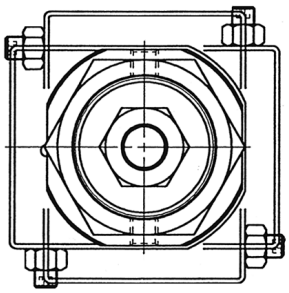
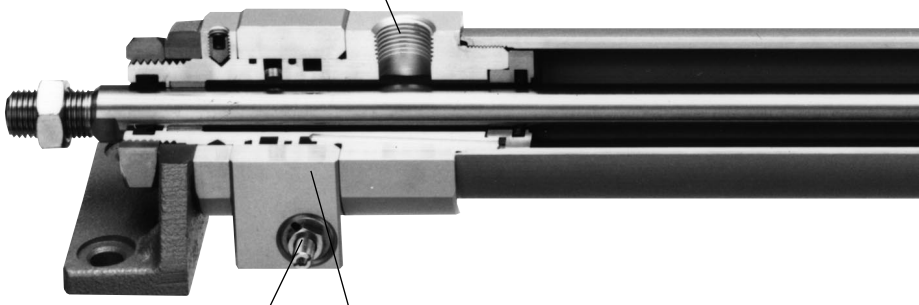
High Power Cylinder:

Smooth cushioning for high speed opration (3000mm/s) with light loads and

The capacity to absorb 10 to 20 times more energy than general purpose cylinders.





Supply/Exhaust Port

The diameter of the port orifice has been increased to support high speed operation.

Relief Valve Adjustment Screw

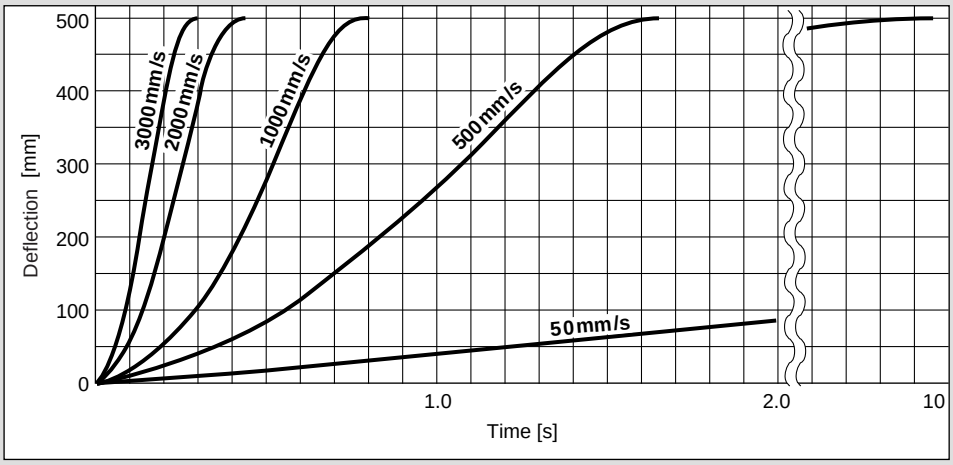
Relief Valve Body

The relief valve body rotates 360°, enabling relief adjustment from any direction.

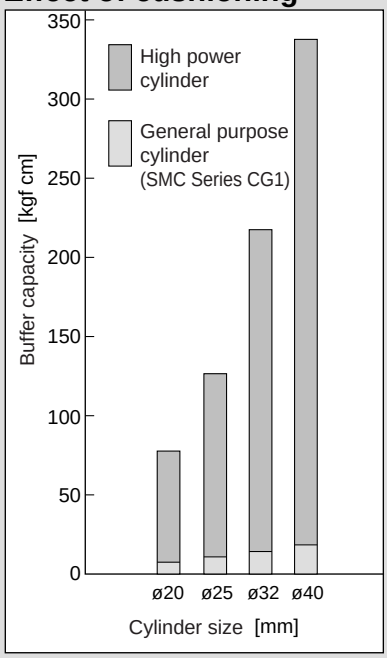
Mounting and cushion adjustment

Piping/mounting man-hours are the same as that of the conventional cylinders.
Cushion adjustment (Relief adjustment) man-hours are the same as the adjustment (cushion needle adjustment) for general purpose cylinders.

Quality of cushioning (RHCF40-500, Load weight 5kg, Supply pressure 0.5MPa, Horizontal operation)



Effect of cushioning



Series RHC

ow/medium speed opration with heavy loads

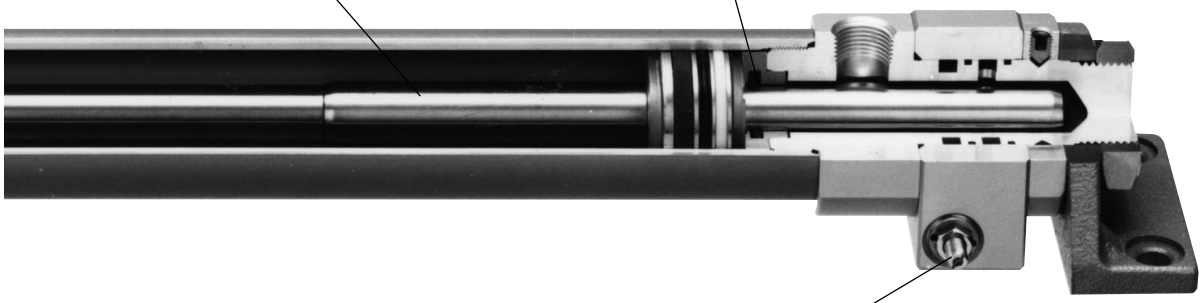
ø20 , ø25 , ø32 , ø40

Cushion Ring

The long cushion ring can absorb larger energy (in terms of speed and weight).

Cushion Seal

Strong seals are used for improved high speed durability and cushioning performance.

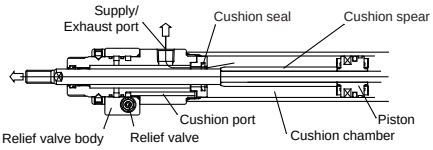


Relief Valve

The relief valve is used as a cushion valve and it provides better cushioning performance than a needle throttle of a general purpose cylinder.

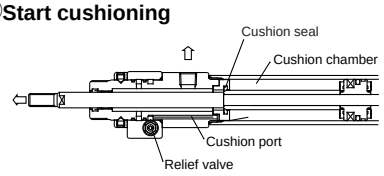
Working Principles

①Before cushioning



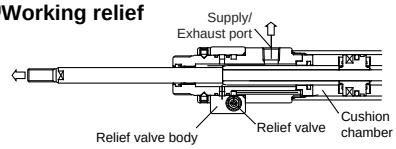
Air passes via the clearance between the cushion seal and the piston rod to the supply/exhaust port.

②Start cushioning



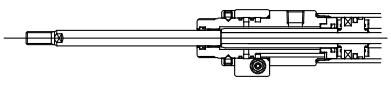
The cushion seal establishes the cushion chamber. Air flows to the cushion port provided in the rod cover.

③Working relief



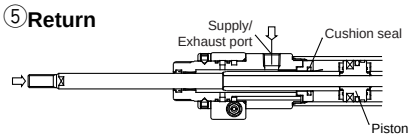
Air passes through the relief valve provided in the relief valve body, through the inside of the rod cover, to the supply/exhaust port.

④Finish cushioning



Transferring to the opposite stroke, air passes through the cushion seal that functions as a check valve, and starts to push the piston.

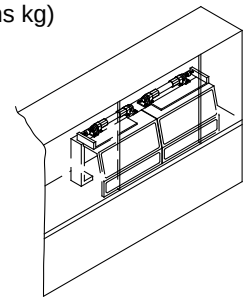
⑤Return



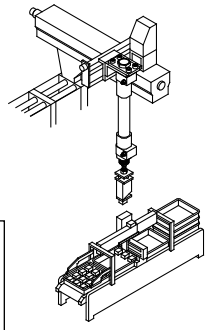
The cushion ring travels past the cushion seal, and the stroke becomes the opposite of step 1, and the movements shown in steps 1 through 4 above are carried out on the head cover side.

Applications

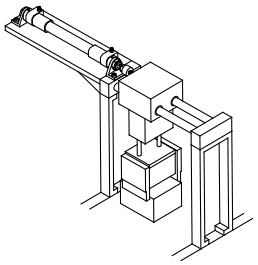
Opening/closing doors
(Up to 1500mm/s, several tens kg)



High speed Z-axis
(High speed and light load)
(Up to 3000mm/s, several kg)



Carrier device
"125kg, 700mm/s (In case of ø40)"



Model Selection for High Power Cylinder

Selection with Flow Chart

Selection of cylinder

Load weight M [kg], Stroke St [mm], Stroke time To [S], Average speed of cylinder Vm=St/To [mm/s]

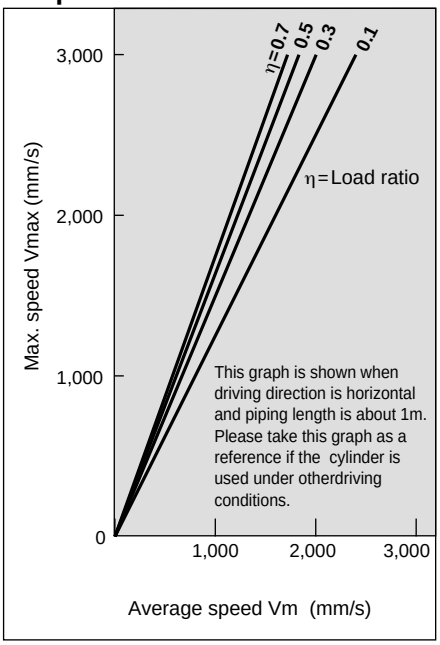
↓

Apply Vm (average speed) with Graph 1, and determine Vmax (Max. speed). — Graph 1

↓

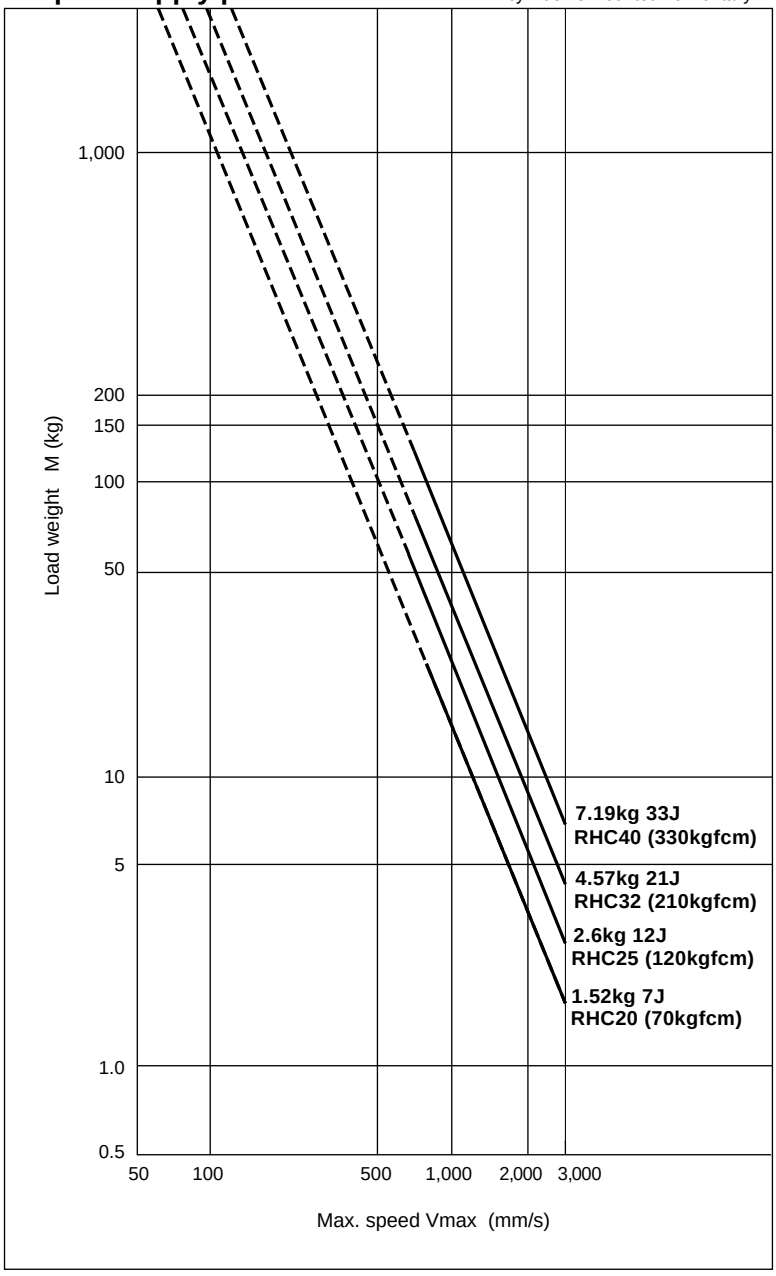
Apply M (load weight) with Graph 2 and Vmax determined with Graph 1, and determine cylinder size. — Graph 2

Graph 1



Graph 2 Supply pressure: 0.5MPa

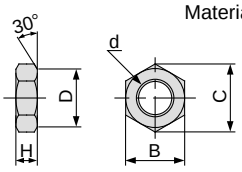
Note) The dotted line is a reference if the cylinder is mounted horizontally.



Accessories

Rod end nut (mm)

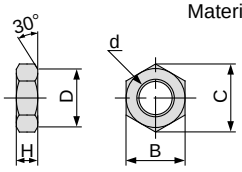
Material: Carbon steel



Part no	Applicable bore size	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 (mm)

Material: Carbon steel



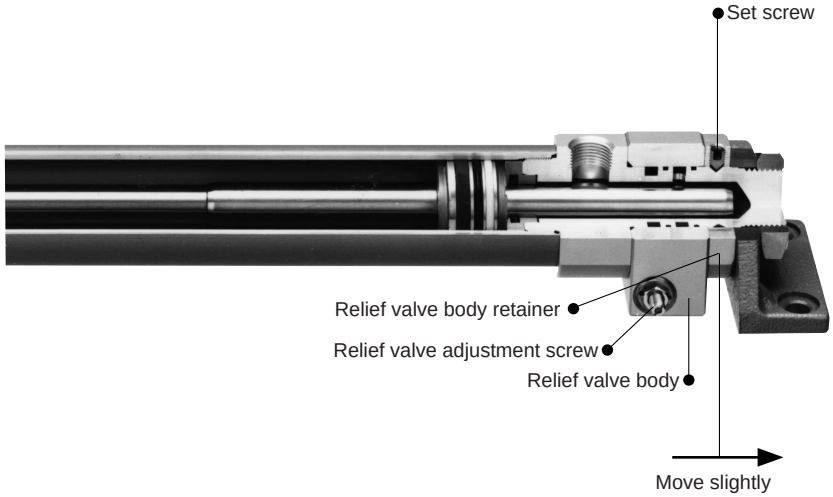
Part no.	Applicable bore size	B	C	D	d	H
SOR-20	**20**	26	30	26	M22 X 1.5	8
SOR-25	**25**	32	36.9	32	M24 X 1.5	8
SOR-32	**32**	38	43.9	38	M30 X 1.5	9
SOR-40	**40**	41	47.3	41	M33 X 2.0	11

How to Rotate the Relief Valve Body

The relief adjustment screw can be placed in any direction by rotating the relief valve body by following the steps given below.

Procedures

①Verify that there is no residual pressure in the cylinder. Then, loosen the mounting bracket (such as foot, flange, etc.).
②Loosen the set screw that is provided in the relief valve body holder and rotate the relief valve body.
③While keeping the relief valve body holder pressed against the relief valve body, secure it with the set screw. After having secured the relief valve body holder, make sure that the relief valve body cannot be rotated. In the event that it does rotate, loosen the set screw again and repeat the operation described in step 3.



⚠Precautions

Be sure to read before handling.
Refer to p.0-39 to 0-43 for Safety Instructions and common precautions.

⚠Warning

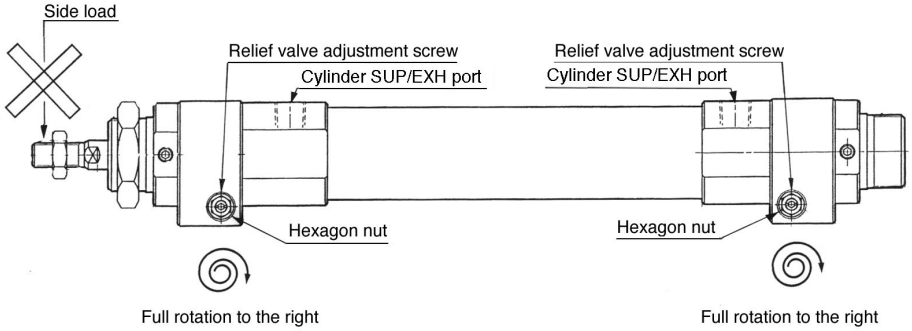
①**It is abnormal for the relief valve body to rotate after the installation of the cylinder has been completed.**
With the cylinder mounted in place, make sure that the relief valve body does not rotate. If there is looseness in the relief valve body in the axial direction, the cushion will not be effective. If this happens, the resulting impact or the highly pressurized air that leaks out of the cushion chamber could cause the relief valve body holder or the relief valve body to become detached from the cylinder body, or could cause the seals in the vicinity to slip from their designated positions. Therefore, if the relief valve body rotates, follow step 3 in the "How to Rotate the Relief Valve Body" to prevent it from rotating.

②**Strictly observe the allowable operating range of the relief valve (fully open to six turns to close).**
The relief valve adjustment screw, which adjusts the cushioning capability at the cylinder stroke end, can be used only within the range from the fully open state (turned all the way counterclockwise) to the fully closed state (turned six turns clockwise). Perform the adjustment starting from the fully closed state. Also, be aware that it is strictly prohibited to turn the relief valve adjustment screw clockwise beyond its fully closed state. This could damage the spring in the relief valve, which will lead to the loss of cushioning capability. The hexagon nut for locking the relief valve adjustment screw must be tightened securely. If it is loose, the relief valve adjustment screw could turn when the cylinder operates, which could change the cushioning capability.

⚠Caution

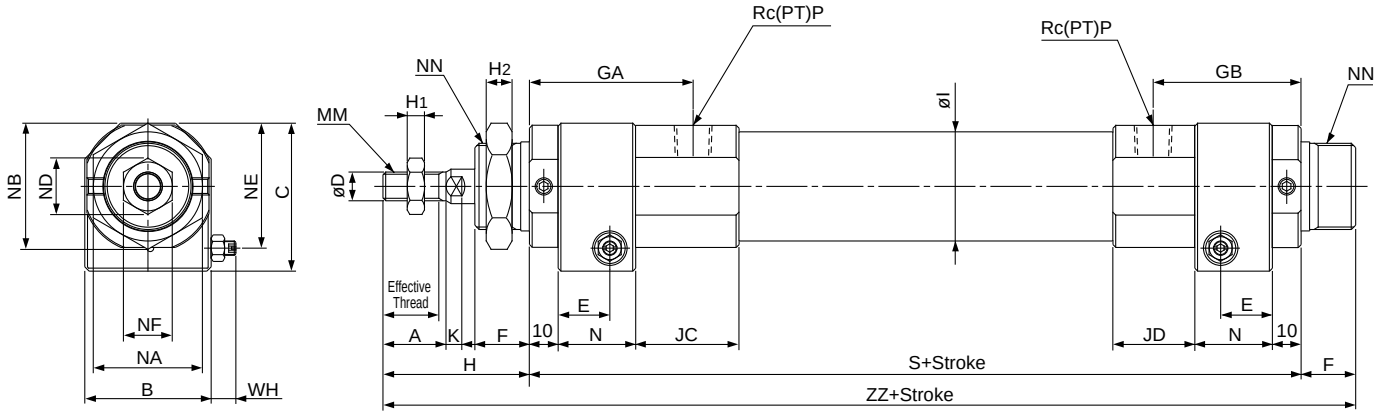
①**Do not apply a lateral load to the cylinder piston rod.**
If a lateral load is applied to the cylinder piston rod, the rod could bend. Therefore, if the stroke is relatively long, take appropriate measures such as equipping the load with a guide. Similar precautions must be taken to prevent buckling.

②**Secure an effective sectional area for the component equipment in accordance with the desired speed.**
The cylinder supply/exhaust port has been designed to enable a maximum speed of 3000mm/s. If the cylinder stroke is short, it might not be possible to obtain the desired speed. Also, due to the pressure reduction that occurs at each piece of component equipment (such as valves, speed regulator valves, pipes, fittings, etc.) it might not be possible to obtain the desired speed. Therefore, make sure to secure an effective sectional area that is sufficient for the component equipment.



Dimensions/Refer to p.4.10-6 for rod end nut and mounting nut.

Basic

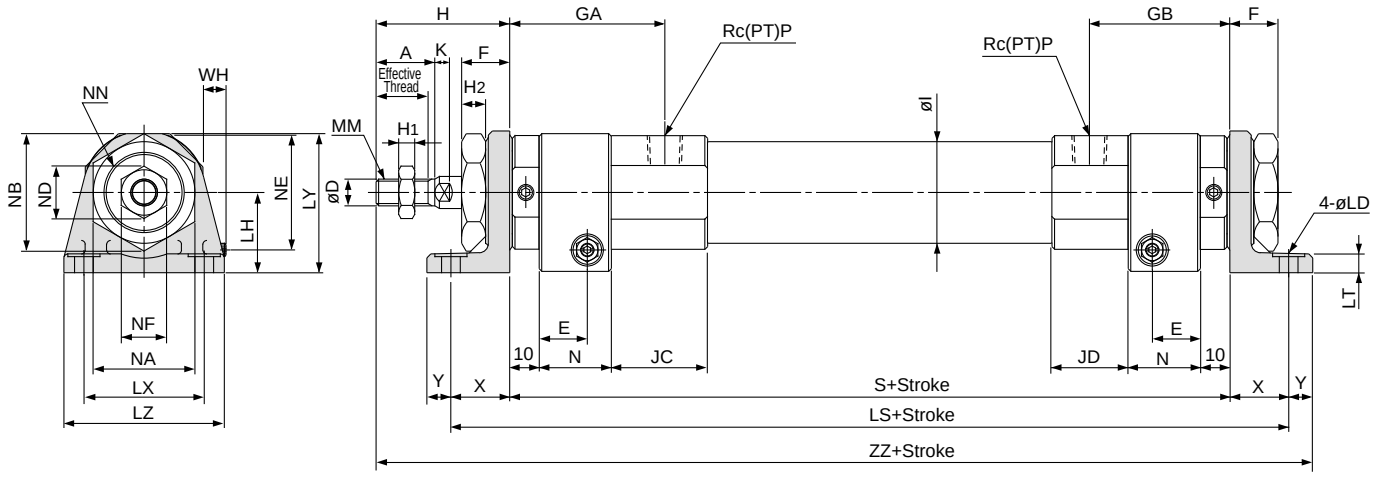


(mm)

Bore (mm)	Stroke range (mm)	Eff. thread length	A	B	C	D	E	F	GA	GB	H	H_1	H_2	øI
20	200 to 700	15.5	18	32	40.5	10	14.5	16	53.5	47.5	44	5	8	26
25	200 to 700	19.5	22	36	45.5	12	18	16	56.5	49.5	48	6	8	31
32	200 to 1000	19.5	22	44	51.5	12	18	19	55	51.5	51	6	9	38
40	200 to 1000	21	24	53	61.5	16	20.5	21	56	51.5	54.5	8	11	47

Bore (mm)	JC	JD	K	MM	N	NE	NA	NB	NF	ND	NN	Rc(PT)P	S	WH	ZZ
20	43	30.5	5	M8 X 1.25	22	33.5	26	30	13	15.0	M22 X 1.5	1/4	192		252
25	39	25.5	5.5	M10 X 1.25	27	37	32	36.9	17	19.6	M24 X 1.5	1/4	193	5.8 to 8.8	257
32	36	28.5	5.5	M10 X 1.25	27	43.5	38	43.9	17	19.6	M30 X 1.5	3/8	195		265
40	32	23	7.5	M14 X 1.5	30	52.5	41	47.3	22	25.4	M33 X 2.0	3/8	201.5	6.8 to 11.3	277

Axial foot



(mm)

Bore (mm)	Stroke range (mm)	Eff. thread length	A	D	E	F	GA	GB	H	I	JC	JD	K	LD	LH	H_1	H_2
20	200 to 700	15.5	18	10	14.5	16	53.5	47.5	44	26	43	30.5	5	7	25	5	8
25	200 to 700	19.5	22	12	18	16	56.5	49.5	48	31	39	25.5	5.5	7	28	6	8
32	200 to 1000	19.5	22	12	18	19	55	51.5	51	38	36	28.5	5.5	7	30	6	9
40	200 to 1000	21	24	16	20.5	21	56	51.5	54.5	47	32	23	7.5	9	35	8	11

Bore (mm)	LS	LT	LX	LY	LZ	MM	N	NA	NB	NE	NF	ND	NN	Rc(PT)P	S	WH	X	Y	ZZ
20	232	5.5	40	41	55	M8 X 1.25	22	26	30	33.5	13	15.0	M22 X 1.5	1/4	192		20	9	265
25	233	5.5	40	46.5	55	M10 X 1.25	27	32	36.9	37	17	19.6	M24 X 1.5	1/4	193	5.8 to 8.8	20	9	270
32	241	6	45	53	60	M10 X 1.25	27	38	43.9	43.5	17	19.6	M30 X 1.5	3/8	195		23	9	278
40	251.5	6	55	62	75	M14 X 1.5	30	41	47.3	52.5	22	25.4	M33 X 2.0	3/8	201.5	6.8 to 11.3	25	11	292

High Power Cylinder

Series RHC

ø20, ø25, ø32, ø40

How to Order

High power cylinder **RHC** **B** **20** ☐ ☐ ☐

High power cylinder

Mounting

B	Basic
L	Axial foot
F	Front flange
G	Rear flange

Bore size

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

Cylinder stroke

∗Refer to the stroke table on p.4.10-5.

Number of auto switches

—	2
S	1
n	n

Applicable Auto Switches/Refer to p.5.3-2 for further information on auto switch.

Style	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m)∗ 0.5 (–)	3 (L)	5 (Z)	— (N)	Applicable load	
Reed switch	—	Grommet	Yes	3 wire (Equiv. to NPN)	—	5V	—	**C76**	●	●	—	—	IC	—
				2 wire	24V	12V	100V	**C73**	●	●	●	—	—	Relay PLC
			No			5V 12V	≤100V	**C80**	●	●	—	—	IC	Relay PLC
			Yes			12V	—	**B53**	●	●	●	—	—	PLC
						12V	100V 200V	**B54**	●	●	●	—	—	Relay PLC
			No			12V	≤200V	**B64**	●	●	—	—		
		Connector	Yes			12V	—	**C73C**	●	●	●	●		
			No			5V 12V	≤24V	**C80C**	●	●	●	●	IC	
		Terminal conduit	Yes			12V	—	**A33**	—	—	—	●	—	PLC
						12V	100V 200V	**A34**	—	—	—	●		Relay PLC
		DIN terminal						**A44**	—	—	—	●		
	Diagnostic indication (2 color)	Grommet				—	—	**B59W**	●	●	—	—		
Solid state switch	—	Grommet	Yes	3 wire (NPN)	24V	5V 12V	—	**H7A1**	●	●	○	—	IC	Relay PLC
				3 wire (PNP)				**H7A2**	●	●	○	—		
				2 wire		12V		**H7B**	●	●	○	—	—	
		Connector						**H7C**	●	●	●	●		
		Terminal conduit		3 wire (NPN)		5V 12V		**G39**	—	—	—	●	IC	
				2 wire		12V		**K39**	—	—	—	●		
	Diagnostic indication (2 color)	Grommet		3 wire (NPN)		5V 12V		**H7NW**	●	●	○	—	IC	
				3 wire (PNP)				**H7PW**	●	●	○	—		
				2 wire		12V		**H7BW**	●	●	○	—	—	
	Water resistant (2 color)							**H7BA**	—	●	○	—		
	With timer			3 wire (NPN)		5V 12V		**G5NT**	—	●	○	—	IC	
	With diagnostic output			4 wire (NPN)				**H7NF**	●	●	○	—		
	Latch with diagnostic output(2 color)							**H7LF**	●	●	○	—	—	

Lead wire length 0.5m ⋯ — (Example) C80C 5m ⋯ Z (Example) C80CZ
3m ⋯ L C80CL — ⋯ N C80CN

∗Solid state switches marked with " ○ " is manufactured upon receipt of order.

∗D-A3☐, A44, G39, K39: Not indicate the symbol "N" for lead wire length.

Specifications

Fluid	Air
Proof pressure	1.5MPa
Max. operating pressure	1.0MPa
Min. operating pressure	0.05MPa
Ambient and fluid temperature	–10 to +60°C (Non freezing)
Piston speed	50 to 3000mm/s
Cushion	Air cushion
Lubrication	Not required (Non-lube)
Thread tolerance	JIS class 2
Stroke length tolerance	to 1000st +1.4
Mounting	Basic, Axial foot, Front/Rear flange

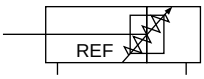
Stroke*

(mm)

Bore size (mm)	Standard stroke	Max. manufacturable stroke*
20	≤ 700	1500
25	≤ 700	1500
32	≤ 1000	1500
40	≤ 1000	1500

*It is possible in each size to manufacture the cylinder with 1500 stroke maximum.
To exceede standard stroke is not guaranteed.

Symbol



Absorbed Energy/Cushioning Stroke

Bore size (mm)	Max. absorbed energy (J)	Effective cushioning stroke (mm)
20	7	80
25	12	80
32	21	80
40	33	80

Theoretical Force (Unit: N)

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
20	10	OUT	314	62.8	94.2	126	157	188	220	251	283	314
		IN	236	47.2	70.8	94.4	118	142	165	189	212	236
25	12	OUT	491	98.2	147	196	246	295	344	393	442	491
		IN	378	75.6	113	151	189	227	265	302	340	378
32	12	OUT	804	161	241	322	402	482	563	643	724	804
		IN	691	138	207	276	346	415	484	553	622	691
40	16	OUT	1260	252	378	504	630	756	882	1010	1130	1260
		IN	1060	212	318	424	530	636	742	848	954	1060

Note) Theoretical force (N) = Pressure (MPa) X Piston area (mm^2)

Please consult SMC about bore sizes ø50, ø63, ø80 and ø100.

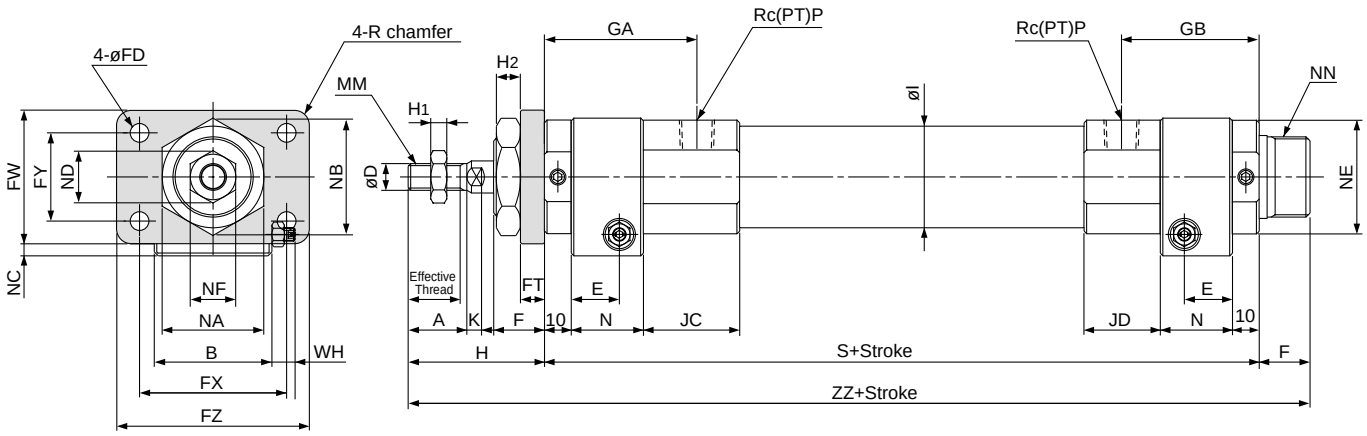
Weight (In case of 500 stroke)

(kg)

Bore size (mm)		**20**	**25**	**32**	**40**
Basic weight	Basic	1.2	1.62	2.04	3.2
	Axial foot	1.44	1.88	2.44	3.72
	Flange	1.29	1.79	2.23	3.47
Weight for additional stroke per 50mm		0.06	0.08	0.09	0.15

Calculation example: RHCL32-600
●Basic weight····· 2.44 (Foot style ø32)
●Basic weight····· 0.09/50 Stroke
●Cylinder stroke·····600 Stroke
2.44+0.09 X 100/50=2.62kg

Front flange

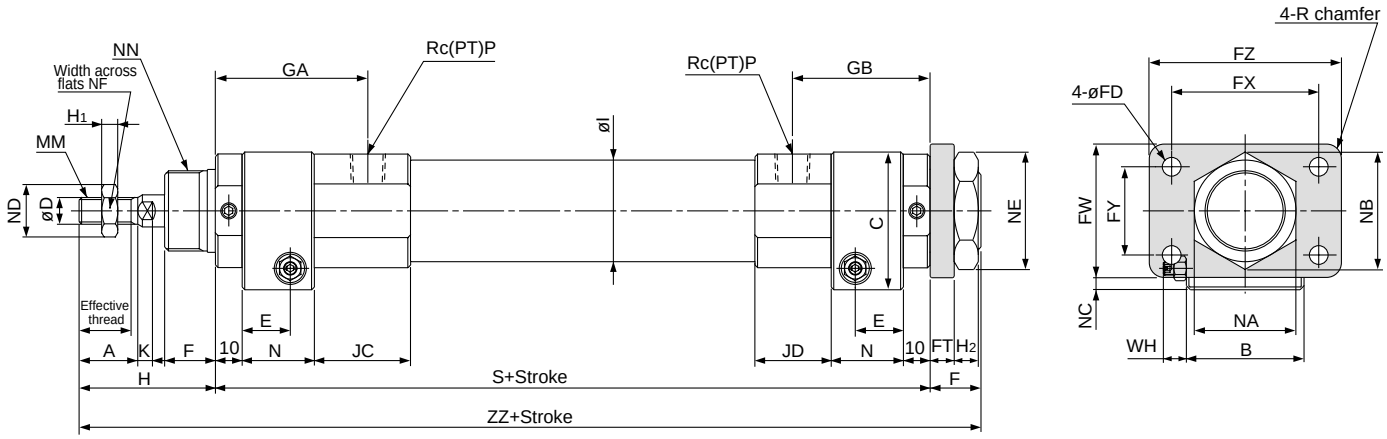


(mm)

Bore (mm)	Stroke range (mm)	Eff. thread length	A	B	D	E	F	FD	FT	FX	FY	FW	FZ	GA	GB	H_1	H_2
20	200 to 700	15.5	18	32	10	14.5	16	7	6	51	21	38	68	53.5	47.5	5	8
25	200 to 700	19.5	22	36	12	18	16	7	9	53	27	44	70	56.5	49.5	6	8
32	200 to 1000	19.5	22	44	12	18	19	7	9	55	33	50	72	55	51.5	6	9
40	200 to1000	21	24	53	16	20.5	21	9	9	66	36	60	84	56	51.5	8	11

Bore (mm)	H	øI	JC	JD	K	MM	N	NA	NB	NC	NE	NF	ND	NN	Rc(PT)P	S	WH	ZZ
20	44	26	43	30.5	5	M8 X 1.25	22	26	30	5.5	33.5	13	15.0	M22 X 1.5	1/4	192	5.8 to 8.8	252
25	48	31	39	25.5	5.5	M10 X 1.25	27	32	36.9	5.5	37	17	19.6	M24 X 1.5	1/4	193	5.8 to 8.8	257
32	51	38	36	28.5	5.5	M10 X 1.25	27	38	43.9	4.5	43.5	17	19.6	M30 X 1.5	3/8	195	5.8 to 8.8	265
40	54.5	47	32	23	7.5	M14 X 1.5	30	41	47.3	4.5	52.5	22	25.4	M33 X 2.0	3/8	201.5	6.8 to 11.3	277

Rear flange

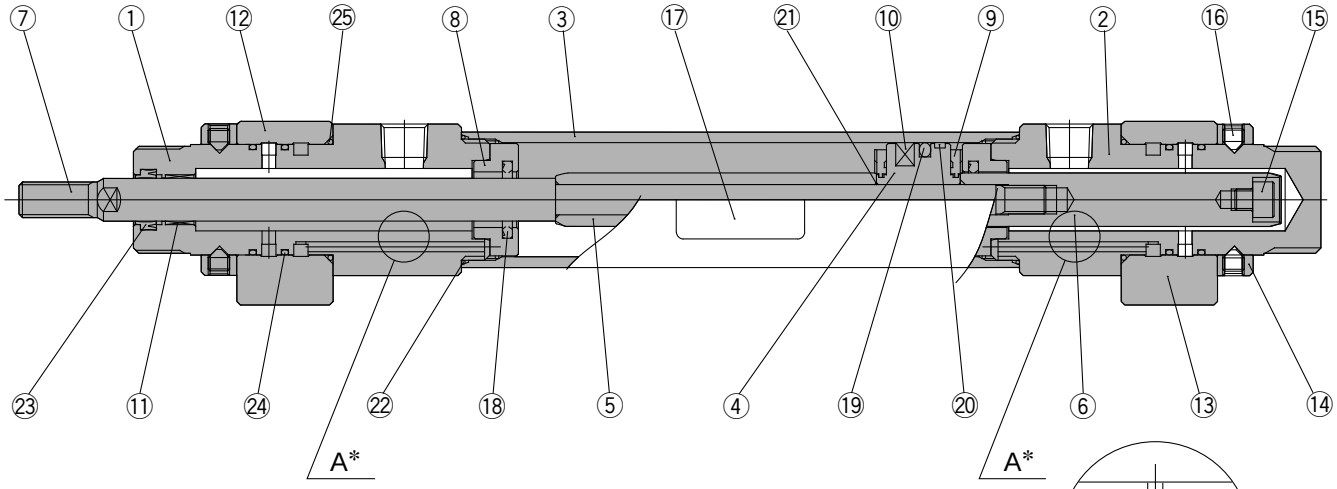


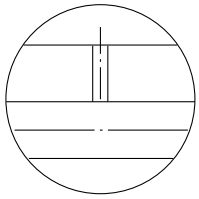
(mm)

Bore (mm)	Stroke range (mm)	Eff. thread length	A	B	C	D	E	F	FD	FT	FX	FY	FW	FZ	GA	GB	H_1
20	200 to 700	15.5	18	32	40.5	10	14.5	16	7	6	51	21	38	68	53.5	47.5	5
25	200 to 700	19.5	22	36	45.5	12	18	16	7	9	53	27	44	70	56.5	49.5	6
32	200 to 1000	19.5	22	44	51.5	12	18	19	7	9	55	33	50	72	55	51.5	6
40	200 to 1000	21	24	53	61.5	16	20.5	21	9	9	66	36	60	84	56	51.5	8

Bore (mm)	H	I	JC	JD	K	MM	N	NA	NB	NC	NE	NF	ND	NN	Rc(PT)P	S	WH	ZZ
20	44	26	43	30.5	5	M8 X 1.25	22	26	30	5.5	33.5	13	15.0	M22 X 1.5	1/4	192		252
25	48	31	39	25.5	5.5	M10 X 1.25	27	32	36.9	5.5	37	17	19.6	M24 X 1.5	1/4	193	5.8 to 8.8	257
32	51	38	36	28.5	5.5	M10 X 1.25	27	38	43.9	4.5	43.5	17	19.6	M30 X 1.5	3/8	195		265
40	54.5	47	32	23	7.5	M14 X 1.5	30	41	47.3	4.5	52.5	22	25.4	M33 X 2.0	3/8	201.5	6.8 to 11.3	277

Construction





Enlarged view of “A”

Component Parts

No.	Description	Material	Remarks
①	Rod cover	Aluminum alloy	White anodized
②	Head cover	Aluminum alloy	White anodized
③	Cylinder tube	Aluminum alloy	Hard anodized
④	Piston	Aluminum alloy	Chromated
⑤	Cushion spear A	Carbon steel	Hard chromate plated
⑥	Cushion spear B	Carbon steel	Hard chromate plated
⑦	Piston Rod	Carbon steel	Hard chromate plated
⑧	Cushion spacer	Stainless steel	
⑨	Damper	Urethane	
⑩	Magnet	—	
⑪	Bushing	Oil-impregnated sintered alloy	
⑫	Relief valve ass'y (Front side)	—	
⑬	Relief valve ass'y (Rear side)	—	
⑭	Relief valve body holder	Aluminum alloy	White anodized
⑮	Hexagon socket head screw	Chrome-molybdenum steel	ø20: M5 X 0.8 X 6 ø25, ø32: M6 X 1 X 6 ø40: M8 X 1.25 X 8 Nickel plated
⑯	Hexagon socket head set screw	Chrome-molybdenum steel	ø20, ø25: M5 X 0.8 X 6 ø32, ø40: M6 X 1 X 8 Nickel plated
⑰	Name plate	—	
⑱	Cushion seal	Special resin	

Replacement Parts

No.	Description	Material	Bore size (mm)/Part No.			
			20	**25**	**32**	**40**
⑲	Piston seal	NBR	NLP-20A	NLP-19A	NLP-32A	NLP-40A
⑳	Wear ring	Resin	CM-020-07-301A	CM-025-07-302A	CM-032-07-304A	C1A040-07-305A
㉑	Piston gasket	NBR	SO-012-13	SO-010-22	SO-010-23	SO-013-7
㉒	Cylinder tube gasket	NBR	CM-020-16-123	CM-025-16-124	CM-032-16-126	CM-040-16-127
㉓	Rod seal	NBR	PDU-10Z	PDU-12LZ	PDU-12LZ	PDU-16Z
㉔	O ring	NBR	SO-017-30	SO-017-32	SO-017-34	SO-017-36
㉕	O ring	NBR	SO-015-23	SO-015-23	SO-017-36	SO-017-37

Auto Switch Specifications

Refer to p.5.3-2 for auto switch specifications.

Applicable Auto Switch

Auto switch style	Auto switch model	Electrical entry	Page
Reed switch	**D-C7,C8**	Grommet	5.3-9
	D-C73C, C80C	Connector	5.3-11
	D-B5, B6	Grommet	5.3-10
	D-B59W	Grommet (2 color indication)	5.3-25
	D-A3	Terminal conduit	5.3-12
	D-A44	DIN terminal	5.3-12
Solid state switch	**D-H7A, H7B**	Grommet	5.3-29
	D-H7C	Connector	5.3-31
	D-G39, K39	Terminal conduit	5.3-32
	D-H7□W	Grommet (2 color indication)	5.3-42
	D-H7BAL	Grommet (Water resistant/2 color)	5.3-55
	D-G5NT	Grommet (With timer)	5.3-59
	D-H7NF	Grommet (With diagnostic output/2 color)	5.3-50
	D-H7LF	Grommet (W/ latching diagnostic output/2 color)	5.3-49

Auto Switch Mounting Bracket (including band and screw)

Applicable auto switch		Bore size mm			
		20	**25**	**32**	**40**
Reed	D-C73, D-C76, D-C80 D-C73C, D-C80C	BMA2-020	BMA2-025	BMA2-032	BMA2-040
Solid state	D-H7A1, D-H7A2, D-H7B, D-H7C D-H7NW, D-H7PW, D-H7BW D-H7LF, D-H7NF, D-H7BAL				
Reed	D-B53, D-B54, D-B64, D-B59W	BA-01	BA-02	BA-32	BA-04
Solid state	D-G5NTL				
Reed	D-A33, D-A34, D-A4	BD1-02M		BD1-02	BD1-04M
Solid state	D-G39, D-K39				

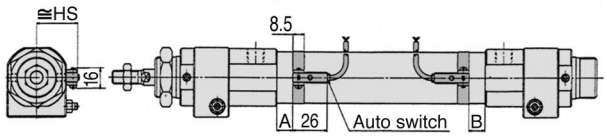
⚠Precautions

Be sure to read before handling.
Refer to p.0-39 to 0-43 for Safety Instructions and common precautions.

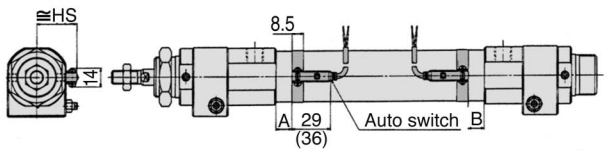
Series RHC
Auto Switch Specifications

Auto Switch Mounting Position and Mounting Height

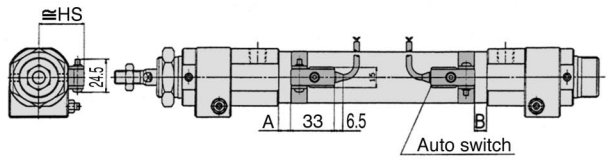
D-C7/C8



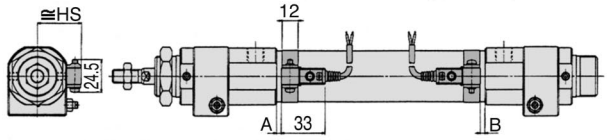
D-H7□ /H7□W/H7□F/H7BAL



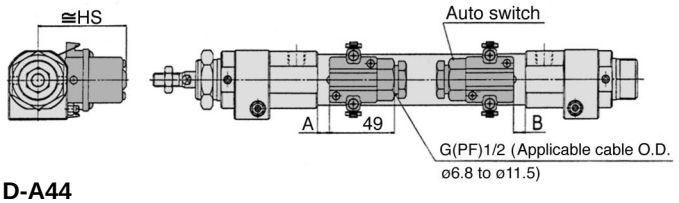
D-B5/B6/B59W



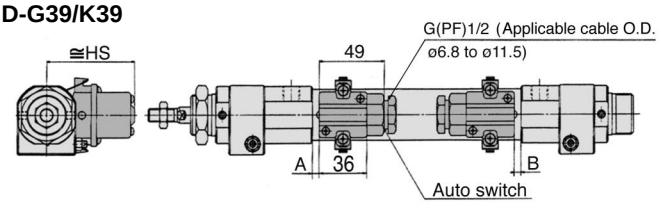
D-G5NTL



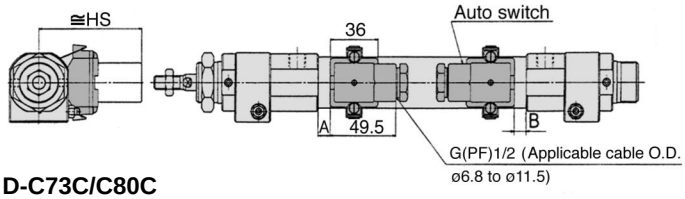
D-A33/A34



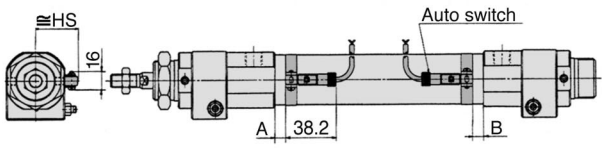
D-G39/K39



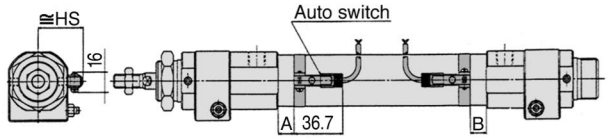
D-A44



D-H7C



D-C73C/C80C



Auto Switch Setting Position (mm)

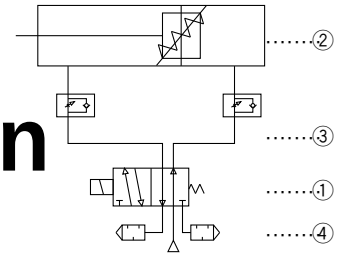
Bore size (mm)	D-C7 D-C8 D-C73C D-C80C		D-B5 D-B6		D-A3□ D-A44 D-G39 D-K39		D-H7□ D-H7C		D-G5NTL		D-H7□W D-H7□F D-H7BAL		D-B59W	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	15	20.6	9	14.6	8.5	14.1	14	19.6	10.5	16.1	12.5	18.1	11.9	17.5
25	15	20.6	9	14.6	8.5	14.1	14	19.6	10.5	16.1	12.5	18.1	11.9	17.5
32	14.9	22.6	8.9	16.6	8.4	16.1	13.9	21.6	10.4	18.1	12.4	20.1	11.8	19.5
40	19.9	27.7	13.9	21.7	13.4	21.2	18.9	26.7	15.4	23.2	17.4	25.2	16.8	24.6

Auto Switch Mounting Height (mm)

D-C7 D-C8 D-H7□ D-H7□W D-H7□F D-H7BAL	D-B5/B6 D-B59W D-G5NTL	D-A3□ D-G39 D-K39	D-A44	D-C73C D-C80C
HS	HS	HS	HS	HS
24.5	27.3	62	69.7	27
27	29.8	64.5	72.2	29.5
30.5	33.3	68	75.7	33
35	37.8	72.5	80.2	37.5

High Power Cylinder *Series* ***RHC***

System Selection

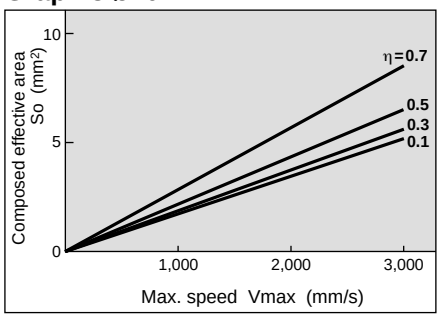


①Solenoid valve (A to E)
②Speed control valve (1-A to 2-B)
③Piping 3m
④Silencer
(Supply pressure 0.5MPa)

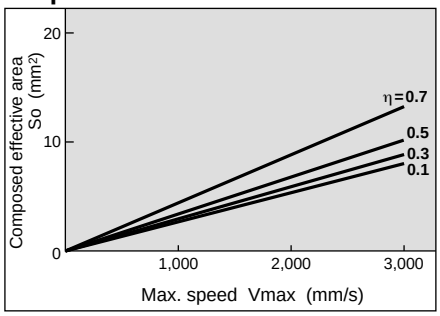
Apply η (cylinder load ratio) and Vmax (max. speed) with Graph 3, and determine effective sectional area 'So'.

Refer to "System selection table", and the appropriate solenoid valve, speed control valve ad bore size may be selected.

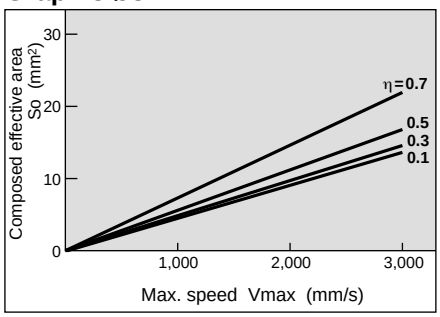
Graph 3:ø20



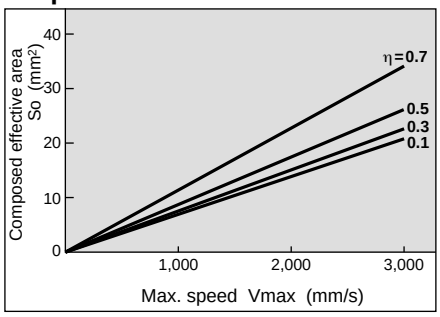
Graph 3:ø25



Graph 3:ø32



Graph 3:ø40



η: Cylinder load ratio
Vmax: Max. speed (Refer to p.4.10-6.)

System Selection Table

Bore size (mm)	Max. speed (mm/s)	Composed effective sectional area (mm²)	Solenoid valve ( ): Effective area [mm²] ▭: Metal seal					Speed controller		Piping tube O.D. (mm) Steel piping size
			A	B	C	D	E			
			3.6 to 6.3	9.0 to 14.4	16.2 to 18.0	36 to 45	64.8 to 67			
			VQ1000 (4.5)	VQ2000 (14.4)	–	–	–	1 With One-touch fittings	1-A Elbow	
			VQ1000 (6.3)	–	VQ2000 (16.2)	–	–		1-B Universal	
			SY3000 (5.9)	SY5000 (10.6)	SY7000 (18)	–	–		1-C In-line	
			SX3000 (5.9)	SX5000 (10.6)	SX7000 (18)	–	–			
			VJ5000 (3.6)	VJ7000 (11.0)	–	–	–	2 Standard	2-A Metal elbow	
			–	VZ4000 (9.9)	–	–	–			
			VZ3000 (3.6)	VZ5000 (11.0)	–	–	–			
			VZS2000 (6.3)	VZS3000 (12.2)	–	–	–			
			–	–	VF3000 (18)	VF5000 (45)	–		2-B In-line	
			–	–	VFR2000 (16.2)	VFR3000 (41.4)	VFR4000 (67)			
			–	VFS1000 (9.0)	VFS2000 (18)	VFS3000 (36)	VFS4000 (64.8)			
ø20 (1/4)	500	1.5	▭					1-A	AS22□1F (3.5)	ø6 1/8, 1/4
								1-B	AS23□1F (3.5)	
								1-C	AS2051F (4.5)	
								2-A	AS22□0 (2.9)	
								2-B	AS2000 (3.8)	
	1000	3		▭				1-C	AS3001F (6.5)	ø6 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
	1500	4.5		▭				1-C	AS4001F(16)	ø10 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
	2000	6			▭			1-C	AS4001F (16)	ø10 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
	2500	7.5			▭			1-C	AS4001F (16)	ø10 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
	3000	9			▭			1-C	AS4001F (16)	ø10 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
ø25 (1/4)	500	2.5	▭					1-C	AS2051F (4.5)	ø6 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
	1000	5		▭				1-C	AS3001F (10)	ø8 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
	1500	7.5			▭			1-C	AS4001F (16)	ø10 1/4, 3/8
								2-B	AS3000, AS3500 (12.3)	
	2000	10				▭		1-C	AS4001F (16)	ø10 1/4
								2-B	AS4000 (25.5)	
	2500	12.5				▭		2-B	AS4000 (25.5)	1/4
	3000	15					▭	2-B	AS4000 (25.5)	1/4
ø32 (3/8)	500	4		▭				1-A	AS32□1F (10)	ø6 ø10 1/4, 3/8
								1-B	AS33□1F (10)	
								1-C	AS4001F (16)	
								2-A	AS32□0 (13)	
								2-B	AS3000, AS3500 (12.3)	
	1000	8			▭			1-C	AS4001F (16)	ø10 1/4, 3/8
								2-A	AS32□0 (13)	
								2-B	AS3000, AS3500 (12.3)	
	1500	12				▭		2-B	AS4000 (25.5)	1/4, 3/8
	2000	16				▭		2-B	AS5000 (74)	3/8
	2500	20				▭		2-B	AS5000 (74)	3/8
	3000	24					▭	2-B	AS5000 (74)	3/8
ø40 (3/8)	500	6			▭			1-A	AS32□1F (10)	ø8 ø10 1/4, 3/8
								1-B	AS33□1F (10)	
								1-C	AS4001F (16)	
								2-A	AS32□0 (13)	
								2-B	AS3000, AS3500 (12.3)	
	1000	12				▭		2-B	AS4000 (25.5)	3/8 ø12
	1500	18				▭		2-B	AS5000 (74)	3/8 ø12
	2000	24					▭	2-B	AS5000 (74)	3/8 ø12
	2500	30					▭	2-B	AS5000 (74)	3/8 ø12
	3000	36					▭	2-B	AS420 (74)	3/8 ø12

Note) Refer to p.4.10-5 for max. absorbed energy since cushioning ability may in some cases exceed the allowable cushioning ability if the cylinder is used under high speeds and large loads.