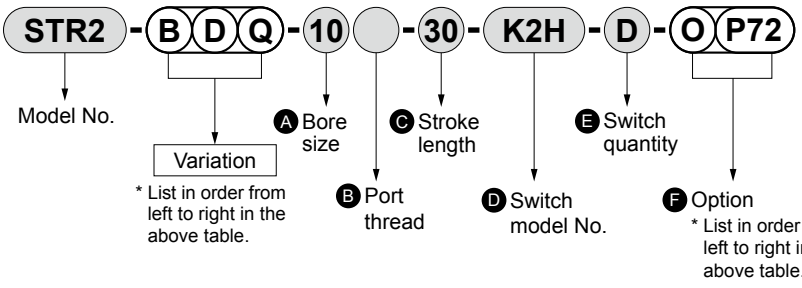
Variation and option combination selection table (ball bearing)

● : Standard
◎ : Option
○ : Available (made-to-order product)
△ : Available depending on conditions (Contact CKD.)
× : Not available

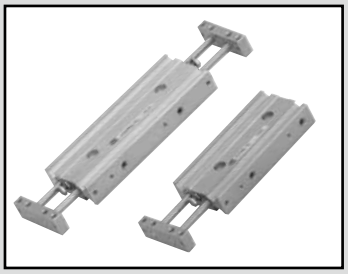
Category		Category	Variation					Port thread		Option						
			Double acting basic (bearing bush type)	Double rod	Position locking	Low speed	Fine speed	NPT1/8	G1/8	Steel plate specified	Copper and PTFE free	Clean-room specifications (exhaust port)	Clean-room specifications (vacuum treatment)	Piping port on the 180° opposite side	Rear piping	
		Code	B	D	Q	O	F	N	G	F	P6	P72	P73	O	R	
Variation	Double acting basic (bearing bush type)	B		◎	◎	◎	◎	○	○	◎	*2	◎	◎	◎	◎	
	Double rod	D			○	○	○	○	○	◎	*2	△	△	◎	×	
	Position locking	Q				×	×	○	○	◎	*2	△	△	◎	×	
	Low speed	O					×	○	○	◎	×	○	○	◎	○	
	Fine speed	F						○	○	◎	×	○	○	○	◎	
Port thread	NPT	N							×	○	*2	○	○	○	○	
	G	G								○	*2	○	○	○	○	
Option	End plate material: steel	F									*2	○	○	○	○	
	Copper and PTFE free	P6										*1	*1	*2	*2	
	Clean-room specifications (exhaust port)	P72											×	○	×	
	Clean-room specifications (vacuum treatment)	P73												○	×	
	Piping port position on the 180° opposite side	O													×	
	Rear piping	R														
Accy.	Cylinder switch	Listed separately	◎	◎	◎	◎	◎	○	○	◎	◎	◎	◎	◎	◎	

*1: Refer to “Components for Clean Room Specifications” No. CB-033SA for the clean room specifications (P72, P73, P52, P53).
*2: Copper and PTFE free. (P6 code is not required.)

[Example of model No.]



Model: Twin rod cylinder
● Variations : Ball bearing, double rod, position locking
A Bore size : ø10 mm
B Port thread : Rc thread
C Stroke length : 30 mm
D Switch model No. : Proximity K2H switch Lead wire 1 m
E Switch quantity : 2
F Option : Piping port position on the 180° opposite side, clean-room specifications (exhaust port)



Twin rod cylinder Double acting/standard

STR2-$^{M}_{B}$ Series

● Bore size: ø6/ø10/ø16/ø20/ø25/ø32

JIS symbol

RoHS CAD

Specifications

Item		STR2-M (metal bush bearing) STR2-B (ball bearing)					
Bore size mm		ø6	ø10	ø16	ø20	ø25	ø32
Actuation		Double acting					
Working fluid		Compressed air					
Max. working pressure MPa		0.7 (≈100 psi, 7 bar)					
Min. working pressure MPa		0.2 (≈29 psi, 2 bar)	0.15 (≈22 psi, 1.5 bar)	0.1 (≈15 psi, 1 bar)			
Proof pressure MPa		1.05 (≈150 psi, 10.5 bar)					
Ambient temperature °C		-10 (14°F) to 60 (140°F) (no freezing)					
Port size		M5					Rc1/8
Stroke tolerance mm		+2.0 0					
Adjustable stroke range mm		0 to -5					
Working piston speed mm/s		50 to 500					
Non-rotating accuracy (reference value)	STR2-M	±0.4°	±0.3°			±0.2°	
	STR2-B	±0.2°	±0.1°			±0.3°	
Piston rod	STR2-M	Metal bush bearing					
Bearing	STR2-B	Ball bearing					
Cushion		Rubber cushion					
Lubrication		Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)					
Max absorbed energy J	PUSH	0.008	0.061	0.181	0.303	0.68	1.3
	PULL	0.059	0.083	0.083	0.127	0.237	0.311

Stroke length

Bore size	Stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)	Available stroke length (mm)	Min. stroke with switch (mm)
ø6	10, 20, 30, 40, 50	50	5	100	10
ø10					
ø16	10, 20, 30, 40, 50 60, 70, 80, 90, 100	100 *1		200	
ø20					
ø25					
ø32					

*1 : In the case of rear piping:
· ø16: 70
· ø20/ø25: 60
· ø32: 50

*2 : Custom stroke length
Available in 1 mm increments.
However, the total length is the same as that of the next longer standard stroke length.

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa							
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø6	Push	-	-	11.3	17.0	22.6	28.3	33.9	39.6
	Pull	-	-	6.28	9.42	12.6	15.7	18.8	22.0
ø10	Push	-	23.6	31.4	47.1	62.8	78.5	94.2	1.10×10^{2}
	Pull	-	15.1	20.1	30.2	40.2	50.3	60.3	70.4
ø16	Push	40.2	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
	Pull	24.5	36.8	49.0	73.5	98.0	1.23×10^{2}	1.47×10^{2}	1.72×10^{2}
ø20	Push	62.8	94.2	1.26×10^{2}	1.88×10^{2}	2.51×10^{2}	3.14×10^{2}	3.77×10^{2}	4.40×10^{2}
	Pull	40.2	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
ø25	Push	98.2	1.47×10^{2}	1.96×10^{2}	2.95×10^{2}	3.93×10^{2}	4.91×10^{2}	5.89×10^{2}	6.87×10^{2}
	Pull	67.4	1.01×10^{2}	1.35×10^{2}	2.02×10^{2}	2.70×10^{2}	3.37×10^{2}	4.04×10^{2}	4.72×10^{2}
ø32	Push	1.61×10^{2}	2.41×10^{2}	3.22×10^{2}	4.83×10^{2}	6.43×10^{2}	8.04×10^{2}	9.65×10^{2}	1.13×10^{3}
	Pull	1.21×10^{2}	1.81×10^{2}	2.41×10^{2}	3.62×10^{2}	4.83×10^{2}	6.03×10^{2}	7.24×10^{2}	8.44×10^{2}

Switch specifications

● 1-color/2-color display

Item	Proximity 2-wire		Proximity 3-wire			Reed 2-wire			
	K2H/K2V	K2YH/K2YV	K3H/K3V	K3PH/K3PV (Made to order)	K3YH/K3YV	K0H/K0V		K5H/K5V	
Applications	Dedicated for programmable controller		For programmable controller, relay			For programmable controller, relay		For programmable controller, relay, IC circuit (no indicator lamp), serial connection	
Output method	-		NPN output	PNP output	NPN output	-			
Power supply voltage	-		10 to 28 VDC			-			
Load voltage	10 to 30 VDC		30 VDC or less			12 VDC/24 VDC	110 VAC	5/12/24 VDC	110 VAC
Load current	5 to 20 mA (*3)		50 mA or less			5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less
Indicator lamp	LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		-	
Leakage current	1 mA or less		10 μA or less			0 mA			
Weight g	1 m:18 3 m:49 5 m:80	1 m:31 3 m:85 5 m:139	1 m:18 3 m:49 5 m:80		1 m:31 3 m:85 5 m:139	1 m:18 3 m:49 5 m:80			

*1 : Refer to Ending Page 1 for detailed switch specifications and dimensions.
*2 : Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.
*3 : The max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)

Cylinder weight

Unit: g

Bore size	Product weight at 0 mm stroke		Additional weight per S = 10 mm
	STR2-M	STR2-B	
ø6	60	64	10
ø10	140	155	14
ø16	240	300	20
ø20	340	405	40
ø25	580	610	52
ø32	1300	1150	83

(Example) Product weight

STR2-M-6-10-K2H-D

● Product weight for 0 mm stroke length ... 60 g

● Additional weight for stroke length 10 mm ... 10 g x 1 = 10 g

● Weight of 2 cylinder switches ... 18 g x 2 = 36 g

● Product weight ... 60 g + 10 g + 36 g = 106 g

Clean-room specifications

(Catalog No. CB-033SA)

● Anti-dust generation structure for use in cleanrooms

STR2-B-·····-P7*

STR2-B-·····-P5*

Specifications for rechargeable battery

(Catalog No. CC-1226A)

● Design compatible with rechargeable battery manufacturing process.

STR2-M/B-·····-P4*

How to order

Without switch (built-in magnet for switch)

STR2 - M - 16 ○ - 30 ——— F

With switch (built-in magnet for switch)

STR2 - M - 16 ○ - 30 - K0H - R - F

Model No.

Ⓐ Bearing

Ⓑ Bore size

Ⓒ Port thread

Ⓓ Stroke length *1

■ The custom stroke length is available in 1 mm increments.

Ⓔ Switch model No. *2

Ⓕ Switch quantity

Ⓖ Option *3 *4

Code	Description
Ⓐ Bearing	
M	Metal bush bearing
B	Ball bearing
Ⓑ Bore size (mm)	
6	ø6
10	ø10
16	ø16
20	ø20
25	ø25
32	ø32
Ⓒ Port thread	
Blank	Rc thread
NN	NPT thread (ø32 only) (made-to-order product)
GN	G thread (ø32 only) (made-to-order product) *5

Ⓓ Stroke length (mm)

Bore size	Stroke length	Available stroke length	Custom stroke length
ø6	**5 to 50**	**100**	**In 1 mm increments**
ø10	**5 to 50**	**100**	
ø16	**5 to 100**	**200**	
ø20	**5 to 100**	**200**	
ø25	**5 to 100**	**200**	
ø32	**5 to 100**	**200**	

Ⓔ Switch model No.

Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Indicator	Lead wire
K0H*	**K0V***	Reed	●	●	1-color display	2-wire
K5H*	**K5V***		●	●	no indicator lamp	
K2H*	**K2V***	Proximity		●	1-color display	2-wire
K3H*	**K3V***			●		3-wire
K3PH*	**K3PV***			●	1-color display (made to order)	3-wire
K2YH*	**K2YV***			●	2-color display	2-wire
K3YH*	**K3YV***			●		3-wire

*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

Ⓕ Switch quantity	
R	1 on rod side
H	1 on head side
D	2

Ⓖ Option	
F	End plate material: steel
P6	Copper and PTFE free
O	Piping port position on the 180° opposite side
R	Rear piping

⚠ Precautions for model No. selection

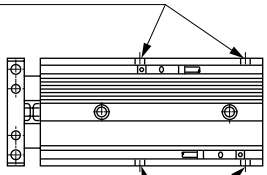
*1 : The max stroke length of rear piping "R" is:
- ø6/10 : 50 Stroke
- ø16 : 70 Stroke
- ø20/25 : 60 Stroke
- ø32 : 50 Stroke

*2 : STR2-B-6 and 10 are not compatible with a reed switch.

*3 : The ball bearing is copper and PTFE free "P6" standard.

*4 : The piping port positions for "O" are as shown in the figure below.

Piping port positions for standard (blank)



Piping port position on the 180° opposite side (Code: 0) piping port

*5 : In the case of G thread, ports on the opposite side (option "O") are not available. Rather than plug sealing, they are simply not provided.
(The standard ports are not provided in the case of option "O".)

[Example of model No.]

STR2-M-16-30-K0H-R-F

Model: Twin rod cylinder, standard

Ⓐ Bearing : Metal bush bearing
Ⓑ Bore size : ø16 mm
Ⓒ Port thread : Rc thread
Ⓓ Stroke length : 30 mm
Ⓔ Switch model No. : Reed K0H switch
Ⓕ Switch quantity : 1 on rod side
Ⓖ Option : End plate material: steel

How to order switch

SW - K0H*

Switch model No.
(Item Ⓔ above)

MEMO

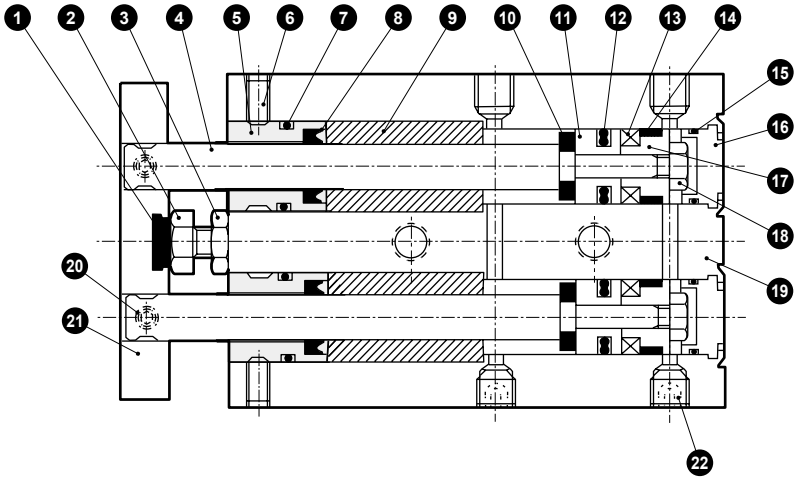
Internal structure and parts list (metal bush bearing ø6/ø10)

● Standard
STR2-M

● End plate material: steel
STR2-M-F

● Copper and PTFE free
STR2-M-P6

● Piping port position on the 180° opposite side
STR2-M ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		12	Piston packing	Nitrile rubber	
2	Hexagon head bolt	Stainless steel		13	Magnet	Plastic	
3	Hexagon nut	Stainless steel		14	Wear ring	Acetal resin	
4	Piston rod	Stainless steel		15	O-ring	Nitrile rubber	
5	Housing	Stainless steel		16	Cap	Aluminum alloy	Chromate
6	Hexagon socket set screw	Stainless steel		17	Spacer	Aluminum alloy	Chromate
7	O-ring	Nitrile rubber		18	Hexagon nut	Steel	Zinc chromate
8	Rod packing	Nitrile rubber		19	Cylinder body	Aluminum alloy	Hard alumite
9	Bush	Aluminum alloy		20	Hexagon socket set screw	Stainless steel	
10	Cushion rubber (R)	Urethane rubber		21	End plate *1	Aluminum alloy	Alumite
11	Piston	Aluminum alloy	Chromate	22	Hexagon socket set screw	Stainless steel	

*1 : The steel end plate is zinc chromate.

Repair parts list

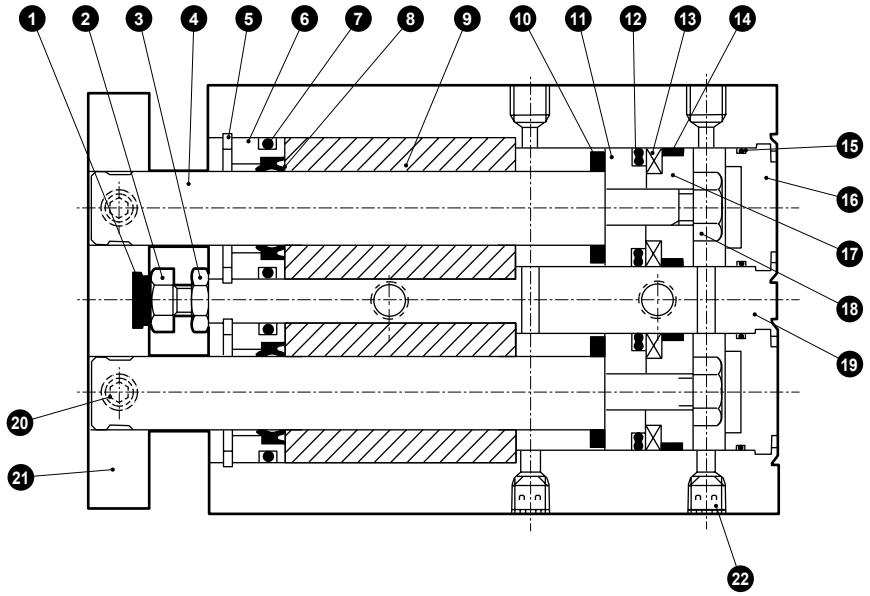
STR2-M (standard), STR2-M-F (end plate material: steel), STR2-M-P6 (copper and PTFE free)

Bore size (mm)	Kit No.	Repair parts No.
ø6	STR2-6K	1 7 8 10 12 14
ø10	STR2-10K	

Note : Specify the kit No. when placing an order.

Internal structure and parts list (metal bush bearing ø16/ø20/ø25/ø32)

- Standard
  STR2-M
- End plate material: steel
  STR2-M-F
- Copper and PTFE free
  STR2-M-P6
- Piping port position on the 180° opposite side
  STR2-M ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		12	Piston packing	Nitrile rubber	
2	Hexagon head bolt	Stainless steel		13	Magnet	Plastic	
3	Hexagon nut	Stainless steel		14	Wear ring	Acetal resin	
4	Piston rod	Stainless steel (ø16, ø20) Steel (ø25, ø32)	Industrial chrome plating	15	O-ring	Nitrile rubber	
				16	Cap	Aluminum alloy	Chromate
5	Snap ring for hole	Stainless steel		17	Spacer	Aluminum alloy	Chromate
6	Housing	Aluminum alloy	Chromate	18	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		19	Cylinder body	Aluminum alloy	Hard alumite
8	Rod packing	Nitrile rubber		20	Hexagon socket set screw	Stainless steel	
9	Bush	Aluminum alloy		21	End plate *1	Aluminum alloy	Alumite
10	Cushion rubber (R)	Urethane rubber		22	Hexagon socket set screw	Stainless steel	
11	Piston	Aluminum alloy	Chromate				

*1 : The steel end plate is zinc chromate.

Repair parts list

STR2-M (standard), STR2-M-F (end plate material: steel), STR2-M-P6 (copper and PTFE free)

Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-16K	❶ ❼ ❽ ❿ ⓬ ⓮
ø20	STR2-20K	
ø25	STR2-25K	
ø32	STR2-32K	

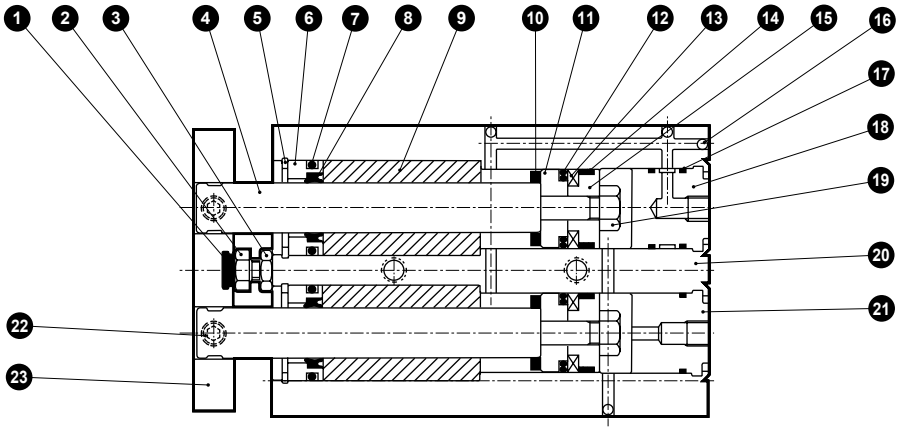
Note : Specify the kit No. when placing an order.

Internal structure and parts list (metal bush bearing ø6/ø10/ø16/ø20/ø25/ø32)

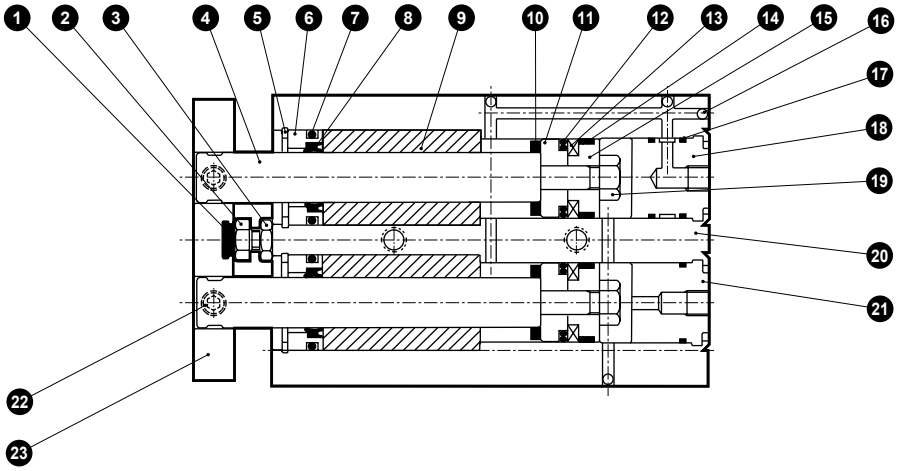
● Rear piping

STR2-M-R

ø6, ø10



ø16 to ø32



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		12	Piston packing	Nitrile rubber	
2	Hexagon head bolt	Stainless steel		13	Magnet	Plastic	
3	Hexagon nut	Stainless steel		14	Wear ring	Acetal resin	
4	Piston rod	Stainless steel (ø6 to ø20) Steel (ø25, ø32)	Industrial chrome plating (ø16 to ø32)	15	Spacer	Aluminum alloy	Chromate
				16	Steel ball	Steel	
5	Snap ring for hole	Stainless steel		17	O-ring	Nitrile rubber	
6	Housing	Stainless steel (ø6, ø10) Aluminum alloy (ø16 to ø32)	Chromate	18	Cap (A)	Aluminum alloy	Chromate
				19	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		20	Cylinder body	Aluminum alloy	Hard alumite
8	Rod packing	Nitrile rubber		21	Cap (B)	Aluminum alloy	Chromate
9	Bush	Aluminum alloy		22	Hexagon socket set screw	Stainless steel	
10	Cushion rubber (R)	Urethane rubber		23	End plate	Aluminum alloy	Alumite
11	Piston	Aluminum alloy	Chromate				

*: The steel end plate is zinc chromate.

Repair parts list

STR2-M-R (rear piping)

Bore size (mm)	Kit No.	Repair parts No.
ø 6	STR2-6K	
ø10	STR2-10K	
ø16	STR2-16K	1 7 8
ø20	STR2-20K	10 12 14
ø25	STR2-25K	
ø32	STR2-32K	

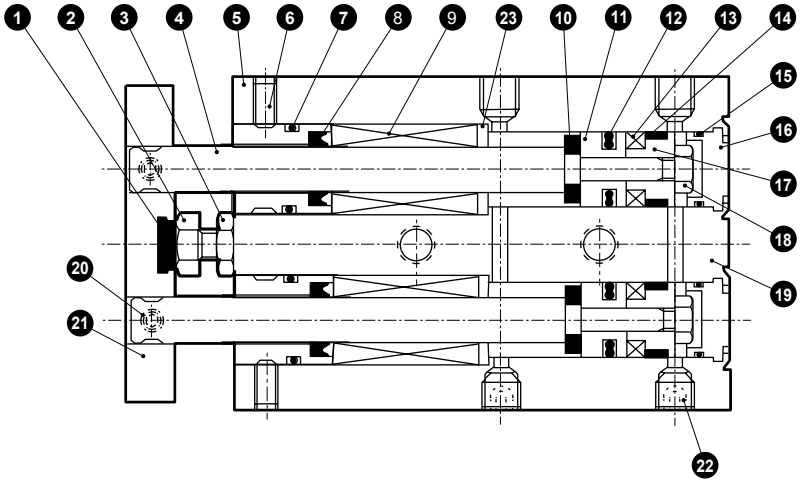
Note : Specify the kit No. when placing an order.

Internal structure and parts list (ball bearing ø6/ø10)

● Standard
STR2-B

● End plate material: steel
STR2-B-F

● Piping port position on the 180° opposite side
STR2-B ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		13	Magnet	Plastic	
2	Hexagon head bolt	Stainless steel		14	Wear ring	Acetal resin	
3	Hexagon nut	Stainless steel		15	O-ring	Nitrile rubber	
4	Piston rod	Steel	Industrial chrome plating	16	Cap	Aluminum alloy	Chromate
5	Housing	Stainless steel		17	Spacer	Aluminum alloy	Chromate
6	Hexagon socket set screw	Stainless steel		18	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		19	Cylinder body	Aluminum alloy	Hard alumite
8	Rod packing	Nitrile rubber		20	Hexagon socket set screw	Stainless steel	
9	Bearing			21	End plate *1	Aluminum alloy	Alumite
10	Cushion rubber (R)	Urethane rubber		22	Hexagon socket set screw	Stainless steel	
11	Piston	Aluminum alloy	Chromate	23	Spacer	Aluminum alloy	Chromate
12	Piston packing	Nitrile rubber					

*1 : The steel end plate is zinc chromate.

Repair parts list

STR2-B (standard), STR2-B-F (end plate material: steel)

Bore size (mm)	Kit No.	Repair parts No.
ø6	STR2-6K	❶ ❼ ❽ ❿ ⓬ ⓮
ø10	STR2-10K	

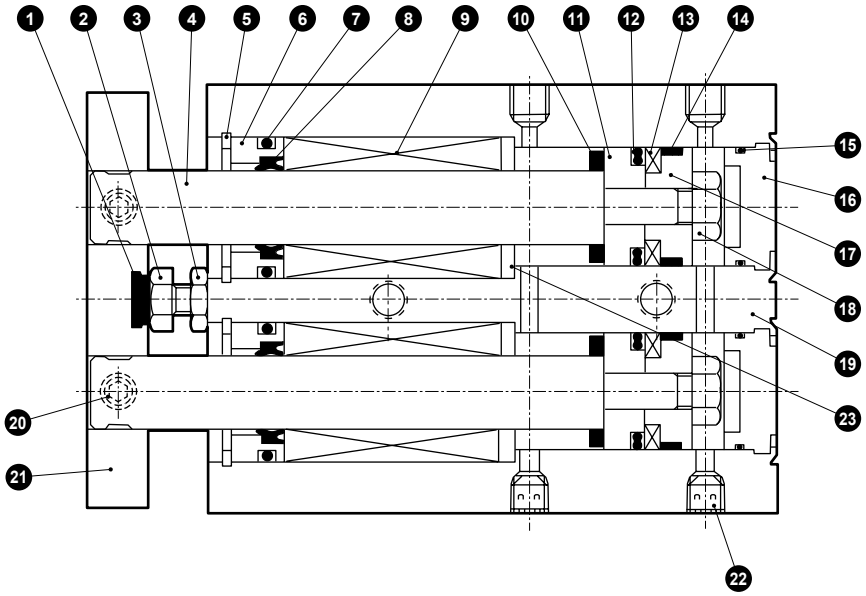
Note : Specify the kit No. when placing an order.

Internal structure and parts list (ball bearing ø16/ø20/ø25/ø32)

● Standard
STR2-B

● End plate material: steel
STR2-B-F

● Piping port position on the 180° opposite side
STR2-B ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		13	Magnet	Plastic	
2	Hexagon head bolt	Stainless steel		14	Wear ring	Acetal resin	
3	Hexagon nut	Stainless steel		15	O-ring	Nitrile rubber	
4	Piston rod	Steel	Industrial chrome plating	16	Cap	Aluminum alloy	Chromate
5	Snap ring for hole	Stainless steel		17	Spacer	Aluminum alloy	Chromate
6	Housing	Aluminum alloy	Chromate	18	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		19	Cylinder body	Aluminum alloy	Hard alumite
8	Rod packing	Nitrile rubber		20	Hexagon socket set screw	Stainless steel	
9	Bearing			21	End plate *1	Aluminum alloy	Alumite
10	Cushion rubber (R)	Urethane rubber		22	Hexagon socket set screw	Stainless steel	
11	Piston	Aluminum alloy	Chromate	23	Spacer	Aluminum alloy	Chromate
12	Piston packing	Nitrile rubber					

*1 : The steel end plate is zinc chromate.

Repair parts list

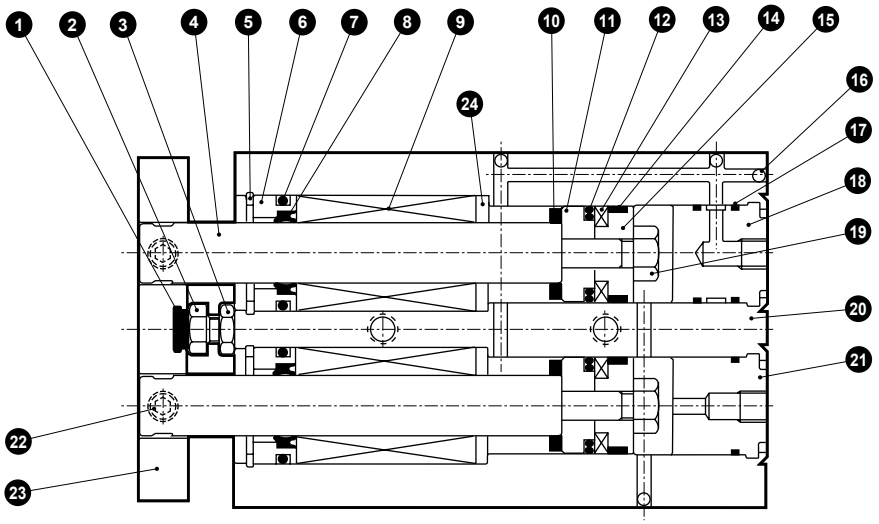
STR2-B (standard), STR2-B-F (end plate material: steel)

Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-16K	❶ ❼ ❽ ❿ ⓬ ⓮
ø20	STR2-20K	
ø25	STR2-25K	
ø32	STR2-32K	

Internal structure and parts list (ball bearing)

● Rear piping

STR2-B-R



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		13	Magnet	Plastic	
2	Hexagon head bolt	Stainless steel		14	Wear ring	Acetal resin	
3	Hexagon nut	Stainless steel		15	Spacer	Aluminum alloy	Chromate
4	Piston rod	Steel	Industrial chrome plating	16	Steel ball	Steel	
5	Snap ring for hole	Stainless steel		17	O-ring	Nitrile rubber	
6	Housing	Stainless steel (ø6, ø10) Aluminum alloy (ø16 to ø32)	Chromate	18	Cap (A)	Aluminum alloy	Chromate
				19	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		20	Cylinder body	Aluminum alloy	Hard alumite
8	Rod packing	Nitrile rubber		21	Cap (B)	Aluminum alloy	Chromate
9	Bearing			22	Hexagon socket set screw	Stainless steel	
10	Cushion rubber (R)	Urethane rubber		23	End plate	Aluminum alloy	Alumite
11	Piston	Aluminum alloy	Chromate	24	Spacer	Aluminum alloy	Chromate
12	Piston packing	Nitrile rubber					

Repair parts list

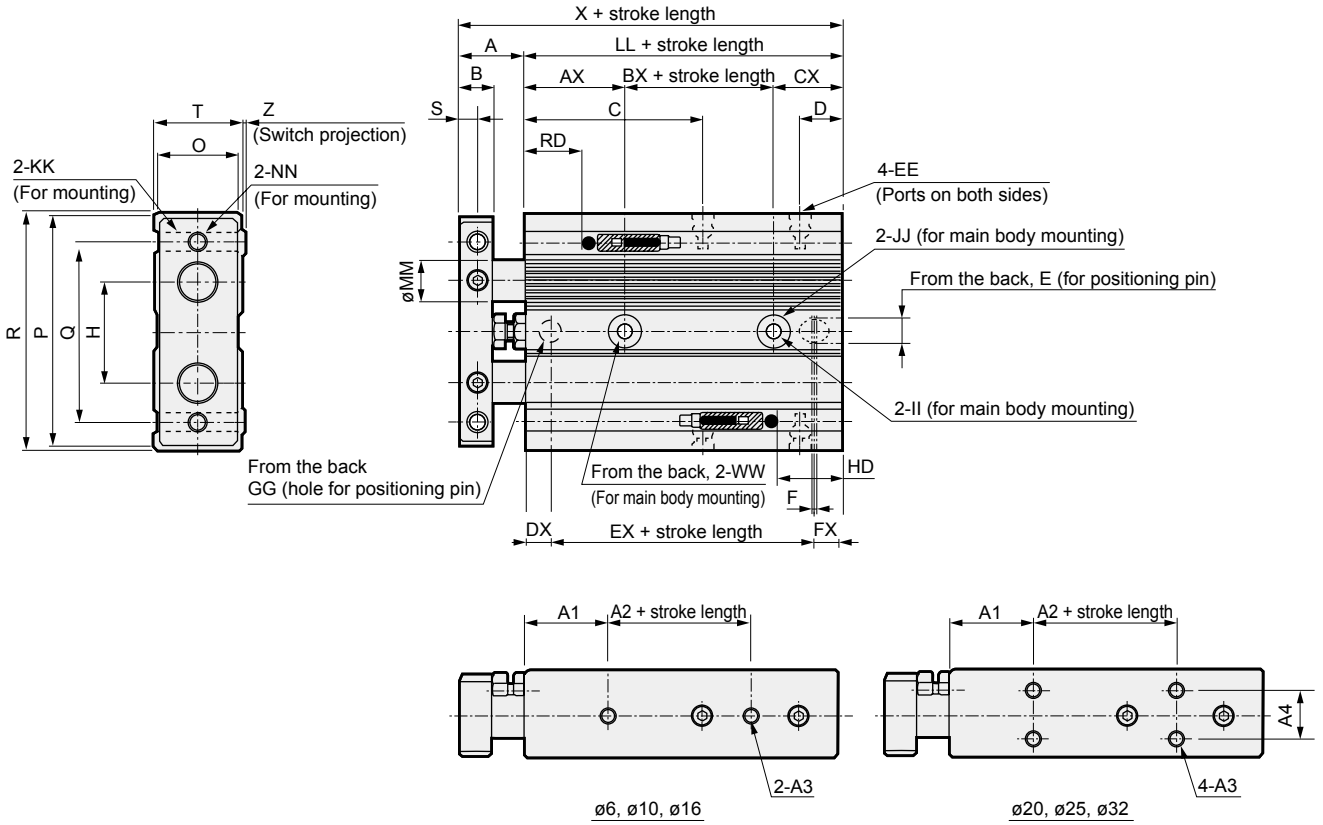
STR2-B-R (rear piping)

Bore size (mm)	Kit No.	Repair parts No.
ø 6	STR2-6K	
ø10	STR2-10K	
ø16	STR2-16K	❶ ❼ ❽
ø20	STR2-20K	❿ ⓬ ⓮
ø25	STR2-25K	
ø32	STR2-32K	

Note : Specify the kit No. when placing an order.

Dimensions (ø6 to ø32) CAD

● Standard, end plate material: steel (F), copper and PTFE free (P6), piping port position on the 180° opposite side (O)



*1 : HD and RD dimensions for 10 mm stroke length differ from these dimensions according to the setting.
*2 : When using a custom stroke length, the total length is the same as that of the next longer standard stroke length.
*3 : Refer to page 618 for HD, RD and protruding dimensions of the 2-color display switch.

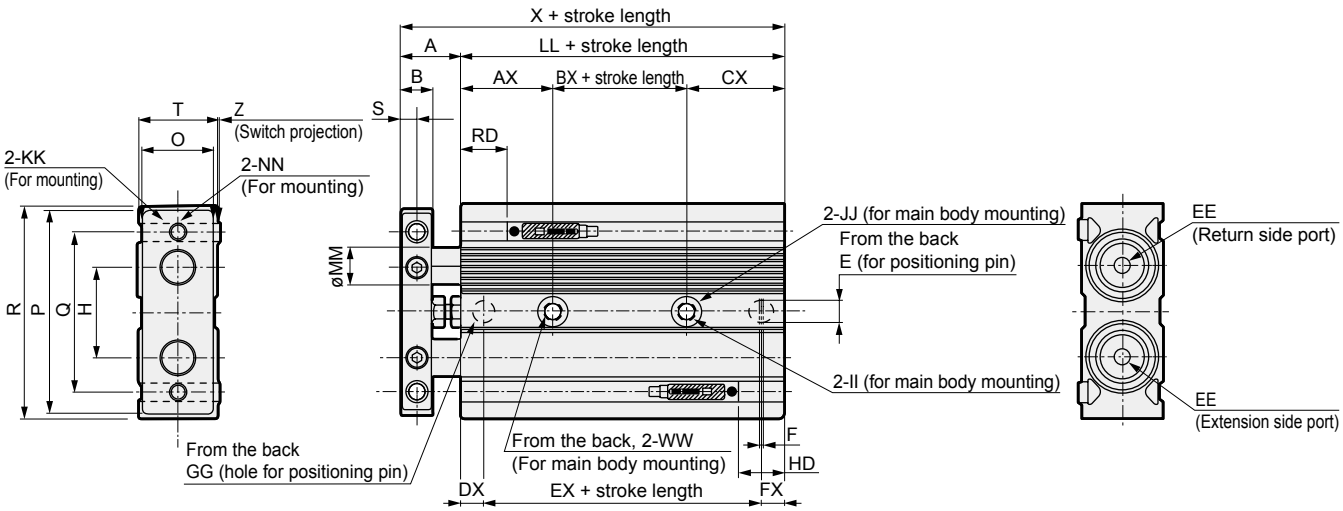
Code	Basic, O, F and P6 basic dimensions																
Bore size (mm)	A	B	C	D	E	EE	F	GG	H	II	JJ	KK	LL	MM	NN	O	P
ø 6	12	6	24.5	7.5	$4^{+0.07}_{+0.02}$depth 4	M5	1	$4^{+0.07}_{+0.02}$depth 4	14	3.4	6.5 spot face depth 3.3	M3 through	44	4	M3 through	11	34
ø10	14	6	35	7	$4^{+0.07}_{+0.02}$depth 4	M5	1	$4^{+0.07}_{+0.02}$depth 4	20	4.3	8 spot face depth 4.4	M4 through	55	6	M4 through	13	42
ø16	16	8	43	9.5	$6^{+0.07}_{+0.02}$depth 6	M5	1	$6^{+0.07}_{+0.02}$depth 6	25	4.3	8 spot face depth 4.4	M5 through	66	10	M5 through	19	52
ø20	20	10	46	9.5	$6^{+0.07}_{+0.02}$depth 6	M5	1	$6^{+0.07}_{+0.02}$depth 6	28	5.2	9.5 spot face depth 5.4	M5 through	75	12	M5 through	24	60
ø25	22	12	44	10.5	$6^{+0.07}_{+0.02}$depth 6	M5	1	$6^{+0.07}_{+0.02}$depth 6	34	6.3	11 spot face depth 6.5	M6 through	75	14	M6 through	30	70
ø32	22	12	56	11	$6^{+0.07}_{+0.02}$depth 6	Rc1/ 8	1	$6^{+0.07}_{+0.02}$depth 6	44	6.3	11 spot face depth 6.5	M6 through	91	16	M6 through	36	94

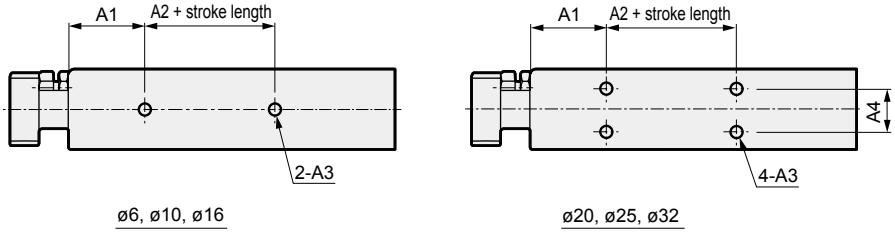
Code																	K0/K5/K2/K3	
Bore size (mm)	Q	R	S	T	WW	X	AX	BX	CX	DX	EX	FX	Z	A1	A2	A3	A4	HD	RD
ø 6	29	36	3	13	M4 depth 5	56	20	10	14	7	30	7	1.0	15	10	M3 depth 4	-	3.5 *1	21 *1
ø10	36	44	3	15	M5 depth 6	69	24	14	17	8	38	9	1.0	15	20	M3 depth 3.5	-	2.5 *1	33 *1
ø16	45	58	4	21	M5 depth 6	82	24	26	16	8	50	8	0.5	20	25	M4 depth 4	-	7	39.5
ø20	50	62	5	27	M6 depth 8	95	24	33	18	9	57	9	0.5	20	30	M4 depth 4	13	10.5	45
ø25	60	72	6	33	M8 depth 8	97	24	33	18	9	57	9	0.5	20	30	M5 depth 6	18	11.5	43.5
ø32	75	96	6	38	M8 depth 8	113	24	47	20	9	73	9	0.5	20	40	M5 depth 8	24	15.5	55.5

*4 : STR2-B-6 and 10 are not compatible with K0 and K5 reed switches.
*5 : The cylinder may tilt due to the uneven surface if it is installed with the spot face side (JJ) contacted. In this case, change the port position or use the option of piping port position on the 180° opposite side (O) to keep the spot face side from being the contacting surface.

Dimensions (ø6 to ø32)

● Rear piping (R)





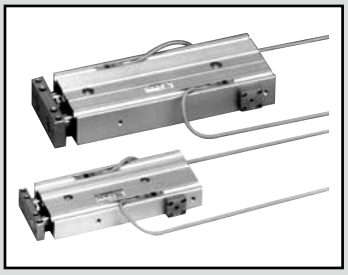
ø6, ø10, ø16 ø20, ø25, ø32

*1 : HD and RD dimensions for 10 mm stroke length differ from these dimensions according to the setting.
*2 : When using a custom stroke length, the total length is the same as that of the next longer standard stroke length.
*3 : Refer to page 618 for HD, RD and protruding dimensions of the 2-color display switch.

Code	R Basic dimensions														
Bore size (mm)	A	B	E	EE	F	GG	H	II	JJ	KK	LL	MM	NN	O	P
ø 6	12	6	$4^{+0.07}_{+0.02}$depth 4	M5	1	$4^{+0.07}_{+0.02}$depth 4	14	3.4	6.5 spot face depth 3.3	M3 through	54	4	M3 through	11	34
ø10	14	6	$4^{+0.07}_{+0.02}$depth 4	M5	1	$4^{+0.07}_{+0.02}$depth 4	20	4.3	8 spot face depth 4.4	M4 through	65	6	M4 through	13	42
ø16	16	8	$6^{+0.07}_{+0.02}$depth 6	M5	1	$6^{+0.07}_{+0.02}$depth 6	25	4.3	8 spot face depth 4.4	M5 through	76	10	M5 through	19	52
ø20	20	10	$6^{+0.07}_{+0.02}$depth 6	M5	1	$6^{+0.07}_{+0.02}$depth 6	28	5.2	9.5 spot face depth 5.4	M5 through	85	12	M5 through	24	60
ø25	22	12	$6^{+0.07}_{+0.02}$depth 6	M5	1	$6^{+0.07}_{+0.02}$depth 6	34	6.3	11 spot face depth 6.5	M6 through	85	14	M6 through	30	70
ø32	22	12	$6^{+0.07}_{+0.02}$depth 6	Rc1/ 8	1	$6^{+0.07}_{+0.02}$depth 6	44	6.3	11 spot face depth 6.5	M6 through	101	16	M6 through	36	94

Code																		K0/K5/K2/K3	
Bore size (mm)	Q	R	S	T	WW	X	AX	BX	CX	DX	EX	FX	Z	A1	A2	A3	A4	HD	RD
ø 6	29	36	3	13	M4 depth 5	66	20	10	24	7	40	7	1.0	15	10	M3 depth 4	-	13.5	21
ø10	36	44	3	15	M5 depth 6	79	24	14	27	8	48	9	1.0	15	20	M3 depth 3.5	-	12.5	33
ø16	45	58	4	21	M5 depth 6	92	24	26	26	8	60	8	0.5	20	25	M4 depth 4	-	17	39.5
ø20	50	62	5	27	M6 depth 8	105	24	33	28	9	67	9	0.5	20	30	M4 depth 4	13	20.5	45
ø25	60	72	6	33	M8 depth 8	107	24	33	28	9	67	9	0.5	20	30	M5 depth 6	18	21.5	43.5
ø32	75	96	6	38	M8 depth 8	123	24	47	30	9	83	9	0.5	20	40	M5 depth 8	24	25.5	55.5

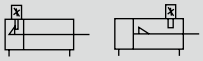
*4 : STR2-B-6 and 10 are not compatible with K0 and K5 reed switches.
*5 : The cylinder may tilt due to the uneven surface if it is installed with the spot face side (JJ) contacted. In this case, change the port position or use the option of piping port position on the 180° opposite side (O) to keep the spot face side from being the contacting surface.



Twin rod cylinder/double acting/position locking

STR2-$^{M}_{B}$Q Series

● Bore size: ø16/ø20/ø25/ø32

JIS symbol 

RoHS CAD

Specifications

Item		STR2-MQ (metal bush bearing) STR2-BQ (ball bearing)			
Bore size mm		ø16	ø20	ø25	ø32
Actuation		Double acting/position locking			
Working fluid		Compressed air			
Max. working pressure MPa		0.7 (≈100 psi, 7 bar)			
Min. working pressure MPa		0.15 (≈22 psi, 1.5 bar)			
Proof pressure MPa		1.05 (≈150 psi, 10.5 bar)			
Ambient temperature °C		-10 (14°F) to 60 (140°F) (no freezing)			
Port size		M5			Rc1/8
Stroke tolerance mm		+2.0 0			
Adjustable stroke range mm		Not adjustable (with head side position locking)/0 to -5 (with rod side position locking)			
Working piston speed mm/s		50 to 500			
Non-rotating accuracy (reference value)	STR2-M	±0.3°		±0.2°	
	STR2-B	±0.1°		±0.3°	
Piston rod bearing	STR2-M	Metal bush bearing			
	STR2-B	Ball bearing			
Cushion		Rubber cushion			
Lubrication		Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)			
Position locking mechanism		Rod side or head side			
Holding force N		Max. thrust x 0.7			
Max absorbed energy J	PUSH	0.181	0.303	0.68	1.3
	PULL	0.083	0.127	0.237	0.311

Stroke length

Bore size	Stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)	Min. stroke with switch (mm)
ø16	10, 20, 30, 40, 50 60, 70, 80, 90, 100	100	5	10
ø20				
ø25				
ø32				

*1: Custom stroke length is available as made to order.

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa						
		0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø16	Push	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
	Pull	36.8	49.0	73.5	98.0	1.23×10^{2}	1.47×10^{2}	1.72×10^{2}
ø20	Push	94.2	1.26×10^{2}	1.88×10^{2}	2.51×10^{2}	3.14×10^{2}	3.77×10^{2}	4.40×10^{2}
	Pull	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
ø25	Push	1.47×10^{2}	1.96×10^{2}	2.95×10^{2}	3.93×10^{2}	4.91×10^{2}	5.89×10^{2}	6.87×10^{2}
	Pull	1.01×10^{2}	1.35×10^{2}	2.02×10^{2}	2.70×10^{2}	3.37×10^{2}	4.04×10^{2}	4.72×10^{2}
ø32	Push	2.41×10^{2}	3.22×10^{2}	4.83×10^{2}	6.43×10^{2}	8.04×10^{2}	9.65×10^{2}	1.13×10^{3}
	Pull	1.81×10^{2}	2.41×10^{2}	3.62×10^{2}	4.83×10^{2}	6.03×10^{2}	7.24×10^{2}	8.44×10^{2}

⚠ Be sure to read the safety precautions of the position locking STR2-Q on pages 630 to 633 before use.

Switch specifications

● 1-color/2-color display

Item	Proximity 2-wire		Proximity 3-wire			Reed 2-wire			
	K2H/K2V	K2YH/K2YV	K3H/K3V	K3PH/K3PV (Made to order)	K3YH/K3YV	K0H/K0V		K5H/K5V	
Applications	Dedicated for programmable controller		For programmable controller, relay			For programmable controller, relay		For programmable controller, relay, IC circuit (without indicator lamp), serial connection	
Output method	-		NPN output	PNP output	NPN output	-			
Power supply voltage	-		10 to 28 VDC			-			
Load voltage	10 to 30 VDC		30 VDC or less			12 VDC/24 VDC	110 VAC	5/12/24 VDC	110 VAC
Load current	5 to 20 mA (*3)		50 mA or less			5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less
Indicator lamp	LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		-	
Leakage current	1 mA or less		10 μA or less			0 mA			
Weight g	1 m:18 3 m:49 5 m:80	1 m:31 3 m:85 5 m:139	1 m:18 3 m:49 5 m:80		1 m:31 3 m:85 5 m:139	1 m:18 3 m:49 5 m:80			

*1 : Refer to Ending Page 1 for detailed switch specifications and dimensions.
*2 : Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.
*3 : The max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)

Cylinder weight

Unit: g

Bore size	Product weight at 0 mm stroke		Additional weight per S = 10 mm
	STR2-M	STR2-B	
ø16	390	405	31
ø20	605	605	43
ø25	910	890	59
ø32	1430	1480	84

(Example) Product weight

STR2-MQ-16-10-H-K2H-D

● Product weight for 0 mm stroke length ... 390 g

● Additional weight for stroke length 10 mm ... 31 g x 1 = 31 g

● Weight of 2 cylinder switches ... 18 g x 2 = 36 g

● Product weight ... 390 g + 31 g + 36 g = 457 g

Specifications for rechargeable battery (Catalog No. CC-1226A)

● Design compatible with rechargeable battery manufacturing process.

STR2-MBQ-·····-P4*

How to order

Without switch (built-in magnet for switch)

STR2 - M Q - 16 ( ) - 30 - H ——— O

With switch (built-in magnet for switch)

STR2 - M Q - 16 ( ) - 30 - H - K0H - R - O

Model No.

Ⓐ Bearing

Ⓑ Bore size

Ⓒ Port thread

Ⓓ Stroke length
Refer to page 592 for the min. stroke length.
■ Custom stroke length
Available as made to order.

Ⓔ Position locking mechanism

Ⓕ Switch model No.

Ⓖ Switch quantity

Ⓗ Option *1

Code	Description
Ⓐ Bearing	
M	Metal bush bearing
B	Ball bearing
Ⓑ Bore size (mm)	
16	ø16
20	ø20
25	ø25
32	ø32
Ⓒ Port thread	
Blank	Rc thread
NN	NPT thread (ø32 only) (made-to-order product)
GN	G thread (ø32 only) (made-to-order product) *2
Ⓓ Stroke length (mm)	
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100
Ⓔ Position locking mechanism	
H	With head side position locking
R	With rod side position locking

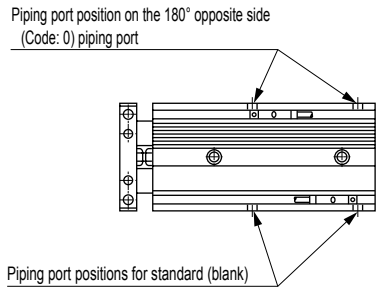
Ⓕ Switch model No.

Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Indicator	Lead wire
K0H*	**K0V***	Reed	●	●	1-color display	2-wire
K5H*	**K5V***		●	●	no indicator lamp	
K2H*	**K2V***	Proximity		●	1-color display	2-wire
K3H*	**K3V***			●		3-wire
K3PH*	**K3PV***			●	1-color display (made to order)	3-wire
K2YH*	**K2YV***			●	2-color display	2-wire
K3YH*	**K3YV***			●		3-wire

*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)
Ⓖ Switch quantity	
R	1 on rod side
H	1 on head side
D	2
Ⓗ Option	
F	End plate material: steel
O	Piping port position on the 180° opposite side

Precautions for model No. selection

*1: The piping port positions for "O" are as shown in the figure below.



*2: In the case of G thread, ports on the opposite side (option "O") are not available. Rather than plug sealing, they are simply not provided. (The standard ports are not provided in the case of option "O".)

[Example of model No.]

STR2-MQ-16-30-H-K0H-R-O

Model: Twin rod cylinder, position locking
Ⓐ Bearing : Metal bush bearing
Ⓑ Bore size : ø16 mm
Ⓒ Port thread : Rc thread
Ⓓ Stroke length : 30 mm
Ⓔ Position locking mechanism : With head side position locking
Ⓕ Switch model No. : Reed K0H switch
Ⓖ Switch quantity : 1 on rod side
Ⓗ Option : Piping port position on the 180° opposite side

How to order switch

SW - K0H*

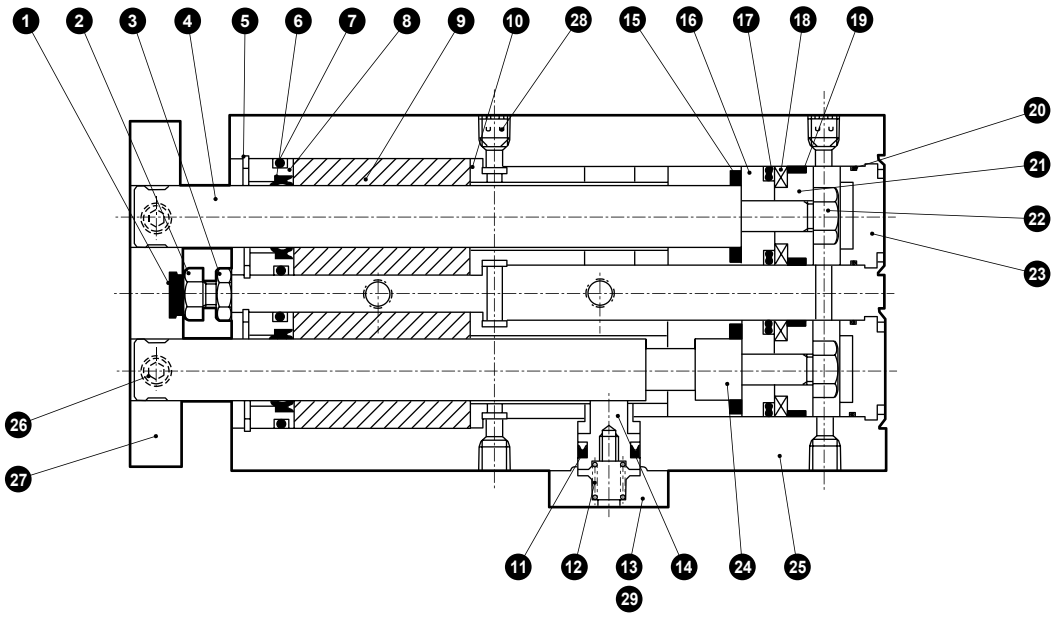
Switch model No.
(Item Ⓕ above)

MEMO

Internal structure and parts list (metal bush bearing)

● Position locking
with rod side position locking
STR2-MQ-R

● Piping port position on the 180° opposite side
STR2-MQ ··· -R ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		16	Piston	Aluminum alloy	Chromate
2	Hexagon head bolt	Stainless steel		17	Piston packing	Nitrile rubber	
3	Hexagon nut	Stainless steel		18	Magnet	Plastic	
4	Piston rod (2)	Stainless steel (ø16, ø20) Steel (ø25, ø32)	Industrial chrome plating	19	Wear ring	Acetal resin	
				20	O-ring	Nitrile rubber	
5	Snap ring for hole	Stainless steel		21	Spacer	Aluminum alloy	Chromate
6	Rod packing	Nitrile rubber		22	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		23	Cap	Aluminum alloy	Chromate
8	Housing	Aluminum alloy	Chromate	24	Piston rod (1)	Stainless steel (ø16, ø20) Steel (ø25, ø32)	Industrial chrome plating
9	Bush	Aluminum alloy					
10	Adaptor	Aluminum alloy	Chromate	25	Cylinder body	Aluminum alloy	Hard alumite
11	Stopper packing	Nitrile rubber		26	Hexagon socket set screw	Stainless steel	
12	Coil spring	Piano wire	Electrodeposition	27	End plate	Aluminum alloy	Alumite
13	Stopper cover	Aluminum alloy	Alumite	28	Hexagon socket set screw	Stainless steel	
14	Stopper piston	Stainless steel		29	Hexagon socket head cap screw	Stainless steel	
15	Cushion rubber (R)	Urethane rubber					

*: The steel end plate is zinc chromate.

Repair parts list

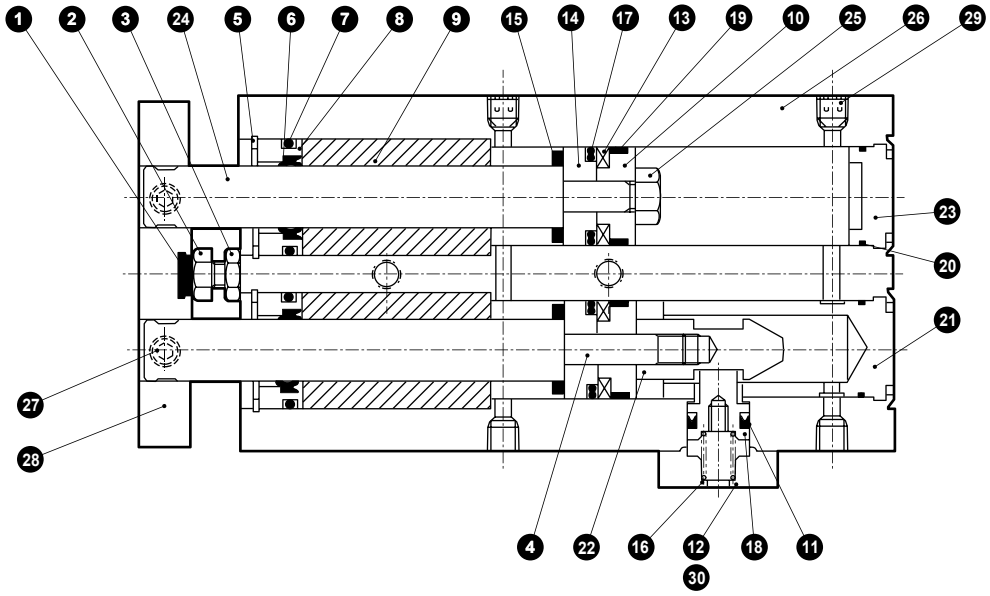
Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-Q-16K	
ø20	STR2-Q-20K	1 6 7 11
ø25	STR2-Q-25K	15 17 19
ø32	STR2-Q-32K	

Note: Specify the kit No. when placing an order.

Internal structure and parts list (metal bush bearing)

● Position locking
with head side position locking
STR2-MQ-H

● Piping port position on the 180° opposite side
STR2-MQ-H ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		16	Coil spring	Piano wire	Electrodeposition
2	Hexagon head bolt	Stainless steel		17	Piston packing	Nitrile rubber	
3	Hexagon nut	Stainless steel		18	Stopper piston	Stainless steel	
4	Piston rod (2)	Stainless steel (ø16, ø20) Steel (ø25, ø32)	Industrial chrome plating	19	Wear ring	Acetal resin	
				20	O-ring	Nitrile rubber	
5	Snap ring for hole	Stainless steel		21	Head cover	Aluminum alloy	Chromate
6	Rod packing	Nitrile rubber		22	Sleeve	Stainless steel	
7	O-ring	Nitrile rubber		23	Cap	Aluminum alloy	Chromate
8	Housing	Aluminum alloy	Chromate	24	Piston rod (1)	Stainless steel (ø16, ø20) Steel (ø25, ø32)	Industrial chrome plating
9	Bush	Aluminum alloy					
10	Spacer	Aluminum alloy	Chromate	25	Hexagon nut	Steel	Zinc chromate
11	Stopper packing	Nitrile rubber		26	Cylinder body	Aluminum alloy	Hard alumite
12	Stopper cover	Aluminum alloy	Alumite	27	Hexagon socket set screw	Stainless steel	
13	Magnet	Plastic		28	End plate	Aluminum alloy	Alumite
14	Piston	Aluminum alloy	Chromate	29	Hexagon socket set screw	Stainless steel	
15	Cushion rubber (R)	Urethane rubber		30	Hexagon socket head cap screw	Stainless steel	

*: The steel end plate is zinc chromate.

Repair parts list

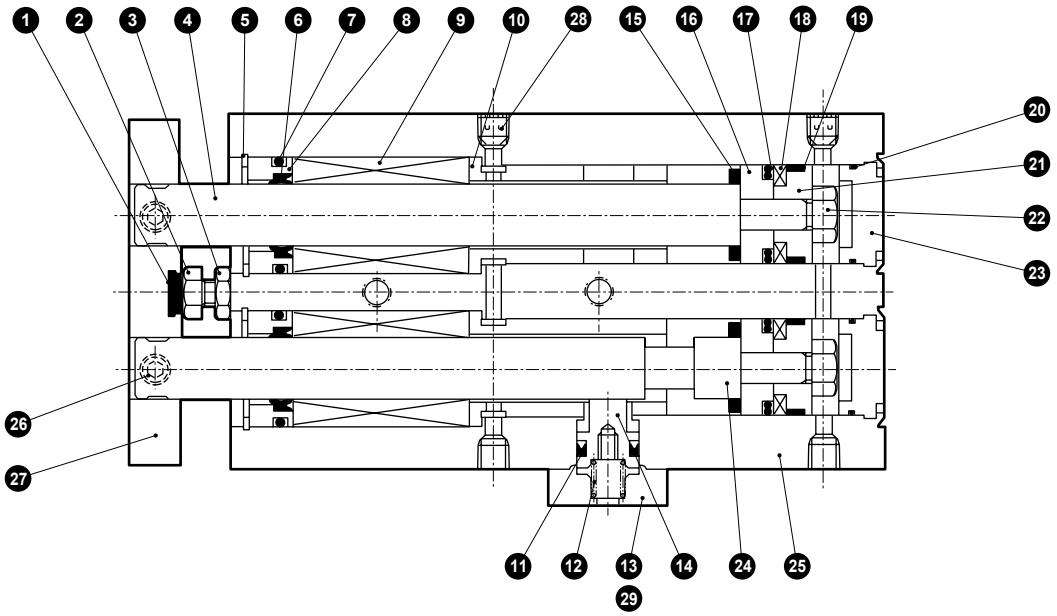
Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-Q-16K	
ø20	STR2-Q-20K	1 6 7 11
ø25	STR2-Q-25K	15 17 19
ø32	STR2-Q-32K	

Note: Specify the kit No. when placing an order.

Internal structure and parts list (ball bearing)

● Position locking
with rod side position locking
STR2-BQ-R

● Piping port position on the 180° opposite side
STR2-BQ ··· -R ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		16	Piston	Aluminum alloy	Chromate
2	Hexagon head bolt	Stainless steel		17	Piston packing	Nitrile rubber	
3	Hexagon nut	Stainless steel		18	Magnet	Plastic	
4	Piston rod (2)	Steel	Industrial chrome plating	19	Wear ring	Acetal resin	
5	Snap ring for hole	Stainless steel		20	O-ring	Nitrile rubber	
6	Rod packing	Nitrile rubber		21	Spacer	Aluminum alloy	Chromate
7	O-ring	Nitrile rubber		22	Hexagon nut	Steel	Zinc chromate
8	Housing	Aluminum alloy	Chromate	23	Cap	Aluminum alloy	Chromate
9	Bearing			24	Piston rod (1)	Steel	Industrial chrome plating
10	Adaptor	Aluminum alloy	Chromate	25	Cylinder body	Aluminum alloy	Hard alumite
11	Stopper packing	Nitrile rubber		26	Hexagon socket set screw	Stainless steel	
12	Coil spring	Piano wire	Electrodeposition	27	End plate	Aluminum alloy	Alumite
13	Stopper cover	Aluminum alloy	Alumite	28	Hexagon socket set screw	Stainless steel	
14	Stopper piston	Stainless steel		29	Hexagon socket head cap screw	Stainless steel	
15	Cushion rubber (R)	Urethane rubber					

Repair parts list

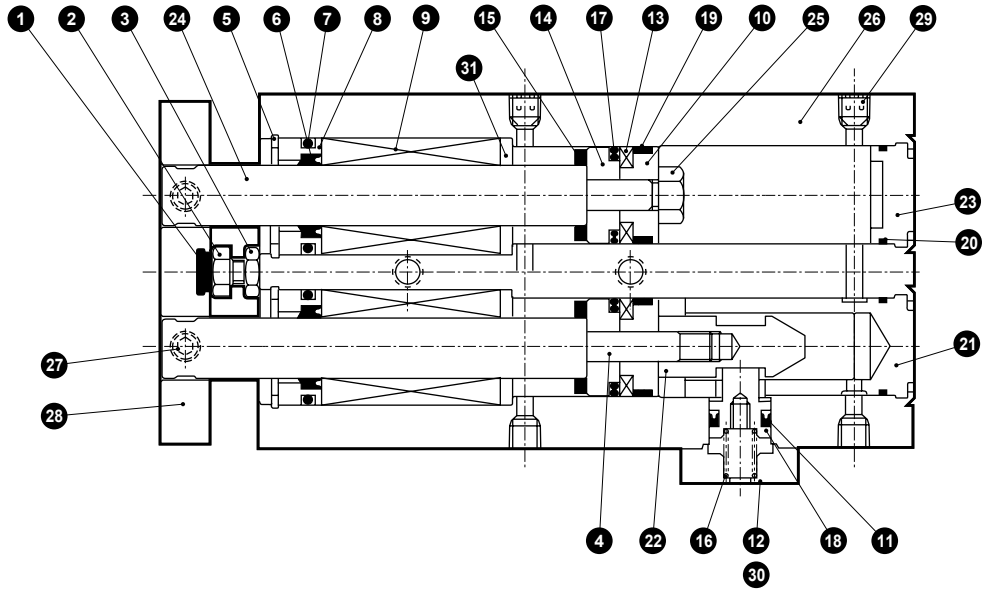
Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-Q-16K	❶ ❻ ❼ ⓫ ⓯ ⓱ ⓳
ø20	STR2-Q-20K	
ø25	STR2-Q-25K	
ø32	STR2-Q-32K	

Note: Specify the kit No. when placing an order.

Internal structure and parts list (ball bearing)

● Position locking
with head side position locking
STR2-BQ-H

● Piping port position on the 180° opposite side
STR2-BQ-H ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		17	Piston packing	Nitrile rubber	
2	Hexagon head bolt	Stainless steel		18	Stopper piston	Stainless steel	
3	Hexagon nut	Stainless steel		19	Wear ring	Acetal resin	
4	Piston rod (2)	Steel	Industrial chrome plating	20	O-ring	Nitrile rubber	
5	Snap ring for hole	Stainless steel		21	Head cover	Aluminum alloy	Chromate
6	Rod packing	Nitrile rubber		22	Sleeve	Stainless steel	
7	O-ring	Nitrile rubber		23	Cap	Aluminum alloy	Chromate
8	Housing	Aluminum alloy	Chromate	24	Piston rod (1)	Steel	Industrial chrome plating
9	Bearing			25	Hexagon nut	Steel	Zinc chromate
10	Spacer	Aluminum alloy	Chromate	26	Cylinder body	Aluminum alloy	Hard alumite
11	Stopper packing	Nitrile rubber		27	Hexagon socket set screw	Stainless steel	
12	Stopper cover	Aluminum alloy	Alumite	28	End plate	Aluminum alloy	Alumite
13	Magnet	Plastic		29	Hexagon socket set screw	Stainless steel	
14	Piston	Aluminum alloy	Chromate	30	Hexagon socket head cap screw	Stainless steel	
15	Cushion rubber (R)	Urethane rubber		31	Spacer	Aluminum alloy	Chromate
16	Coil spring	Piano wire	Electrodeposition				

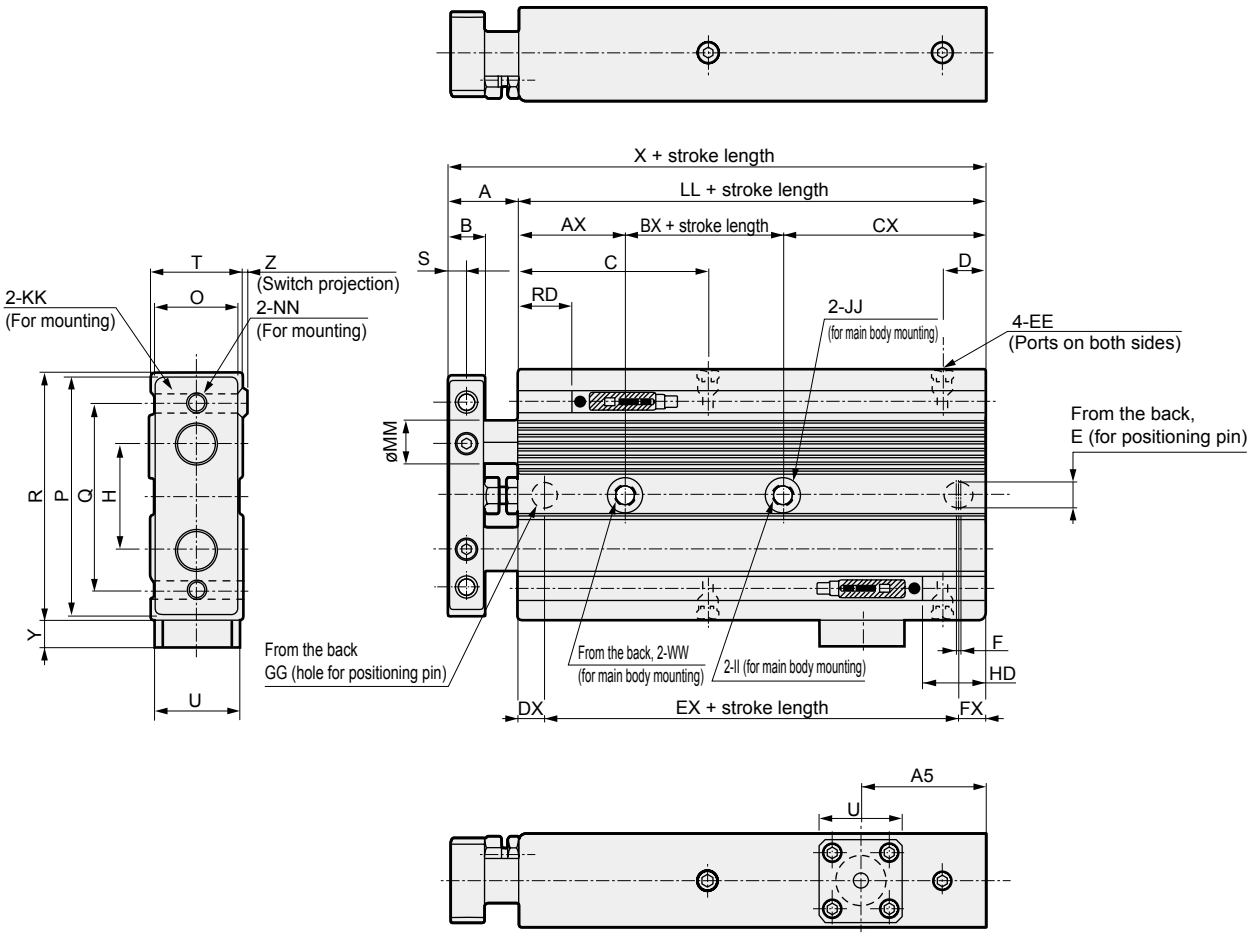
Repair parts list

Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-Q-16K	
ø20	STR2-Q-20K	1 6 7 11
ø25	STR2-Q-25K	15 17 19
ø32	STR2-Q-32K	

Note: Specify the kit No. when placing an order.

Dimensions (ø16 to ø32)

● Position locking (Q), head side position locking (H) and piping port position on the 180° opposite side (O)



*1 : HD and RD dimensions for 10 mm stroke length differ from these dimensions according to the setting.

*2 : Refer to page 618 for HD, RD and protruding dimensions of the 2-color display switch.

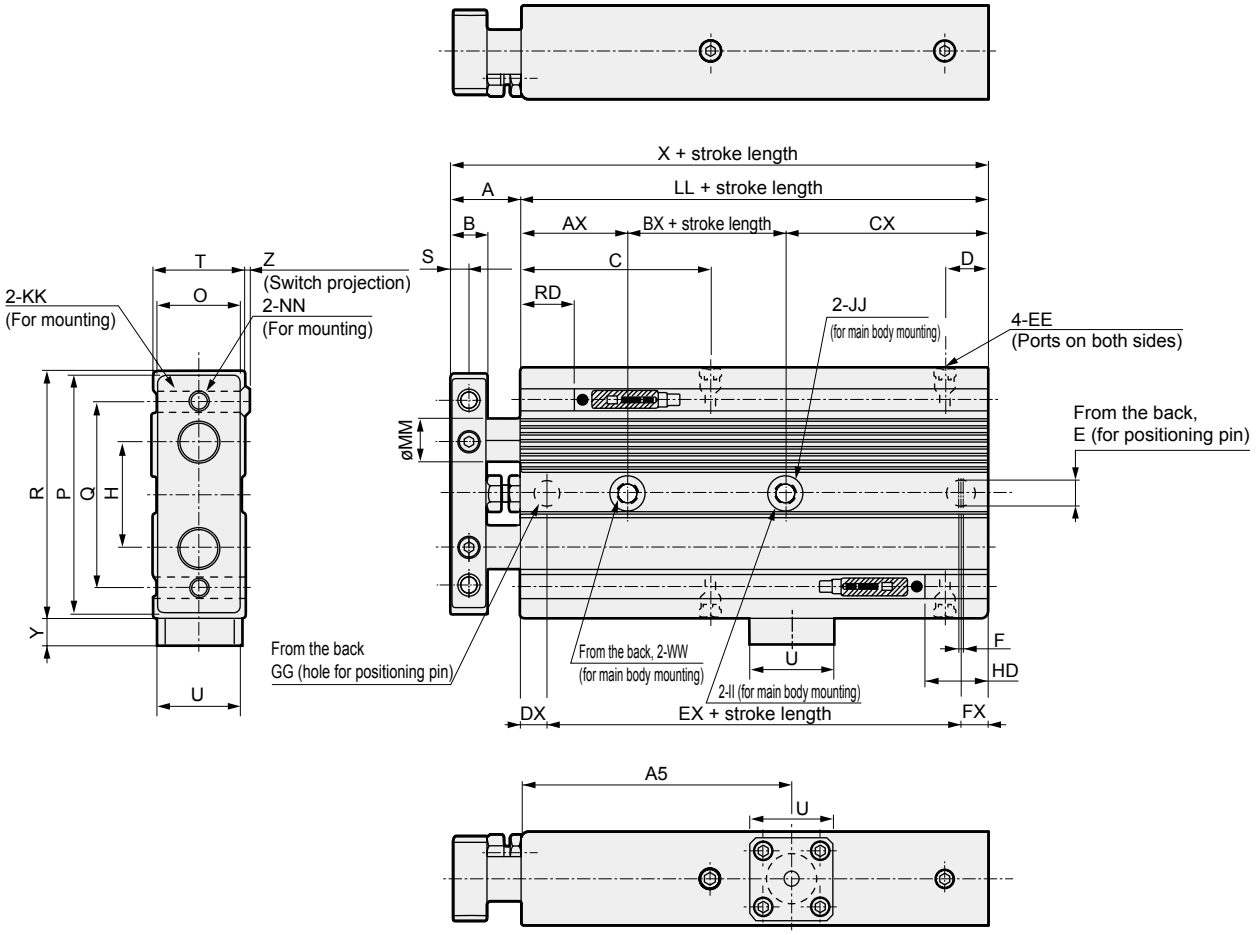
*3 : The cylinder may tilt due to the uneven surface if it is installed with the spot face side (JJ) contacted. In this case, change the port position or use the option of piping port position on the 180° opposite side (O) to keep the spot face side from being the contacting surface.

Code	Q-H Basic dimensions																
Bore size (mm)	A	B	C	D	E	EE	F	GG	H	II	JJ	KK	LL	MM	NN	O	P
ø16	16	8	43	9.5	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	25	4.3	8 spot face depth 4.4	M5 through	96	10	M5 through	19	52
ø20	20	10	46	9.5	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	28	5.2	9.5 spot face depth 5.4	M5 through	105	12	M5 through	24	60
ø25	22	12	44	10.5	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	34	6.3	11 spot face depth 6.5	M6 through	105	14	M6 through	30	70
ø32	22	12	56	11	$6^{+0.07}_{+0.02}$ depth 6	Rc1/8	1	$6^{+0.07}_{+0.02}$ depth 6	44	6.3	11 spot face depth 6.5	M6 through	121	16	M6 through	36	94

Code																K0/K5/K2/K3	
Bore size (mm)	Q	R	S	T	U	WW	X	Y	AX	BX	CX	DX	EX	FX	Z	A5	HD	RD
ø16	45	58	4	21	19	M5 depth 6	112	6	24	26	46	8	80	8	0.5	28	37	39.5
ø20	50	62	5	27	23	M6 depth 8	125	7.5	24	33	48	9	87	9	0.5	25	40.5	45
ø25	60	72	6	33	23	M8 depth 8	127	7.5	24	33	48	9	87	9	0.5	28	41.5	43.5
ø32	75	96	6	38	23	M8 depth 8	143	7.5	24	47	50	9	103	9	0.5	27.5	45.5	55.5

Dimensions (ø16 to ø32)

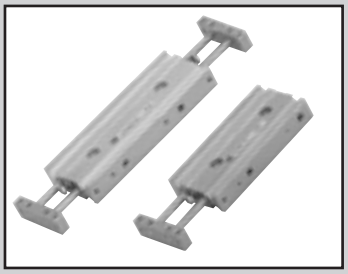
● Position locking (Q), rod side position locking (R) and piping port position on the 180° opposite side (O)



*1 : HD and RD dimensions for 10 mm stroke length differ from these dimensions according to the setting.
*2 : Refer to page 618 for HD, RD and protruding dimensions of the 2-color display switch.
*3 : The cylinder may tilt due to the uneven surface if it is installed with the spot face side (JJ) contacted. In this case, change the port position or use the option of piping port position on the 180° opposite side (O) to keep the spot face side from being the contacting surface.

Code	Q-R Basic dimensions																
Bore size (mm)	A	B	C	D	E	EE	F	GG	H	II	JJ	KK	LL	MM	NN	O	P
ø16	16	8	43	9.5	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	25	4.3	8 spot face depth 4.4	M5 through	96	10	M5 through	19	52
ø20	20	10	46	9.5	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	28	5.2	9.5 spot face depth 5.4	M5 through	105	12	M5 through	24	60
ø25	22	12	44	10.5	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	34	6.3	11 spot face depth 6.5	M6 through	105	14	M6 through	30	70
ø32	22	12	56	11	$6^{+0.07}_{+0.02}$ depth 6	Rc1/8	1	$6^{+0.07}_{+0.02}$ depth 6	44	6.3	11 spot face depth 6.5	M6 through	121	16	M6 through	36	94

Code																K0/K5/K2/K3	
Bore size (mm)	Q	R	S	T	U	WW	X	Y	AX	BX	CX	DX	EX	FX	Z	A5	HD	RD
ø16	45	58	4	21	19	M5 depth 6	112	6	24	26	46	8	80	8	0.5	61.5	7	69.5
ø20	50	62	5	27	23	M6 depth 8	125	7.5	24	33	48	9	87	9	0.5	61.5	10.5	75
ø25	60	72	6	33	23	M8 depth 8	127	7.5	24	33	48	9	87	9	0.5	61.5	11.5	73.5
ø32	75	96	6	38	23	M8 depth 8	143	7.5	24	47	50	9	103	9	0.5	72.5	15.5	85.5



Twin rod cylinder/double acting/low speed

STR2-$^{M}_{B}$O Series

● Bore size: ø6/ø10/ø16/ø20/ø25/ø32

JIS symbol 

RoHS CAD

Specifications

Item		STR2-MO (metal bush bearing) STR2-BO (ball bearing)					
Bore size mm		ø6	ø10	ø16	ø20	ø25	ø32
Actuation		Double acting/low speed					
Working fluid		Compressed air					
Max. working pressure MPa		0.7 (≈100 psi, 7 bar)					
Min. working pressure MPa		0.2 (≈29 psi, 2 bar)	0.15 (≈22 psi, 1.5 bar)	0.1 (≈15 psi, 1 bar)			
Proof pressure MPa		1.05 (≈150 psi, 10.5 bar)					
Ambient temperature °C		-10 (14°F) to 60 (140°F) (no freezing)					
Port size		M5					Rc1/8
Stroke tolerance mm		$^{+2.0}_{0}$					
Adjustable stroke range mm		0 to -5					
Working piston speed mm/s		10 to 200					
Non-rotating accuracy (reference value)	STR2-M	±0.4°	±0.3°			±0.2°	
	STR2-B	±0.2°	±0.1°			±0.3°	
Piston rod	STR2-M	Metal bush bearing					
Bearing	STR2-B	Ball bearing					
Cushion		Rubber cushion					
Lubrication		Not available					
Max absorbed energy J	PUSH	0.008	0.061	0.181	0.303	0.68	1.3
	PULL	0.059	0.083	0.083	0.127	0.237	0.311

Stroke

Bore size	Stroke (mm)	Max. stroke (mm)	Min. stroke (mm)	Available stroke (mm)	Min. stroke with switch (mm)
ø6	10, 20, 30, 40, 50	50	5	100	10
ø10					
ø16	10, 20, 30, 40, 50 60, 70, 80, 90, 100	100		200	
ø20					
ø25					
ø32					

Note: The custom stroke is available in 1 mm increments.
However, the total length is the same as that of the next longer standard stroke.

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa							
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø6	Push	-	-	11.3	17.0	22.6	28.3	33.9	39.6
	Pull	-	-	6.28	9.42	12.6	15.7	18.8	22.0
ø10	Push	-	23.6	31.4	47.1	62.8	78.5	94.2	1.10×10^{2}
	Pull	-	15.1	20.1	30.2	40.2	50.3	60.3	70.4
ø16	Push	40.2	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
	Pull	24.5	36.8	49.0	73.5	98.0	1.23×10^{2}	1.47×10^{2}	1.72×10^{2}
ø20	Push	62.8	94.2	1.26×10^{2}	1.88×10^{2}	2.51×10^{2}	3.14×10^{2}	3.77×10^{2}	4.40×10^{2}
	Pull	40.2	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
ø25	Push	98.2	1.47×10^{2}	1.96×10^{2}	2.95×10^{2}	3.93×10^{2}	4.91×10^{2}	5.89×10^{2}	6.87×10^{2}
	Pull	67.4	1.01×10^{2}	1.35×10^{2}	2.02×10^{2}	2.70×10^{2}	3.37×10^{2}	4.04×10^{2}	4.72×10^{2}
ø32	Push	1.61×10^{2}	2.41×10^{2}	3.22×10^{2}	4.83×10^{2}	6.43×10^{2}	8.04×10^{2}	9.65×10^{2}	1.13×10^{3}
	Pull	1.21×10^{2}	1.81×10^{2}	2.41×10^{2}	3.62×10^{2}	4.83×10^{2}	6.03×10^{2}	7.24×10^{2}	8.44×10^{2}

Switch specifications

● 1-color/2-color LED

Item	Proximity 2-wire		Proximity 3-wire			Reed 2-wire			
	K2H/K2V	K2YH/K2YV	K3H/K3V	K3PH/K3PV (Made to order)	K3YH/K3YV	K0H/K0V		K5H/K5V	
Applications	Dedicated for programmable controller		For programmable controller, relay			For programmable controller, relay		For programmable controller, relay, IC circuit (without indicator lamp), serial connection	
Output method	-		NPN output	PNP output	NPN output	-			
Power supply voltage	-		10 to 28 VDC			-			
Load voltage	10 to 30 VDC		30 VDC or less			12 VDC/24 VDC	110 VAC	5/12/24 VDC	110 VAC
Load current	5 to 20 mA (*3)		50 mA or less			5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less
Indicator lamp	LED (ONHourON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		-	
Leakage current	1 mA or less		10 μA or less			0mA			
Weight g	1 m: 18 3 m: 49 5 m: 80	1 m: 31 3 m: 85 5 m: 139	1 m: 18 3 m: 49 5 m: 80		1 m: 31 3 m: 85 5 m: 139	1 m: 18 3 m: 49 5 m: 80			

*1 : Refer to Ending Page 1 for detailed switch specifications and dimensions.
*2 : Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.
*3 : The max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)

Cylinder weight

Unit: g

Bore size	Product weight at 0 mm stroke		Additional weight per S = 10 mm
	STR2-M	STR2-B	
ø6	60	64	10
ø10	140	155	14
ø16	240	300	20
ø20	340	405	40
ø25	580	610	52
ø32	1300	1150	83

(Example) Product weight
STR2-M-6-10-K2H-D

● Product weight at 0 mm stroke…60g

● Additional weight for 10 mm stroke…10g×1=10g

● Weight of 2 cylinder switches 18g×2=36g

● Product weight……60g+10g+36g=106g

How to order

Without switch (built-in magnet for switch)

STR2 - M O - 16 ( ) - 30 ——— O

With switch (built-in magnet for switch)

STR2 - M O - 16 ( ) - 30 - K0H - R - O

Model No.

Ⓐ Bearing

Ⓑ Bore size

Ⓒ Port thread

Ⓓ Stroke

■ Custom stroke
Available in 1 mm increments.
However, the total length is the same as that of the next longer standard stroke.

Ⓔ Switch model No. *1

Ⓕ Switch quantity

Ⓖ Option *2

Code	Description
Ⓐ Bearing	
M	Metal bush bearing
B	Ball bearing
Ⓑ Bore size (mm)	
6	ø6
10	ø10
16	ø16
20	ø20
25	ø25
32	ø32
Ⓒ Port thread	
Blank	Rc thread
NN	NPT thread (ø32 only) (made-to-order product)
GN	G thread (ø32 only) (made-to-order product) *3

Ⓓ Stroke (mm)

Bore size	Stroke	Available stroke	Custom stroke
ø6	**5 to 50**	**100**	**In 1 mm increments**
ø10	**5 to 50**	**100**	
ø16	**5 to 100**	**200**	
ø20	**5 to 100**	**200**	
ø25	**5 to 100**	**200**	
ø32	**5 to 100**	**200**	

Ⓔ Switch model No.

Straight lead wire	L-shaped lead wire	Contact	Voltage AC	Voltage DC	Indicator	Lead wire
K0H*	**K0V***	Reed	●	●	1-color LED	2-wire
K5H*	**K5V***		●	●	no indicator lamp	
K2H*	**K2V***	Proximity		●	1-color LED	2-wire
K3H*	**K3V***			●		3-wire
K3PH*	**K3PV***			●	1-color LED (made to order)	3-wire
K2YH*	**K2YV***			●	2-color LED	2-wire
K3YH*	**K3YV***			●		3-wire

*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

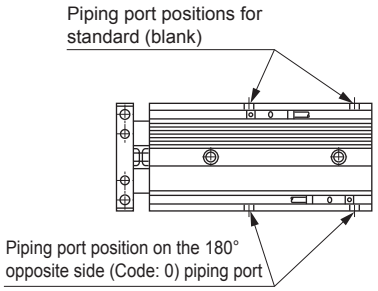
Ⓕ Switch quantity	
R	1 on rod side
H	1 on head side
D	2

Ⓖ Option	
F	End plate material: steel
O	Piping port position on the 180° opposite side

⚠ Precautions for model No. selection

*1 : STR2-B-6 and 10 are not compatible with a reed switch.

*2 : The piping port positions for "O" are as shown in the figure below.



*3 : In the case of G thread, ports on the opposite side (option "O") are not available. Rather than plug sealing, they are simply not provided.
(The standard ports are not provided in the case of option "O".)

[Example of model No.]

STR2-MO-16-30-K0H-R-O

Model: Twin rod cylinder, low speed
Ⓐ Bearing : Metal bush bearing
Ⓑ Bore size : ø16 mm
Ⓒ Port thread : Rc thread
Ⓓ Stroke : 30 mm
Ⓔ Switch model No. : Reed K0H switch
Ⓕ Switch quantity : 1 on rod side
Ⓖ Option : Piping port position on the 180° opposite side

How to order switch

SW - K0H*

Switch model No.
(Item Ⓔ above)

MEMO

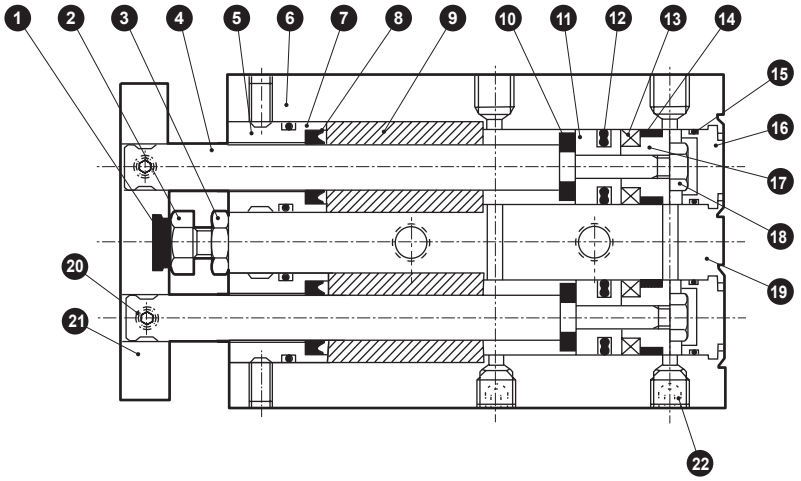
Internal structure and parts list (metal bush bearing ø6/ø10)

● Low speed

STR2-MO

● Piping port position on the 180° opposite side

STR2-MO ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		12	Piston packing	Nitrile rubber	
2	Hexagon head bolt	Stainless steel		13	Magnet	Plastic	
3	Hexagon nut	Stainless steel		14	Wear ring	Acetal resin	
4	Piston rod	Stainless steel		15	O-ring	Nitrile rubber	
5	Housing	Stainless steel		16	Cap	Aluminum alloy	Chromate
6	Hexagon socket set screw	Stainless steel		17	Spacer	Aluminum alloy	Chromate
7	O-ring	Nitrile rubber		18	Hexagon nut	Steel	Zinc chromate
8	Rod packing	Nitrile rubber		19	Cylinder body	Aluminum alloy	Hard alumite
9	Bush	Copper alloy		20	Hexagon socket set screw	Stainless steel	
10	Cushion rubber (R)	Urethane rubber		21	End plate *1	Aluminum alloy	Alumite
11	Piston	Aluminum alloy	Chromate	22	Hexagon socket set screw	Stainless steel	

*1 : The steel end plate is zinc chromate.

Repair parts list

STR2-MO (low speed) * Repair parts other than the piston packing are the same as those of the standard.

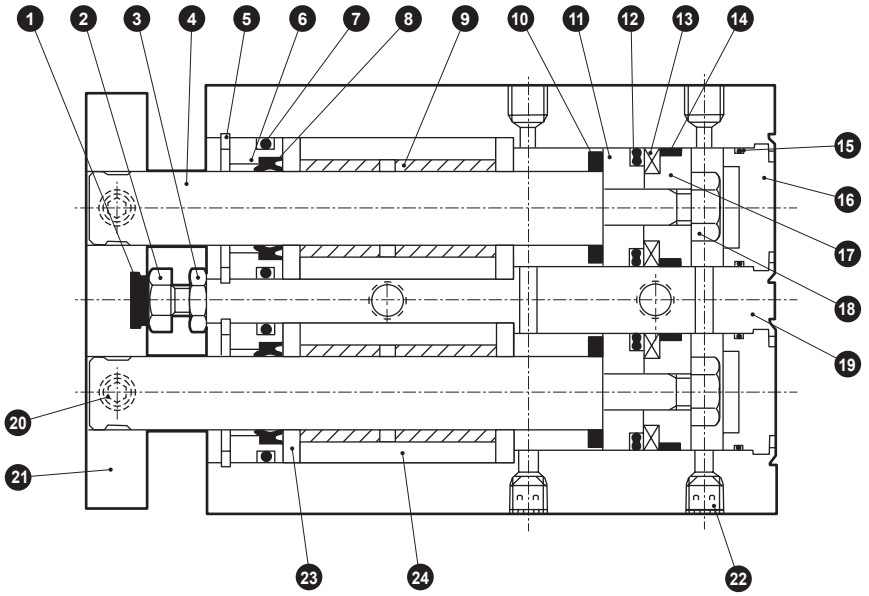
Bore size (mm)	Kit No.	Repair parts No.
ø6	STR2-O-6K	❶ ❼ ❽ ❿ ⓬ ⓮
ø10	STR2-O-10K	

Note: Specify the kit No. when placing an order.

Internal structure and parts list (metal bush bearing ø16/ø20/ø25/ø32)

● Low speed
STR2-MO

● Piping port position on the 180° opposite side
STR2-MO ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		13	Magnet	Plastic	
2	Hexagon head bolt	Stainless steel		14	Wear ring	Acetal resin	
3	Hexagon nut	Stainless steel		15	O-ring	Nitrile rubber	
4	Piston rod	Stainless steel (ø16, ø20) Steel (ø25, ø32)	Industrial chrome plating	16	Cap	Aluminum alloy	Chromate
				17	Spacer	Aluminum alloy	Chromate
5	Snap ring for hole	Stainless steel		18	Hexagon nut	Steel	Zinc chromate
6	Housing	Aluminum alloy	Chromate	19	Cylinder body	Aluminum alloy	Hard alumite
7	O-ring	Nitrile rubber		20	Hexagon socket set screw	Stainless steel	
8	Rod packing	Nitrile rubber		21	End plate *1	Aluminum alloy	Alumite
9	Bush	Copper alloy		22	Hexagon socket set screw	Stainless steel	
10	Cushion rubber (R)	Urethane rubber		23	Spacer	Aluminum alloy	Chromate
11	Piston	Aluminum alloy	Chromate	24	Aluminum housing	Aluminum alloy	Chromate
12	Piston packing	Nitrile rubber					

*1 : The steel end plate is zinc chromate.

Repair parts list

STR2-MO (low speed) * Repair parts other than the piston packing are the same as those of the standard.

Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-O-16K	❶ ❼ ❽ ❿ ⓬ ⓮
ø20	STR2-O-20K	
ø25	STR2-O-25K	
ø32	STR2-O-32K	

Note: Specify the kit No. when placing an order.

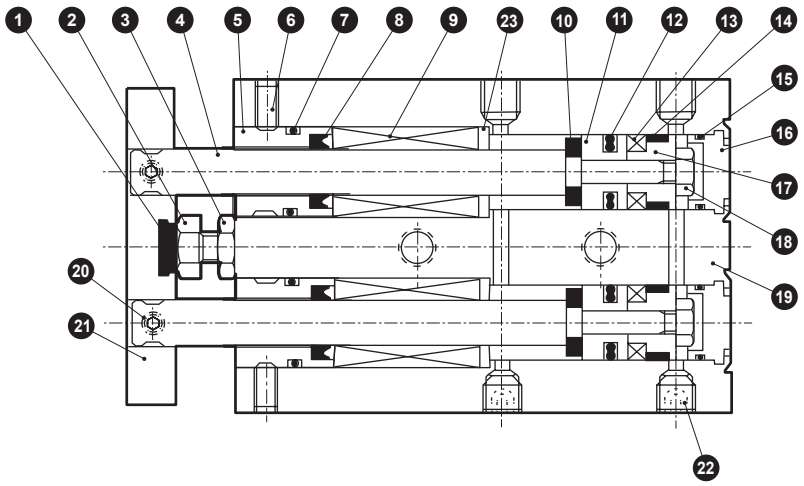
Internal structure and parts list (ball bearing ø6/ø10)

● Low speed

STR2-BO

● Piping port position on the 180° opposite side

STR2-BO ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		13	Magnet	Plastic	
2	Hexagon head bolt	Stainless steel		14	Wear ring	Acetal resin	
3	Hexagon nut	Stainless steel		15	O-ring	Nitrile rubber	
4	Piston rod	Steel	Industrial chrome plating	16	Cap	Aluminum alloy	Chromate
5	Housing	Stainless steel		17	Spacer	Aluminum alloy	Chromate
6	Hexagon socket set screw	Stainless steel		18	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		19	Cylinder body	Aluminum alloy	Hard alumite
8	Rod packing	Nitrile rubber		20	Hexagon socket set screw	Stainless steel	
9	Bearing			21	End plate *1	Aluminum alloy	Alumite
10	Cushion rubber (R)	Urethane rubber		22	Hexagon socket set screw	Stainless steel	
11	Piston	Aluminum alloy	Chromate	23	Spacer	Aluminum alloy	Chromate
12	Piston packing	Nitrile rubber					

Repair parts list

STR2-BO (low speed) * Repair parts other than the piston packing are the same as those of the standard.

Bore size (mm)	Kit No.	Repair parts No.
ø6	STR2-O-6K	❶ ❼ ❽ ❿ ⓬ ⓮
ø10	STR2-O-10K	

Note: Specify the kit No. when placing an order.

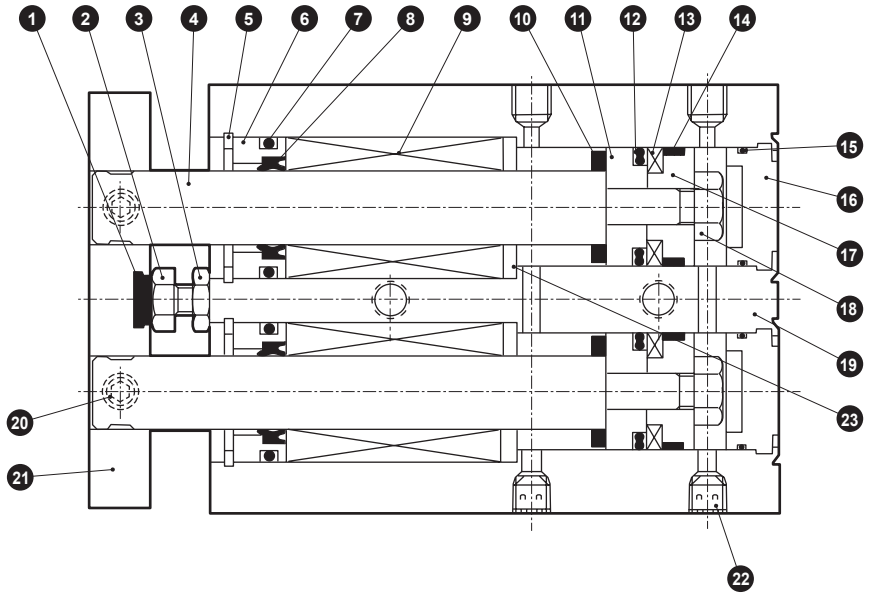
Internal structure and parts list (ball bearing ø16/ø20/ø25/ø32)

● Low speed

STR2-BO

● Piping port position on the 180° opposite side

STR2-BO ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		13	Magnet	Plastic	
2	Hexagon head bolt	Stainless steel		14	Wear ring	Acetal resin	
3	Hexagon nut	Stainless steel		15	O-ring	Nitrile rubber	
4	Piston rod	Steel	Industrial chrome plating	16	Cap	Aluminum alloy	Chromate
5	Snap ring for hole	Stainless steel		17	Spacer	Aluminum alloy	Chromate
6	Housing	Aluminum alloy	Chromate	18	Hexagon nut	Steel	Zinc chromate
7	O-ring	Nitrile rubber		19	Cylinder body	Aluminum alloy	Hard alumite
8	Rod packing	Nitrile rubber		20	Hexagon socket set screw	Stainless steel	
9	Bearing			21	End plate *1	Aluminum alloy	Alumite
10	Cushion rubber (R)	Urethane rubber		22	Hexagon socket set screw	Stainless steel	
11	Piston	Aluminum alloy	Chromate	23	Spacer	Aluminum alloy	Chromate
12	Piston packing	Nitrile rubber					

Repair parts list

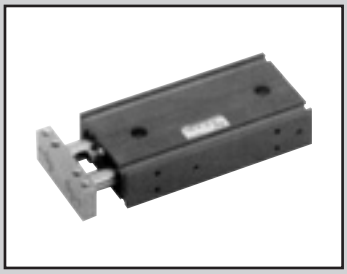
STR2-BO (low speed) * Repair parts other than the piston packing are the same as those of the standard.

Bore size (mm)	Kit No.	Repair parts No.
ø16	STR2-O-16K	❶ ❼ ❽ ❿ ⓬ ⓮
ø20	STR2-O-20K	
ø25	STR2-O-25K	
ø32	STR2-O-32K	

Note: Specify the kit No. when placing an order.

Dimensions

Same as STR2$^{M}_{B}$ Series (double acting/standard). Refer to page 590.



Twin rod cylinder/double acting/fine speed

STR2-$^{M}_{B}$F Series

● Bore size: ø10/ø16/ø20/ø25/ø32

JIS symbol

RoHS CAD

Specifications

Item		STR2-MF (metal bush bearing), STR2-BF (ball bearing)				
Bore size mm		ø10	ø16	ø20	ø25	ø32
Actuation		Double acting				
Working fluid		Compressed air				
Max. working pressure MPa		0.70 (≈100 psi, 7 bar)				
Min. working pressure MPa		0.15 (≈22 psi, 1.5 bar)	0.1 (≈15 psi, 1 bar)			
Ambient temperature °C		5 (41°F) to 60 (140°F)				
Port size		M5				Rc1/8
Stroke tolerance mm		0 to -5				
Working piston speed mm/s		1 to 200				
Non-rotating accuracy (reference value)	STR2-MF	±0.3°			±0.2°	
	STR2-BF	±0.1°			±0.3°	
Piston rod bearing	STR2-MF	Metal bush bearing				
	STR2-BF	Ball bearing				
Cushion		Rubber cushion				
Lubrication		Lubrication not possible				
Allowable absorbed energy J		0.061	0.181	0.303	0.68	1.3

* The low speed (STR2-0) is recommended for ø6.

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke (mm)	Min. stroke with switch (mm)
ø10	10, 20, 30, 40, 50	50	5	10
ø16, ø20, ø25, ø32	10, 20, 30, 40, 50, 60, 70, 80, 90, 100	100		

*1: The custom stroke is available in 1 mm increments. However, the total length is the same as that of the next longer standard stroke.

Switch specifications

● 1-color/2-color LED

Item	Proximity 2-wire		Proximity 3-wire			Reed 2-wire			
	K2H/K2V	K2YH/K2YV	K3H/K3V	K3PH/K3PV (Made to order)	K3YH/K3YV	K0H/K0V		K5H/K5V	
Applications	Dedicated for programmable controller		For programmable controller, relay			For programmable controller, relay		For programmable controller, relay, IC circuit (without indicator lamp), serial connection	
Output method	-		NPN output	PNP output	NPN output	-			
Power supply voltage	-		10 to 28 VDC			-			
Load voltage	10 to 30 VDC		30 VDC or less			12 VDC/24 VDC	110 VAC	5/12/24 VDC	110 VAC
Load current	5 to 20 mA (*3)		50 mA or less			5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less
Indicator	LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		-	
Leakage current	1 mA or less		10 μA or less			0 mA			
Weight g	1 m:18 3 m:49 5 m:80	1 m:31 3 m:85 5 m:139	1 m:18 3 m:49 5 m:80		1 m:31 3 m:85 5 m:139	1 m:18 3 m:49 5 m:80			

*1 : Refer to Ending Page 1 for detailed switch specifications and dimensions.
*2 : Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.
*3 : The max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa							
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø10	Push	-	23.6	31.4	47.1	62.8	78.5	94.2	1.10×10^{2}
	Pull	-	15.1	20.1	30.2	40.2	50.3	60.3	70.4
ø16	Push	40.2	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
	Pull	24.5	36.8	49.0	73.5	98.0	1.23×10^{2}	1.47×10^{2}	1.72×10^{2}
ø20	Push	62.8	94.2	1.26×10^{2}	1.88×10^{2}	2.51×10^{2}	3.14×10^{2}	3.77×10^{2}	4.40×10^{2}
	Pull	40.2	60.3	80.4	1.21×10^{2}	1.61×10^{2}	2.01×10^{2}	2.41×10^{2}	2.81×10^{2}
ø25	Push	98.2	1.47×10^{2}	1.96×10^{2}	2.95×10^{2}	3.93×10^{2}	4.91×10^{2}	5.89×10^{2}	6.87×10^{2}
	Pull	67.4	1.01×10^{2}	1.35×10^{2}	2.02×10^{2}	2.70×10^{2}	3.37×10^{2}	4.04×10^{2}	4.72×10^{2}
ø32	Push	1.61×10^{2}	2.41×10^{2}	3.22×10^{2}	4.83×10^{2}	6.43×10^{2}	8.04×10^{2}	9.65×10^{2}	1.13×10^{3}
	Pull	1.21×10^{2}	1.81×10^{2}	2.41×10^{2}	3.62×10^{2}	4.83×10^{2}	6.03×10^{2}	7.24×10^{2}	8.44×10^{2}

How to order

● Without switch (built-in magnet for switch)

STR2 - M F - 16 ○ - 30 ——— F

● With switch (built-in magnet for switch)

STR2 - M F - 16 ○ - 30 - K0H - R - F

Model No. Ⓐ Bearing Ⓑ Bore size Ⓒ Port thread Ⓓ Stroke *1 Ⓔ Switch model No. *2 Ⓕ Switch quantity Ⓖ Option

■ The custom stroke is available in 1 mm increments. However, the total length is the same as that of the next longer standard stroke.

Code	Description
Ⓐ Bearing	
M	Metal bush bearing
B	Ball bearing
Ⓑ Bore size (mm)	
10	ø10
16	ø16
20	ø20
25	ø25
32	ø32
Ⓒ Port thread	
Blank	Rc thread
NN	NPT thread (ø32 only) (made-to-order product)
GN *3	G thread (ø32 only) (made-to-order product)

Ⓓ Stroke (mm)

Bore size	Stroke	Available stroke	Custom stroke
ø10	**5 to 50**	**100**	**In 1 mm increments**
ø16	**5 to 100**	**200**	
ø20	**5 to 100**	**200**	
ø25	**5 to 100**	**200**	
ø32	**5 to 100**	**200**	

Ⓔ Switch model No.

Straight lead wire	L-shaped lead wire	Contact	Voltage AC	Voltage DC	Indicator	Lead wire
K0H*	**K0V***	Reed	●	●	1-color LED	2-wire
K5H*	**K5V***	Reed	●	●	no indicator lamp	
K2H*	**K2V***	Proximity		●	1-color LED	2-wire
K3H*	**K3V***	Proximity		●	LED	3-wire
K3PH*	**K3PV***	Proximity		●	1-color LED (made to order)	3-wire
K2YH*	**K2YV***	Proximity		●	2-color	2-wire
K3YH*	**K3YV***	Proximity		●	LED	3-wire

*** Lead wire length**

Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

Ⓕ Switch quantity

R	1 on rod side
H	1 on head side
D	2

Ⓖ Option

F	End plate material: steel
O	Piping port position 180°

Precautions for model selection

*1 : The max stroke of rear piping "R" is:
- ø16 : 70 stroke
- ø20/ø25 : 60 stroke
- ø32 : 50 stroke

*2 : STR2-BF-10 is not compatible with reed switch.

*3 : In the case of G thread, ports on the opposite side (option "O") are not available. Rather than plug sealing, they are simply not provided.
(The standard ports are not provided in the case of option "O".)

[Example of model No.]

STR2-MF-16-30-K0H-R-F

Model: Twin rod cylinder, fine speed

Ⓐ Bearing : Metal bush bearing
Ⓑ Bore size : ø16 mm
Ⓒ Port thread : Rc thread
Ⓓ Stroke : 30 mm
Ⓔ Switch model No. : Reed switch K0H, lead wire 1 m
Ⓕ Switch quantity : 1 on rod side
Ⓖ Option : End plate material: steel

How to order switch

Switch body only

SW - K0H*

Switch model No. (Item Ⓔ above)

Clean-room specifications

(Catalog No. CB-033SA)

● Anti-dust generation structure for use in cleanrooms

STR2-B - ····· - P7*

Internal structure

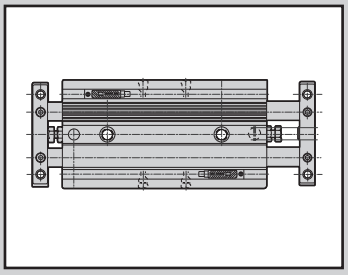
Refer to page 606 for low-speed STR2-$^{M}_{B}$O Series.

Dimensions

Same as STR2 Series (double acting/single rod). Refer to page 590.

Technical data

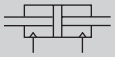
Refer to Measuring methods (in Pneumatic Cylinders I (Catalog No.CB-029SA) on page 1161), for technical data regarding measuring methods.



Twin rod cylinder/double acting/double rod

STR2-$^{M}_{B}$D Series

● Bore size: ø6/ø10/ø16/ø20/ø25/ø32

JIS symbol 

RoHS CAD

Specifications

Item		STR2-MD (metal bush bearing) STR2-BD (ball bearing)					
Bore size mm		ø6	ø10	ø16	ø20	ø25	ø32
Actuation		Double acting/double rod					
Working fluid		Compressed air					
Max. working pressure MPa		0.7 (≈100 psi, 7 bar)					
Min. working pressure MPa		0.25 (≈36 psi, 2.5 bar)	0.2 (≈29 psi, 2 bar)	0.15 (≈22 psi, 1.5 bar)			
Proof pressure MPa		1.05 (≈150 psi, 10.5 bar)					
Ambient temperature °C		-10 (14°F) to 60 (140°F) (no freezing)					
Port size		M5					Rc1/8
Stroke tolerance mm		+2.0 0					
Adjustable stroke range mm		0 to -5					
Working piston speed mm/s		50 to 500					
Non-rotating accuracy (reference value)	STR2-M	±0.4°	±0.3°			±0.2°	
	STR2-B	±0.2°	±0.1°			±0.3°	
Piston rod	STR2-M	Metal bush bearing					
Bearing	STR2-B	Ball bearing					
Cushion		Rubber cushion					
Lubrication		Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)					
Max absorbed energy J *1	PULL	0.059	0.083	0.083	0.127	0.237	0.311

*1: The allowable absorbed energy of the double rod is for the PULL only.

Stroke

Bore size	Stroke (mm)	Max. stroke (mm)	Min. stroke (mm)	Min. stroke with switch (mm)
ø6	10, 20, 30, 40, 50	50	5	10
ø10				
ø16	10, 20, 30, 40, 50 60, 70, 80, 90, 100	100		
ø20				
ø25				
ø32				

Theoretical thrust table

(Unit: N)

Bore size (mm)	Working pressure MPa						
	0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø6	-	-	9.42	12.6	15.7	18.8	22.0
ø10	-	20.1	30.2	40.2	50.3	60.3	70.4
ø16	36.8	49.0	73.5	98.0	1.23×10^2	1.47×10^2	1.72×10^2
ø20	60.3	80.4	1.21×10^2	1.61×10^2	2.01×10^2	2.41×10^2	2.81×10^2
ø25	1.01×10^2	1.35×10^2	2.02×10^2	2.70×10^2	3.37×10^2	4.04×10^2	4.72×10^2
ø32	1.81×10^2	2.41×10^2	3.62×10^2	4.83×10^2	6.03×10^2	7.24×10^2	8.44×10^2

Switch specifications

● 1-color/2-color LED

Item	Proximity 2-wire		Proximity 3-wire			Reed 2-wire			
	K2H/K2V	K2YH/ K2YV	K3H/K3V	K3PH/K3PV (Made to order)	K3YH/ K3YV	K0H/K0V		K5H/K5V	
Applications	Dedicated for programmable controller		For programmable controller, relay			For programmable controller, relay		For programmable controller, relay, IC circuit (without indicator lamp), serial connection	
Output method	-		NPN output	PNP output	NPN output	-			
Power supply voltage	-		10 to 28 VDC			-			
Load voltage	10 to 30 VDC		30 VDC or less			12 VDC/24 VDC	110 VAC	5/12/24 VDC	110 VAC
Load current	5 to 20 mA (*3)		50 mA or less			5 to 50mA	7 to 20mA	50 mA or less	20 mA or less
Indicator lamp	LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		-	
Leakage current	1 mA or less		10 μA or less			0mA			
Weight g	1 m: 18 3 m: 49 5 m: 80	1 m: 31 3 m: 85 5 m: 139	1 m: 18 3 m: 49 5 m: 80		1 m: 31 3 m: 85 5 m: 139	1 m: 18 3 m: 49 5 m: 80			

*1 : Refer to Ending Page 1 for detailed switch specifications and dimensions.
*2 : Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.
*3 : The max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)

Cylinder weight

Unit: g

Bore size	Product weight at 0 mm stroke		Additional weight per S = 10 mm
	STR2-M	STR2-B	
ø6	100	95	13
ø10	185	200	20
ø16	450	475	44
ø20	735	730	60
ø25	1160	1120	82
ø32	1960	2060	115

(Example) Product weight
STR2-MD-6-10-K2H-D

- Product weight for 0 mm stroke...100g
- Additional weight for 10 mm stroke...13 x1=13g
- Weight of 2 cylinder switches =36g
- Product weight.....100g+13g+36g=149g

How to order

Without switch (built-in magnet for switch)

STR2 - M D - 16 ( ) - 30 ——— O

With switch (built-in magnet for switch)

STR2 - M D - 16 ( ) - 30 - K0H - R - O

Model No. STR2

Ⓐ Bearing

Ⓑ Bore size

Ⓒ Port thread

Ⓓ Stroke
Refer to page 612 for the min. stroke.

Ⓔ Switch model No. *1

Ⓕ Switch quantity

Ⓖ Option *2

Code	Description
Ⓐ Bearing	
M	Metal bush bearing
B	Ball bearing
Ⓑ Bore size (mm)	
6	ø6
10	ø10
16	ø16
20	ø20
25	ø25
32	ø32
Ⓒ Port thread	
Blank	Rc thread
NN	NPT thread (ø32 only) (made-to-order product)
GN	G thread (ø32 only) (made-to-order product) *3
Ⓓ Stroke (mm)	
10	10 — ø6 to ø32
20	20
30	30
40	40
50	50
60	60 — ø16 to ø32
70	70
80	80
90	90
100	100

Ⓔ Switch model No.

Straight lead wire	L-shaped lead wire	Contact	Voltage AC	Voltage DC	Indicator	Lead wire
K0H*	**K0V***	Reed	●	●	1-color LED	2-wire
K5H*	**K5V***	Reed	●	●	No indicator lamp	2-wire
K2H*	**K2V***	Proximity		●	1-color LED	2-wire
K3H*	**K3V***	Proximity		●	1-color LED	3-wire
K3PH*	**K3PV***	Proximity		●	1-color LED (made to order)	3-wire
K2YH*	**K2YV***	Proximity		●	2-color LED	2-wire
K3YH*	**K3YV***	Proximity		●	2-color LED	3-wire

*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

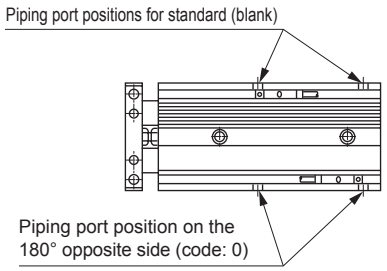
Ⓕ Switch quantity	
R	1 on rod side
H	1 on head side
D	2

Ⓖ Option	
F	End plate material: steel
O	Piping port position on the 180° opposite side

Precautions for model No. selection

*1 : STR2-B-6 and 10 are not compatible with a reed switch.

*2 : The piping port positions for "O" are as shown in the figure below.



*3 : In the case of G thread, ports on the opposite side (option "O") are not available. Rather than plug sealing, they are simply not provided. (The standard ports are not provided in the case of option "O".)

[Example of model No.]

STR2-MD-16-30-K0H-R-O

Model: Twin rod cylinder, double rod

Ⓐ Bearing : Metal bush bearing
Ⓑ Bore size : ø16 mm
Ⓒ Port thread : Rc thread
Ⓓ Stroke : 30 mm
Ⓔ Switch model No. : Reed K0H switch
Ⓕ Switch quantity : 1 on rod side
Ⓖ Option : Piping port position on the 180° opposite side

How to order switch

SW - K0H*

Switch model No. (Item Ⓔ above)

Internal structure and parts list (metal bush bearing)

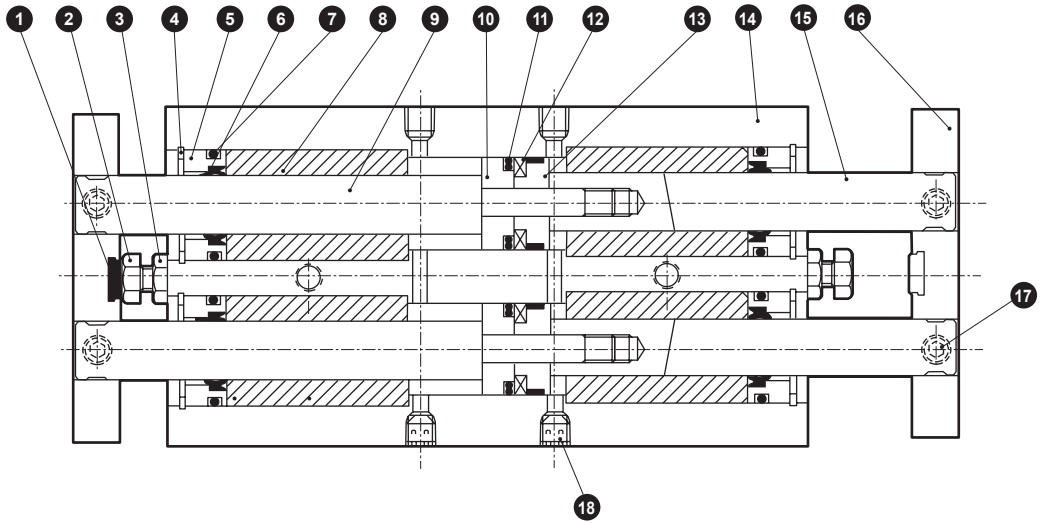
● Double rod

STR2-MD

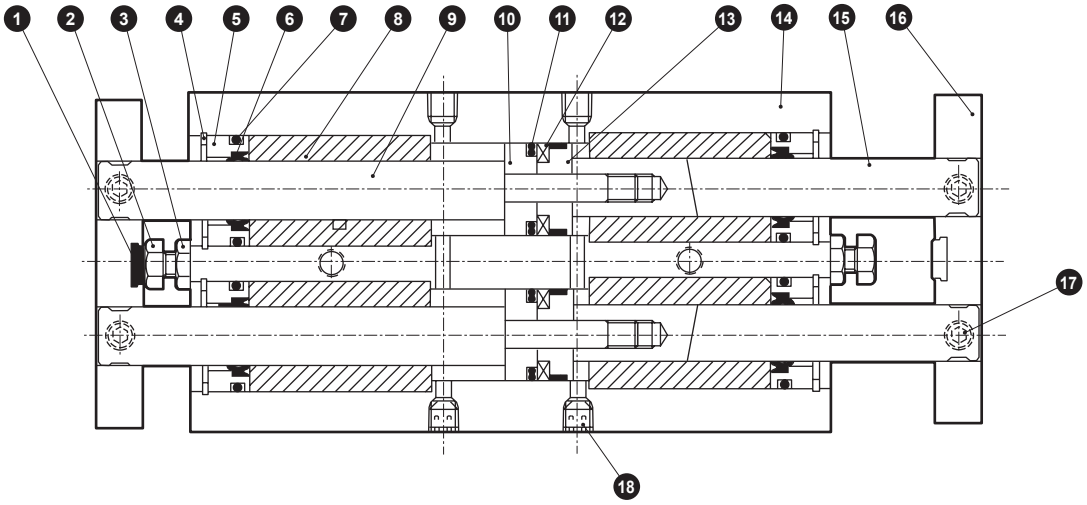
● Piping port position on the 180° opposite side

STR2-MD ··· -O

ø6, ø10



ø16, ø32



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		10	Piston	Aluminum alloy	Chromate
2	Hexagon head bolt	Stainless steel		11	Piston packing	Nitrile rubber	
3	Hexagon nut	Stainless steel		12	Magnet	Plastic	
4	Snap ring for hole	Stainless steel		13	Spacer	Aluminum alloy	Chromate
5	Housing	Aluminum alloy	Chromate	14	Cylinder body	Aluminum alloy	Hard alumite
6	Rod packing	Nitrile rubber		15	Piston rod (B)	Stainless steel (ø6 to ø20) Steel (ø25, ø32)	Industrial chrome plating (ø16 to ø32)
7	O-ring	Nitrile rubber					
8	Bush	Aluminum alloy		16	End plate *1	Aluminum alloy	Alumite
9	Piston rod (A)	Stainless steel (ø6 to ø20) Steel (ø25, ø32)	Industrial chrome plating (ø16 to ø32)	17	Hexagon socket set screw	Stainless steel	
				18	Hexagon socket set screw	Stainless steel	

*1 : The steel end plate is zinc chromate.

Repair parts list

Bore size (mm)	Kit No.	Repair parts No.
ø 6	STR2-D-6K	❶ ❻ ❼ ⓫
ø10	STR2-D-10K	
ø16	STR2-D-16K	
ø20	STR2-D-20K	
ø25	STR2-D-25K	
ø32	STR2-D-32K	

Note: Specify the kit No. when placing an order.

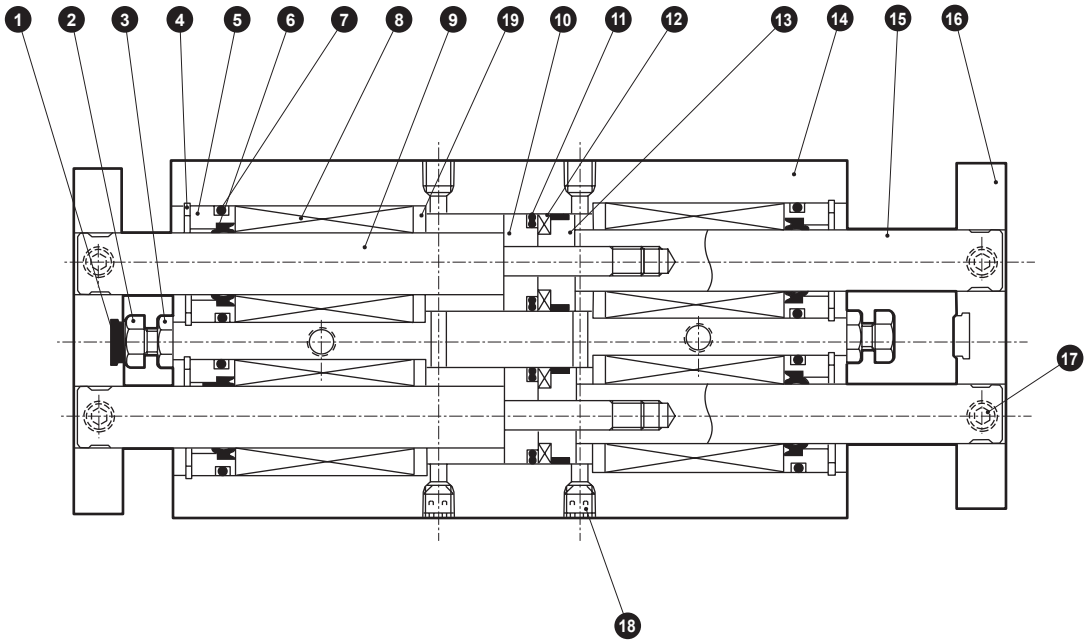
Internal structure and parts list (ball bearing)

● Double rod

STR2-BD

● Piping port position on the 180° opposite side

STR2-BD ··· -O



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Cushion rubber (H)	Urethane rubber		10	Piston	Aluminum alloy	Chromate
2	Hexagon head bolt	Stainless steel		11	Piston packing	Nitrile rubber	
3	Hexagon nut	Stainless steel		12	Magnet	Plastic	
4	Snap ring for hole	Stainless steel		13	Spacer	Aluminum alloy	Chromate
5	Housing	Stainless steel (ø6, ø10) Aluminum alloy (ø16 to ø32)	Chromate	14	Cylinder body	Aluminum alloy	Hard alumite
				15	Piston rod (B)	Steel	Industrial chrome plating
6	Rod packing	Nitrile rubber		16	End plate	Aluminum alloy	Alumite
7	O-ring	Nitrile rubber		17	Hexagon socket set screw	Stainless steel	
8	Bearing			18	Hexagon socket set screw	Stainless steel	
9	Piston rod (A)	Steel	Industrial chrome plating	19	Spacer	Aluminum alloy	Chromate

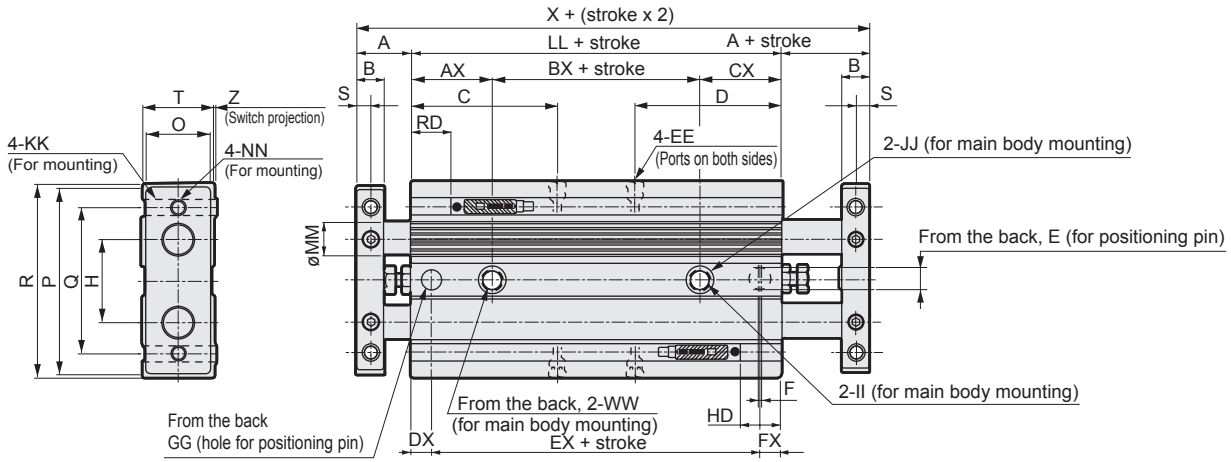
Repair parts list

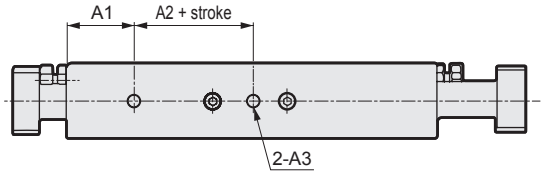
Bore size (mm)	Kit No.	Repair parts No.
ø 6	STR2-D-6K	❶ ❻ ❼ ⓫
ø10	STR2-D-10K	
ø16	STR2-D-16K	
ø20	STR2-D-20K	
ø25	STR2-D-25K	
ø32	STR2-D-32K	

Note: Specify the kit No. when placing an order.

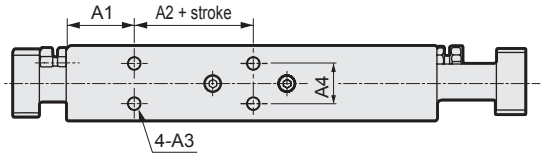
Dimensions (ø6 to ø32)

● Double rod (D), piping port position on the 180° opposite side (O)





ø6, ø10, ø16



ø20, ø25, ø32

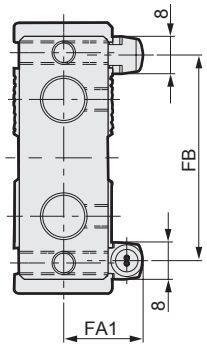
*1 : HD and RD dimensions for 10 mm stroke differ from these dimensions according to the setting.
*2 : Refer to page 619 for HD, RD and protruding dimensions of the 2-color LED switch.
*3 : STR2-B-6 and 10 are not compatible with K0 and K5 reed switches.
*4 : The cylinder may tilt due to the uneven surface if it is installed with the spot face side (JJ) contacted. In this case, change the port position or use the option of piping port position on the 180° opposite side (O) to keep the spot face side from being the contacting surface.

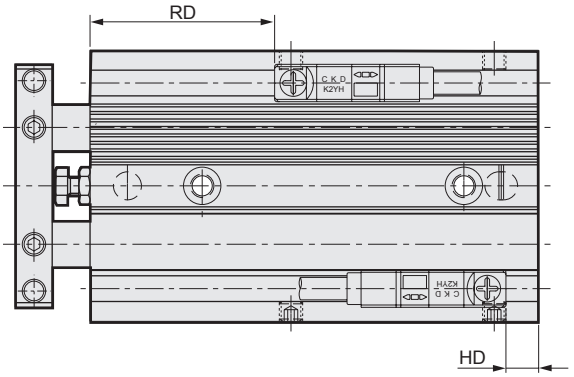
Code	Basic dimensions																
Bore size (mm)	A	B	C	D	E	EE	F	GG	H	II	JJ	KK	LL	MM	NN	O	P
ø 6	12	6	24.5	24.5	$4^{+0.07}_{+0.02}$ depth 4	M5	1	$4^{+0.07}_{+0.02}$ depth 4	14	3.4	6.5 spot face depth 3.3	M3 through	61	4	M3 through	11	34
ø10	14	6	35	35	$4^{+0.07}_{+0.02}$ depth 4	M5	1	$4^{+0.07}_{+0.02}$ depth 4	20	4.3	8 spot face depth 4.4	M4 through	82.5	6	M4 through	13	42
ø16	16	8	43	43	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	25	4.3	8 spot face depth 4.4	M5 through	99	10	M5 through	19	52
ø20	20	10	46	46	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	28	5.2	9.5 spot face depth 5.4	M5 through	108	12	M5 through	24	60
ø25	22	12	44	44	$6^{+0.07}_{+0.02}$ depth 6	M5	1	$6^{+0.07}_{+0.02}$ depth 6	34	6.3	11 spot face depth 6.5	M6 through	108	14	M6 through	30	70
ø32	22	12	56	56	$6^{+0.07}_{+0.02}$ depth 6	Rc 1/8	1	$6^{+0.07}_{+0.02}$ depth 6	44	6.3	11 spot face depth 6.5	M6 through	133	16	M6 through	36	94

Code																	K0/K5/K2/K3	
Bore size (mm)	Q	R	S	T	WW	X	AX	BX	CX	DX	EX	FX	Z	A1	A2	A3	A4	HD	RD
ø 6	29	36	3	13	M4 depth 5	85	20	21	20	7	47	7	1.0	15	10	M3 depth 4	-	20.5 *1	21 *1
ø10	36	44	3	15	M5 depth 6	110.5	24	34.5	24	8	65.5	9	1.0	15	20	M3 depth 3.5	-	30.5 *1	32.5 *1
ø16	45	58	4	21	M5 depth 6	131	24	51	24	8	83	8	0.5	20	25	M4 depth 4	-	39	40.5
ø20	50	62	5	27	M6 depth 8	148	24	60	24	9	90	9	0.5	20	30	M4 depth 4	13	43	45
ø25	60	72	6	33	M8 depth 8	152	24	60	24	9	90	9	0.5	20	30	M5 depth 6	18	43.5	44.5
ø32	75	96	6	38	M8 depth 8	177	24	85	24	9	115	9	0.5	20	40	M5 depth 8	24	55.5	57.5

STR2 Series with switch common dimensions (2-color LED switch)

● Standard, low speed (O), position locking (Q), fine speed (F), end plate material: steel (F)
rear piping (R), copper and PTFE free (P6), piping port position on the 180° opposite side (O)



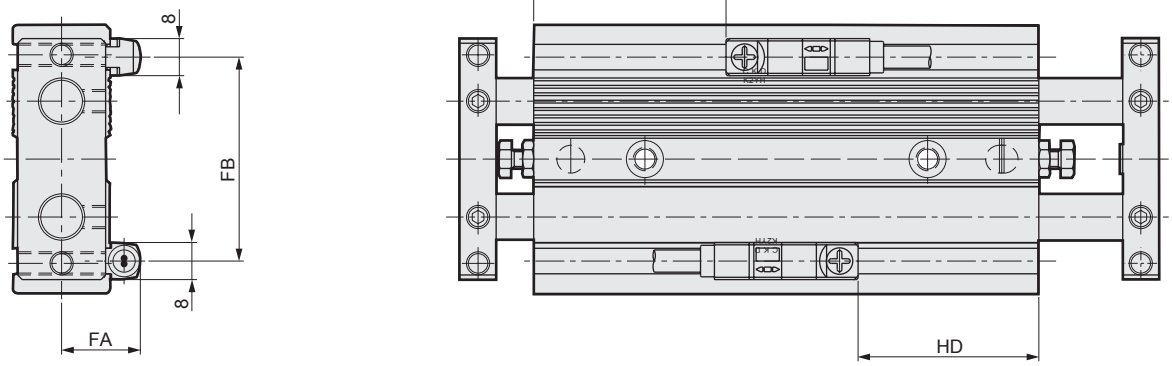


● 2-color LED K□YH/V

Code / Bore size (mm)	FA	FB	RD				HD			
			STR2-$^{M}_{B}$ STR2-$^{M}_{B}$O STR2-$^{M}_{B}$-F STR2-$^{M}_{B}$-P6 STR2-$^{M}_{B}$-O	STR2-$^{M}_{B}$-R	STR2-$^{M}_{B}$-Q-H	STR2-$^{M}_{B}$-Q-R	STR2-$^{M}_{B}$ STR2-$^{M}_{B}$O STR2-$^{M}_{B}$-F STR2-$^{M}_{B}$-P6 STR2-$^{M}_{B}$-O	STR2-$^{M}_{B}$-R	STR2-$^{M}_{B}$-Q-H	STR2-$^{M}_{B}$-Q-R
ø6	13.5	24	20	20	-	-	2.5	12.5	-	-
ø10	14.5	34	32	32	-	-	1	11	-	-
ø16	17	44	38.5	38.5	38.5	68.5	5.5	15.5	35.5	5.5
ø20	20	49	44	44	44	74	9.5	19.5	39.5	9.5
ø25	23	58	42.5	42.5	42.5	72.5	10.5	20.5	40.5	10.5
ø32	25.5	71	54.5	54.5	54.5	84.5	14.5	24.5	44.5	14.5

STR2 Series with switch common dimensions (2-color LED switch)

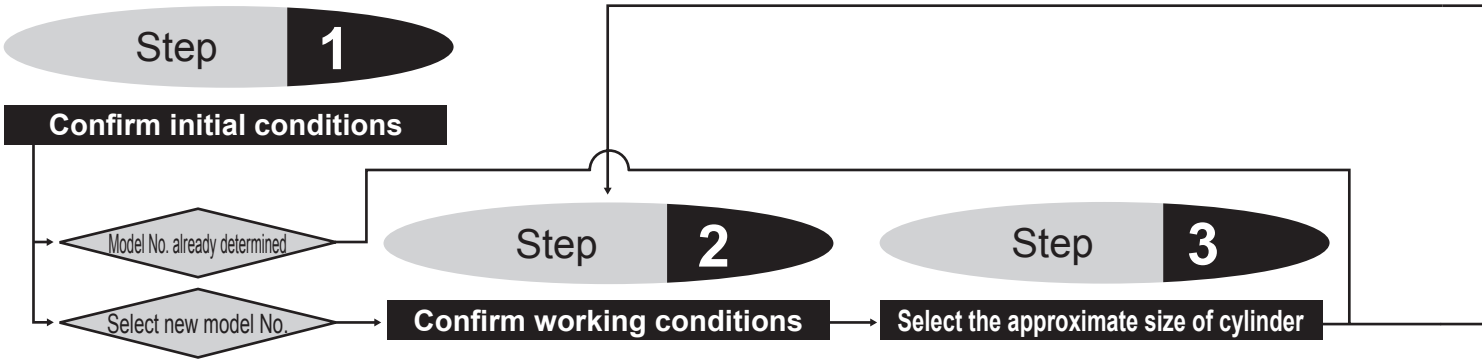
● Double rod (D)



● 2-color LED K□YH/V

Code / Bore size (mm)	FA	FB	RD	HD
ø6	13.5	24	20	19.5
ø10	14.5	34	31	29
ø16	17	44	39	38
ø20	20	49	44	42
ø25	23	58	43.5	42.5
ø32	25.5	71	56.5	54.5

As the selection conditions are different from those of general air cylinders, confirm whether the model is adequate or not according to the selection guide.



Step 2 Confirm working conditions

1. Working pressure P (MPa)
2. Total applied load W(N)
   (Total applied load)
   W = (Applied load) + (Jig load) + (Self-weight of movable part: Fa). Table 1 shows the formula of the self weight of movable parts.

Table 1 Formula of the self weight of movable parts

Tube	Fa: Self-weight of movable part (N)
	STR2
ø6	0.16+0.002ST
ø10	0.38+0.004ST
ø16	1.08+0.013ST
ø20	1.66+0.013ST
ø25	2.82+0.025ST
ø32	4.33+0.025ST

3. Mounting orientation
   [Actuation]
   Horizontal, vertical-rise, vertical-decline
4. Stroke ST (mm)
5. Operation time t(s)
6. Operation speed V (mm/s)
   Formula of cylinder average operation speed Va
   Va=ST /t (mm/s)

Step 3 Select the approximate size of cylinder

● Formula for calculating cylinder size (bore size)

$F = \pi/4 \times D^2 \times P$

$\therefore D = \sqrt{4F/\pi P}$

D: Cylinder bore size (mm)
P: Working pressure (MPa)
F: Cylinder theoretical thrust (N)

● When calculating from the theoretical thrust table

Approximate required thrust ≥ Applied load x 2
("x 2" in "Applied load x 2" is for when the load factor is approx. 50% as a safety coefficient)

[Example] Working pressure 0.5(MPa)
Applied load 25(N)
Required thrust: 25(N)×2=50(N)
The bore size selected from Table 2 with theoretical thrust of 50 N and over at working pressure of 0.5 MPa will be ø10 or more.
D=ø10

[Cylinder theoretical thrust]

Table 2 Cylinder theoretical thrust table

Theoretical thrust table Unit: N

Bore size (mm)	Operating direction	Working pressure MPa		
		0.1	0.15	0.2
ø6	Push	-	-	11.3
	Pull	-	-	6.28
ø10	Push	-	-	31.4
	Pull	-	-	20.1
ø16	Push	40.2	60.3	80.4
	Pull	24.5	36.8	49.0
ø20	Push	62.8	94.2	1.26×10^2
	Pull	40.2	60.3	80.4
ø25	Push	98.2	1.47×10^2	1.96×10^2
	Pull	67.4	1.01×10^2	1.35×10^2
ø32	Push	1.61×10^2	2.41×10^2	3.22×10^2
	Pull	1.21×10^2	1.81×10^2	2.41×10^2

*Refer to page 580 for the theoretical thrust table.

Step 4

Calculate the total applied load (W) and each moment

To the next page

Step 4 Calculate the total applied load (W) and each moment

● Calculate the static load(W_0) and the moment (M) based on the load mounted on the cylinder.

W_0 = (Applied load) + (Jig load) (N)

$M_1=F_1\times \ell_1$ (N·m)

$M_2=F_2\times \ell_2$ (N·m)

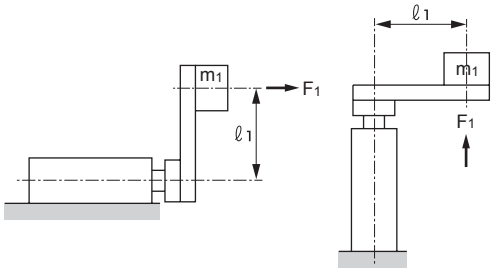
$M_3=F_3\times \ell_3$ (N·m)

For values of F_1, F_2 and F_3, use those shown in Fig. 2.

Fig. 2 Formula for calculating each moment
Calculate each moment from the applied load, inertia force coefficient and eccentric distance.

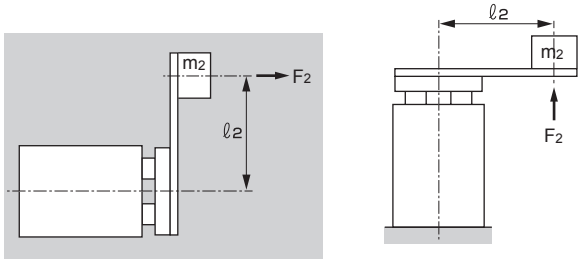
[Bending moment]

$M_1=F_1\times \ell_1=10\times m_1\times G\times \ell_1$



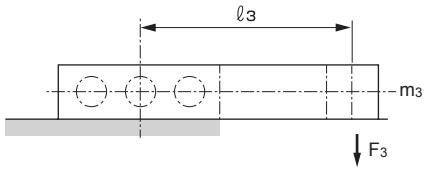
[L-shaped moment]

$M_2=F_2\times \ell_2=10\times m_2\times G\times \ell_2$



[Torsion moment]

$M_3 = F_3\times \ell_3 = 10\times m_3\times \ell_3$

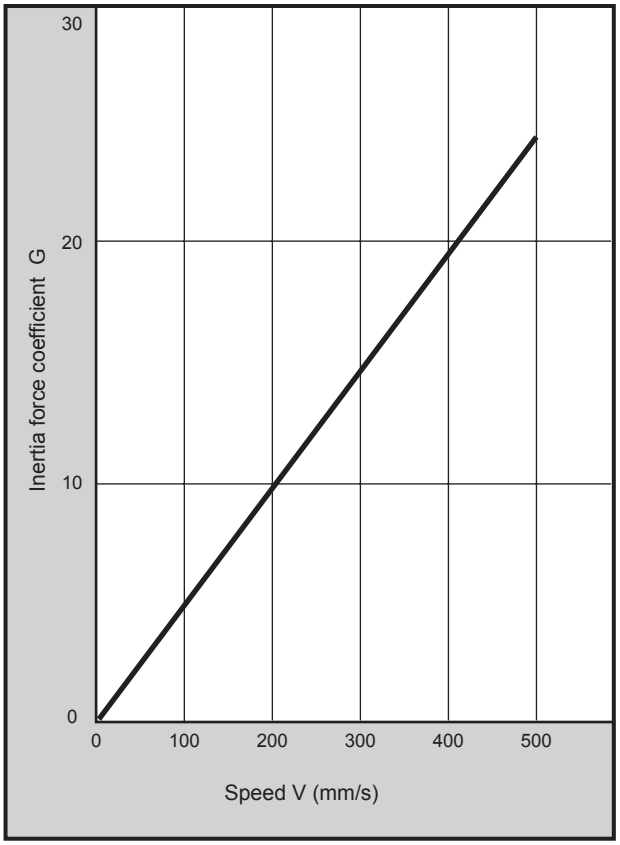


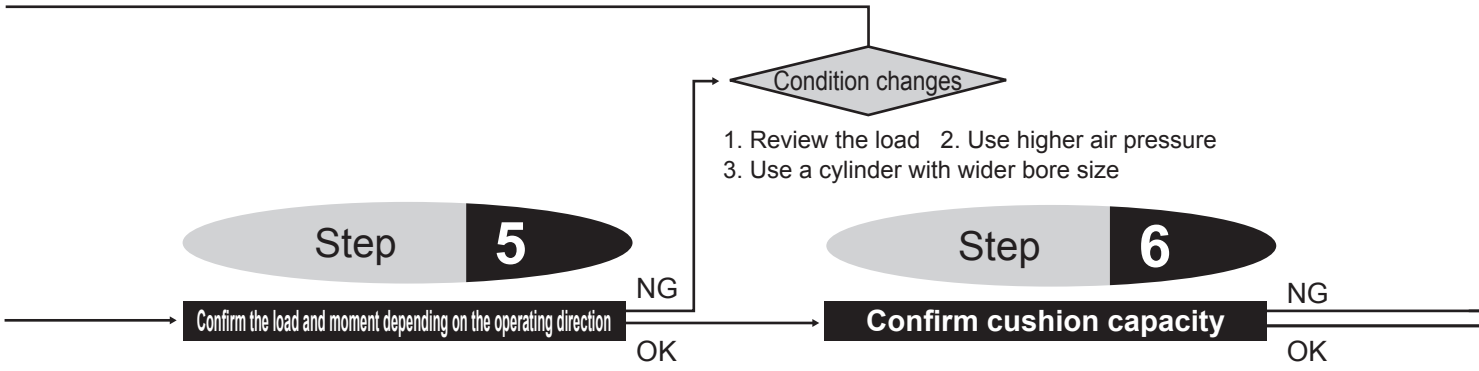
m_1:
m_2: } Load weight (kg)
m_3:

ℓ_1:
ℓ_2: } Eccentric distance (m)
ℓ_3:

G : Inertia force coefficient

Fig. 3 Trend of inertia force coefficient for guided cylinder





Step 5 Confirm the load and moment depending on the operating direction

5-1 Confirm applied load

1 For horizontal operation

The value of static applied load must be the allowable load value or less.

Static applied load Wo Value obtained in Step 4
Allowable lateral load Wmax Select from Table 3 depending on the stroke

(When using a custom stroke, select the longer standard stroke)

Wo≤Wmax

Table 3 Allowable lateral load

● Metal bush bearing Unit: N

Type	Stroke (mm)			
	10	20	30	40
STR2-M-6	2.4	1.9	1.5	1.3
STR2-M-10	5.8	4.8	4.1	3.5
STR2-M-16	15.9	13.3	11.5	10.1
STR2-M-20	20.3	17.3	15.1	13.4
STR2-M-25	22.1	18.9	16.5	14.7
STR2-M-32	34.9	30.2	26.7	23.9

● Ball bearing Unit: N

Type	Stroke (mm)			
	10	20	30	40
STR2-B-6	2.6	1.9	1.5	1.2
STR2-B-10	6.0	4.4	3.6	3.0
STR2-B-16	11.4	8.5	7.0	5.9
STR2-B-20	12.7	9.6	7.9	6.8
STR2-B-25	14.7	11.1	9.2	7.9
STR2-B-32	24.3	18.5	15.4	13.3

* Refer to page 624 for allowable lateral load.
Also refer to the graphs on pages 625 and 626 for eccentric load.

2 For vertical operation

The total applied load value must be the value obtained by applying the load factor to the theoretical thrust

● Calculation of load factor

Total applied load W Value obtained in Step 2
Theoretical thrust of cylinder F Select from the theoretical thrust table on page 580 depending on the pressure

$\alpha = W/F \times 100$ (%)

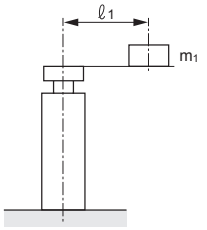
● Determine the load factor by taking into account the status of utilization such as stability margin and service life of the cylinder. For general use, the value within the range in Table 4 is desirable.

Table 4 Appropriate range of load factor (reference value)

Working pressure (MPa)	Load factor (%)
0.1 to 0.3	α ≤ 40
0.3 to 0.6	α ≤ 50
0.6 to 1.0	α ≤ 60

● A lateral load works when an eccentric load is applied.

The lateral load should be within the allowable lateral load in Table 3.



$$\frac{m_1 \times \ell_1 \times 10}{L} \leq W_{max}$$

ST: Stroke (m)

Bore size	L	Bore size	L
ø6	0.022+ST	ø20	0.032+ST
ø10	0.027+ST	ø25	0.034+ST
ø16	0.026+ST	ø32	0.036+ST

5-2 Confirming static moment

1 Divide the value of bending moment and L-shaped moment by the value in Table 5 to obtain the moment ratio and check that the total value of the moment ratio is 1.0 or less.

● Calculation of moment ratio

Bending moment M_1 } Calculated value
L-shaped moment M_2 } in Step 4

$M_1/M_{1max}+M_2/M_{2max} \leq 1.0$

Condition changes

1. Install an external shock absorber
2. Decrease the operation speed
3. Use a cylinder with larger bore size

Selection complete

Table 5 Allowable value of moment (N·m)

Bore size	Allowable bending moment $M_{1\,max}/M_{2\,max}$
ø6	3.6
ø10	3.6
ø16	9.2
ø20	9.2
ø25	74
ø32	74

2 The torsion moment is the allowable torque value or less.thing

Torsion moment M3 Value obtained in Step 4

Allowable torque

M_3 max Select from Table 6 depending on the stroke

(When using a custom stroke, select the longer standard stroke)

$$M_3 \leq M_3\,max$$

Table 6 Allowable torque

● Metal bush bearing (N·m)

Type	Stroke (mm)			
	10	20	30	40
STR2-M-6	0.008	0.006	0.005	0.004
STR2-M-10	0.029	0.024	0.020	0.017
STR2-M-16	0.099	0.083	0.071	0.063
STR2-M-20	0.142	0.121	0.105	0.093
STR2-M-25	0.187	0.160	0.140	0.125
STR2-M-32	0.383	0.332	0.293	0.262

● Ball bearing (N·m)

Type	Stroke (mm)			
	10	20	30	40
STR2-B-6	0.009	0.006	0.005	0.004
STR2-B-10	0.030	0.022	0.018	0.015
STR2-B-16	0.071	0.053	0.043	0.036
STR2-B-20	0.088	0.067	0.055	0.047
STR2-B-25	0.125	0.094	0.078	0.067
STR2-B-32	0.267	0.203	0.169	0.146

* Refer to page 627 for allowable torque.

Step 6 Confirm cushion capacity

Check if the kinetic energy generated by an actual load can be absorbed by the cylinder cushion.

● To obtain the allowable absorbed energy of cylinder (E1), use the value in Table 7.

● Kinetic energy of piston(E_2)formula

$$E_2=1/2\times W\times V^2\times (J) \quad \frac{1}{10}$$

W : Total applied load (N) Value obtained in Step 2

V: Speed of the piston entering the cushion (m/s)

$$V=ST/t\times (1+1.5\times \alpha/100)$$

ST: stroke (m)

t: Operating time (s)

α: Load factor (%)

Allowable absorbed energy of cylinder

● The kinetic energy absorption performance of the cylinder's cushion depends on the cylinder bore size. For the guided cylinder, use the values in Table 7 for comparison.

Table 7 Allowable absorbed energy value (E_1) of STR2

Bore size	Allowable absorbed energy (J)	
	Rubber cushion	
	push	pull
ø6	0.008	0.059
ø10	0.061	0.083
ø16	0.181	0.083
ø20	0.303	0.127
ø25	0.68	0.237
ø32	1.3	0.311

$E_1>E_2$

(Allowable absorbed energy) > (Kinetic energy of piston)

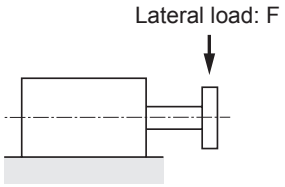
Selection complete

$E_1<E_2$

(Allowable absorbed energy) < (Kinetic energy of piston)

Technical data ❶ Allowable lateral load

Allowable lateral load



● Metal bush bearing (N)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-M-6	2.4	1.9	1.5	1.3	1.1	-	-	-	-	-
STR2-M-10	5.8	4.8	4.1	3.5	3.1	-	-	-	-	-
STR2-M-16	15.9	13.3	11.5	10.1	8.9	8.1	7.3	6.7	6.2	5.8
STR2-M-20	20.3	17.3	15.1	13.4	12.1	10.9	10.0	9.2	8.5	7.9
STR2-M-25	22.1	18.9	16.5	14.7	13.1	11.9	10.9	10.1	9.3	8.7
STR2-M-32	34.9	30.2	26.7	23.9	21.6	19.7	18.1	16.8	15.7	14.7

● Ball bearing (N)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-B-6	2.6	1.9	1.5	1.2	1.0	-	-	-	-	-
STR2-B-10	6.0	4.4	3.6	3.0	2.6	-	-	-	-	-
STR2-B-16	11.4	8.5	7.0	5.9	5.1	4.5	4.0	3.7	3.3	3.0
STR2-B-20	12.7	9.6	7.9	6.8	5.9	5.3	4.7	4.3	3.9	3.6
STR2-B-25	14.7	11.1	9.2	7.9	6.9	6.1	5.5	5.0	4.6	4.2
STR2-B-32	24.3	18.5	15.4	13.3	11.7	10.5	9.5	8.7	8.0	7.4

STR2-D allowable lateral load

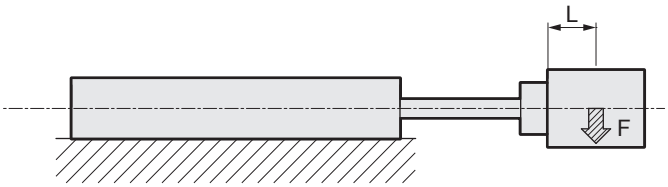
● Metal bush bearing (double rod) (N)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-MD-6	3.3	3.2	3.1	3.0	2.9	-	-	-	-	-
STR2-MD-10	8.0	7.6	7.3	7.1	7.0	-	-	-	-	-
STR2-MD-16	21.7	20.5	19.7	19.1	18.7	18.3	18.0	17.8	17.6	17.5
STR2-MD-20	26.7	25.3	24.3	23.7	23.1	22.7	22.4	22.1	21.9	21.7
STR2-MD-25	29.3	27.8	26.7	26.0	25.4	24.9	24.6	24.3	24.0	23.8
STR2-MD-32	45.2	42.9	41.3	40.1	39.1	38.3	37.7	37.2	36.7	36.3

● Ball bearing (double rod) (N)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-BD-6	3.7	3.0	2.7	2.5	2.3	-	-	-	-	-
STR2-BD-10	8.6	6.9	6.2	5.7	5.3	-	-	-	-	-
STR2-BD-16	16.6	13.3	11.7	10.7	10.0	9.4	9.0	8.6	8.3	8.0
STR2-BD-20	17.8	14.3	12.6	11.5	10.8	10.2	9.8	9.3	9.0	8.7
STR2-BD-25	20.8	16.7	14.7	13.5	12.6	11.9	11.4	10.9	10.5	10.2
STR2-BD-32	34.5	27.6	24.2	22.1	20.6	19.5	18.5	17.8	17.1	16.6

Allowable lateral load

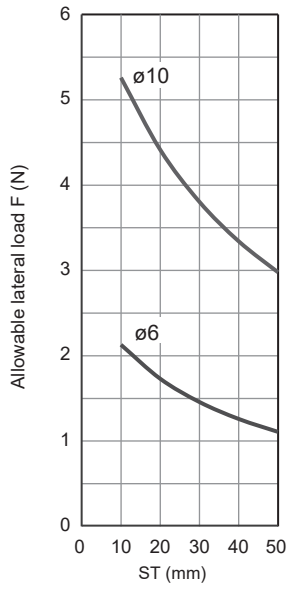


F: Lateral load (kg)
L: Load center of gravity position (mm)

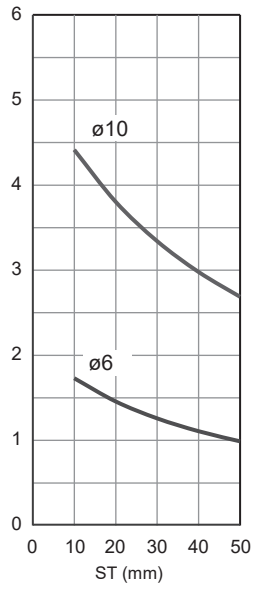
Basic Metal bush bearing

STR2-M-6/10

● When L = 5

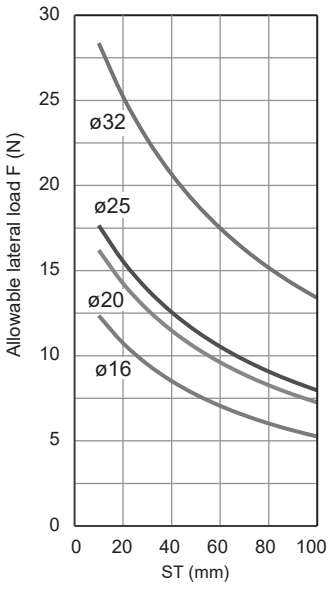


● When L = 15

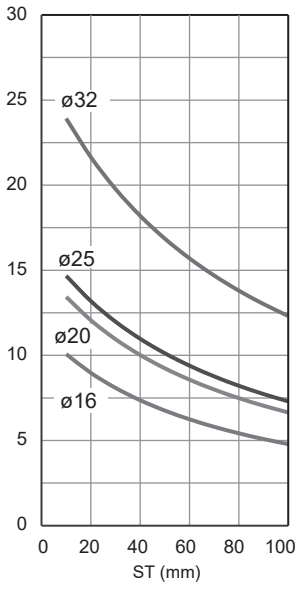


STR2-M-16/20/25/32

● When L = 15



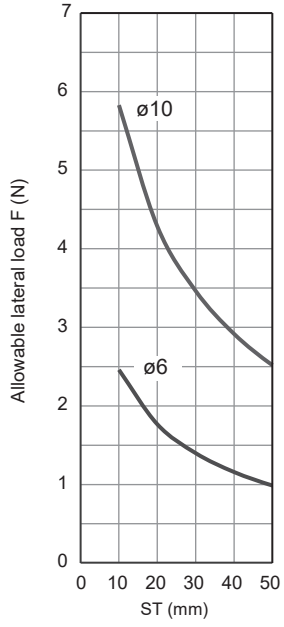
● When L = 30



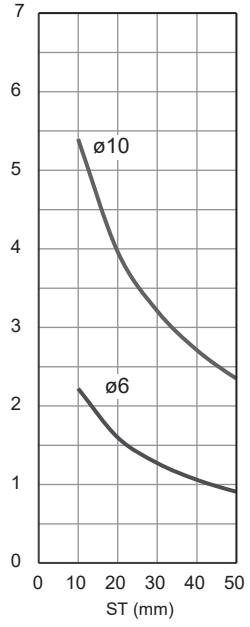
Basic Ball bearing

STR2-B-6/10

● When L = 5

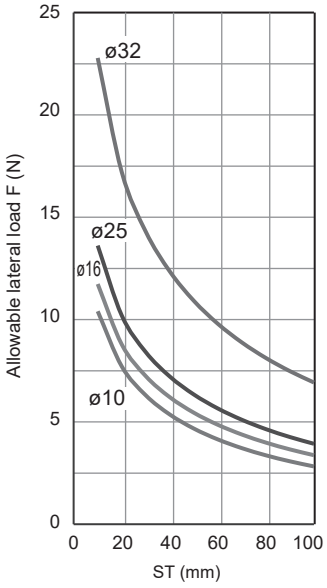


● When L = 15

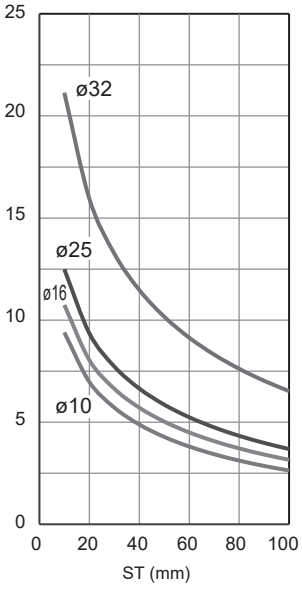


STR2-B-16/20/25/32

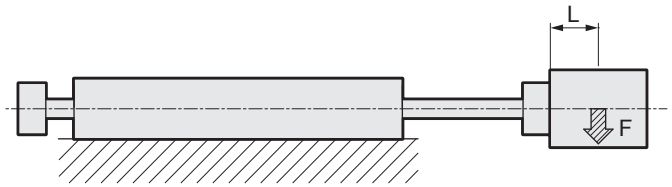
● When L = 15



● When L = 30



Allowable lateral load

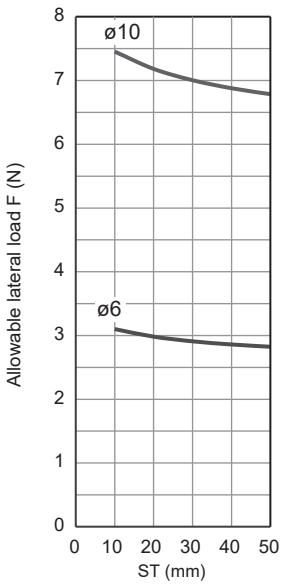


F: Lateral load (kg)
L: Load center of gravity position (mm)

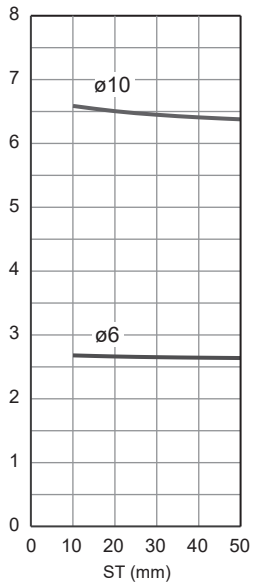
Double rod Metal bush bearing

STR2-MD-6/10

● When L = 5

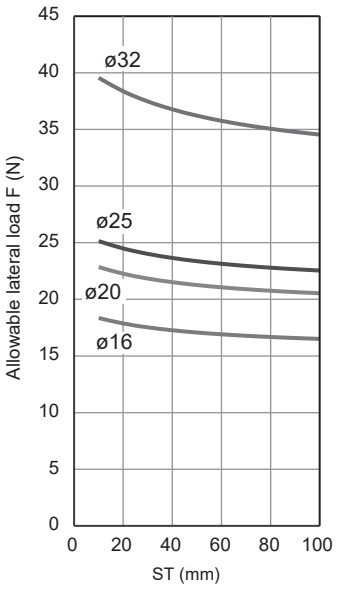


● When L = 15

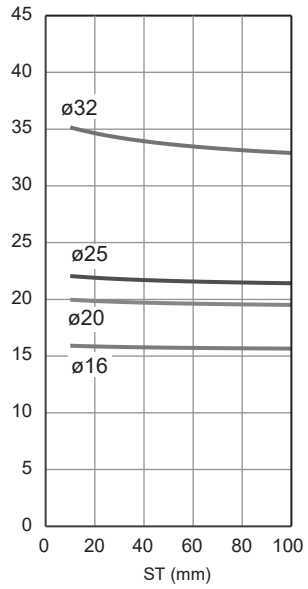


STR2-MD-16/20/25/32

● When L = 15



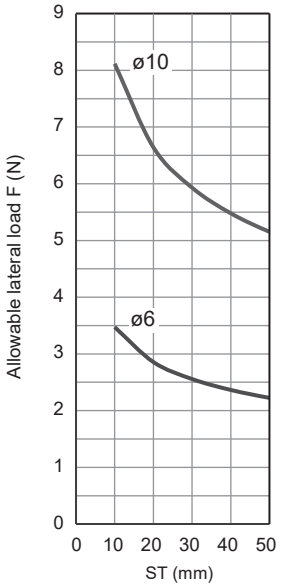
● When L = 30



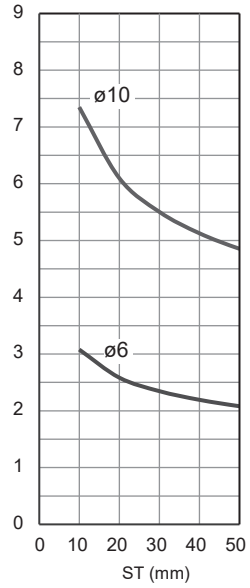
Double rod Ball bearing

STR2-BD-6/10

● When L = 5

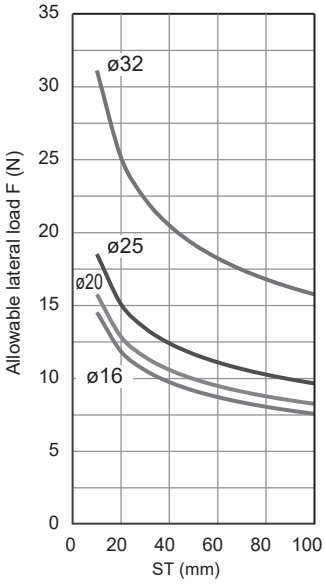


● When L = 15

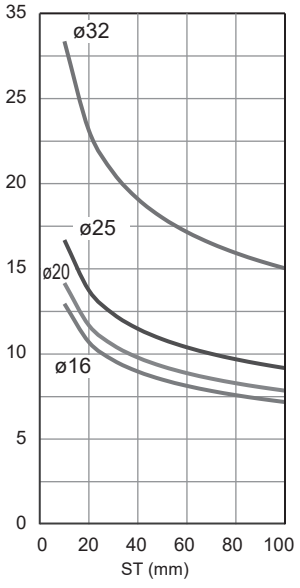


STR2-BD-16/20/25/32

● When L = 15

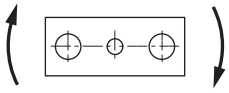


● When L = 30



Allowable torque

Torque: T (N·m)



● Metal bush bearing (N·m)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-M-6	0.008	0.006	0.005	0.004	0.003	-	-	-	-	-
STR2-M-10	0.029	0.024	0.020	0.017	0.015	-	-	-	-	-
STR2-M-16	0.099	0.083	0.071	0.063	0.055	0.050	0.045	0.041	0.038	0.036
STR2-M-20	0.142	0.121	0.105	0.093	0.084	0.076	0.070	0.064	0.059	0.055
STR2-M-25	0.187	0.160	0.140	0.125	0.111	0.101	0.092	0.085	0.079	0.074
STR2-M-32	0.383	0.332	0.293	0.262	0.237	0.216	0.199	0.184	0.172	0.161

● Ball bearing (N·m)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-B-6	0.009	0.006	0.005	0.004	0.003	-	-	-	-	-
STR2-B-10	0.030	0.022	0.018	0.015	0.013	-	-	-	-	-
STR2-B-16	0.071	0.053	0.043	0.036	0.031	0.028	0.025	0.023	0.020	0.018
STR2-B-20	0.088	0.067	0.055	0.047	0.041	0.037	0.032	0.030	0.027	0.025
STR2-B-25	0.125	0.094	0.078	0.067	0.058	0.051	0.046	0.042	0.039	0.035
STR2-B-32	0.267	0.203	0.169	0.146	0.128	0.115	0.104	0.095	0.088	0.081

STR2-D allowable torque

● Metal bush bearing (double rod) (N·m)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-MD-6	0.011	0.011	0.010	0.010	0.010	-	-	-	-	-
STR2-MD-10	0.040	0.038	0.036	0.035	0.035	-	-	-	-	-
STR2-MD-16	0.135	0.128	0.123	0.119	0.116	0.114	0.112	0.111	0.110	0.109
STR2-MD-20	0.186	0.177	0.170	0.165	0.161	0.158	0.156	0.154	0.153	0.151
STR2-MD-25	0.249	0.236	0.227	0.221	0.215	0.211	0.209	0.206	0.204	0.202
STR2-MD-32	0.497	0.471	0.454	0.441	0.430	0.421	0.414	0.409	0.403	0.399

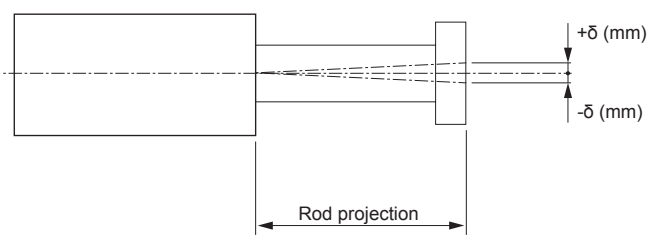
● Ball bearing (double rod) (N·m)

Type	Stroke (mm)									
	10	20	30	40	50	60	70	80	90	100
STR2-BD-6	0.013	0.010	0.009	0.008	0.008	-	-	-	-	-
STR2-BD-10	0.043	0.034	0.031	0.028	0.026	-	-	-	-	-
STR2-BD-16	0.103	0.083	0.073	0.066	0.062	0.055	0.056	0.053	0.051	0.050
STR2-BD-20	0.124	0.100	0.088	0.080	0.075	0.071	0.068	0.065	0.063	0.060
STR2-BD-25	0.176	0.142	0.125	0.114	0.107	0.101	0.096	0.092	0.089	0.086
STR2-BD-32	0.379	0.303	0.266	0.243	0.226	0.214	0.203	0.195	0.188	0.182

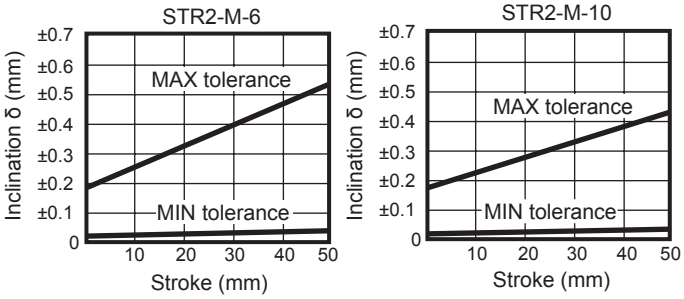
Deflection

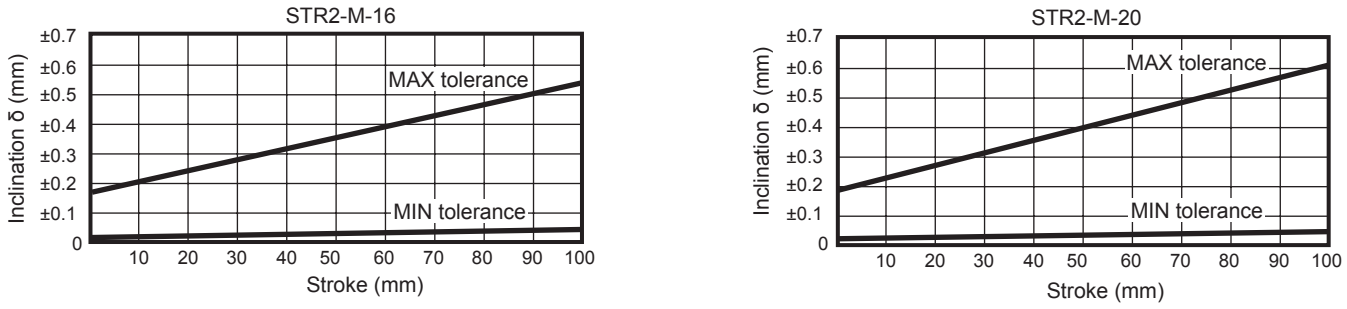
(Reference value)

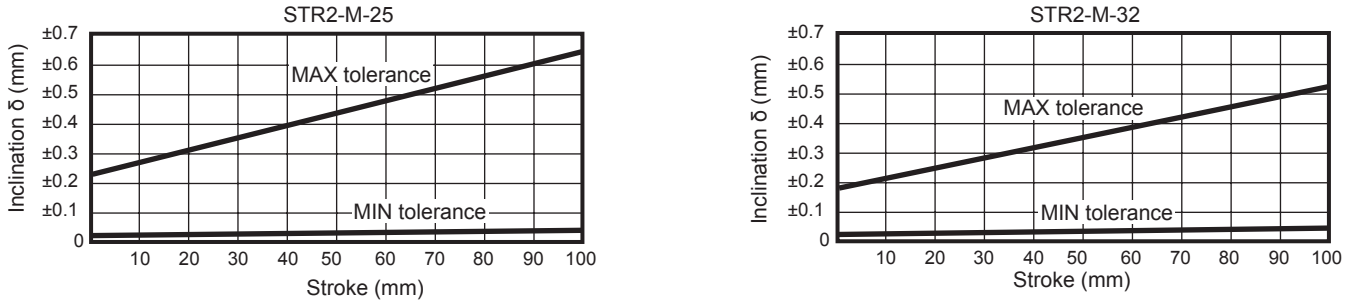
For the inclination that is produced at the end of the end plate when no load is applied, the value in the graph below is used as a guide. (Excluding sag of piston rod)



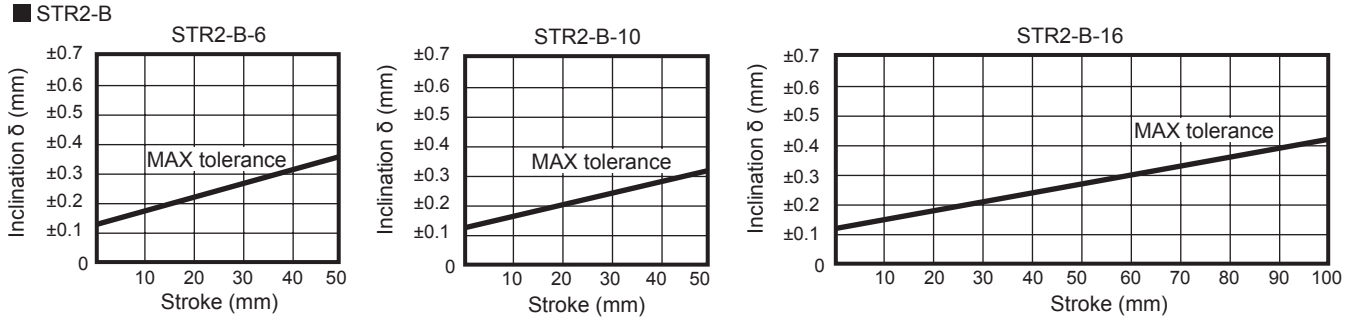
■ STR2-M

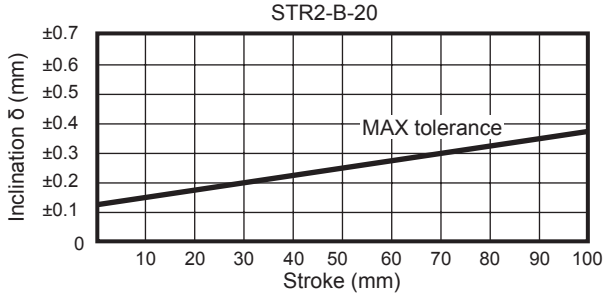


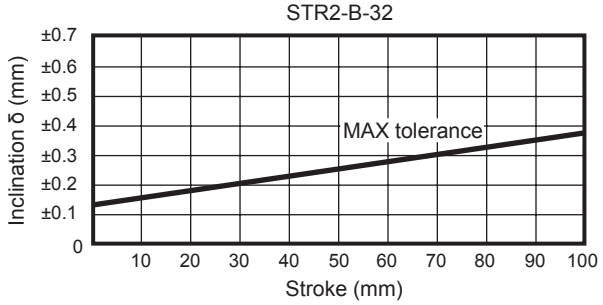


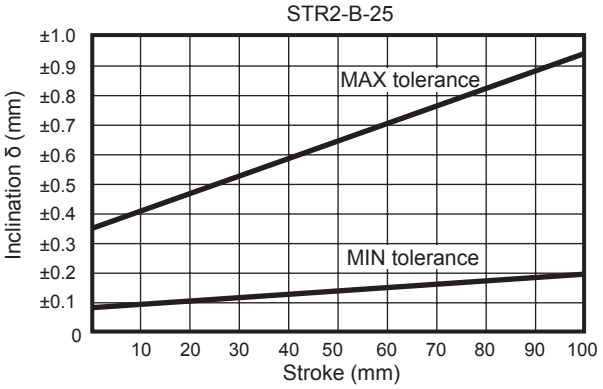


■ STR2-B



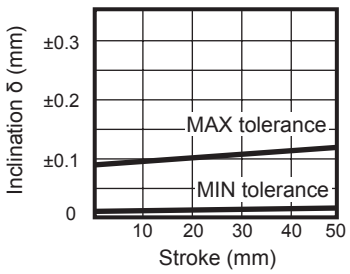




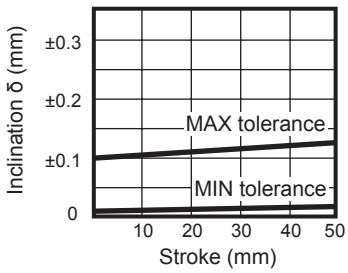


■ STR2-MD

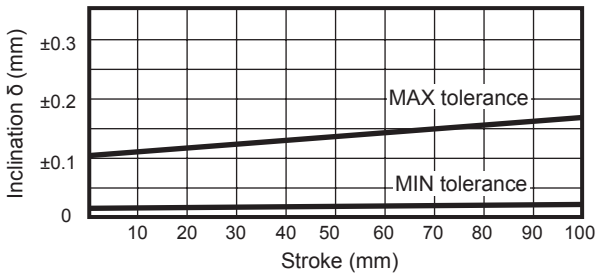
STR2-MD-6



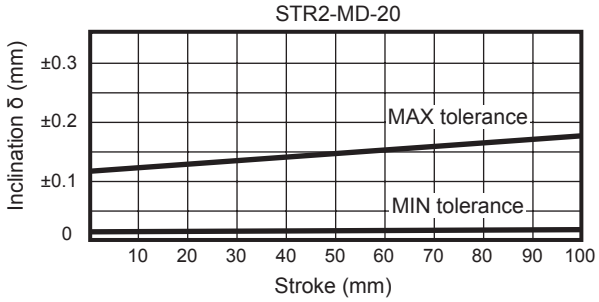
STR2-MD-10



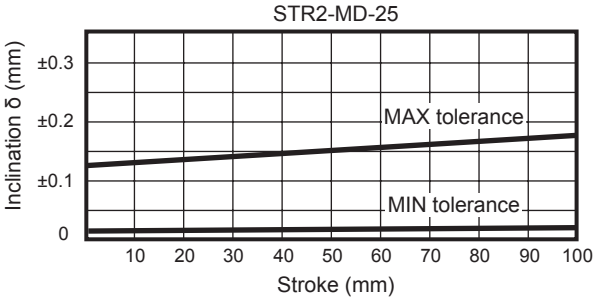
STR2-MD-16



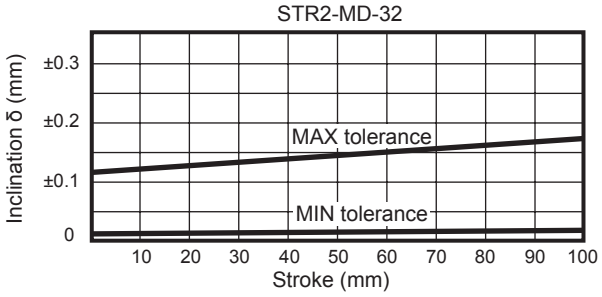
STR2-MD-20



STR2-MD-25

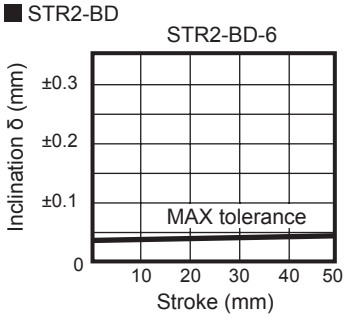


STR2-MD-32

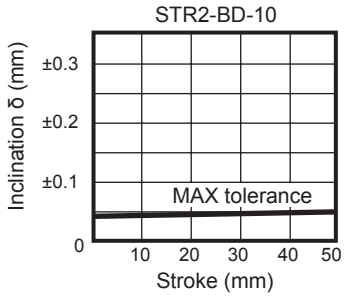


■ STR2-BD

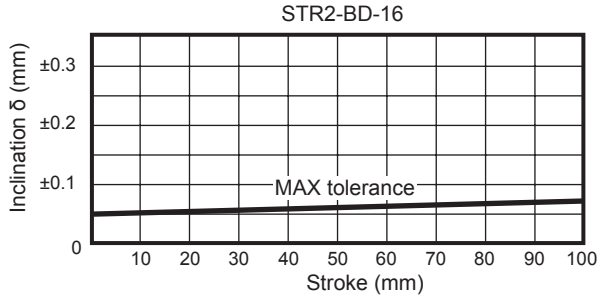
STR2-BD-6



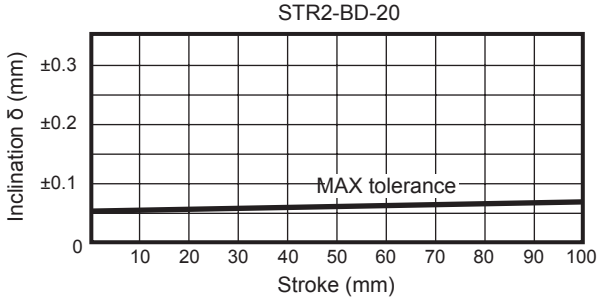
STR2-BD-10



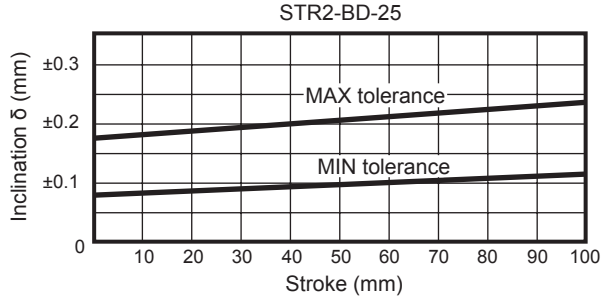
STR2-BD-16



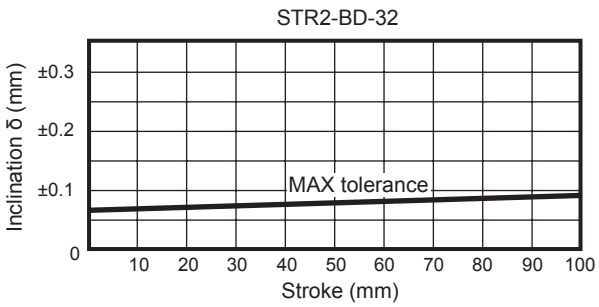
STR2-BD-20



STR2-BD-25



STR2-BD-32



Pneumatic components

Safety Precautions

Be sure to read this section before use.

Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: Twin rod cylinder STR2 Series

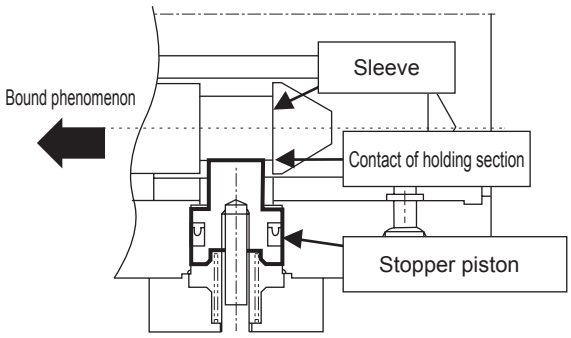
Design/selection

1. Position locking STR2-Q

⚠WARNING

■ If pressure is supplied to the port on the locking side when both ports are not pressurized and the piston is locked, the lock may not be released or the piston rod may suddenly pop out just after the lock is released. This can be extremely hazardous.
To release the lock mechanism, make sure to supply pressure to the port on the other side. Check that load is not applied to the lock mechanism.

■ For usage where the drop rate is increased using the quick exhaust valve, the lock may not release normally because the cylinder starts operating before the lock mechanism.
For the position locking cylinder, do not use the quick exhaust valve.
When stopping the piston with an external buffer device (shock absorber, etc.), adjust it so that there is no bound. If the piston bounds at the stroke end, the sleeve and stopper piston will collide strongly and may result in damage of the locking mechanism. Inspect the piston once or twice a year to make sure there is no damage to the retainer caused by this phenomenon.



■ Do not use 3-position valves.
Do not use the cylinder in combination with 3-position (especially closed center metal seal) valves. If pressure is trapped in the piston chamber with the lock mechanism, the lock cannot be engaged. Even if it is locked once, the air leaked from the valve enters the cylinder, and the lock may be released after a certain period of time.

⚠CAUTION

■ Cylinder load factor must be 50% or less.
If the load factor is high, the lock may not be released, or the lock section may be damaged.

■ If back pressure is applied to the locking mechanism, the lock may be released. Use a single solenoid valve, or an individual exhaust manifold.

■ Do not use multiple synchronized cylinders.
● Do not use so that 1 workpiece is moved by synchronizing 2 or more position locking cylinders. Lock release may fail for one of the cylinders.

2. Fine speed STR2-F

⚠CAUTION

■ Use without lubrication.
Applying lubrication may cause changes in characteristics.

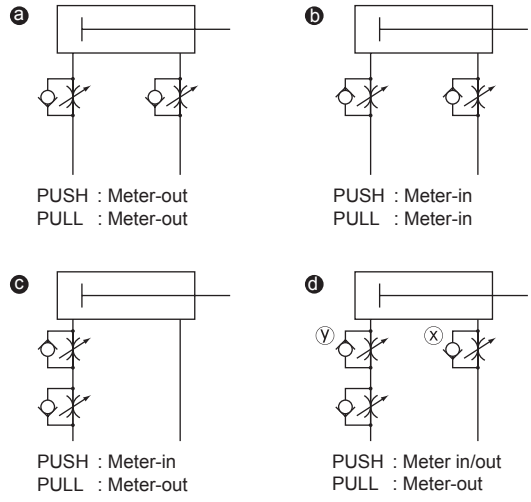
■ Assemble the speed controller near the cylinder.
When installed far from the cylinder, the speed becomes unstable.
Use SC-M3/M5, SC3W, SCD-M3/M5 and SC3WU Series for the speed controller.

■ In general, the speed is stabler at higher air pressure and lower load factor.
Use at a 50% or less load factor.

■ Do not apply a lateral load to the cylinder.
Also install the sliding guide so that it is not twisted.
When the load or the resistance fluctuates, operation becomes unstable.
With a large difference between static friction and kinematic friction of the guide, operation becomes unstable.

■ Avoid using this product where vibration is present.
The product will be adversely affected by vibration and operation will become unstable.

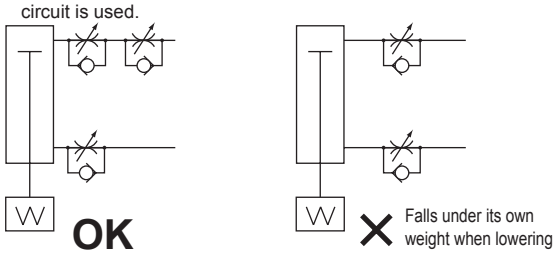
■ Stable speed control is achieved with a meter-out circuit.
When fine speed activation is performed with operating direction PUSH for the single rod cylinder, the popping out phenomenon occurs when operation starts if the load resistance is low. For countermeasures, use the ⓑ, ⓒ or ⓓ circuit.
Note that circuit ⓓ is the most stable.



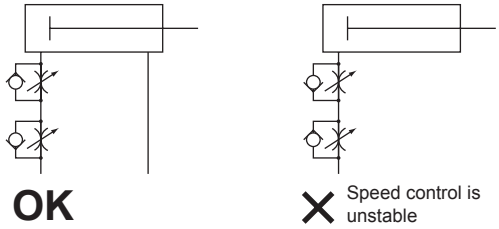
Speed adjustment method for PUSH operation of circuit ⓓ:
1. Set the speed with the speed controller x.
2. Restrict the speed with the speed controller y until there is no popping out.
3. Check the speed again.

(*1) When comparing ⓑ ⓒ ⓓ, the circuit ⓓ is the most stable.

(*2) For vertical mounting, combine the cylinder with a meter-out circuit, as it will fall under its own weight when a meter-in circuit is used.



(*3) Use the circuit shown in the figure below for the serial connection of the speed controllers.



(Guidelines for pop-out generation)
Popping out occurs in the following cases.
· Thrust > Resistance
*Resistance: Thrust caused by residual pressure on the exhaust side (in the fine speed, suction pressure = residual pressure) + { When using horizontally: frictional force caused by load / When using vertically: load self-weight }

Mounting, installation and adjustment

1. Common

⚠CAUTION

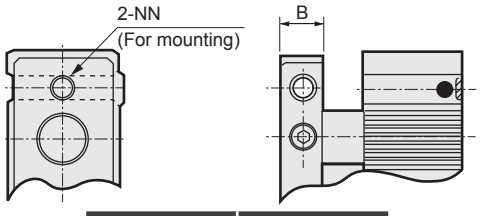
■ The twin rod cylinder has two piping ports each on both sides in the operating direction. Change the plugged ports according to your application. After the change, confirm that there is no air leakage from the plugged ports.

■ Do not damage surface flatness by denting or scratching the tube main body mounting surface or the end plate surface in order to increase sliding resistance. Make sure that the flatness of the mating surface where the end plate will be attached is 0.03 mm or below. If it is difficult to ensure the above flatness, insert a shim (customer-provided) between the end plate and workpiece and adjust the clearance. This may prevent an increase in sliding resistance.

■ When mounting the body with the through bolt, tighten with tightening torque as shown in the table below.

Bore size (mm)	Tightening torque
ø6	0.6 to 1.0 N•m
ø10	1.4 to 2.4 N•m
ø16	
ø20	2.9 to 5.1 N•m
ø25	4.8 to 8.6 N•m
ø32	

■ When using screw hole NN of the end plate, make sure that the bolt length is equivalent to the B dimension. Not doing so could cause malfunction or damage of the end plate.



Bore size (mm)	B dimension
ø6	6
ø10	6
ø16	8
ø20	10
ø25	12
ø32	12

■ Rubber cushion is integrated as a cushion mechanism. The table below shows the kinetic energy which can be absorbed by the rubber cushion. If the energy exceeds these values, consider using a separate shock absorber.

Bore size (mm)	Allowable absorbed energy J	
	PUSH	PULL
ø 6	0.008	0.059
ø10	0.061	0.083
ø16	0.181	0.083
ø20	0.303	0.127
ø25	0.68	0.237
ø32	1.3	0.311

■ The cylinder may tilt due to the uneven surface if it is installed with the spot face side (JJ) contacted. In this case, change the port position or use the option of piping port position on the 180° opposite side (O) to keep the spot face side from being the contacting surface.

■ The cylinder body may be damaged or may malfunction if a unit with excessive inertia, etc., is actuated. Use within the allowable absorbed energy range.

■ The twin rod cylinder has a bolt for 0 to -5 mm stroke length adjustment on the piston rod retraction side. Loosen the hexagon nut, adjust to the desired stroke length and tighten the hexagon nut to fix the length.

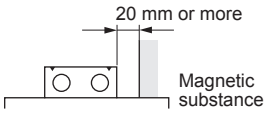
■ Do not use the product with the stroke length adjusting bolt removed.

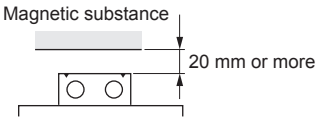
2. Common; with switch

⚠CAUTION

■ STR2-B-6 and 10 are not compatible with reed switch.
When using a proximity switch for STR2-B-6, avoid mounting the cylinder on a magnetic substance such as a metal plate. This could lead to switch detection malfunction.

■ The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently.
Check that a distance of 20 mm is provided from the surface of the cylinders. (Same clearance for all bore sizes)





■ The cylinder switch may malfunction if cylinders are installed adjacently. Check that the following distances are allocated between cylinders.

Adjacent conditions			Switch	ø6	ø10	ø16	ø20	ø25	ø32
Two cylinders in parallel	Horizontal mounting	A	K2,K3	43	45	56	66	75	111
			K0,K5	40 *1	47 *1	62	81	85	111
		B	K2,K3	7	1	2	4	3	15
			K0,K5	4 *1	3 *1	8	19	12	15
	Vertical mounting switches are attached on the side of the adjacent cylinders	A	K2,K3	28	27	36	47	47	58
			K0,K5	27 *1	26 *1	36	53	53	58
		B	K2,K3	15	12	15	20	14	20
			K0,K5	14 *1	11 *1	15	26	20	20
	Vertical mounting switches are attached on the opposite side of the adjacent cylinders	A	K2,K3	19	16	22	28	34	39
			K0,K5	14 *1	16 *1	22	33	34	39
		B	K2,K3	6	1	1	1	1	1
			K0,K5	1 *1	1 *1	1	6	1	1
Three or more cylinders in parallel	Horizontal mounting	A	K2,K3	44	45	57	67	77	111
			K0,K5	41 *1	47 *1	64	83	86	111
		B	K2,K3	8	1	3	5	5	15
			K0,K5	5 *1	3 *1	10	21	14	15
	Vertical mounting	A	K2,K3	33	30	40	51	49	58
			K0,K5	30 *1	28 *1	42	60	97	58
		B	K2,K3	20	15	19	24	16	20
			K0,K5	17 *1	13 *1	21	33	25	20

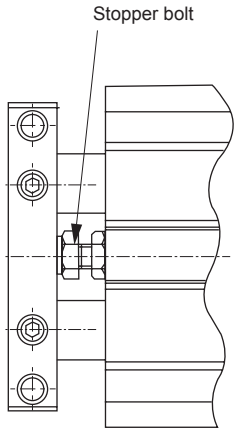
*1: Dimensions for STR2-M.
STR2-B-6 and 10 are not compatible with reed switch.

3. Position locking STR2-Q

⚠ CAUTION

- The lock mechanism functions at the stroke end, so that if the stopper is engaged during the stroke by the external stopper, the lock mechanism may not work and the piston could fall. When setting a load, make sure to check that the lock mechanism functions before installing the product.

- In the head side position locking, do not change or adjust the stopper bolt to adjust the pull stroke length. Doing so will disable the lock mechanism.



- When the piping at the side where the lock mechanism is provided is long and thin, or when the speed controller is far away from the cylinder port, note that it takes time to engage the lock. Clogging in the silencer mounted on the EXH. port of the solenoid valve may also cause the same result.

4. Fine speed STR2-F

⚠ CAUTION

- Perform adjustment such as centering so that a lateral load is not applied to the cylinder. Adjust and install the sliding guide so that it is not twisted.
  - When the load or the resistance fluctuates, operation becomes unstable.
  - With a large difference between static friction and kinematic friction of the guide, operation becomes unstable.

Use/maintenance

1. Position locking STR2-Q

⚠ WARNING

- For safety purposes, prevent the load from falling under its own weight during maintenance.

⚠ CAUTION

- After the locking mechanism is manually operated, make sure to return the locking mechanism to the original state before use. Do not perform manual operation except for adjustment, as it is dangerous.

- When mounting or adjusting the cylinder, release the lock. If mounting work, etc., is done while the lock is engaged, the lock part may be damaged.

- Use the speed controller with meter-out.
  - If the meter-in control is used, the lock may not be releasable.

- How to unlock
  - By screwing the hexagon socket head cap screw (M3 x 20) into the stopper piston and pulling the bolt 3 mm with force of 20 N or more, the stopper piston moves and the lock is released. When the screw is released, the internal spring returns the stopper piston. When the stopper piston fits in the piston rod groove, the cylinder is locked.