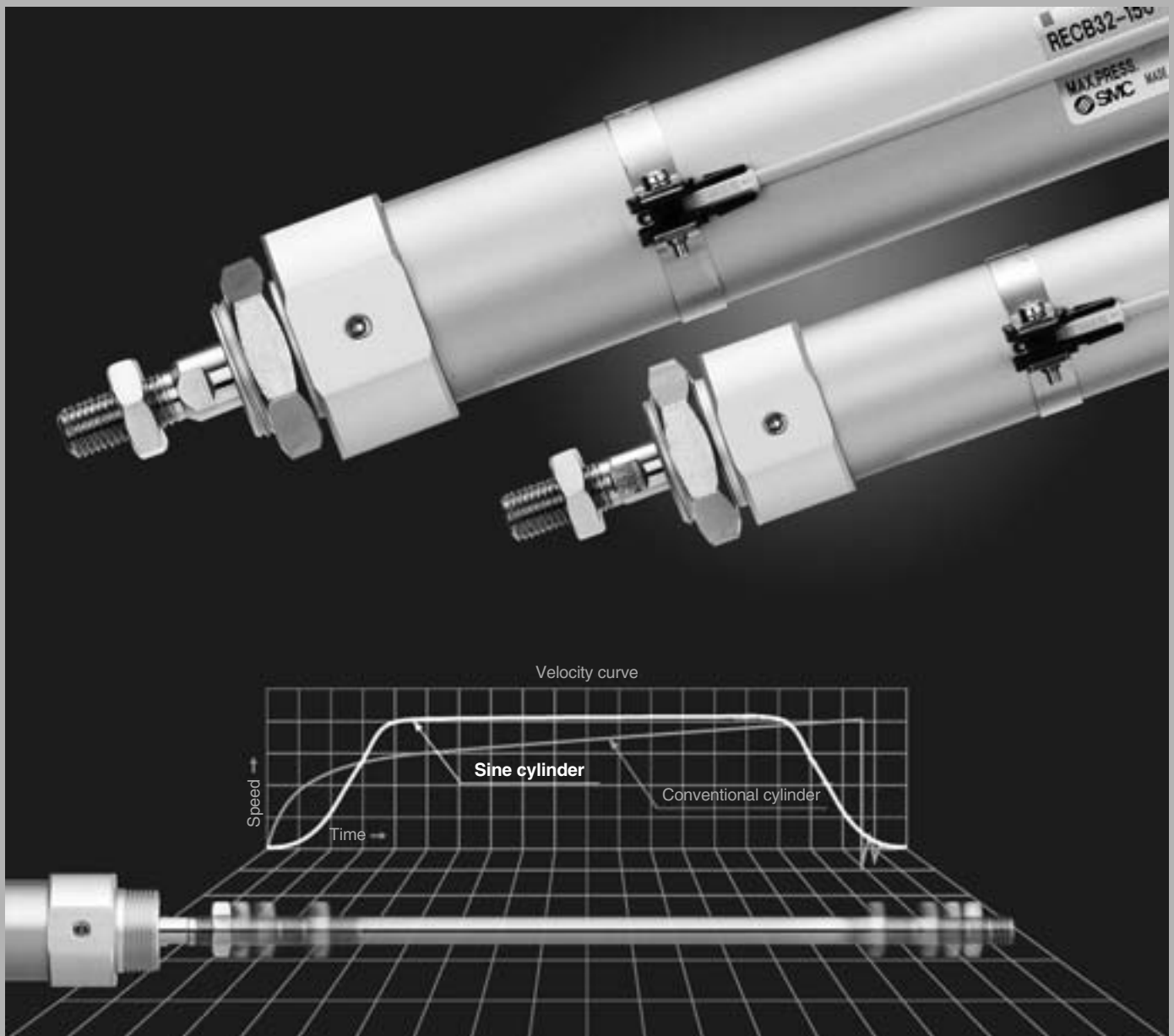


Sine Cylinder

Series *REC*

ø20, ø25, ø32, ø40

Allows high speed transfer of work with dramatically reduced shock/impact.



REA

REB

REC

C□Y

C□X

MQ

RHC

RZQ

D-□

-X□

Individual
-X□

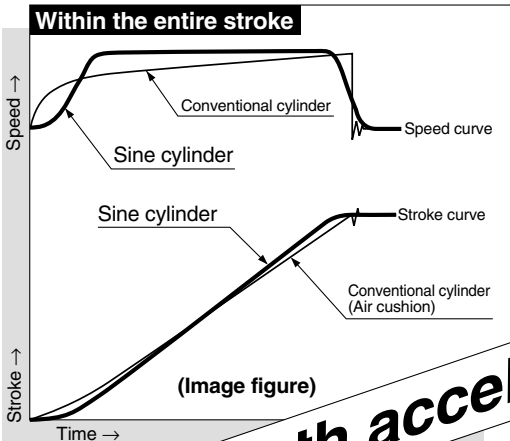
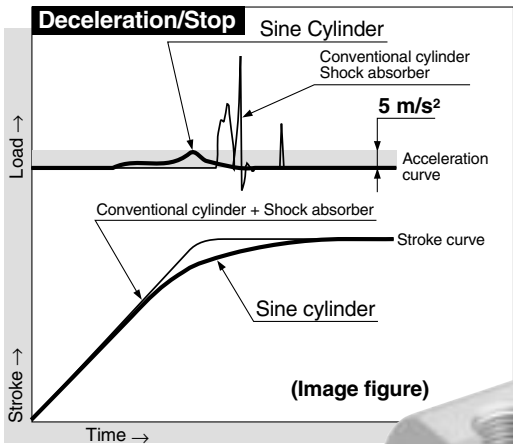
Sine Cylinder

Series **REC**

Allows rapid transfer of work with dramatically reduced shock/impact.

ø20,ø25,ø32,ø40

Motion comparison with the one with shock absorber



Smooth acceleration

and deceleration (5 m/s² or less)

Cushion seal

Cushion ring

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

Smooth acceleration/decelation without having influence from load, speed or pressure fluctuation

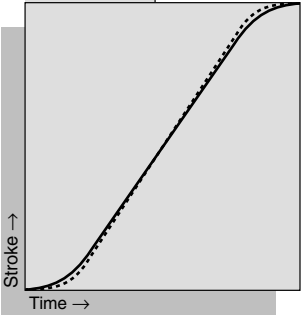
Reducing actuation cycle time

Max. 500 mm/s of high speed transfer is possible. Cycle time can be drastically reduced compared with existing low speed cylinder (10 to 30 mm/s).

Reference Example) Motion on RECL32-300

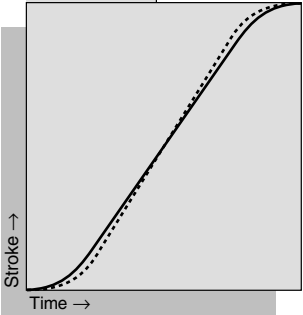
Pressure Fluctuation

Pressure (MPa)	0.3	0.5
Load (kg)	10	
Speed (mm/s)	300	

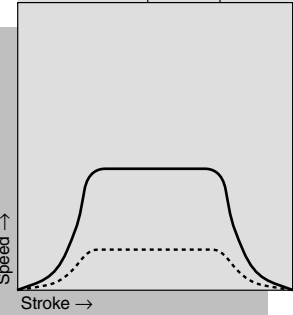


Load Fluctuation

Pressure (MPa)	0.5	
Load (kg)	10	30
Speed (mm/s)	300	



Pressure (MPa)	0.5	
Load (kg)	10	
Speed (mm/s)	100	300



Space-saving has been realized by simple circuit

Comparison to Shockless Transfer Systems				Sine Cylinder
Conventional System				Cushioning keep up with depth of orifice as sine function which change depend on stroke.
Control method	Speed control by a flow control valve which can variable throttle flow according to indicated current.	Shock absorber	Multistage speed control by combining speed controllers and a directional control valve.	
System construction	Symbol Conventional system 1			
Acceleration	Smooth operation	Same start up as standard cylinder due to lack of slow controlled start function.	Smooth speed control cannot be achieved by digital control changes are associated with it.	
Deceleration	Smooth operation	Initial impact is large. (Initial force against shock absorber)	Smooth speed control cannot be achieved by digital control, and sudden speed changes are associated with it.	
Construction	Complex	Simple	Complex	Simple

Compatible with Clean Room Class M3.5 (Fed.Std.209E). (Refer to page 1031.)

This model conforming to the clean room specification removes dust generated inside with an exhaust from the relief port or vacuum sweeping.

⚠ Caution

Recommended Speed Controllers

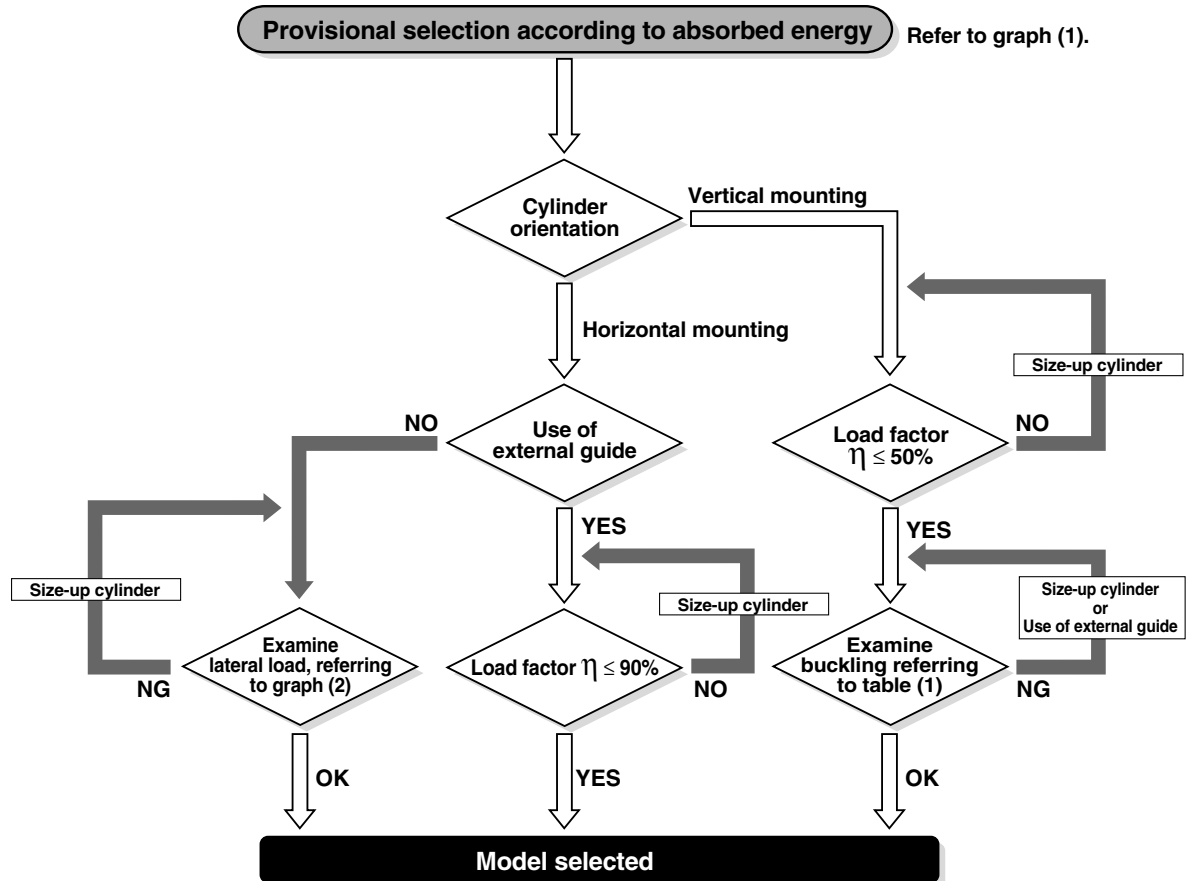
Model	Model		
	Elbow type	Straight type	In-line type
REC20	AS2201F-01-06-X214	AS2301F-01-06-X214	AS2001F-06-X214
REC25	AS2201F-01-06-X214	AS2301F-01-06-X214	AS2001F-06-X214
REC32	AS2201F-01-06-X214	AS2301F-01-06-X214	AS3001F-08-X214
REC40	AS3201F-02-08-X214	AS3301F-02-08-X214	AS3001F-08-X214

⚠ Caution

Use the recommended speed controllers. (Refer to page 1041.)

Series REC Model Selection

Selection Step

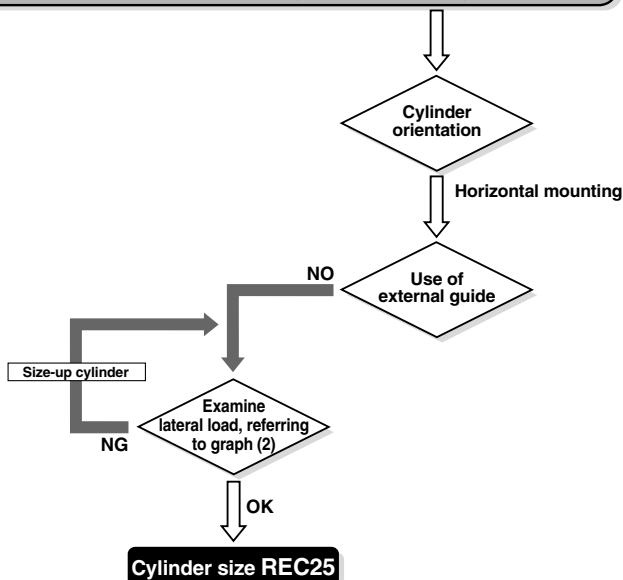


Selection Example 1

Actuating orientation:
Horizontal transfer of work
(without external guide)
Maximum speed: $v = 200$ mm/s
Supply pressure: $P = 0.5$ MPa

Load mass: $M = 0.2$ kg (2N)
Cylinder stroke: 300 mm

REC20 provisionally selected from graph (1) ($M = 0.2$ kg, $v = 200$ mm/s)

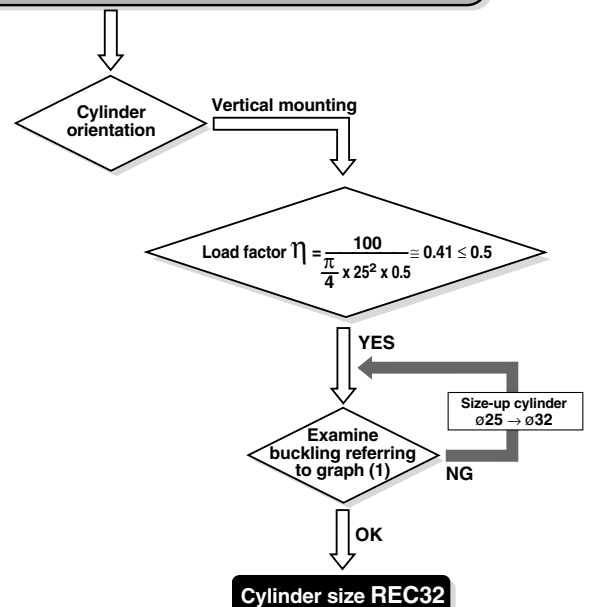


Selection Example 2

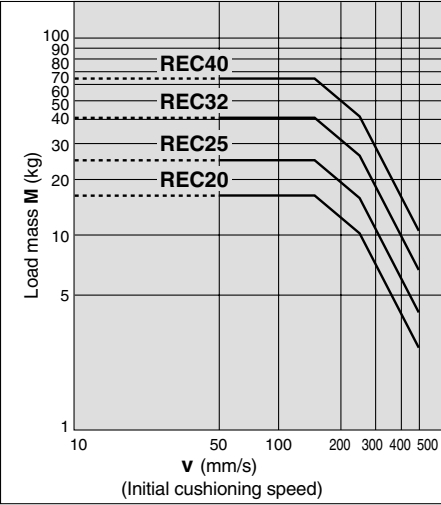
Actuating orientation:
Vertical transfer of work
(Rod side flange)
Maximum speed: $v = 300$ mm/s
Supply pressure: $P = 0.5$ MPa

Load mass: $M = 10$ kg
Cylinder stroke: 400 mm

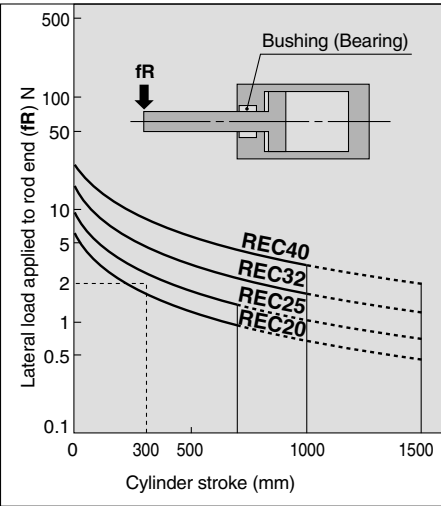
REC25 provisionally selected from graph (1) ($M = 10$ kg, $v = 300$ mm/s)



Graph (1) Absorbed Energy Curve



Graph (2) Applicable Max. Stroke Against Lateral Load*



* The above curve in the graph refers to P = 0.5 MPa of supply pressure. If supply pressure is other than P = 0.5 MPa, please figure out a max. stroke, using proportional calculation.
Example) If P = 0.6 MPa, a max. stroke = the respective stroke in the graph x $\frac{0.6}{0.5}$

Figure (1)

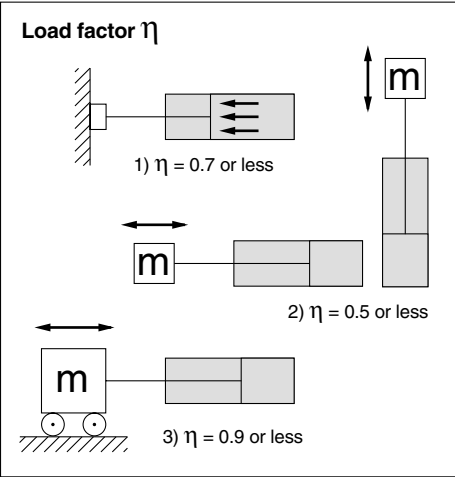
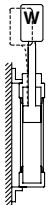
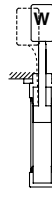
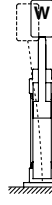
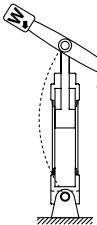
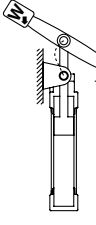
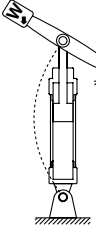
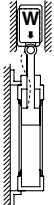
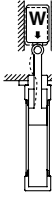
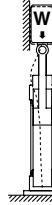
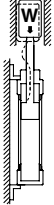
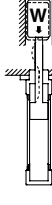


Table (1) Relation between Cylinder Size and Max. Stroke

(cm)

Mounting style			Symbol	Operating pressure (MPa)	Applicable max. stroke according to buckling strength			
Mounting bracket symbol and figure					REC			
					ø20	ø25	ø32	ø40
Foot style: L	Rod side flange style: F	Head side flange style: G	L F	0.3	39	50	56	61
				0.5	30	38	43	47
				0.7	24	31	36	39
			G	0.3	11	17	19	21
				0.5	7	11	13	13
				0.7	4	7	9	9
Clevis style: C, D	Rod side trunnion style: U	Head side trunnion style: T	C D	0.3	32	42	48	52
				0.5	22	30	35	37
				0.7	17	24	27	29
						U	0.3	82
			0.5	62	79		89	97
			0.7	52	66		75	81
			T	0.3	33	43	49	53
				0.5	23	31	36	39
				0.7	18	25	29	31
Foot style: L	Rod side flange style: F	Head side flange style: G	L F	0.3	118	148	167	182
				0.5	90	114	128	140
				0.7	76	95	108	117
			G	0.3	51	66	75	81
				0.5	37	49	55	60
				0.7	30	39	45	49
Foot style: L	Rod side flange style: F	Head side flange style: G	L F	0.3	168	211	237	259
				0.5	129	162	183	199
				0.7	109	136	154	168
			G	0.3	76	97	110	119
				0.5	56	73	83	90
				0.7	46	60	68	74

- 1) In the case where cylinder is used for static action: Load factor $\eta = 0.7$ or less
2) In the case where cylinder is used for dynamic action: Load factor $\eta = 0.5$ or less
3) In the case where guide is used in horizontal orientation: Load factor $\eta = 0.9$ or less

Sine Cylinder

Series REC

ø20, ø25, ø32, ø40

How to Order

RE C B 25 - 150 - M9BW

Sine cylinder

Rod type

Mounting style

B	Basic style	C	Single clevis style
L	Axial foot style	D	Double clevis style
F	Rod side flange style	U	Rod side trunnion style
G	Head side flange style	T	Head side trunnion style

Bore size

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

Port type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 1029 for standard strokes.

Number of auto switches

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

Auto switch

Nil	Without auto switch (Built-in magnet)
------------	---------------------------------------

* Select an applicable auto switch part number from the table below.

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model	Lead wire length (m)					Pre-wired connector	Applicable load				
					DC	AC			0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)						
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V,12V	—	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC			
				3-wire (PNP)				M9P	●	●	●	○	—	○					
		Connector		2-wire	12V	M9B	●	●	●	○	—	○	—						
				Terminal conduit	3-wire (NPN)	5V,12V	H7C	●	—	●	●	●		—	IC circuit				
	Diagnostic indication (2-color indication)	Grommet			2-wire	12V	K39	—	—	—	—	●	—	—	—				
				3-wire (NPN)	5V,12V	M9NW	●	●	●	○	—	○	IC circuit						
				3-wire (PNP)		M9PW	●	●	●	○	—	○	IC circuit						
				2-wire	12V	M9BW	●	●	●	○	—	○	—						
						H7BA**	—	—	●	○	—	○	—						
						H7NF	●	●	●	○	—	○	IC circuit						
				Water resistant (2-color indication)															
With diagnostic output (2-color indication)																			
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	24V	5V	—	A96	●	—	●	—	—	—	IC circuit	—			
								No	100V	A93	●	—	●	—	—		—	—	—
										100V or less	A90	●	—	●	—		—	—	IC circuit
										100V, 200V	B54	●	—	●	●		—	—	—
										200V or less	B64	●	—	●	—		—	—	
		Connector		No		2-wire	12V	—	C73C	●	—	●	●	●	—	IC circuit			
								24V or less	C80C	●	—	●	●	—	—				
								—	A33	—	—	—	—	●	—		—		
								100V,200V	A34	—	—	—	—	●	—				
									A44	—	—	—	—	●	—				
		Terminal conduit		Yes		2-wire	12V	100V,200V	B59W	●	—	●	—	—	—	—			
		DIN terminal																	
		Diagnostic indication (2-color indication)		Grommet															

** Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

* Lead wire length symbols: 0.5 m Nil
1 m M
3 m L
5 m Z
None N

(Example) M9NW
(Example) M9NWM
(Example) M9NWL
(Example) M9NWZ
(Example) H7CN

* Solid state auto switches marked with "○" are produced upon receipt of order.
* D-A9□V/M9□V/M9□WV/M9□A(V)L types cannot be mounted.
* Do not indicate suffix "N" for no lead wire on D-A3□/A44/G39/K39 models.

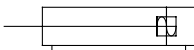
* Since there are other applicable auto switches than listed, refer to page 1040 for details.

* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.

* D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

Standard Specifications

JIS Symbol



Bore size (mm)	20	25	32	40
Action	Double acting, Single rod			
Fluid	Air			
Proof pressure	1.5 MPa			
Maximum operating pressure	1.0 MPa			
Minimum operating pressure	0.2 MPa			
Ambient and fluid temperature	-10 to 60°C			
Piston speed	50 to 500 mm/s			
Cushion	Air cushion (End rubber bumper)			
Effective cushioning stroke (mm)	45	45	50	60
Lubrication	Not required (Non-lube)			
Stroke length tolerance	Up to 1000 st: $^{+1.4}_0$, 1001 to 1500 st: $^{+1.8}_0$			

Standard Stroke

Bore size (mm)	Minimum stroke (1) (Recommended)	Standard stroke (2) (mm)	Maximum manufacturable stroke (mm)
20	150	Up to 700	1500
25	150	Up to 700	
32	150	Up to 1000	
40	200	Up to 1000	

Note 1) The recommended minimum strokes or shorter lengths are available. However, since the effective cushion stroke is longer, the cushion performance may differ from the standard specifications.

Note 2) When exceeding the standard strokes, it will be out of warranty.

Mass

Bore size (mm)		20	25	32	40
Basic mass	Basic style	0.32	0.47	0.74	1.25
	Axial foot style	0.47	0.63	0.90	1.52
	Flange style	0.38	0.56	0.83	1.37
	Single clevis style	0.36	0.51	0.78	1.34
	Double clevis style	0.37	0.53	0.79	1.38
	Trunnion style	0.36	0.54	0.81	1.35
Additional mass per each 50 mm of stroke		0.05	0.07	0.09	0.13
Mounting bracket	Pivot bracket for clevis (With pin)	0.07	0.07	0.14	0.14
	Single knuckle joint	0.06	0.06	0.06	0.23
	Double knuckle joint (With pin)	0.07	0.07	0.07	0.20

* Calculation: (Example) **RECL32-200**

Basic mass 0.90 (Foot style ø32)

Additional mass 0.09/50 st

Cylinder stroke 200 (st)

$0.90 + 0.09 \times 200/50 = 1.26 \text{ kg}$

Mounting Bracket Part No.

Mounting bracket	Minimum order	Bore size (mm)				Description (when ordering a minimum number)
		20	25	32	40	
Axial foot *	2	CM-L020B	CM-L032B	CM-L040B		Foot 2 pcs., Mounting nut 1 pc.
Flange	1	CM-F020B	CM-F032B	CM-F040B		Flange 1 pc.
Single clevis**	1	CM-C020B	CM-C032B	CM-C040B		Single clevis 1 pc., Liner 3 pcs.
Double clevis (With pin)***	1	CM-D020B	CM-D032B	CM-D040B		Double clevis 1 pc., Liner 3 pcs., Clevis pin 1 pc., Retaining ring 2 pcs.
Trunnion (With nut)	1	CM-T020B	CM-T032B	CM-T040B		Trunnion 1 pc., Trunnion nut 1 pc.

* When ordering foot bracket, order 2 pieces per cylinder.

** 3 liners are included in the clevis bracket for adjusting an angle when mounting it.

*** Clevis pin and retaining ring (cotter pin for ø40) are packaged together.

REA

REB

REC

C□Y

C□X

MQ

RHC

RZQ

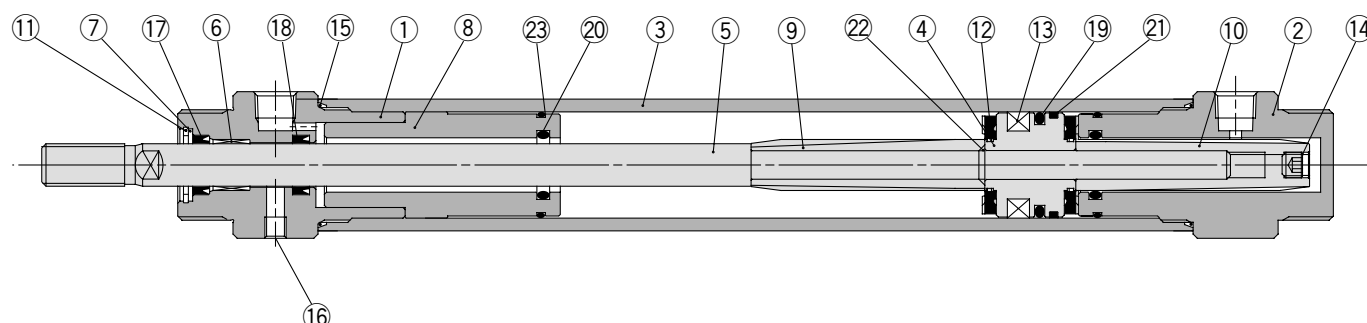
D-□

-X□

Individual

-X□

Construction



Component Parts

No.	Description	Material	Qty.	Note
1	Rod cover	Aluminum alloy	1	Clear anodized
2	Head cover	Aluminum alloy	1	Clear anodized
3	Cylinder tube	Aluminum alloy	1	Hard anodized
4	Piston	Aluminum alloy	1	Chromated
5	Piston rod	Stainless steel	1	Hard chrome plated
6	Bushing	Oil-impregnated sintered iron alloy	1	
7	Seal retainer	Stainless steel	1	
8	Cushion seal holder	Aluminum alloy	1	Chromated
9	Cushion ring A	Brass	1	Electroless nickel plated
10	Cushion ring B	Brass	1	Electroless nickel plated
11	Retaining ring	Carbon steel	1	Phosphate coated
12	Bumper	Urethane	2	
13	Magnet	—	1	
14	Hexagon socket head set screw	Carbon steel	1	Zinc chromated
15	Cylinder tube gasket	NBR	2	
16	Hexagon socket head set screw	Carbon steel	1	Nickel plated

Component Parts

No.	Description	Material	Qty.	Note
17	Rod seal A	NBR	1	
18	Rod seal B	NBR	1	
19	Piston seal	NBR	1	
20	Cushion seal	NBR	2	
21	Wear ring	Resin	1	
22	Piston gasket	NBR	1	
23	Holder gasket	NBR	2	

Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
20	REC20-PS	Set of nos. above (15, 17, 19, 20, 21, 23)
25	REC25-PS	
32	REC32-PS	
40	REC40-PS	

* Seal kit includes a grease pack (10 g).

Order with the following part number when only the grease pack is needed.

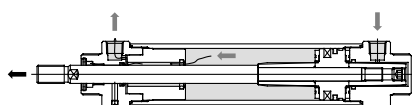
Grease pack part no.: GR-S-010 (10 g)

Caution

When disassembling cylinders with bore sizes of $\phi 20$ to $\phi 40$, grip the double flat part of either the tube cover or the rod cover with a vise and loosen the other side with a wrench or an adjustable angle wrench, and then remove the cover. When re-tightening, tighten approximately 2 degrees more than the original position.

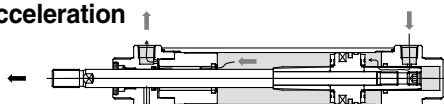
Working Principle

1. Start-up



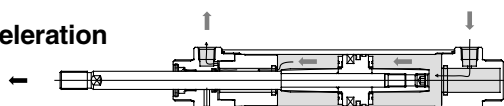
Actuating air passes from cylinder port on head side and enters the right hand side of chamber of the cylinder from space between cushion seal and U-shaped groove on the outer surface of cushion spear. Air in the left hand side of chamber of the cylinder passes through space between cushion seal and piston rod, and is released to the cylinder port on rod side.

2. In-rush/acceleration



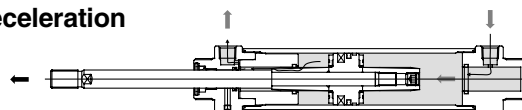
Differential pressure (theoretical force) generated on the left and right sides of piston becomes larger than starting resistance, and piston starts to actuate. With the actuation, U-shaped groove on the cushion spear outer surface gradually becomes deeper, air flow necessary for piston enters the right hand side of chamber of the cylinder, and piston accelerates. This acceleration process can be achieved smoothly (as a sine function) by using a cushion spear on which a U-shaped groove is machined.

3. Acceleration



When piston starts to actuate, air can go in and out freely because cushion spear on head side is released from cushion seal. With this actuation, piston speed accelerates (or maintains the same speed).

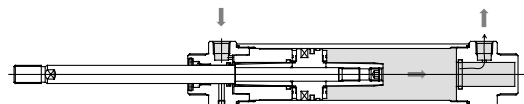
4. Deceleration



When cushion spear on rod side meets cushion seal, air in cushion chamber on rod side flows through space between cushion spear groove and cushion seal.

Since the space is reduced as a sine function, the cylinder rod decelerates smoothly.

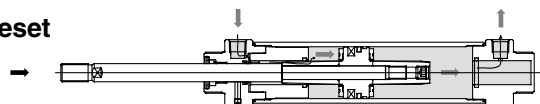
5. Stop



The piston stops at the stroke end on rod side with smooth cushioning.

Air flow which is switched by solenoid valve is reversed from the one indicated in the above "1. Start-up".

6. Reset



Actuating air passes from cylinder port on rod side and enters the left chamber of the cylinder from space between cushion seal and U-shaped groove on the outer surface of cushion spear.

Also, air in right hand side of chamber of piston is exhausted from cylinder port. As U-shaped groove on the cushion spear outer surface gradually becomes deeper, the cylinder accelerates.

Clean Series

10 – REC **Mounting style** **Bore size** – **Stroke**

Clean Series

10	Relief type
11	Vacuum type

The type which is applicable for using inside the clean room graded Class M 3.5 by making an actuator's rod section a double seal construction and discharging by relief port directly to the outside of clean room.

The plug (M5 x 0.8) in the standard dimensions becomes a relief port.



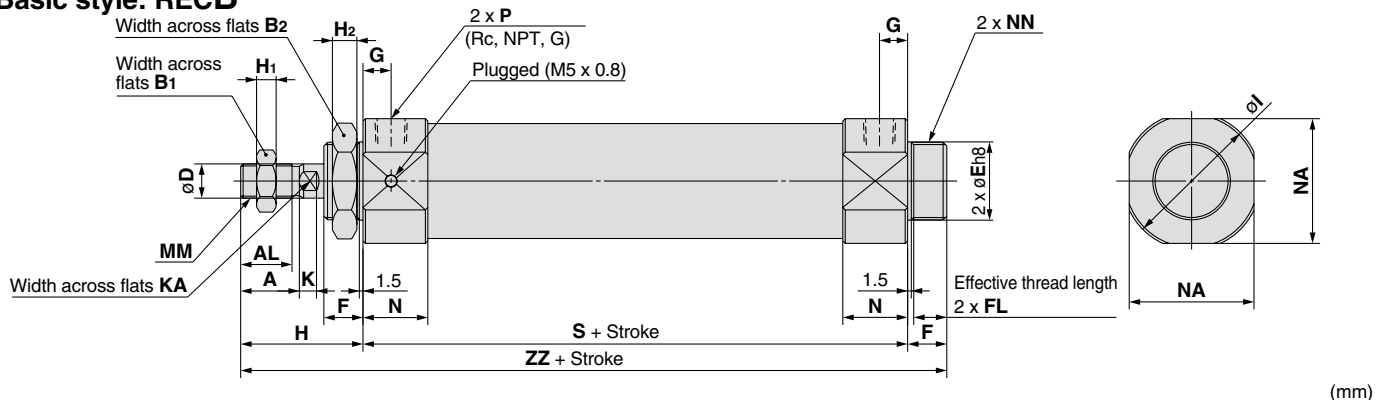
Specifications

Action	Double acting, Single rod
Bore size	ø20, ø25, ø32, ø40
Maximum operating pressure	1.0 MPa
Minimum operating pressure	0.2 MPa
Cushion	Air cushion
Relief port size	M5 x 0.8
Piston speed	50 to 400 mm/s
Mounting	Basic style, Axial foot style, Rod side flange style Head side flange style

* Auto switch can be mounted.

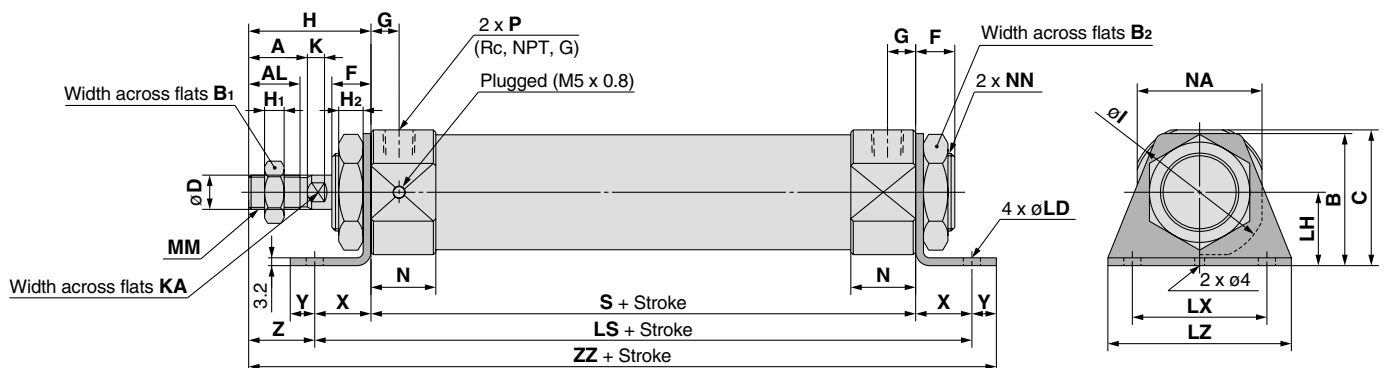
Dimensions

Basic style: RECB



Bore (mm)	A	AL	B1	B2	D	E	F	FL	G	H	H1	H2	I	K	KA	MM	N	NA	NN	P	S	ZZ
20	18	15.5	13	26	8	20 _{0 -0.033}	13	10.5	10	41	5	8	33.5	5	6	M8 x 1.25	20	30	M20 x 1.5	1/8	146	200
25	22	19.5	17	32	10	26 _{0 -0.033}	13	10.5	10	45	6	8	37.5	5.5	8	M10 x 1.25	20	34.5	M26 x 1.5	1/8	146	204
32	22	19.5	17	32	12	26 _{0 -0.033}	13	10.5	11	45	6	8	46.5	5.5	10	M10 x 1.25	22	42.5	M26 x 1.5	1/8	159	217
40	24	21	22	41	14	32 _{0 -0.039}	16	13.5	12.5	50	8	10	56	7	12	M14 x 1.5	26.5	51	M32 x 2	1/4	181	247

Axial foot style: RECL



Bore (mm)	A	AL	B	B1	B2	C	D	F	G	H	H1	H2	I	K	KA	LD	LH	LS	LX	LZ	MM	N	NA
20	18	15.5	40	13	26	40	8	13	10	41	5	8	33.5	5	6	6.8	25	186	40	55	M8 x 1.25	20	30
25	22	19.5	47	17	32	45.5	10	13	10	45	6	8	37.5	5.5	8	6.8	28	186	40	55	M10 x 1.25	20	34.5
32	22	19.5	47	17	32	49.5	12	13	11	45	6	8	46.5	5.5	10	6.8	28	199	40	55	M10 x 1.25	22	42.5
40	24	21	54	22	41	55.5	14	16	12.5	50	8	10	56.2	7	12	7	30	227	55	75	M14 x 1.5	26.5	51

Bore (mm)	NN	P	S	X	Y	Z	ZZ
20	M20 x 1.5	1/8	146	20	8	21	215
25	M26 x 1.5	1/8	146	20	8	25	219
32	M26 x 1.5	1/8	159	20	8	25	232
40	M32 x 2	1/4	181	23	10	27	264

REA

REB

REC

C□Y

C□X

MQ

RHC

RZQ

D-□

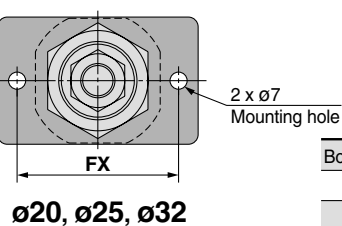
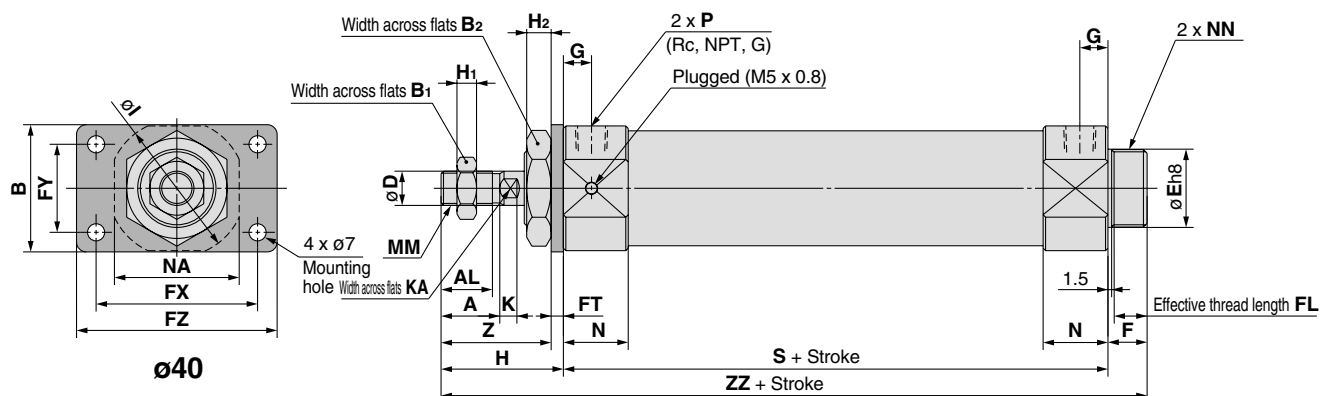
-X□

Individual
-X□

Series REC

Dimensions

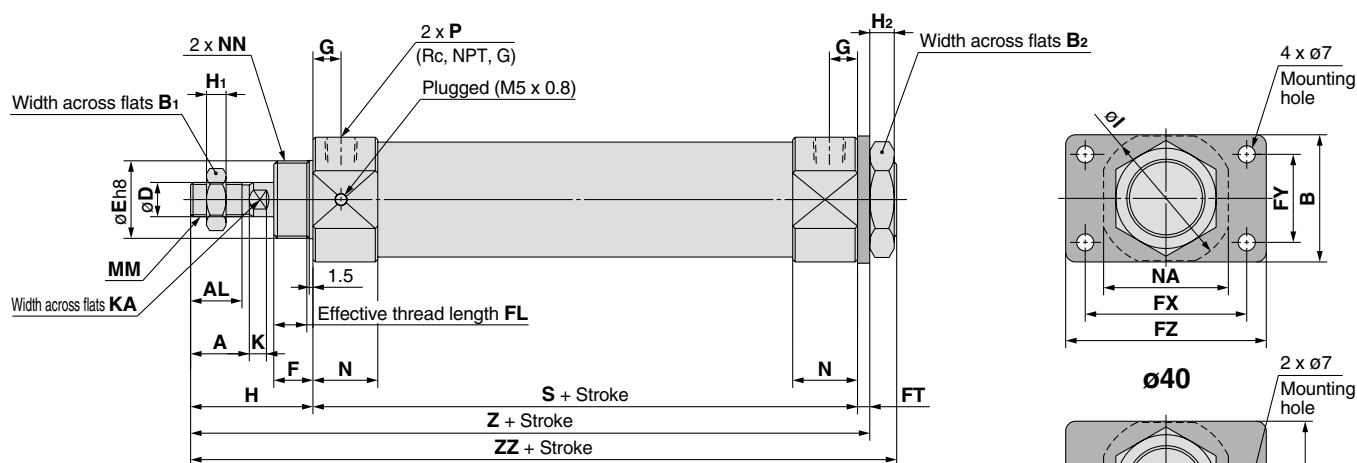
Rod side flange style: RECF



Bore (mm)	A	AL	B	B ₁	B ₂	D	E	F	FL	FT	FX	FY	FZ	G	H
20	18	15.5	34	13	26	8	20 ⁰ _{-0.033}	13	10.5	4	60	—	75	10	41
25	22	19.5	40	17	32	10	26 ⁰ _{-0.033}	13	10.5	4	60	—	75	10	45
32	22	19.5	40	17	32	12	26 ⁰ _{-0.033}	13	10.5	4	60	—	75	11	45
40	24	21	52	22	41	14	32 ⁰ _{-0.039}	16	13.5	5	66	36	82	12.5	50

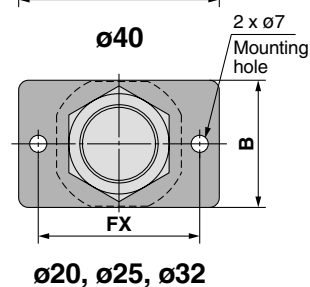
Bore (mm)	H ₁	H ₂	I	K	KA	MM	N	NA	NN	P	S	Z	ZZ
20	5	8	33.5	5	6	M8 x 1.25	20	30	M20 x 1.5	1/8	146	37	200
25	6	8	37.5	5.5	8	M10 x 1.25	20	34.5	M26 x 1.5	1/8	146	41	204
32	6	8	46.5	5.5	10	M10 x 1.25	22	42.5	M26 x 1.5	1/8	159	41	217
40	8	10	56.2	7	12	M14 x 1.5	26.5	51	M32 x 2	1/4	181	45	247

Head side flange style: RECG



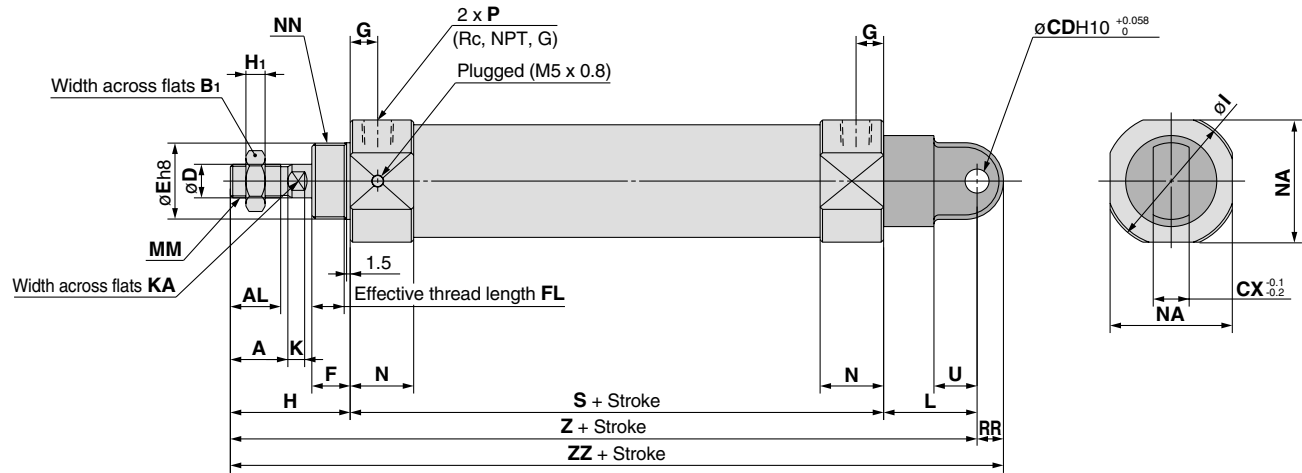
Bore (mm)	A	AL	B	B ₁	B ₂	D	E	F	FL	FT	FX	FY	FZ	G	H
20	18	15.5	34	13	26	8	20 ⁰ _{-0.033}	13	10.5	4	60	—	75	10	41
25	22	19.5	40	17	32	10	26 ⁰ _{-0.033}	13	10.5	4	60	—	75	10	45
32	22	19.5	40	17	32	12	26 ⁰ _{-0.033}	13	10.5	4	60	—	75	11	45
40	24	21	52	22	41	14	32 ⁰ _{-0.039}	16	13.5	5	66	36	82	12.5	50

Bore (mm)	H ₁	H ₂	I	K	KA	MM	N	NA	NN	P	S	Z	ZZ
20	5	8	33.5	5	6	M8 x 1.25	20	30	M20 x 1.5	1/8	146	191	200
25	6	8	37.5	5.5	8	M10 x 1.25	20	34.5	M26 x 1.5	1/8	146	195	204
32	6	8	46.5	5.5	10	M10 x 1.25	22	42.5	M26 x 1.5	1/8	159	208	217
40	8	10	56.2	7	12	M14 x 1.5	26.5	51	M32 x 2	1/4	181	236	247



Dimensions

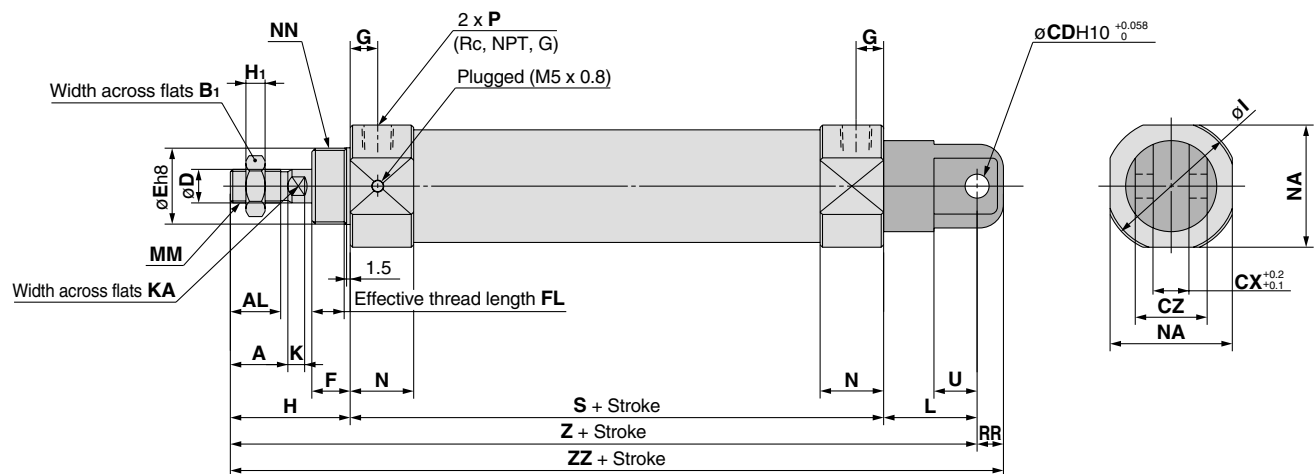
Single clevis style: RECC



Bore (mm)	A	AL	B1	CD	CX	D	E	F	FL	G	H	H1	I	K	KA	L	MM	N
20	18	15.5	13	9	10	8	20 ⁰ _{-0.033}	13	10.5	10	41	5	33.5	5	6	30	M8 x 1.25	20
25	22	19.5	17	9	10	10	26 ⁰ _{-0.033}	13	10.5	10	45	6	37.5	5.5	8	30	M10 x 1.25	20
32	22	19.5	17	9	10	12	26 ⁰ _{-0.033}	13	10.5	11	45	6	46.5	5.5	10	30	M10 x 1.25	22
40	24	21	22	10	15	14	32 ⁰ _{-0.039}	16	13.5	12.5	50	8	56.2	7	12	39	M14 x 1.5	26.5

Bore (mm)	NA	NN	P	RR	S	U	Z	ZZ
20	30	M20 x 1.5	1/8	9	146	14	217	226
25	34.5	M26 x 1.5	1/8	9	146	14	221	230
32	42.5	M26 x 1.5	1/8	9	159	14	234	243
40	51	M32 x 2	1/4	11	181	18	270	281

Double clevis style: RECD



Bore (mm)	A	AL	B1	CD	CX	CZ	D	E	F	FL	G	H	H1	I	K	KA	L	MM
20	18	15.5	13	9	10	19	8	20 ⁰ _{-0.033}	13	10.5	10	41	5	33.5	5	6	30	M8 x 1.25
25	22	19.5	17	9	10	19	10	26 ⁰ _{-0.033}	13	10.5	10	45	6	37.5	5.5	8	30	M10 x 1.25
32	22	19.5	17	9	10	19	12	26 ⁰ _{-0.033}	13	10.5	11	45	6	46.5	5.5	10	30	M10 x 1.25
40	24	21	22	10	15	30	14	32 ⁰ _{-0.039}	16	13.5	12.5	50	8	56.2	7	12	39	M14 x 1.5

Bore (mm)	N	NA	NN	P	RR	S	U	Z	ZZ
20	20	30	M20 x 1.5	1/8	9	146	14	217	226
25	20	34.5	M26 x 1.5	1/8	9	146	14	221	230
32	22	42.5	M26 x 1.5	1/8	9	159	14	234	243
40	26.5	51	M32 x 2	1/4	11	181	18	270	281

REA

REB

REC

C□Y

C□X

MQ

RHC

RZQ

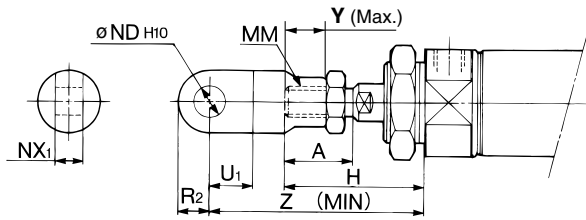
D-□

-X□

Individual
-X□

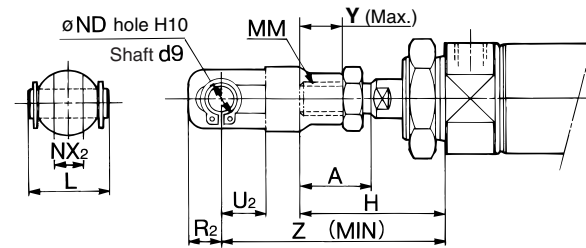
Accessory Dimensions

Single Knuckle Joint Mounting



Bore (mm)	A	H	MM	NDH10	NX1	U1	R2	Y	Z
20	18	41	M8 x 1.25	9 ^{+0.058} ₀	9 ^{-0.1} _{-0.2}	14	10	11	66
25, 32	22	45	M10 x 1.25	9 ^{+0.058} ₀	9 ^{-0.1} _{-0.2}	14	10	14	69
40	24	50	M14 x 1.5	12 ^{+0.070} ₀	16 ^{-0.1} _{-0.3}	20	14	13	92

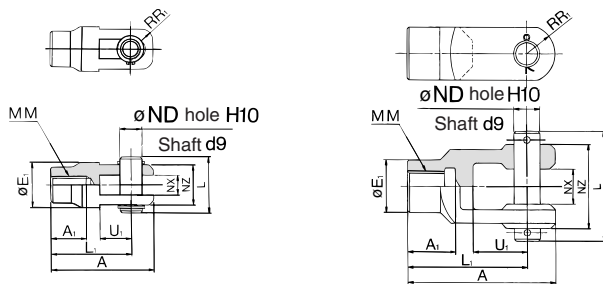
Double Knuckle Joint Mounting



Bore (mm)	A	H	L	MM	ND	NX2	R2	U2	Y	Z
20	18	41	25	M8 x 1.25	9	9 ^{+0.2} _{+0.1}	10	14	11	66
25, 32	22	45	25	M10 x 1.25	9	9 ^{+0.2} _{+0.1}	10	14	14	69
40	24	50	49.7	M14 x 1.5	12	16 ^{+0.3} _{+0.1}	13	25	13	92

Double Knuckle Joint

Y-020B, Y-032B Material: Rolled steel **Y-040B** Material: Cast iron



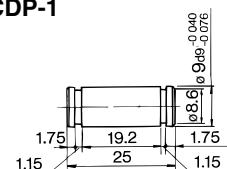
Part no.	Applicable bore size (mm)	A	A1	E1	L	L1	MM	ND	NX	NZ	R1	U1	Applicable pin part no.	Retaining ring Cotter pin Size
Y-020B	20	46	16	20	25	36	M8 x 1.25	9	9 ^{+0.2} _{+0.1}	18	5	14	CDP-1	Type C9 for shaft
Y-032B	25, 32	48	18	20	25	38	M10 x 1.25	9	9 ^{+0.2} _{+0.1}	18	5	14	CDP-1	Type C9 for shaft
Y-040B	40	68	22	24	49.7	55	M14 x 1.5	12	16 ^{+0.3} _{+0.1}	38	13	25	CDP-3	ø3 x 18 ℓ

* Knuckle pins and retaining rings (cotter pins for ø40) are included.

Double Clevis Pin/Material: Carbon steel

Bore size/ø20, ø25, ø32

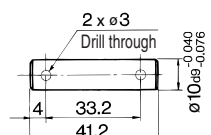
CDP-1



Retaining ring: Type C9 for shaft

Bore size/ø40

CDP-2

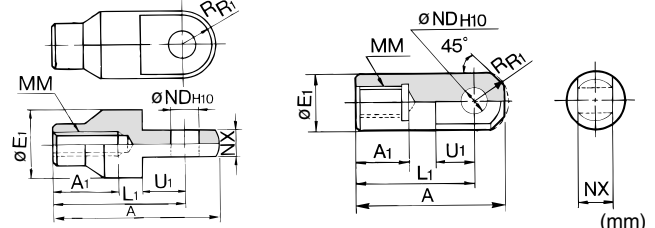


Cotter pin: ø3 x 18 ℓ

* Retaining rings (cotter pins for ø40) are included.

Single Knuckle Joint

I-020B, 032B Material: Rolled steel **I-040B** Material: Free cutting sulfur steel

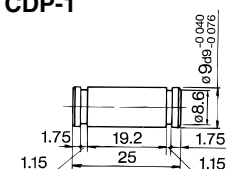


Part no.	Applicable bore size (mm)	A	A1	E1	L1	MM	NDH10	NX	R1	U1
I-020B	20	46	16	20	36	M8 x 1.25	9 ^{+0.058} ₀	9 ^{-0.1} _{-0.2}	10	14
I-032B	25, 32	48	18	20	38	M10 x 1.25	9 ^{+0.058} ₀	9 ^{-0.1} _{-0.2}	10	14
I-040B	40	69	22	24	55	M14 x 1.5	12 ^{+0.070} ₀	16 ^{-0.1} _{-0.3}	15.5	20

Double Knuckle Pin/Material: Carbon steel

Bore size/ø20, ø25, ø32

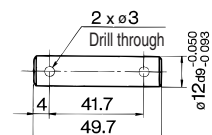
CDP-1



Retaining ring: Type C9 for shaft

Bore size/ø40

CDP-3



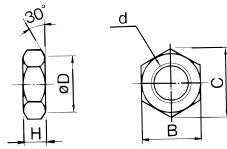
Cotter pin: ø3 x 18 ℓ

* Retaining rings (cotter pins for ø40) are included.

Series REC

Rod End Nut

Material: Carbon steel

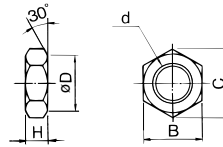


(mm)

Part no.	Applicable bore size (mm)	B	C	D	d	H
NT-02	20	13	15.0	12.5	M8 x 1.25	5
NT-03	25, 32	17	19.6	16.5	M10 x 1.25	6
NT-04	40	22	25.4	21.0	M14 x 1.5	8

Mounting Nut

Material: Carbon steel

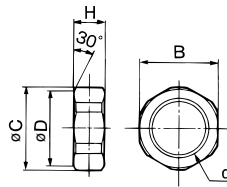


(mm)

Part no.	Applicable bore size (mm)	B	C	D	d	H
SN-020B	20	26	30	25.5	M20 x 1.5	8
SN-032B	25, 32	32	37	31.5	M26 x 1.5	8
SN-040B	40	41	47.3	40.5	M32 x 2.0	10

Trunnion Nut

Material: Carbon steel



(mm)

Part no.	Applicable bore size (mm)	B	C	D	d	H
TN-020B	20	26	28	25.5	M20 x 1.5	10
TN-032B	25, 32	32	34	31.5	M26 x 1.5	10
TN-040B	40	41	45	40.5	M32 x 2	10

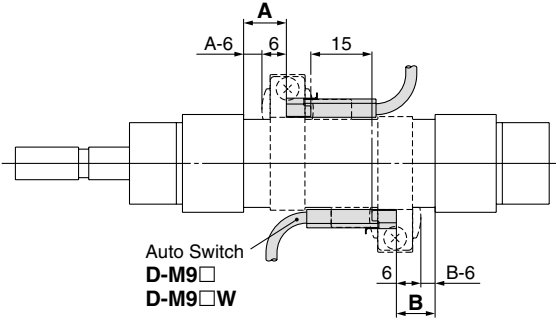
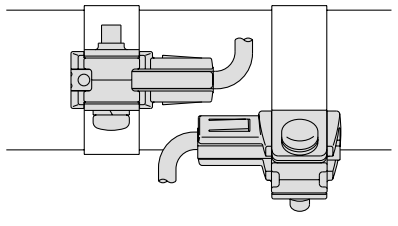
Refer to page 1864 (CM2-XB12: External stainless steel cylinder) for stainless steel mounting brackets and accessories (some are not applicable.).

* Same mounting brackets and accessories are used as Series CM2 (Best Pneumatics No. 2).

Minimum Stroke for Auto Switch Mounting

Auto switch model	No. of auto switches mounted				
	1	2		n	
		Different surfaces	Same surface	Different surfaces	Same surface
D-A9□ D-M9□ D-M9□W	10	15 Note 1)	45 Note 1)	$15 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6, ...)	45 + 45 (n - 2)
D-C7□ D-C80	10	15	50	$15 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6, ...)	50 + 45 (n - 2)
D-H7□ D-H7□W D-H7BAL D-H7NF	10	15	60	$15 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6, ...)	60 + 45 (n - 2)
D-C73C D-C80C D-H7C	10	15	65	$15 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6, ...)	65 + 50 (n - 2)
D-B5□ D-B64 D-G5NTL	10	15	75	$15 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6, ...)	75 + 55 (n - 2)
D-B59W	15	20	75	$20 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6, ...)	75 + 55 (n - 2)
D-A3□ D-A44 D-G39 D-K39	10	35	100	35 + 30 (n - 2)	100 + 100 (n - 2)

Note 1) Auto switch mounting (The adjustment as shown in the figures below is required with the following stroke ranges.)

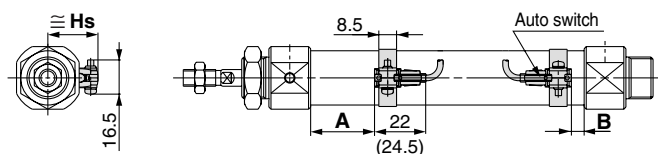
Auto switch model	With 2 auto switches	
	Different surfaces Note 1)	Same surface Note 1)
	 The proper auto switch mounting position is 6 mm inward from the switch holder edge.	 The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-A93	—	45 to less than 50 stroke
D-M9□ D-M9□W	15 to less than 20 stroke	45 to less than 55 stroke

REA
REB
REC
C□Y
C□X
MQ
RHC
RZQ
D-□
-X□
Individual
-X□

Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

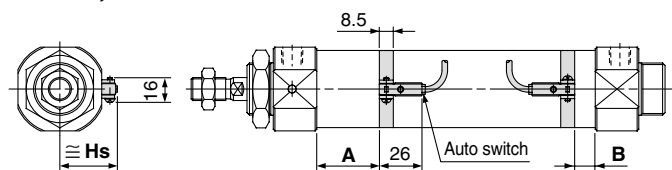
Reed auto switch

D-A9□

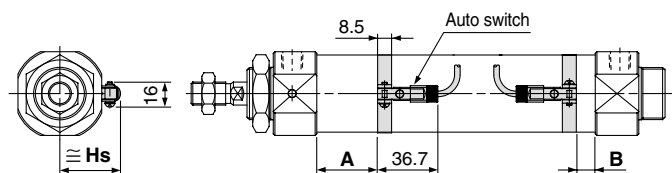


() : For D-A93 type

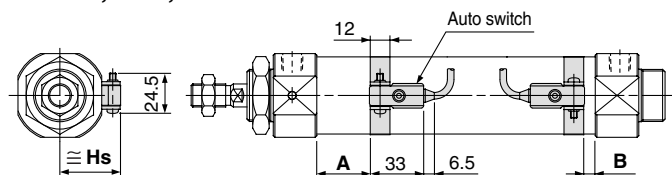
D-C7□, C80



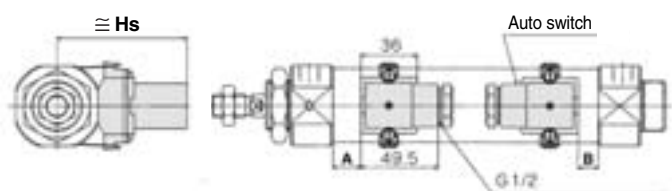
D-C73C, C80C



D-B5□, B64, B59W



D-A44

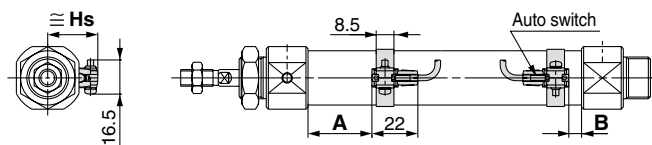


(Applicable cable O.D.:
ø6.8 to ø11.5)

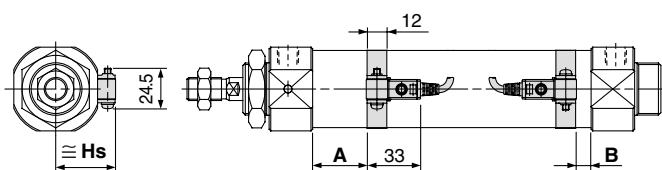
Solid state auto switch

D-M9□

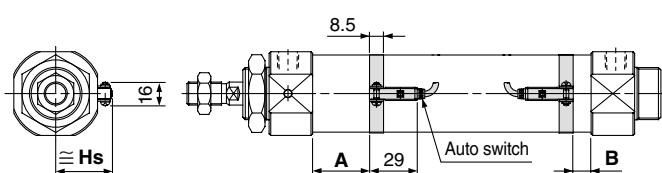
D-M9□W



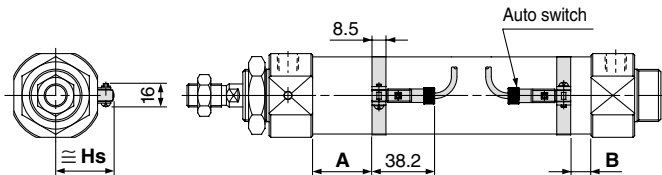
D-G5NTL



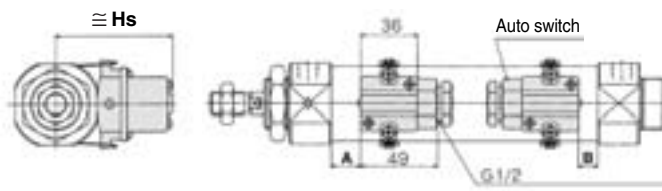
D-H7□, H7□W, H7NF, H7BAL



D-H7C



D-A3□, G39, K39



(Applicable cable O.D.:
ø6.8 to ø9.6)

Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height**Auto Switch Proper Mounting Position**

(mm)

Auto Switch model Bore size (mm)	D-A9□		D-M9□ D-M9□W		D-C7□ D-C80 D-C73C D-C80C		D-B5□ D-B64		D-B59W		D-A3□ D-A44 D-G39 D-K39 D-G5NBL		D-H7□ D-H7C D-H7□W D-H7NF D-H7BAL		D-G5NTL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	55.5	30.5	59.5	34	56	31	50	25	53	28	49.5	24.5	55	30	51.5	26.5
25	55.5	30.5	59.5	34	56	31	50	25	53	28	49.5	24.5	55	30	51.5	26.5
32	59	36	63	40	59.5	36.5	53.5	30.5	56.5	33.5	53	30	58.5	35.5	55	32
40	69.5	38.5	73.5	42.5	70	39	64	33	67	36	63.5	32.5	69	38	65.5	34.5

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

Auto Switch Mounting Height

(mm)

Auto Switch model Bore size (mm)	D-A9□ D-M9□ D-M9□W		D-C7□ D-C80 D-H7□ D-H7□W D-H7NF D-H7BAL		D-B5□ D-B64 D-B59W D-G5NTL D-H7C		D-C73C D-C80C		D-G39 D-K39 D-A33 D-A34		D-A44	
	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs
20	24	24.5	27.5	27	62	72						
25	26.5	27	30	29.5	64.5	74.5						
32	30	30.5	33.5	33	68	78						
40	34.5	35	38	37.5	72.5	82.5						

REA

REB

REC

C□Y

C□X

MQ

RHC

RZQ

D-□

-X□

Individual
-X□

Operating Range

(mm)

Auto switch model	Bore size (mm)			
	20	25	32	40
D-A9□	7	6	8	8
D-M9□ D-M9□W	4	4	5	4
D-C7□/C80 D-C73C/C80C	8	10	9	10
D-B5□/B64	8	10	9	10
D-B59W	13	13	14	14
D-H7□/H7□W D-H7NF/H7BAL	4	4	4.5	5
D-H7C	7	8.5	9	10
D-A3□/D-A44	9	10	9	10
D-G39/D-K39	8	9	9	9
D-G5NTL	4	4	4.5	5
D-G5NBL	35	40	40	45

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

Auto Switch Mounting Bracket Part No.

(mm)

Auto switch model	Bore size (mm)			
	ø20	ø25	ø32	ø40
D-A9□ D-M9□ D-M9□W	Note 1) ①BMA2-020 ②BJ3-1	Note 1) ①BMA2-025 ②BJ3-1	Note 1) ①BMA2-032 ②BJ3-1	Note 1) ①BMA2-040 ②BJ3-1
D-C7□/C80 D-C73C/C80C D-H7□ D-H7□W D-H7BAL D-H7NF	BMA2-020	BMA2-025	BMA2-032	BMA2-040
D-B5□/B64 D-B59W D-G5NTL D-G5NBL	BA-01	BA-02	BA-32	BA-04
D-A3□/A44 D-G39/K39	BD1-01M	BD1-02M	BD1-02	BD1-04M

Note 1) Two kinds of auto switch mounting brackets are used as a set.

[Mounting screws set made of stainless steel]

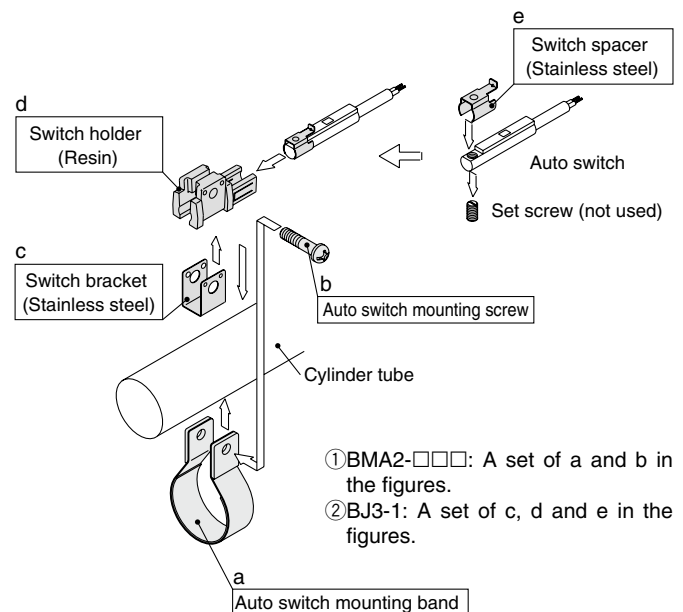
The following set of mounting screws made of stainless steel is also available. Use it in accordance with the operating environment. (Please order the auto switch mounting bracket separately, since it is not included.)

BBA3: For D-B5/B6/G5/K5

BBA4: For D-C7/C8/H7

D-H7BAL/G5BAL auto switches are set on the cylinder with the stainless steel screws above when shipped. When an auto switch is shipped independently, BBA3 or BBA4 is attached.

Note 2) Refer to pages 1813 and 1814 for the details of BBA3 and BBA4.



Other than the applicable auto switches listed in "How to Order", the following auto switches can be mounted.

For detailed specifications, refer to pages 1719 to 1827.

Auto switch type	Model	Electrical entry (Fetching direction)	Features	Applicable bore size
Reed	D-C73, C76	Grommet (In-line)	—	ø20 to ø40
	D-C80		Without indicator light	
	D-B53		—	ø20 to ø40
Solid state	D-H7A1, H7A2, H7B		—	ø20 to ø40
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color indication)	
	D-G5NTL		With timer	ø20 to ø40

* For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785 for details.

* Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H types) are also available. Refer to page 1746 for details.

* Wide range detection type, solid state auto switches (D-G5NBL type) are also available. Refer to page 1776 for details.



Series REC

Specific Product Precautions

Be sure to read before handling.

Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

⚠ Caution

1. Speed Adjustment

Throttle speed controller, such as Series AS, is recommended for speed adjustment.

Recommended Speed Controller

Model	Model		
	Elbow type	Straight type	In-line type
REC20	AS2201F-01-06-X214	AS2301F-01-06-X214	AS2001F-06-X214
REC25	AS2201F-01-06-X214	AS2301F-01-06-X214	AS2001F-06-X214
REC32	AS2201F-01-06-X214	AS2301F-01-06-X214	AS3001F-08-X214
REC40	AS3201F-02-08-X214	AS3301F-02-08-X214	AS3001F-08-X214

JIS: Throttle valve



- Speed control is possible with meter-in and meter-out types of speed controllers. However, smooth acceleration and deceleration may not be obtained by these speed controllers.
- For installation other than horizontal mounting, it is recommended to use a system with reduced pressure supply circuit on the downward side. (This system is also effective for avoiding a start delay at rise and air consumption.)

2. Cushion Adjustment

Cushion adjustment mechanism is not designed.

Cushion adjustment is not necessary because the model can perform smooth acceleration and deceleration in a wide range of strokes without an adjusting cushion.

3. Plug (Relief Port)

For general conditions, a plug (M5 x 0.8) on the rod cover side is plugged with a hexagon socket head set screw ⑩. Do not remove it since dust may enter inside.

Hexagon socket set screw is not prepared for clean room specifications, and use it as relief port accordingly.

4. Cycle Time

Due to the nature of its construction, this cylinder starts and stops gradually. Therefore, the length of time for the stroke could be longer than that of standard cylinders.

REA

REB

REC

C□Y

C□X

MQ

RHC

RZQ

D-□

-X□

Individual
-X□