SRG3

Rodless type High precision guided rodless cylinder

ø12·ø16·ø20·ø25

Overview

High precision guided rodless cylinder with integrated linear gide with a bore size of ø12 to ø25. This is optimal for precision transfer of a small parts.

Features

Compact and precise

Downsized by integrating ine axis high precision guide on the side of rodless cylinder. Downsizing of device is achieved.

Thin design like SRL3

CKD original flat rodless cylinder structure realizes ultra low table position. This enables thin design of devices.

Also the design is based on SRL3 with same stroke length, making it easier to replace.

Common port

Common port (one end porting) and standard port (both ends porting) can be selected according to cylinder installation position.

This contributes to downsizing of devices.

CONTENTS

High precision guided Rodless cylinder SRG3 Series

●: Standard ◎: Option : Not available

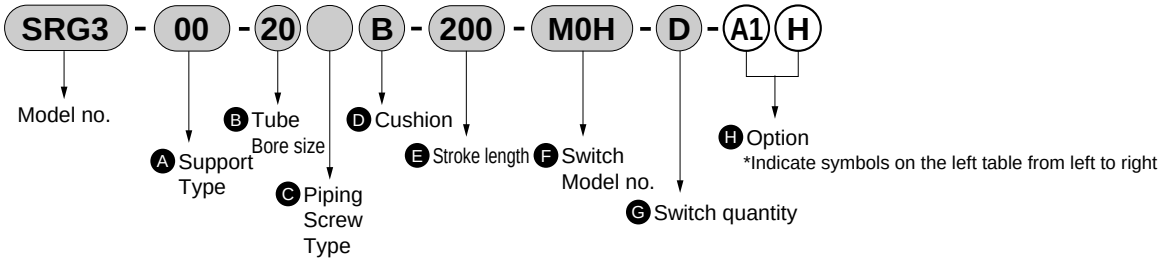
Variation	Model no. JIS symbol	Bore size (mm)	Standard stroke length (mm) 200	300	400	500	600	700	800	900	1000	Min. stroke length (mm)		Max. stroke length (mm)	Custom stroke length (mm)	Mounting style: Basic type 00	Axial foot type LB	Axial foot type LB1	Cushion: No cushion N	Both sides cushioned B	R Side cushioned R	L Side cushioned L	Option: Adjustable full-stroke both sides with shock absorber A	Adjustable full-stroke Rside with shock absorber A1	Adjustable full-stroke Lside with shock absorber A2	Adjustable full-stroke bracket retrofitting A3	Table mounting thread size up H	Switch	Page
Double acting	SRG3	ø12	●	●	●							1		450	1	●	●	●	●	●	●	●	◎	◎	◎	◎	◎	◎	2090
		ø16, 20	●	●	●	●	●	●	●					800		●	●	●	●	●	●	●	◎	◎	◎	◎	◎		
		ø25	●	●	●	●	●	●	●	●	●			1000		●	●	●	●	●	●	●	◎	◎	◎	◎			

Variation and option combination table

◎ : Option
○ : Available (custom order)
△ : Available depending on conditions (consult with CKD)
X : Not available

Code		Code	Variation	Piping Screw		Option									
			Double acting basic type	NPT	G	Adjustable stroke both sides	Adjustable stroke R side	Adjustable stroke H side	For mounting adjustable stroke bracket afterwards	Table mounting thread size up	Port and cushion needle position specification	Port and cushion needle position specification	Port and cushion needle position specification	Port and cushion needle position specification	Port and cushion needle position specification
		Symbol	No	N	G	A	A1	A2	A3	H	R	B	T	D	S
Variation	Double acting basic type	Blank		○	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
Port thread	NPT	N			X	○	○	○	○	○	○	○	○	○	○
	G	G				○	○	○	○	○	○	○	○	○	○
Option	Adjustable stroke both sides	A					X	X	X	◎	◎	◎	◎	◎	◎
	Adjustable stroke R side	A1						X	X	◎	◎	◎	◎	◎	◎
	Adjustable stroke H side	A2							X	◎	◎	◎	◎	◎	◎
	For mounting adjustable stroke bracket afterwards	A3								◎	◎	◎	◎	◎	◎
	Table mounting thread size up	H									◎	◎	◎	◎	◎
	Port and cushion needle position specification	R										X	X	X	X
	Port and cushion needle position specification	B											X	X	X
	Port and cushion needle position specification	T												X	X
	Port and cushion needle position specification	D													X
	Port and cushion needle position specification	S													
Accessory	Cylinder switch	Listed on another section	◎	○	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

<Example of model number>



Model no.: High precision guided rodless cylinder
A Mounting style : Basic type
B Bore size : ø20mm
C Port thread type : Rc thread
D Cushion : Both sides cushioned
E Stroke length : 200mm
F Switch model no. : Reed MOH switch and lead wire 1m
G Switch quantity : 2
H Option : Adjustable full-stroke both sides, with shock absorber or table mounting thread size up

Pneumatic components

Safety precautions

Always read this section before starting use.
Refer to Intro 71 for the cylinder, and to Intro 78 for the cylinder switch.

Individual precautions: rodless cylinder with high precision guide SRG3 Series

Installation & Adjustment

1. Common

CAUTION

■Please watch out when designing intermediate stop circuit.

With a slit rodless cylinder such as the SRL3, some air leaks due to the structure, so braking cannot be controlled with the all ports closed 3-position valve, and it may not be possible to hold the table stop position. Use a double sided pressurized control circuit having a P/A/B connection 3-position valve.
If air pressure drops once and is then pressurized again unenergized, the table may move and the origin deviate.

■Basic circuit diagram

●Horizontal load

If piping is as shown in Fig. 1, equal pressure is applied on both sides of the piston when stopped, and the table does not pop out when restarting.

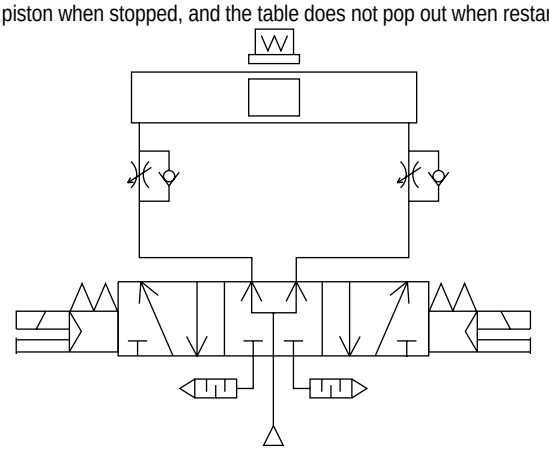


Fig.1

●Vertical load

●If a vertical load is applied as shown in Fig. 2, the table will move in the direction of the load. Thus, install a regulator with check valve to reduce the thrust in the load direction and balance the load.

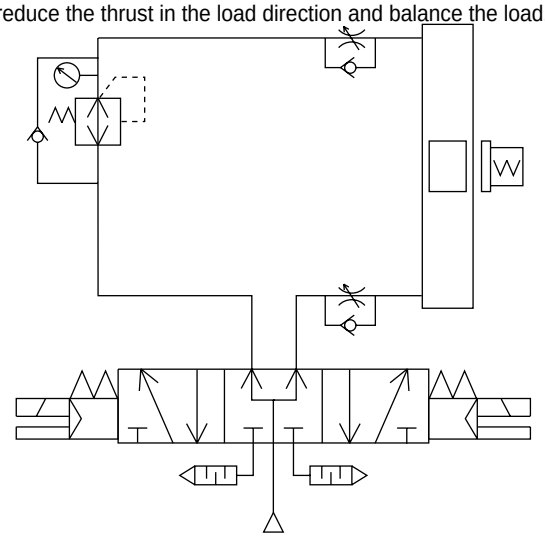


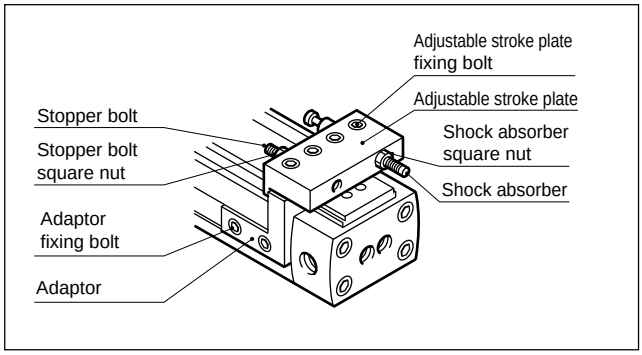
Fig.2

■With the slit rodless cylinder, such as the SRL3, external air leaks at a level that does not affect speed control.

■Do not use for applications that require constant pressurization to only one side such as a balancer.

WARNING

■How to adjust stroke adjustment unit



(1) Moving the stroke adjustment unit

●Loosening adaptor fixing bolt and adjustable stroke end plate fixing bolt allows to move the adjustable stroke unit.

(2) Fixing the stroke adjustment unit

●After moving adjustable stroke unit to the specified position, fix the adaptor fixing bolt and the adjustable stroke end plate fixing bolt using values in Table 1. If tightened at a lower value, the stroke adjustment unit may deviate.

Table 1 Tightening torque for adapter fixing bolt and stroke adjustment plate fixing bolt

Tightening torque / Model	Adaptor fixing bolt (N·m)	Adjustable stroke plate Fixing bolt (N·m)
SRG3-12/16	1.0 to 1.2	0.5 to 0.7
SRG3-20	2.5 to 2.7	
SRG3-25	5.2 to 5.6	2.5 to 2.7

(3) Stroke adjustment using stopper bolt

With 12 to 20mm bore, clearance between the table and stroke adjustment plate is small, and fingers may be pinched during adjustment. The stroke must basically be adjusted by moving the stroke adjustment unit.
Loosen the stopper bolt lock nut, turn the stopper bolt, and adjust the stroke.
After adjusting the stroke, tighten and fix the stopper bolt lock nut using values in Table 2.

Table 2 Tightening torque of stopper bolt fixing nut, shock absorber fixing nut

Tightening torque / Model	Square nut (N·m)	Square nut (N·m)
SRG3-12/16	1.1 to 1.2	1.3 to 1.8
SRG3-20	2.5 to 2.7	2.9 to 3.9
SRG3-25	8.8 to 9.5	4.5 to 6.0

(4) Adjusting shock absorber

●Standard shock absorber

Absorbed energy of shock absorber is adjusted by changing operational stroke length of shock absorber.

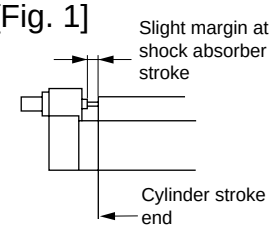
Adjust the shock absorber working stroke by loosening the shock absorber lock nut and turning the shock absorber. After adjusting, tighten the shock absorber fixing nut with the tightening torque shown below.

(5)Precautions upon use

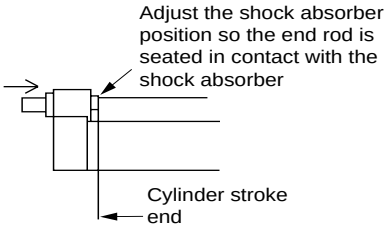
●The shock absorber absorbs rated energy with the rated stroke. When the product is shipped, the shock absorber is installed with a slight margin to the stroke at the cylinder stroke limit.

Absorbed energy is smaller than allowable energy absorption for the individual shock absorber, so if rated absorbed energy is required, adjust so the full stroke for the shock absorber is used.

[Fig. 1]



[Fig. 2]



Note: Explanation of shock absorber with adjustable full stroke.

●The absorption energy differs according to the collision speed, so if the collision speed is 1000mm/s, make sure that half of the maximum absorption energy shown in Table 3 is not exceeded.

Table 3 Adjustable full-stroke shock absorber specifications (initial setpoint)

Type	Absorbed energy (J)	Valid mm stroke (mm)
SRG3-12/16	2.4	5.5
SRG3-20	5.7	7
SRG3-25	10	8

■Avoid electrical welding after installing the rodless cylinder.

If the current flows into the cylinder and generates sparks between the dust-proof belt and cylinder tube, the dust-proof belt may be damaged.

■If a unit with excessive inertia, etc., is moved, the cylinder may be damaged or malfunctioning may occur. Use only within the allowable range.

■Do not apply shock or excessive moment on the table.

■Align before connecting to an load with an external guide mechanism.

●Carefully consider connection (floating) so deviation is absorbed.The longer the stroke, the greater the shaft center may deviate.

■Check that moment, including inertia generated when moving or stopping the load, does not exceed the allowable load, or damage may result. If this value is exceeded, the product is damaged.

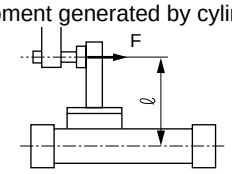
(When the overhang is large)

●If overhang is large and the cylinder is stopped at both ends with the piston, the bending moment functions due to load inertia even within internal cushion energy absorption.

If kinetic energy is large and an external cushion, etc., is used, try contact with the work-piece center of gravity as much as possible.

(When using an external stopper)

●When selecting an external stopper, consider the bending moment generated by cylinder thrust.



M1=F· ℓ

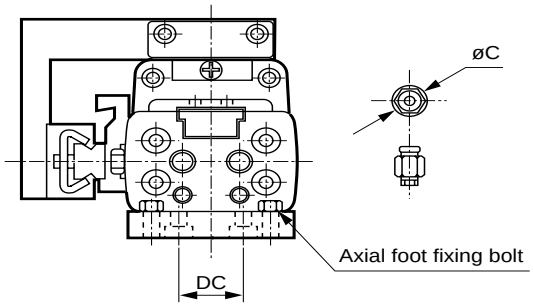
F: Cylinder thrust
ℓ: Distance from cylinder center

■Use of common port piping

●Applicable fittings for common port (option symbol R and T) are limited. Refer to Table 4.

Table 4

Mounting style	Applicable joint outer diameter øC		
Bore size (mm)	00	LB	LB
ø12	11 or less	Common port piping not available	11 or less
ø16	12 or less		12 or less
ø20	16 or less		16 or less
ø25	26 or less		26 or less



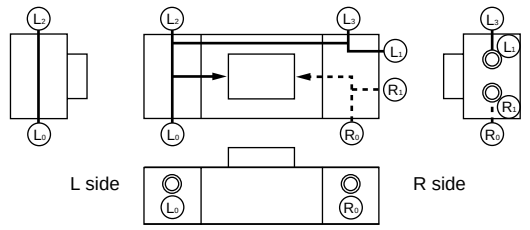
●When mounting style is axial foot type (LB1), and option symbol R or T, the joint interferes with the axial foot fixing bolt. Fix the cylinder main body with (axial foot fixing bolt) before pipe joint installation.

(The fitting will interfere with the axial foot fixing bolt if assembled before it)

■Piping port position and operating direction.

Bore size ø20 to 63.

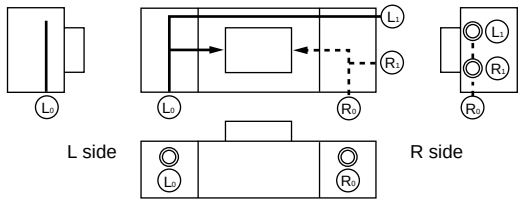
●Option symbol (Blank, R, B, T)



Ⓡ indicates R side pressurized port and Ⓛ indicates L side pressurized port. Before shipping, all plugs other than 1 each at Ⓡ0 and Ⓛ0 are sealed with plugs. Piping to other ports becomes possible by removing plug.
Option symbol D not available.

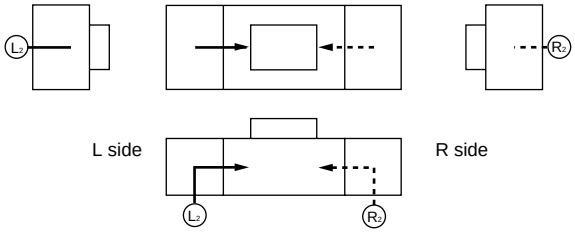
Bore size ø25

●Option symbol (Blank, R, B, T)



Ⓡ indicates R side pressurized port and Ⓛ indicates L side pressurized port. Before shipping, all plugs other than 1 each at Ⓡ0 and Ⓛ0 are sealed with plugs. Piping to other ports becomes possible by removing plug. However, bottom side piping is not possible. Select options (D) if such connection is necessary.

●For option symbols (D) (bottom piping)



Ⓡ indicates R side pressurized port and Ⓛ indicates L side pressurized port.
There are no ports other than Ⓡ2 or Ⓛ2, so pipes cannot be connected.

■Do not make nicks and scratches that impair flatness of the main body (tube) fixing surface and end plate surface.

⚠ CAUTION

■Please watch out when designing intermediate stop circuit.

With a slit rodless cylinder such as the SRL3, some air leaks due to the structure, so braking cannot be controlled with the all ports closed 3-position valve, and it may not be possible to hold the table stop position. Therefore, use a double sided pressurized control circuit having a P/A/B connection 3-position valve.
If air pressure drops once and is then pressurized again deenergized, the table may move and the origin deviate.

■Basic circuit diagram

●Horizontal load

If piping is as shown in Fig. 1, equal pressure is applied on both sides of the piston when stopped, and the table does not pop out when restarting.

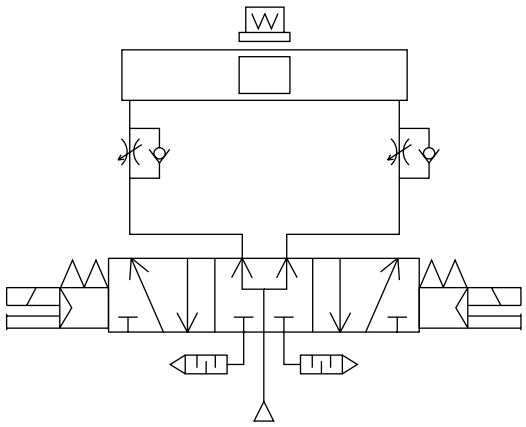


Fig.1

●Vertical load

If a vertical load is applied as shown in Fig. 2, the table will move in the direction of the load. Thus, install a regulator with check valve to reduce the thrust in the load direction and balance the load.

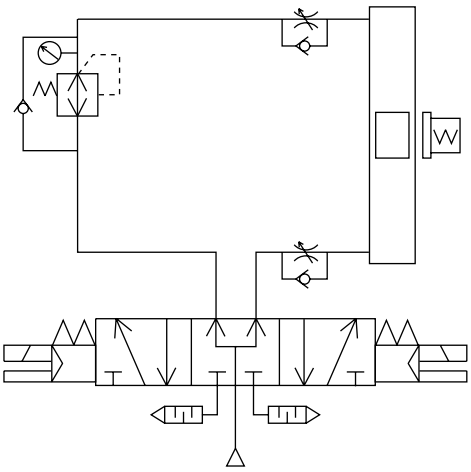


Fig.2

■Do not use in a place where coolant, coolant fluid or oil mist, etc., could come in direct contact with the cylinder.

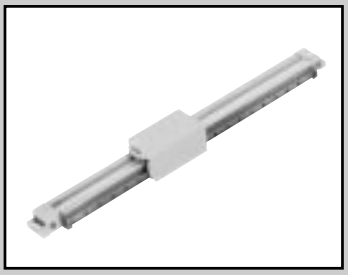
Always protect the cylinder with a cover if it needs to be installed in such environment.

■Do not use in a place where foreign matter such as swarf, powder dust, dust or spatter come in contact or are suspended in the environment.

If unavoidable because of the cylinder installation position, always provide protection with a cover, etc. Consult with CKD when using in such environment.

■The CKD shock absorber is treated as a consumable.

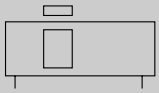
Replace the shock absorber if energy absorption performance drops or if movement is no longer smooth.



Rodless cylinder with high precision guide

SRG3 Series

●Bore size: ø12, ø16, ø20, ø25



RoHS CAD

Specifications

Descriptions	SRG3 (standard type/with switch)			
Bore size	ø12	ø16	ø20	ø25
Actuation	Double acting			
Working fluid	Compressed air			
Max. working pressure MPa	0.7			
Min. working pressure MPa	0.2			0.1
Withstanding pressure MPa	1.05			
Ambient temperature℃	5 to 60			
Port size	M5		Rc1/8	
Stroke tolerance mm	$^{+2.0}_{0}$			
Working piston speed mm/s	50 to 1000 (Note 1)			
Repeatability mm	± 0.05 (if it has shock absorber)			
Cushion	Air cushion			
Lubrication	Not required	Use the turbine oil Class 1 ISOVG32 if lubricated. Lubricate continuously if lubricated.		

Note 1: Piston speed used with common port piping differs with the stroke. Contact CKD for details.

Allowable energy absorption

Bore size (mm)	Cushioned		No cushion	With shock absorber (initial setpoint)	
	Allowable energy absorption (J)	Cushion stroke length (mm)	Allowable energy absorption (J)	Absorbed energy (J)	Valid stroke length (mm)
ø12	0.03	14.5	0.003	2.4	5.5
ø16	0.22	19.2	0.007	2.4	5.5
ø20	0.59	22.2	0.010	5.7	7
ø25	1.40	20.9	0.015	10	9

Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)
ø12	200, 300, 400	450	1
ø16	200, 300, 400, 500 600, 700, 800	800	
ø20			
ø25	200, 300, 400 500, 600, 700 800, 900, 1000	1000	

** The intermediate stroke can be manufactured in 1 mm increments.

M type switch quantity and min. stroke length (mm)

Switch quantity	1		2		3		4		5		6	
Switch model no. / Bore size (mm)	M*V	M*H	M*V	M*H	M*V	M*H	M*V	M*H	M*V	M*H	M*V	M*H
ø12	10	10	30	45 (70)	60	90 (120)	90	135 (170)	120	180 (220)	150	225 (270)
ø16	10	10	30	45 (70)	60	90 (120)	90	135 (170)	120	180 (220)	150	225 (270)
ø20	10	10	30	45 (70)	60	90 (120)	90	135 (170)	120	180 (220)	150	225 (270)
ø25	10	10	30	45 (70)	60	90 (120)	90	135 (170)	120	180 (220)	150	225 (270)

Note: The minimal stroke for full stroke adjustment models with switches are shown in ( ).

T type switch quantity and min. stroke length (mm)

Switch quantity	1		2		3		4		5		6	
Switch model no. / Bore size (mm)	T*V	T*H	T*V	T*H	T*V	T*H	T*V	T*H	T*V	T*H	T*V	T*H
ø12	5	5	45	50 (70)	85	100 (120)	125	150 (170)	165	200 (220)	205	250 (270)
ø16	5	5	45	50 (70)	85	100 (120)	125	150 (170)	165	200 (220)	205	250 (270)
ø20	5	5	45	50 (70)	85	100 (120)	125	150 (170)	165	200 (220)	205	250 (270)
ø25	10	10	45	50 (70)	85	100 (120)	125	150 (170)	165	200 (220)	205	250 (270)

Note: The minimal stroke for full stroke adjustment models with switches are shown in ( ).

Switch specifications (M type switch)

●1 Color/2 color indicator

Descriptions	Proximity 2 wire		Proximity 3 wire		
	M2V and M2H	M2WV (2 color indicator type)	M3H and M3V	M3PH/M3PV (custom order)	M3WV
Applications	PLC		PLC, relay, IC circuit or small solenoid valve		
Output method	-		NPN output	PNP output	NPN output
Power voltage	-		4.5 to 28 VDC		10 to 28 VDC
Load voltage	10 to 30 VDC		30 VDC or less		
Load current	5 to 20mA		200mA or less	100mA or less	150mA or less
Light	LED (ON lighting)	Red/green LED (ON lighting)	LED (ON lighting)	Yellow LED (ON lighting)	Red/green LED (ON lighting)
Leakage current	1mA or less		10µA or less	0.05mA or less	10µA or less

Descriptions	Reed 2 wire			
	M0V and M0H		M5V and M5H	
Applications	PLC, relay		PLC, relay, IC circuit (w/o lamp), serial connection	
Power voltage	-		-	
Load voltage	12/24 VDC	110 VAC	24 VDC or less	110 VAC or less
Load current	5 to 50mA	7 to 20mA	50mA or less	20mA or less
Light	LED (ON lighting)		Without indicator light	
Leakage current	0mA			

Note 1: For MO* switch, if load current is within 7 to 20mA, this switch can be used with 24 VAC and 48 VAC.
Note 2: Refer to Ending 1 for other switch specifications.

Switch specifications (T type switch)

●2 Color indicator type

Descriptions	Proximity 2 wire		Proximity 3 wire	
	T2YH/T2YV	T2WH/T2WV	T3YH/T3YV	T3WH/T3WV
Applications	PLC		PLC, relay	
Output method	-		NPN output	NPN output
Power voltage	-		10 to 28 VDC	
Load voltage	10 to 30 VDC	24 VDC ± 10%	30 VDC or less	
Load current	5 to 20mA (Note 1)		50mA or less	
Light	Red/green LED (ON lighting)	Red/green LED (ON lighting)	Red/green LED (ON lighting)	Red/green LED (ON lighting)
Leakage current	1mA or less		10µA or less	

●Strong magnetic field proof

Descriptions	Proximity 2 wire
	T2YD and T2YDT
Applications	PLC
Light	Red/green LED (ON lighting)
Load voltage	24 VDC ± 10%
Load current	5 to 20mA
Internal voltage drop	6V or less
Leakage current	1.0mA or less

Cylinder weight

Unit: kg

Bore size (mm)	Weight when stroke length is 0mm				Additional weight per stroke length = 100mm
	Basic type (00)	Foot type (LB)	Foot type (LB1)	Weight per switch (Including bracket)	
ø12	0.46	0.25	0.26	0.02	0.23
ø16	0.61	0.33	0.35		0.28
ø20	0.96	0.54	0.58		0.33
ø25	1.73	1.1	1.1		0.52

How to order

Without switch

SRG3 - 00 - 25 ○ B - 200 ——— A

With switch

SRG3 - 00 - 25 ○ B - 200 - M0H - R - A

Ⓐ Mounting style
Ⓑ Bore size
Ⓒ Port thread type
Ⓓ Cushion
Ⓔ Stroke length
Ⓕ Switch model no. Note 2 · Note 3
Ⓖ Switch quantity
Ⓗ Option Note 4, Note 5 Note 6, note 7

Symbol	Descriptions
Ⓐ Mounting style	
00	Basic type
LB	Axial foot type
LB1	Axial foot type

Ⓑ Bore size (mm)	
12	ø12
16	ø16
20	ø20
25	ø25

Ⓒ Port thread type	
Blank	Rc thread
N	NPT thread (ø20 and over) (custom order)
G	G thread (ø20 and over) (custom order)

Ⓓ Cushion	
B	Both sides cushioned
R	R side cushioned
L	L side cushioned
N	No cushion

Ⓔ Stroke length (mm)

Bore size	Stroke length Note 1	Custom stroke length
ø12	**1 to 450**	**By 1 mm increment**
ø16	**1 to 800**	
ø20	**1 to 800**	
ø25	**1 to 1000**	

Ⓕ Switch model no.

Lead wire Axial	Lead wire Radial	Contact	Indicator	Lead Line
M0H*	**M0V***	Reed	1 color indicator type	2-wire
M5H*	**M5V***		Without indicator light	
M2H*	**M2V***	Proximity	1 color indicator type	
-	**M2WV***		2 color indicator type	2-wire
M3H*	**M3V***		1 color indicator type	
-	**M3WV***		2 color indicator type	3-wire
M3PH*	**M3PV***		1 color indicator type (custom order)	3-wire
T2WH*	**T2WV***		2 color indicator type	2-wire
T2YH*	**T2YV***			
T3WH*	**T3WV***			3-wire
T3YH*	**T3YV***			
T2YD*	**-**		Strong magnetic field proof (AC magnetic field dedicated)	2-wire
T2YDT*	**-**			

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

Ⓖ Switch quantity	
R	One on R side
L	One on L side
D	2
T	3
4	4 (fill in switch quantity for 4 or more)

Ⓗ Option

Bore size (ø)				12	16	20	25
A	Adjustable full-stroke both ends, with shock absorber			●	●	●	●
A1	Adjustable full-stroke R end only, with shock absorber			●	●	●	●
A2	Adjustable full-stroke L end only, with shock absorber			●	●	●	●
A3	Adjustable full-stroke bracket retrofitting			●	●	●	●
H	Table mounting thread size up			●	●	●	
Blank	Port position	F (standard)	Cushion needle position F (standard)	●	●	●	●
R		R (common port)	F	●	●	●	●
B		F	B	●	●	●	
T		R (common port)	B	●	●	●	
D		D	F				●

Note on model no. selection

Note 1 : Refer to page 2090 for the minimum stroke length with switch.
Note 2 : Welding spatter can not be used for in cylinder splashed environment.
When T2YD and T2YDT use, care must be taken.
Note 3 : Ⓕ Switches other than A switch model no. are also available. (Custom order) Refer to Ending 1 for details.
Note 4 : Refer to dimensions about ports and cushion needle position indicating symbols.
Note 5 : Mounting style "00" or "LB1" is used for option "R" and "T".
(Mounting style "LB" is not available for option "R" and "T" because it can not be piped)
Note 6 : "A3" is a option that will have a plate nut for mounting installed beforehand so that it can be mounted afterwards without removing the cover.
Note 7 : Thread size for option "H" will be M4 for 12 and ø16, M5 for ø20.

<Example of model number>

SRG3-00-25B-200-M0H-R-A

Model: Rodless cylinder high precision guided
Ⓐ Mounting style: basic type
Ⓑ Bore size: ø25mm
Ⓒ Port thread type: Rc thread
Ⓓ Cushion: both sides cushioned
Ⓔ Stroke length: 200mm
Ⓕ Switch model no.: reed switch MOH
Ⓖ Switch quantity.: R side 1 piece
Ⓗ Option: Adjustable full-stroke both sides, with shock absorber

How to order switch

This is (SRL3 and common)

● Switch body + mounting bracket

SRL3 - M0H

Switch model no.
(Previous page section Ⓕ)

● Only switch body

SW - M0H

Switch model no.
(Previous page section Ⓕ)

● Mounting bracket (Note 2)

M type switch **SRL3 - M**

T type switch **SRL3 - T**

● Lead wire holder (Note 3)

SRL3 - MH

(Note 1): Switch main body+mounting bracket does not include any lead wire holder.
When lead wire holder is necessary, place an order separately.
(Note 2): M type switch and T type switch has different brackets.
(Note 3): Lead wire holder comes in a set of 10 pieces.

How to order discrete shock absorber

SRL3 - 20 - NCK

Bore size
(Previous page section Ⓑ)
(Square nut 1 pc., hex nut for fixing shock absorber 1pc.)

Applicable shock absorber model No.

model no.	Applicable model
NCK-00-0.3-C	SRG3-12/16
NCK-00-0.7-C	SRG3-20
NCK-00-1.2	SRG3-25

How to order repair parts

SRL3 - 20 K - 200

Bore size (Previous page section Ⓑ)
Stroke length (Previous page section Ⓔ)

How to order mounting bracket

SRL3 - Mounting style (LB.LB1) - 20

(Bracket 2 piece and mounting bolt 4 pc.)

Bore size
(Previous page section Ⓑ)

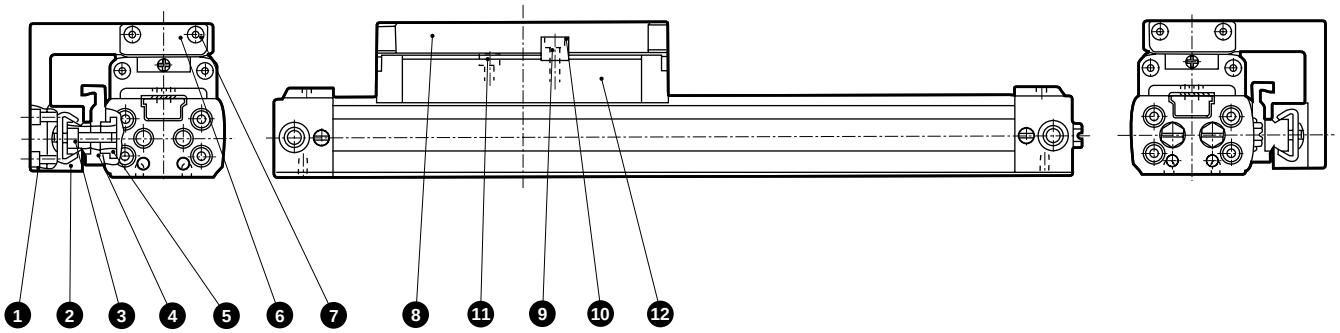
How to order full stroke adjustment bracket kit.

(Applied to option symbol A3)

SRG3 - 20 — Bore size (Previous page section Ⓑ)

- A — (Full stroke adjustment bracket kit on both sides)
- A1 — (Full stroke adjustment bracket kit on R side)
- A2 — (Full stroke adjustment bracket kit on L side)

Internal structure and parts list



L side R side

No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Hexagon socket head cap bolt	Alloy steel	Blackening	7	Hexagon socket head cap bolt	Alloy steel	Galvanizing
2	High precision guide	Stainless steel		8	Connection plate	Aluminum alloy	Alumite
3	Hexagon socket head cap bolt	Alloy steel	Blackening	9	Key	Steel	Blackening
4	Guide holder	Aluminum alloy	Alumite	10	Hexagon socket head cap bolt	Alloy steel	Blackening
5	Square nut (B)	Steel	Blackening	11	Hexagon socket head cap bolt	Alloy steel	Galvanizing
6	Stopper plate	Steel	Galvanizing	12	Table	Aluminum alloy	Alumite

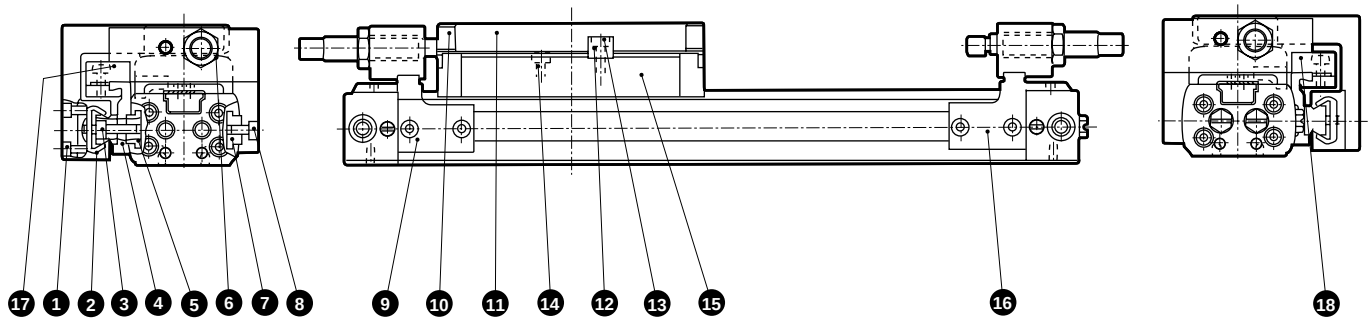
Repair parts list

Bore size (mm)	Kit No.	Repair parts number
ø12	SRL3-12K-*	Repair parts of rodless cylinders are same as SRL3 Series. Refer to page 2005.
ø16	SRL3-16K-*	
ø20	SRL3-20K-*	
ø25	SRL3-25K-*	

Note 1: Specify the kit no. when placing an order Specify stroke length for "*".

Internal structure and parts list

● Adjustable full-stroke with shock absorber

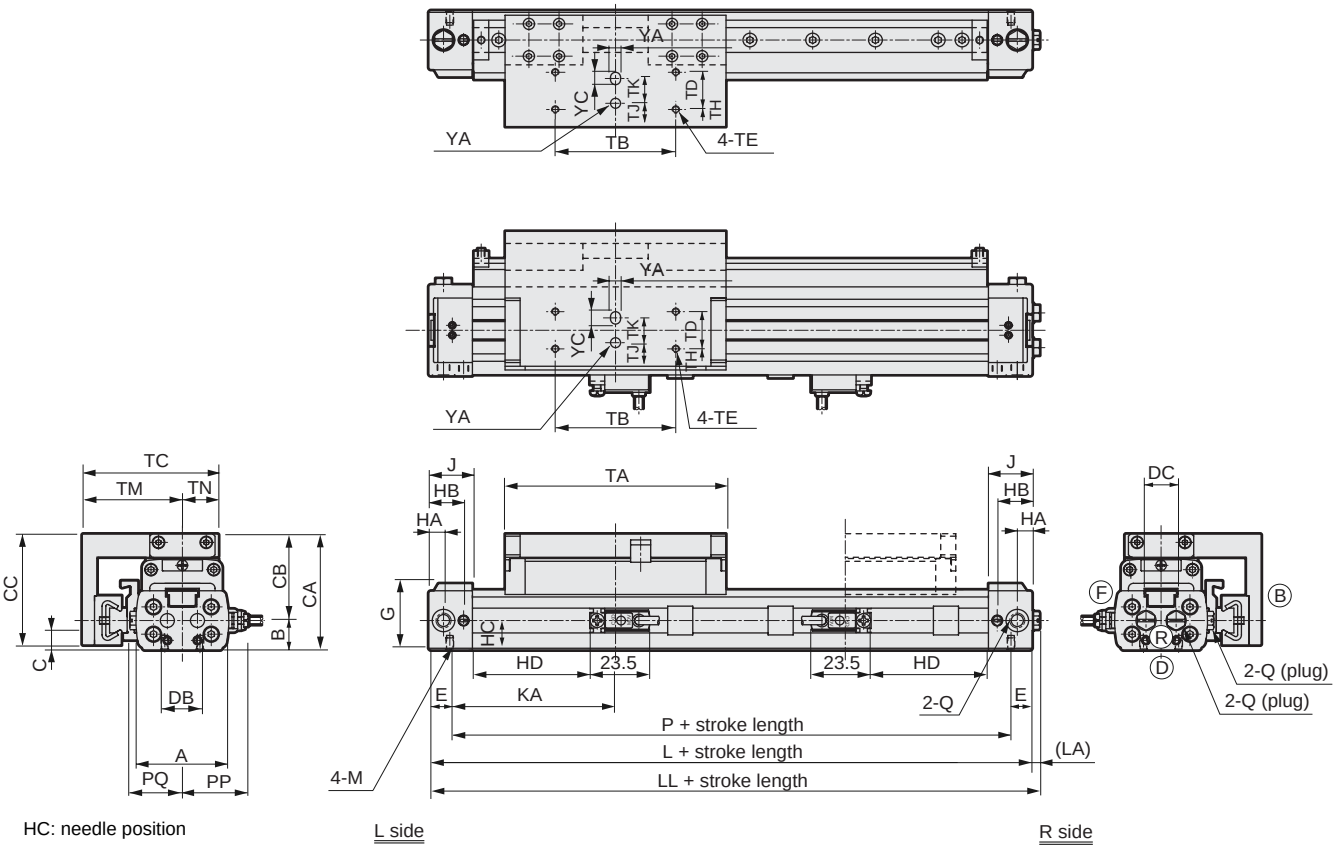


L side R side

No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Hexagon socket head cap bolt	Alloy steel	Blackening	10	Stopper plate	Steel	Galvanizing
2	High precision guide	Stainless steel		11	Connection plate	Aluminum alloy	Alumite
3	Hexagon socket head cap bolt	Alloy steel	Blackening	12	Key	Steel	Blackening
4	Guide holder	Aluminum alloy	Alumite	13	Hexagon socket head cap bolt	Alloy steel	Blackening
5	Square nut (B)	Steel	Blackening	14	Hexagon socket head cap bolt	Alloy steel	Galvanizing
6	Square nut	Steel	Galvanizing	15	Table	Aluminum alloy	Alumite
7	Square nut	Alloy steel	Blackening	16	Adaptor (L)	Steel	Galvanizing
8	Hexagon socket head cap bolt	Alloy steel	Galvanizing	17	Adaptor (LG)	Steel	Galvanizing
9	Adaptor (R)	Steel	Galvanizing	18	Adaptor (RG)	Steel	Galvanizing

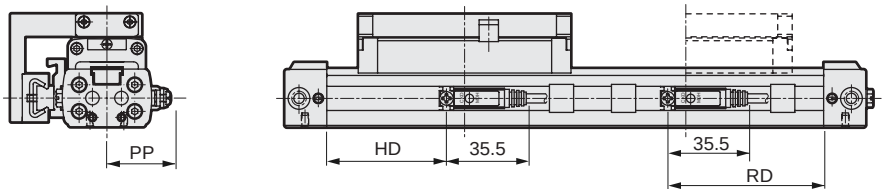
Dimensions

● SRG3 with cylinder switch SRG3-**-**-***-M*V*
(Radial lead wire)



HC: needle position

● SRG3 with cylinder switch SRG3-**-**-***-M*H*
(Axial lead wire)

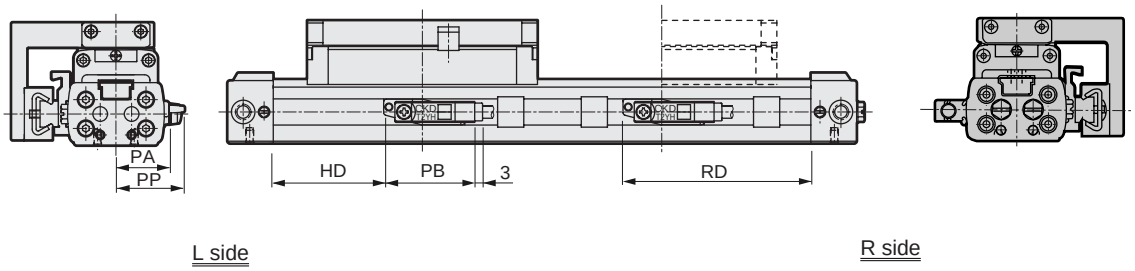


Symbol / Bore size (mm)	A	B	CA	CB	CC	DB	DC	E	G	HA	HB	HC	J	KA	L	LL	LA	M	P	PQ	Q	TA	TB	TC
ø12	33	10.5	43	32.5	40.5	10	11	8.5	24	6	14	10.5	17.5	59.5	136	139	3	M3 depth 5	119	19	M5	81	42	49
ø16	37	12	47	35	45	14	12	8.5	27	6	14	12	17.5	66	149	152	3	M3 depth 5	132	21	M5	88	48	54.5
ø20	44	14	54	40	50	16	16	10.5	31	8.5	18.5	14	22	74	169	171.5	2.5	M4 depth 6.5	148	24.5	Rc1/8	100	60	61.5
ø25	53	17	67	50	63.5	20	26	14	40.5	7.5	20	18.9	24	81	190	192	2	M6 depth 9	162	-	Rc1/8	122	70	80

Note: Also refer to the right table.

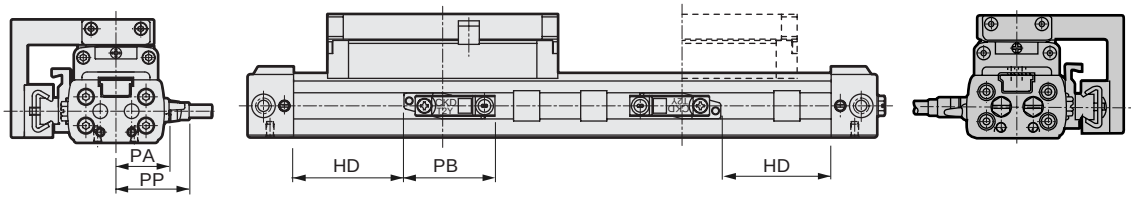
Dimensions

● SRG3-**-**-***-T*H with cylinder switch (T*W, T*Y or T2YD)



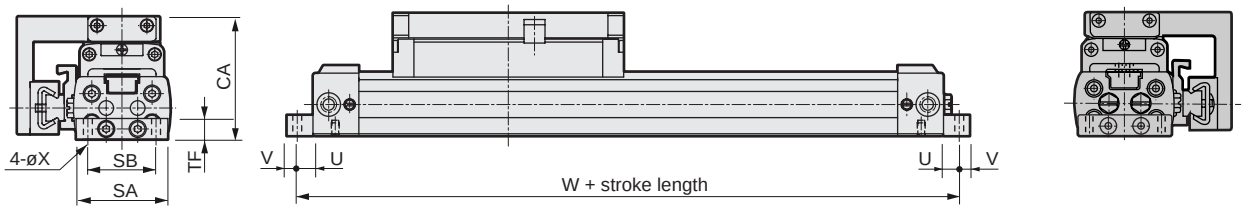
L side R side

● SRG3-**-**-***-T*V with cylinder switch (T*W and T*Y)



L side R side

● SRG3-LB-**-***with foot bracket



L side R side

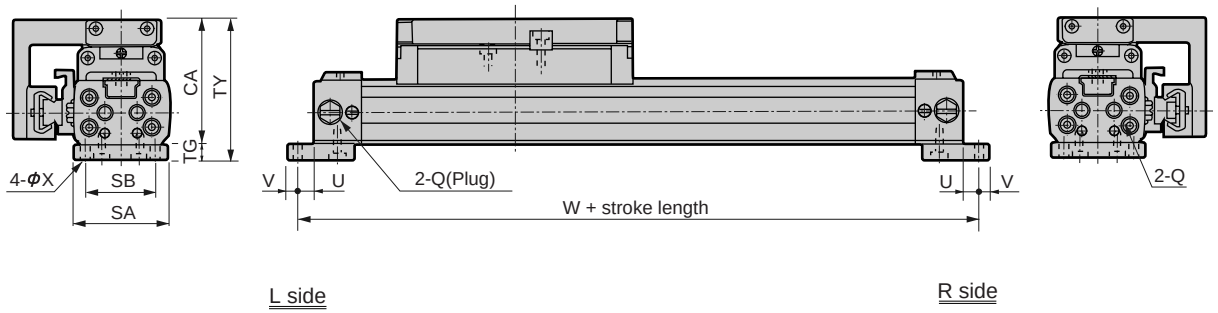
Symbol / Bore size (mm)	TD	TE	TH	TJ	TK	TM	TN	YA	YC	With foot bracket (LB) SA	SB	TF	U	V	W	X
ø12	13	M3 depth 5	6.5	8	10	36	13	$4^{+0.07}_{+0.02}$ depth 4	5	32	24	8	6	4	148	3.4
ø16	15	M3 depth 6	7	9.5	10	40	14.5	$4^{+0.07}_{+0.02}$ depth 4	5	35	26	8	6	4	161	3.4
ø20	18	M4 depth 6	8.5	10	15	44	17.5	$6^{+0.07}_{+0.02}$ depth 6	7	43	33	10	6	6	181	4.5
ø25	20	M5 depth 8	12	14.5	15	58	22	$6^{+0.07}_{+0.02}$ depth 6	7	52	20	12	9	11	208	7

Symbol / Bore size (mm)	With switch HD M*	HD T*Y*	HD T*W	RD M*	RD T*Y*	RD T*W	PA	PB T*Y*	PB T2YD	PB T*W*	PP M*V	PP M*H	PP T*YV	PP T*YH	PP T2YD	PP T*WV	PP T*WH
ø12	40.5	36	32	60.5	65	69	24.3	35	34	33.5	24.5	24.5	26	23	28.4	20.7	17.2
ø16	47	42	38	67	72	76	26.3	35	34	33.5	26.5	26.5	28	25	30.4	22.7	19.2
ø20	52.5	48	44	72.5	77	81	29.3	35	34	33.5	29.5	29.5	31	28	33.4	25.7	22.2
ø25	60	56	52	82	86	90	34.3	35	34	33.5	34.5	34.5	36	33	38.4	30.7	27.2

Note: Also refer to the left table.

Dimensions

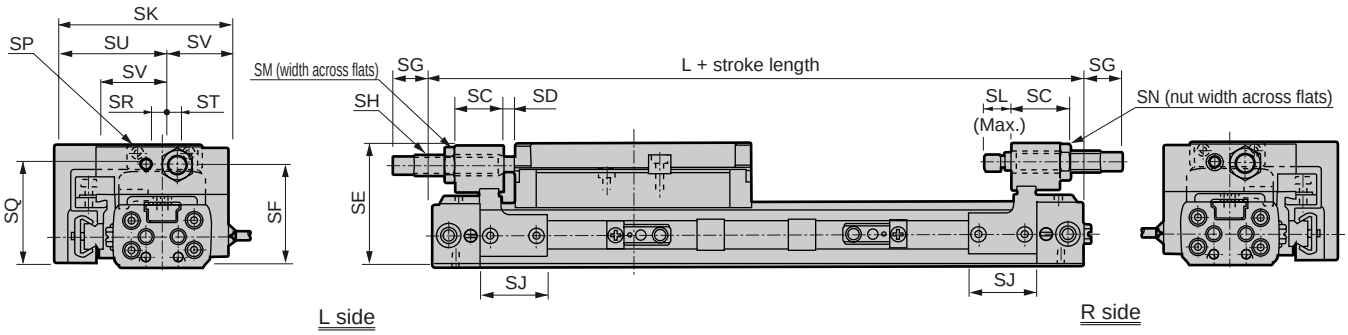
● SRG3-LB1-**-***with foot bracket



Symbol / Bore size (mm)	With foot bracket (LB1)									
	Q	SA	SB	TG	TY	CA	U	V	W	X
ø12	M5	32	24	6	49	43	6	4	148	3.4
ø16	M5	35	26	6	53	47	6	4	161	3.4
ø20	Rc1/8	43	33	8	62	54	6	6	181	4.5
ø25	Rc1/8	50	20	10	77	67	9	11	208	7

Dimensions: With option

● Adjustable full-stroke with shock absorber (SRG3)

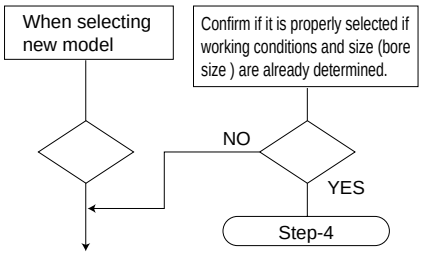


Symbol / Bore size (mm)	SC	SD	SE	SF	SG			SH		SJ	SK	SL	SM	SN	SP	SQ	SR	ST	SU	SV
					MAX	MIN	Adjusting range	Outer diameter thread	Maximum energy absorption (J)											
ø12	19.5	2.5	42	35	17.5	7.5	10	M8 x 0.75	3	25	58.5	8.5	12	7	M4	35.5	6	3	36	22.5
ø16	18	4	46	39	14.5	4.5	10	M8 x 0.75	3	25	64.5	10	12	7	M4	40	6	4	40	24.5
ø20	22.5	3.5	53	45	14.5	4.5	10	M10 x 1.0	7	39	72.5	11.5	14	8	M5	48	8	5	44	28.5
ø25	20	2.5	65.5	54.5	14.5	4.5	10	M12 x 1.0	12	50	96.5	11.5	17	10	M6	56	12	10	58	38.5

SRG3 Series selection guide

Selecting conditions are different from standard cylinders.
Use the selection guide to select the appropriate model.

1 Step-1



2 Step-2 Working conditions confirmation

1. Working pressure (P) (MPa)
2. Load weight (M) (kg)
3. Load (FL) (N)
4. Mounting direction
5. Stroke length (L) (mm)
6. Moving time (t) (s)
7. Operation speed (V) (m/s)

Cylinder average operation speed V formula

$$V = \frac{L}{t} \times \frac{1}{1000} (m/s)$$

(Load weight)

The value shows (Load weight + jig weight)

(Mounting direction)

Operation direction Horizontal, vertical-up or vertical-down
Mounting direction Table upward, table downward

3 Step-3 Roughly selecting cylinder size

● When finding the value according to theoretical thrust value on Table 1.
Rough required thrust ≧ load x 2
("X2" in "load X2" is a safety factor of 50%")

(Example) working pressure 0.5MPa
Load 5N
*Necessary thrust is 5N x 2 = 10N.

ø12 is selected to meet theoretical thrust of more than 10N
at working pressure 0.5MPa according to Table 1.

D = ø12

(cylinder theoretical thrust)

Table 1 cylinder theoretical thrust

Unit: N

Bore size (mm)	Pressurized area (mm^2)	Working pressure MPa							
		0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7
ø12	138	-	-	28	41	55	69	83	97
ø16	216	-	-	43	65	86	108	130	151
ø20	315	-	-	63	94	126	157	189	220
ø25	542	-	54	108	163	217	271	325	380

Note 1: Value in table 1 does not include thrust coefficient.

4 Calculation of step-4 load (W), each moment value

● Calculate static load (W), and moment (M1, M2, M3)
according to load mounting conditions of cylinder.

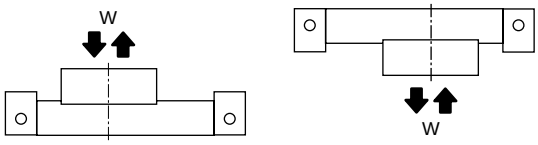
W = W (N) (W = M x 9.8)
M1 = F1 x 1 ℓ (N·m)
M2 = F2 x 2 ℓ (N·m)
M3 = F3 x 3 ℓ (N·m)

Substitute the loads applied on Fig.1 to the values of F1, F2, F3.

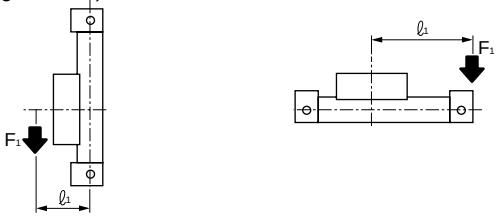
Fig. 1 Formula of each moment

(Vertical load)

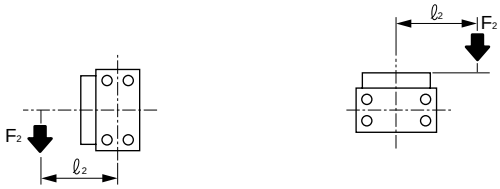
Downward Upward



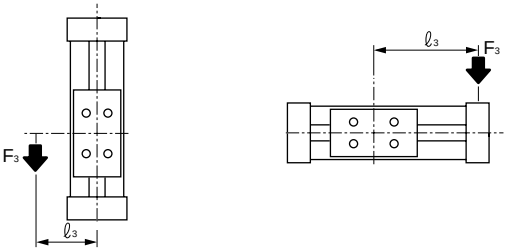
(Bending moment) M1 = F1 x 1 ℓ



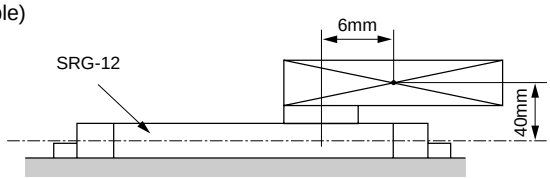
(Radial moment) M2 = F2 x 2 ℓ

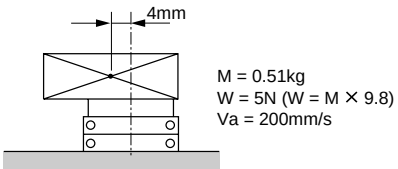


(Twist moment) M3 = F3 x 3 ℓ



(Example)





Working pressure P = 0.5MPa

M1 = 5 x 0.006 = 0.03 (N·m)
M2 = 5 x 0.004 = 0.02 (N·m)
M3 = 0

W = 5N	M1 = 0.03N·m	M2 = 0.02N·m	M3 = 0

5 Step-5 Confirming load and composite moment

● Divide each load by the value on Table 2 to find moment ration, and confirm if the total is 1.0 or less. and confirm the total is 1.0 or less.

● Formula

$$\frac{W}{Wmax.} + \frac{M1}{M1max.} + \frac{M2}{M2max.} + \frac{M3}{M3max.} \leqq 1.0$$

● If the total is larger than 1.0,

1. Reexamine load
2. Increase cylinder bore size

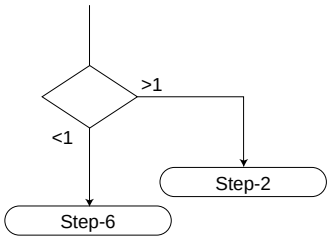


Table 2 Allowable load/moment

Descriptions / Bore size (mm)	Vertical load W: N	Bending moment M1: N·m	Radial moment M2: N·m	Twist moment M3: N·m
ø12	20	1	0.5	3
ø16	40	2.5	1	5.5
ø20	40	2.5	1	5.5
ø25	90	6.5	2.5	17

(example)

W = 5 (N), M = 0.03 (N·m), M2 = 0.02 (N·m), M3 = 0 (N·m)

Cylinder size to be used.: Equivalent to ø12.

$$\frac{5}{20} + \frac{0.03}{1.0} + \frac{0.02}{0.5} + \frac{0}{3} = 0.32 \leqq 1.0$$

Since the total of load, moment ration is 1.0 or less, this is OK.

6 Step-6 Calculating required thrust

● Calculate the required thrust (FN) according to each moment.

1. During horizontal operation

$F_N = F_W + F_{M1} + F_{M2} + F_{M3} + F_L$ (N)

F_W = W x 0.2 (N)

F_{M1} = M1 x C1 (N)

F_{M2} = M2 x C2 (N)

F_{M3} = M3 x C3 (N)

FL: load (N)

Frictional force coefficient caused by C1: moment M1 (table 3)

Frictional force coefficient caused by C2: moment M2 (table 3)

Frictional force coefficient caused by C3: moment M3 (table 3)

2. During vertical operation

FN = W + FM1 + FM3 + FL (N)

FN = ☐ (N)

(Frictional force coefficient caused by each moment)

● Since friction force varies depending on the moment applied to cylinder, calculate frictional force per moment according to Table 3.

Table 3 Friction force coefficient per moment 1/m

Bore size (mm)	C1	C2	C3
ø12	8	27	8
ø16	7	24	7
ø20	6	21	6
ø25	5	16	5

(example)

W = 5 (N), M1 = 0.03 (N·m), M2 = 0.02 (N·m), M3 = 0 (N·m)

Cylinder size to be used.: Equivalent to ø12.

F_W = 5 x 0.2 = 1(N)

F_{M1} = 0.03 x 8 = 0.24(N)

F_{M2} = 0.02 x 27 = 0.54(N)

F_{M3} = 0

F_L = 0

F_N = 1 + 0.24 + 0.54 + 0 + 0 = 1.78(N)

7 Step-7 load factor confirmation

● Load factor is determined according to stability of cylinder operation speed, safety factor and service life, etc.

● Formula of load factor (α)

$$\alpha = \frac{\text{Necessary thrust (FN)}}{\text{Cylinder thrust (F)}} \times 100\ (\%)$$

$$F = A \times P \times \frac{a}{100}\ (N)$$

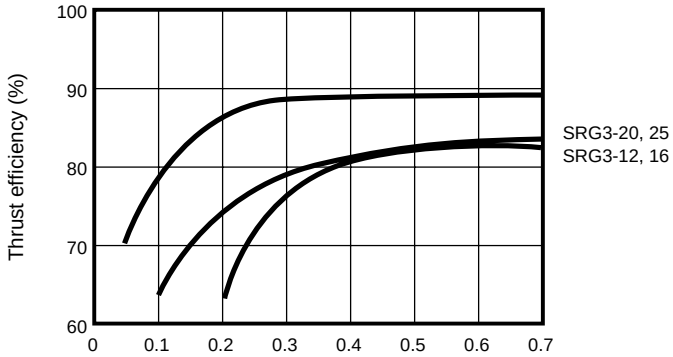
A = pressurized area (mm^2) (refer to the table 1.)

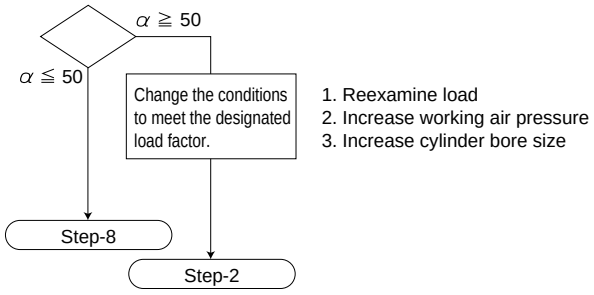
● Cylinder theoretical value of table 1 as can be used as a value of A x P.

P: Working pressure (MPa)

a: thrust efficiency Use value in Fig. 2.

Tendency of thrust efficiency of fig.2 SRG3





(Range of appropriate load factor)

● Speed of piston varies on the load factor but the speed should be within the range shown on Table 4 for general use.

Table 4 (Adequate range of load factor-reference value)

Working pressure MPa	Load factor (%)
0.2 to 0.3	$\alpha \leqq 40$
0.3 to 0.6	$\alpha \leqq 50$
0.6 to 0.7	$\alpha \leqq 60$

(Example) Cylinder size: Equivalent to ø12

Necessary thrust 1.78 (N)

Working pressure 0.5 (MPa)

$$\alpha = \frac{1.78}{138 \times 0.5 \times \frac{95}{100}} \times 100$$

= 2.7%

$\alpha \leqq 50\%$, so it is OK.

8 Step-8 cushion performance confirmation

Check if the kinetic energy of actual load can be absorbed according to cushion performance of cylinder.

● The allowable energy absorption of cylinder (E1) is the characteristic value of cylinder. For SRG, use the values on Table 5)

● Formula of piston kinetic energy (E2)

$$E2 = \frac{1}{2} \times M \times V2\ (J)$$

m: Load weight (kg)

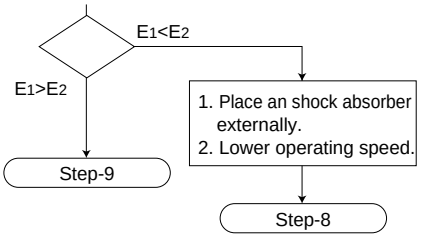
V: Cushion entry speed of piston (m/s)

$$V = \frac{L}{t} \qquad \frac{\alpha}{100}$$

L: Stroke (m)

t: operation time (s)

α: load factor (%)



(Cylinder allowable energy absorption)

● For cylinder cushion mechanism, value of kinetic energy absorbing performance varies depending on cylinder bore size. For SRG3, refer to the value on Table 5

Table 5 Allowable energy absorption of SRG3 (E1)

Bore size (mm)	Allowable energy absorption (J)
ø12	0.03
ø16	0.22
ø20	0.59
ø25	1.40

9 Step-9 Confirming inertia load

● Check if the force applied to load generated by piston operation is within the range of cylinder faculty.

(1) Calculate inertia force (F_1) from cushion entry speed (V) and inertia coefficient of SRG3 shown on table 3.

$F_1 = 10 \times M \times G$ (N)

m: Load weight (kg)

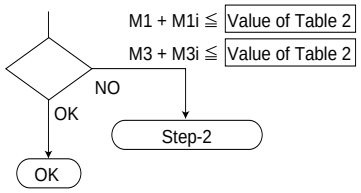
G: inertia force coefficient

(2) Find bending moment (M1i) and twist moment (M3i) according to inertia force (F_1). (M3i) is asked.

$M1i = F1 \times \ell 1$

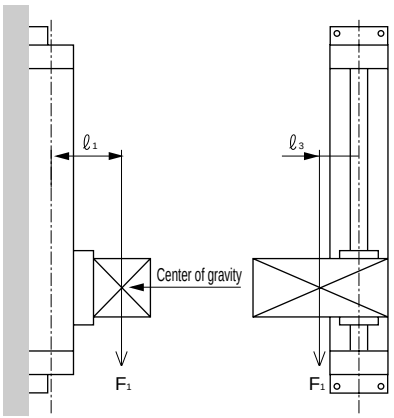
$M3i = F1 \times \ell 3$

(3) Add static load moment (M1 and M3) to inertia load moment (M1i and M3i). Confirm if the composite value is less than value on Table 2.



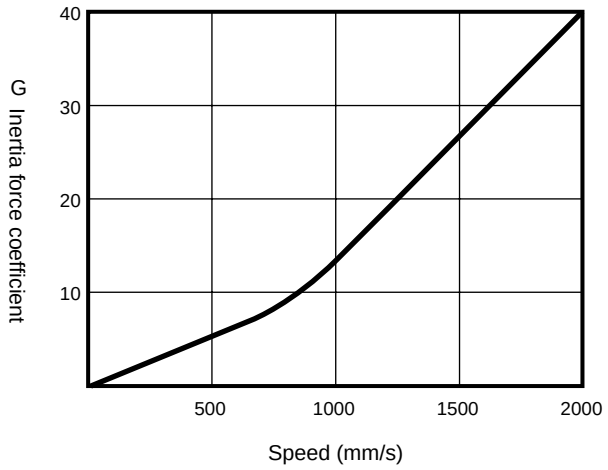
(When M1 and M3 are generated simultaneously)

$M1i = F_1 \times \ell_1$
$M3i = F_1 \times \ell_3$

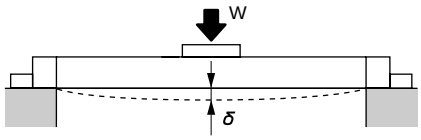


(Tendency of SRG inertia force)

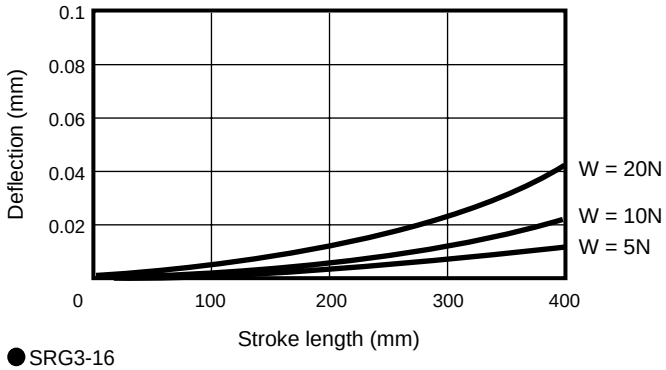
Fig. 3 Tendency of inertia force coefficient of SRG3



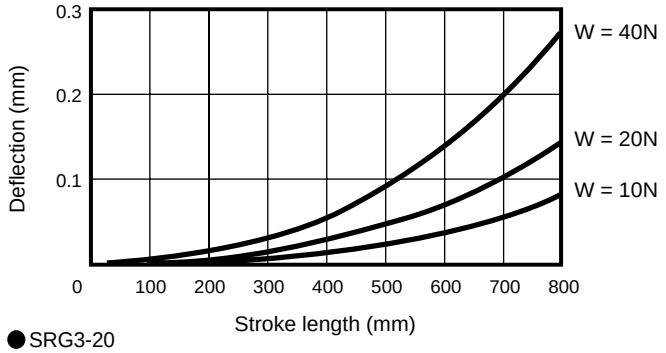
1 Bent of cylinder tube δ



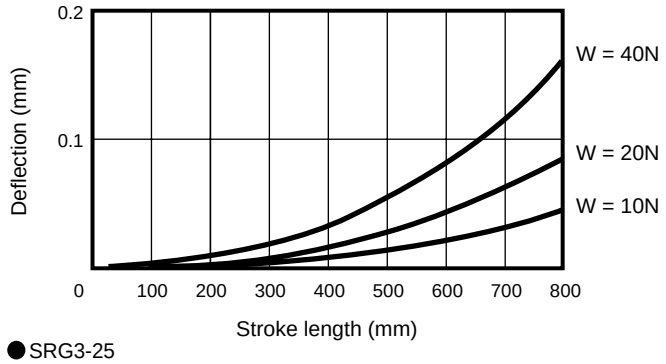
● SRG3-12



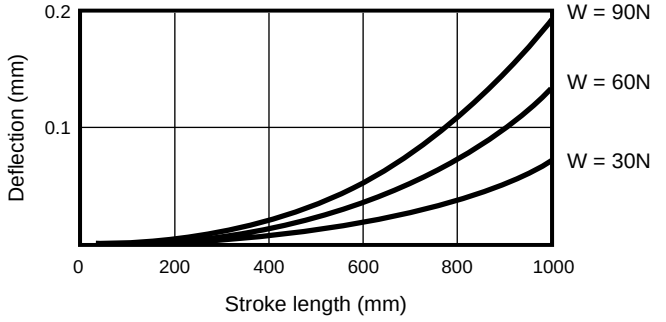
● SRG3-16



● SRG3-20

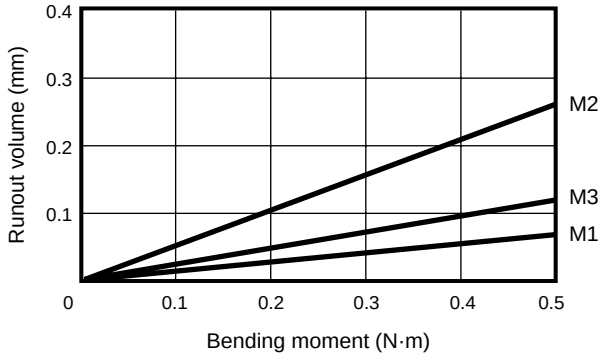


● SRG3-25

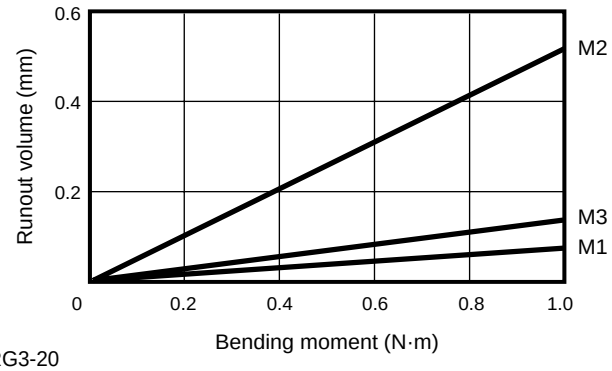


2 Runout of table (Runout from at cylinder center 70mm position)

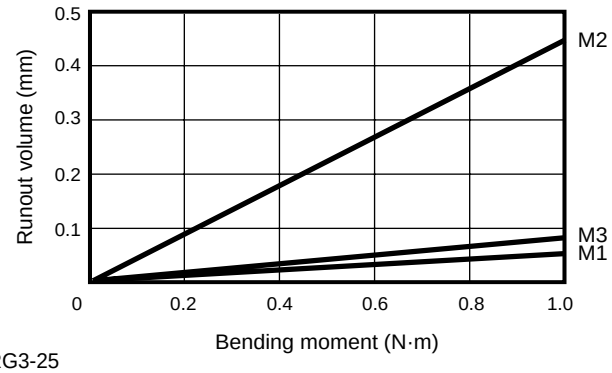
● SRG3-12



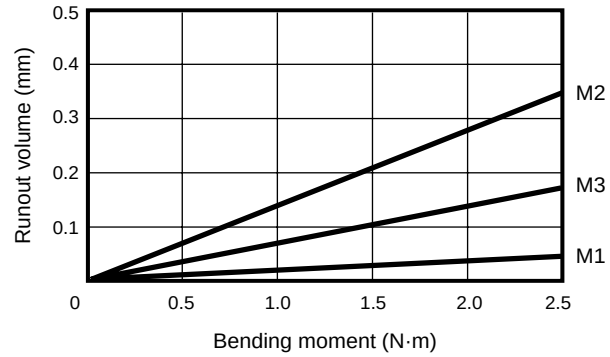
● SRG3-16



● SRG3-20



● SRG3-25



3 How to adjust adjustable full stroke unit

(1) Confirming allowable colliding energy of shock absorber

Calculate the colliding object equivalent weight Me, and colliding energy E according to the formula on the table below, and confirm if Me and E should not be greater than the allowable values on Fig. 4. Also, refer to Table 11 to check if specifications of repeat frequency and colliding speed etc, should be allowable values or less. Allowable value of colliding object equivalent weight Me and colliding energy E may vary depending on colliding speed.

● Symbol

E : Colliding energy (J)
Me : Colliding object equivalent weight (kg)
m : Weight of workpiece (kg)
F : Cylinder thrust (N)
V : Colliding speed (m/s)
St : Stroke of shock absorber (m)
g : Gravity acceleration 9.8 (m/s²)

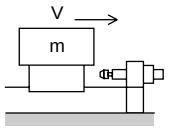
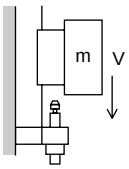
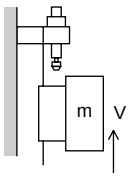
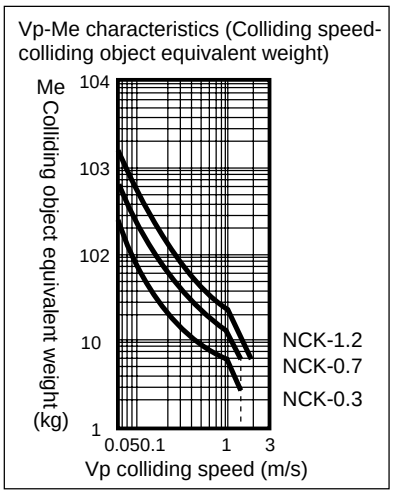
	Horizontal movement	Moving downward	Moving upward
Applications			
Colliding object weight or equivalent Me (kg)	$Me = m + \frac{2F \cdot St}{V^2}$	$Me = m + \frac{2 \cdot St\,(F + mg)}{V^2}$	$Me = m + \frac{2 \cdot St\,(F - mg)}{V^2}$
Energy E (J)	$E = \frac{mV^2}{2} + F \cdot St$	$E = \frac{mV^2}{2} + (F + mg) \cdot St$	$E = \frac{mV^2}{2} + (F - mg) \cdot St$

Fig.4 Colliding object equivalent weight



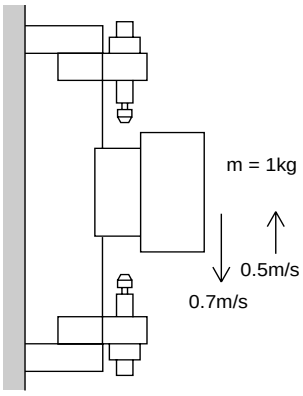
(2) Shock absorber

Table 6 Specifications

Type			SRG3-12/16	SRG3-20	SRG3-25
Shock absorber model no. / Descriptions			NCK-00-0.3-C	NCK-00-0.7-C	NCK-00-1.2
Type/category			Without adjuster spring return type		
Maximum energy absorption		J	3	7	12
Stroke length		mm	6	8	10
Maximum energy absorption per hour		kJ/	6,300	12,600	21,600
Max. colliding speed		m/s	1.5		2.0
Max. repeating cycle		Time/min.	35	30	
Ambient temperature		℃	-10 to 80		
Required strength of mounting bracket		N	3,540	6,150	8,400
Return time		S	0.3 or less		
Product weight		kg	0,012	0.02	0.04
Recoiling force	Extended	N	3.0	2.0	2.9
	Compressed	N	4.6	4.3	5.9

(3) For example of calculation (SRG3-20)

- Example of calculation (1) when lifting up/down Working conditions
- Load M1 (kg)
- Colliding speed
  0.5 when lifting up (m/s)
  0.7 when lifting down (m/s)
- Working pressure 0.5 (MPa)
  (157N)



(1) Kinetic energy of when lifting (E1)

$$E_1 = \frac{1 \times 0.5^2}{2} + (157 - 1 \times 9.8) \times 0.008$$

$$= 1.30 \text{ (J)}$$

The value is less than half of max. energy absorption on Table 12. Kinetic energy (E1) can be absorbed.

$$Me = 1 + \frac{2 \times 0.008\ (157 - 1 \times 9.8)}{0.52}$$

$$= 10.42 \text{ (kg)}$$

Me of shock absorber for SRG3-20 is 18kg at V=0.5m/s according to Fig. 4, thus can be absorbed.

(2) Kinetic energy when lifting down (E1)

$$E_1 = \frac{1 \times 0.7^2}{2} + (157 + 1 \times 9.8) \times 0.008$$

$$= 1.58 \text{ (J)}$$

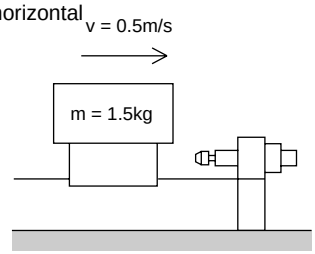
The value is less than half of maximum energy absorption on Table 12. Kinetic energy (E1) can be absorbed.

$$Me = 1 + \frac{2 \times 0.008\ (157 + 1 \times 9.8)}{0.7^2}$$

$$= 6.45 \text{ (kg)}$$

Me of shock absorber used for SRG-20, as Fig 4. shows, is 16 kg when V=0.7m/s. The value can be absorbed.

- Example of calculation (2) horizontal
  Working conditions
  Load weightM 1.5 (kg)
  Colliding speed
  Horizontal 0.5 (m/s)
  Working pressure 0.3 (MPa)
  (94N)



Kinetic energy of horizontal (E_1)

$$E_1 = \frac{1.5 \times 0.5^2}{2} + 94 \times 0.08$$

$$= 0.94 \text{ (J)}$$

The value is less than half of max. energy absorption on Table 12. Kinetic energy (E1) can be absorbed.

$$Me = 1.5 + \frac{2 \times 94 \times 0.008}{0.52}$$

$$= 1.53 \text{ (kg)}$$

Fig. 4 shows, Me value of shock absorber for SRG-20 as 18 kg when V = 0.5 (m/s). Since 1.53 < 18, this can be absorbed.

(Note) Refer to "9 Confirming inertia load" at Step-9 for inertia load. The value should not exceed allowable value.