# SRT3

## Rodless cylinder with brake

ø12 · ø16 · ø20 · ø25
ø32 · ø40 · ø50 · ø63

## Rodless type

### Overview

These are ø12 to ø63 rodless cylinders (SRL3) with compact and reliable brakes.

### Features

Easy brake release

Just return the tilted brake plate to the original position with a slotted screw driver to release brake.

Easy piping

No movable piping (cable bearer etc.) required to supply air to the brake section. Just pipe to the edge of the flange.

Simple structure

Very few number of brake section components, and simple structure.

Space saving

Low compact brake mechanism.

Repeatability ±1.5mm (300mm/s loadless)

Durable long service life brake

### CONTENTS

● : Standard ◎ : Option ■ : Not available

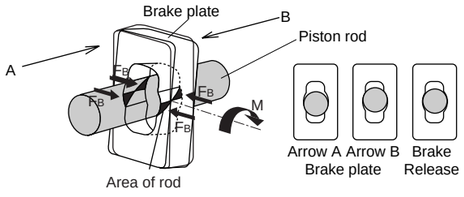
| Variation | Model no. | Bore size (mm) | mm stroke (mm) 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | Min. stroke length (mm) | Max. stroke length (mm) | Custom stroke length (mm) | Mounting style: Basic type 00 | Axial foot type LB | Cushion: Both sides cushioned B | R side cushioned R | L side cushioned L | No cushion N | Option: Floating joint Y | C mount bracket C | Switch | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Double acting | SRT3 | ø12, ø16, ø20 | ● | ● | ● | ● | ● | ● | ● | ● | ● | 1 | 1000 | 1 | ● | ● | ● | ● | ● | ● | ◎ | Note 1 | ◎ | 2144 |
| | | ø25, ø32, ø40 | ● | ● | ● | ● | ● | ● | ● | ● | ● | | 1500 | | ● | ● | ● | ● | ● | ● | ◎ | ◎ | ◎ | |
| | | ø50, ø63 | ● | ● | ● | ● | ● | ● | ● | ● | ● | | 2000 | | ● | ● | ● | ● | ● | ● | ◎ | ◎ | ◎ | |

Note 1: Available for types without switch as an option, not available for types with switch.

## Product introduction

### ● New incorporated brake mechanism

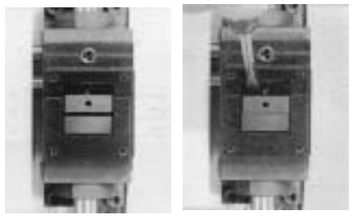
New slant mechanism used for the brake are durable and generates powerful holding force.(Equivalent to cylinder thrust at 0.6MPa)




Applying torque M to the brake plate generates axial force $F_B$ that hold the piston rod.This secures high durability and powerful holding force.

### ● Easy brake release

Just return the tilt of brake plate to the original position using a slotted screw.



### ● Easy piping

No movable piping (cable bearer etc.) required to supply air to the brake section. Just pipe to the edge of the flange.

### ● Simple structure

Simple structure with only a few parts making up the brake section.

### ● Switch installation possible

Cylinder switches of all sorts such as reed and proximity can be mounted.

M*V

M*H

- ● Proximity-2 wire
  M2V/H
- ● Proximity-3 wire
  M3V/H
- ● Reed-2 wire
  M0V/H, M5V/H
- ● 2 Color indicator type proximity-2 wire
  M2WV, T2WV/H, T2YV/H
- ● 2 Color indicator type proximity-3 wire
  M3WV, T3WV/H, T3YV/H

### ● Space saving

Low profile compact brake mechanism

# Safety precautions

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



## Individual precautions: rodless cylinder SRL3 Series

## Design & Selection

### ⚠ WARNING

■Structure so that nothing directly touches the driven object or movable sections of the cylinder with brakes.

Provide a protective cover so that no human-body directly touches the unit. If parts contact is possible, provide safely measures by placing a sensor to stop the cylinder or sound a warning to report danger.

■Use a balance circuit considering piston rod protrusion.

When activating brakes at the specified position in the stroke, as with braking, or if pneumatic pressure is applied to only 1 side of the cylinder, the piston protrudes at high speed when brakes are released. This involves risk to personnel and equipment. Use a balance circuit, such as the recommended pneumatic pressure circuit, to prevent protrusion.
This brake cylinder has oilless specifications. Do not lubricate this cylinder. Otherwise, braking faults may occur.

■Holding force refers to performance to hold a static load without vibration or impact when brakes are activated in a no -load state.

Take care when constantly using near the upper limit of the holding force.

■During braking, kinetic energy is large and the braking distance is long. Thus, avoid using when brakes may be applied at the stroke limit.

Even if a cushion is provided, the back pressure is released and the cushions may not function.
If kinetic energy is large, overrun distance increases and stopping accuracy drops.

■Do not apply loads with impact, strong vibration, or torque while brakes are activated.

If a load with impact, strong vibration, or torque is applied externally, holding force drops.

■Put the stoppage accuracy and overrun length in consideration when braking.

A mechanical lock is applied, so the cylinder does not stop instantly when the stop signal is issued, but stops with a timewise delay. The stroke caused by this delay is the overrun length. The width of the minimum and maximum overrun length is the stoppage accuracy.

- To achieve the required stop position, move the limit switch forward by the overrun distance.
- The limit switch must have a detection length (dog length)equivalent to the overrun distance + $\alpha$.
- When using the CKD cylinder switch, the working range is 7 to 16 mm, depending on the switch. If overrun distance exceeds this, provide self-holding of the contact at the switch load.

■To improve stopping accuracy, minimize the time from stop signal output to brake stoppage.

Use a high-response DC control electricity circuit or solenoid valve, and set the solenoid valve as close to the cylinder as possible.

■Stoppage accuracy is influenced by piston speed.

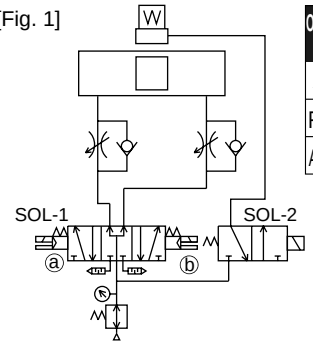
If piston speed changes due to load fluctuation or disturbance during cylinder reciprocation, stop position dispersion increases. Take measures to keep piston speed constant just before the stop position. Speed changes are large during the acceleration range, compared to during the cushion stroke and when starting operation, so dispersion in the stop position increases.

■Cautions for basic circuit

●Parallel load

Pipe like it is shown on figure 1. When using the rodless cylinder, the section area on both sides of the piston is equal, so the regulator for balancing is not required.

[Fig. 1]

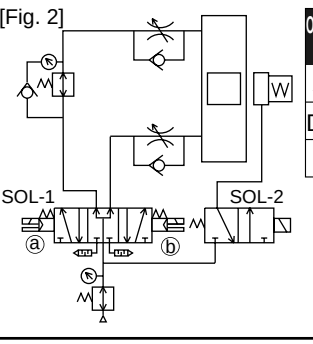



| Operational status | ⓐ SOL-1 | ⓑ | SOL-2 |
|---|---|---|---|
| Stop | OFF | OFF | OFF |
| Return | ON | OFF | ON |
| Advance | OFF | ON | ON |

●Vertical load

If the load is facing downward as in Fig.2, the table moves in the direction of the load when brakes are released. Install a regulator with a check valve to reduce thrust in the load direction and balance the load.

[Fig. 2]




| Operational status | ⓐ SOL-1 | ⓑ | SOL-2 |
|---|---|---|---|
| Stop | OFF | OFF | OFF |
| Down | ON | OFF | ON |
| Up | OFF | ON | ON |

(Note 1) Place a dedicated regulator to stablize the movement if there are pressure fluctuations caused by other components.

■Release brakes before cylinder operation. If the cylinder operation gets faster, brakes may not be released.

■If back pressure is applied to the locking mechanism, the lock may be released. Use a discrete valve, or use a check valve on the side with an individual exhaust type manifold.

■Use a 3-position P/A/B connection (both sides pressurization) valve for the cylinder drive to prevent the piston from protruding when starting.

■Use a regulator with a check valve on the side with large thrust to balance thrust, including load.

## ⚠ CAUTION

■Do not use in an environment where it may contact welding spatters, etc.

■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, dust, dust or spatter may come in contact or are suspended in the environment.
If this environment is inevitable, always provide protection with a cover, etc.
Consult with CKD when using in such environment.

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

■Precautions in stopping accuracy
●Stop pitch and load factor
Stopping accuracy differs with stop pitch and load ratio.
The load factor on the table below is recommended to obtain the specified stoppage accuracy

| Stop pitch | Load factor |
|---|---|
| 50mm or less | 20% of thrust |
| 50mm to 100mm | 40% of thrust |
| 100mm and over | 60% of thrust |

●Valve selection for brakes
Stoppage accuracy and overrun length is affected by the response time of the valve for brake. Couple the solenoid valve to the brake port to improve stopping accuracy.
●When using a PLC
If a PLC is used as the electric control unit for the valve for brakes, stopping accuracy drops due to scan time (computing time). When using a PLC, do not assemble the valve for the brake into the PLC circuit.

■Do not make major changes in load weight when stopped with brakes, or the stopping position may change.

■When the cable bearer slides, the protective tape may generate friction powder. Consider this when using in an environment containing dust.

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

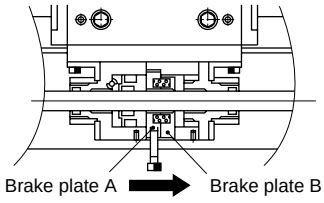
## Installation & Adjustment

### ⚠ WARNING

■If brakes are released when air is pressurized on only 1 side of the cylinder, the piston may protrude at high speed, causing a hazard. When releasing the brake for maintenance etc, follow the following precautions.

- Check that no one is in the movable range of the load and that no problem arises if the load moves when brakes are released.
- Take the following measures to prevent the load from dropping when brakes are released:
  - ·Place the load on the lowering end
  - ·Pressurize both ends
  - ·Place a support
- Confirm that air is not pressured on only one side of the cylinder when releasing brakes.

■How to release brake manually




- When the cover is removed and a hexagon socket head cap screw, etc., is screwed into brake plate A and tilted in the direction of the arrow, brake plates A and B become parallel and the piston rod is freed.
  If both brake plates are not tilted over completely, only one side will be released.
- When the workpiece is seated against the vacuum pad, the vacuum suction flow drops and the valve is pressed down by the spring.
  For safety, take the following measures before manually releasing the lock:
  - ·Move the load to the lowering end
  - ·Place a stopper on the load
  - ·Balance the load by applying air pressure to the rodless cylinder.
- During intermittent operation, when energizing is longer than nonenergizing.

■Brakes are released manually or by pressurizing the brake release port. When mounting the load, it may drop if brakes are left released with either of these operations. Before attaching the load, check that brakes can be applied from the initial state when using manual release or from when air is not applied to the brake release port.

■Do not apply brake holding force to the cylinder exceeding the value indicated in the catalog.

■If there is any play, such as looseness, in the brake signal dog, stopping accuracy is affected. Securely fix to eliminate play, etc.

■If cylinder speed is fast, the detection dog must be long enough to match relay response time. If the dog is short, the stop signal is not output and operation does not stop.

### ⚠ CAUTION

■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.

■Adjust the air balance of the cylinder.

With brakes released, place a load on the cylinder and balance the load by adjusting air pressure applied to the cylinder rod and head. Faults such as cylinder protrusion during brake release or improper brake release are prevented by accurately balancing the load.

■Adjust the position of the detecting section, such as the cylinder switch.

When using braking, consider overrun distance for the required stopping position, and adjust the position of detectors such as the cylinder switch.

■Load fluctuation during the cylinder reciprocation stroke leads to changes in the piston speed, which in turn increases dispersion in the stop position. Make an adjustment so that there is no load fluctuation immediately before stopping.

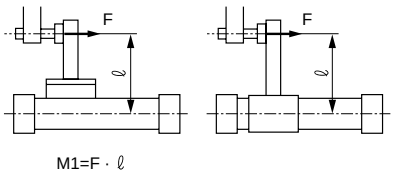
■Speed changes are large during the acceleration range compared to during the cushion stroke and when starting operation, so dispersion in the stop position increases. Accuracy in specifications may therefore not be attained in step operation with a short stroke from the starting position to the next position.

■When the cable bearer slides, the protective tape may generate friction powder. Consider this when using in an environment containing dust.

■Check that moment, including inertia generated when moving or stopping the load, does not exceed the allowable load.Exceeding this value will result in damage.

- 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 when possible.
- When selecting an external stopper, consider the bending moment generated by cylinder thrust.

●Moment that functions when stopping with external stopper

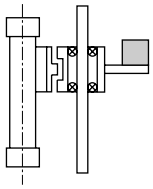



M1=F · ℓ

M3=F · ℓ
F : Cylinder thrust
ℓ : From cylinder center
Distance up to stopper

●When mounting a guide externally, the actuation will not be smooth and the friction caused by twisting will act as moment if the center is not is not projected. Make sure the connecting section can absorb the central misalignment.

●Example of guide use



■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 faulty operation occur. Use within the allowable range.

■Do not scratch or dent the cylinder, or these may cause operation faults. Otherwise, malfunctioning may occur.

■If negative pressure is generated in the cylinder due to external force or inertia force, etc., the seal belt may disengage and caused air to leak externally or operation faults to occur.

■The CKD shock absorber is treated as a consumable. Replace if the energy absorption performance starts to drop, or if the movement is not smooth.

## During Use & Maintenance

### ⚠ WARNING

■For safety purposes, prevent the load from dropping under its own weight during maintenance.

■Never disassemble and inspect the brake section as it may be hazardous when reusing the brakes.

■Avoid applying extra grease and do not wipe grease off. Do not wipe off greases on the brake shaft, neither.

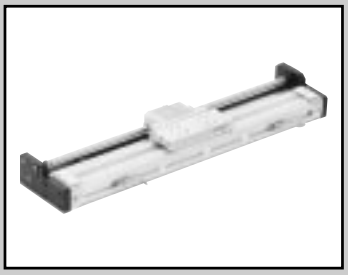
■The braking mechanism cannot be replaced.

■To prevent faults, use a dust cover during operation except when manually releasing brakes.

### ⚠ CAUTION

■If the air supply pipe is thin or long, stopping accuracy drops.

■Frictional resistance increases and causes the piston speed to change when the cylinder has been stopped for a long time, such as when using first thing in the morning or afternoon. This may impair stoppage accuracy. A break-in is required to obtain stable stoppage accuracy.



# Rodless cylinder with brake

# SRT3 Series

●Tube inner diameter : ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63

RoHS CAD

## Specifications

| Descriptions | | | SRT3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Bore size | | mm | ø12 | ø16 | ø20 | ø25 | ø32 | ø40 | ø50 | ø63 |
| Actuation | | | Double acting | | | | | | | |
| Working fluid | | | Compressed air | | | | | | | |
| Max. working pressure | | MPa | 0.7 | | | | | | | |
| Min. working pressure | Cylinder section | MPa | 0.2 | | | 0.15 | | | 0.1 | |
| | Brake section | MPa | 0.3 (note) | | | | | | | |
| Withstanding pressure | | MPa | 1.05 | | | | | | | |
| Ambient temperature | | ℃ | 5 to 60 | | | | | | | |
| Port size | Cylinder section | | M5 | | Rc1/8 | | Rc1/4 | | Rc3/8 | |
| | Brake section | | M5 | | Rc1/8 | | | | | |
| Stroke tolerance | | mm | $+^{2.0}_{0}$ (to 1000), $+^{2.5}_{0}$ (to 2000) | | | | | | | |
| Working piston speed | | mm/s | 50 to 1000 | | | | | | | |
| Cushion | | | Air cushion | | | | | | | |
| Lubrication | | | Not required (when lubricating, use turbine oil Class 1 ISOVG32.) | | | | | | | |
| Stoppage accuracy | | mm | ±1.5 (300mm/s loadless) | | | | | | | |
| Holding force | | N | 66 | 118 | 184 | 288 | 483 | 754 | 1178 | 1870 |

Note: Minimum working pressure of brake section is measured using a well balanced load.

## Allowable energy absorption

| Bore size (mm) | Cushioned | | No cushion |
|---|---|---|---|
| | Allowable energy absorption (J) | Cushion mm stroke (mm) | Allowable energy absorption (J) |
| ø12 | 0.03 | 14.5 | 0.003 |
| ø16 | 0.22 | 19.2 | 0.007 |
| ø20 | 0.59 | 22.2 | 0.010 |
| ø25 | 1.40 | 20.9 | 0.015 |
| ø32 | 2.57 | 23.5 | 0.030 |
| ø40 | 4.27 | 23.9 | 0.050 |
| ø50 | 9.13 | 24.9 | 0.072 |
| ø63 | 17.4 | 29.6 | 0.138 |

## Stroke length

| Bore size (mm) | Standard stroke length (mm) | Max. stroke length (mm) | Min. stroke length (mm) |
|---|---|---|---|
| ø12 | 200,300<br>400,500<br>600,700<br>800,900<br>1000 | 1000 | 1 |
| ø16 | | | |
| ø20 | | | |
| ø25 | | 1500 | |
| ø32 | | | |
| ø40 | | | |
| ø50 | | 2000 | |
| ø63 | | | |

*Custom stroke length is available in 1mm increments.

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

| Switch quantity | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | M*V | M*H | M*V | M*H | M*V | M*H |
| ø12 | 10 | 10 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |
| ø16 | 10 | 10 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |
| ø20 | 10 | 10 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |
| ø25 | 10 | 10 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |
| ø32 | 10 | 10 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |
| ø40 | 10 | 10 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |
| ø50 | 15 | 15 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |
| ø63 | 15 | 15 | 30 | 45 | 60 | 90 | 90 | 135 | 120 | 180 | 150 | 225 | 180 | 270 | 210 | 315 | 240 | 360 |

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

| Switch quantity | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | T*V | T*H | T*V | T*H | T*V | T*H |
| ø12 | 5 | 5 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |
| ø16 | 5 | 5 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |
| ø20 | 5 | 5 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |
| ø25 | 10 | 10 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |
| ø32 | 10 | 10 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |
| ø40 | 10 | 10 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |
| ø50 | 10 | 10 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |
| ø63 | 10 | 10 | 45 | 50 | 90 | 100 | 135 | 150 | 180 | 200 | 225 | 250 | 270 | 300 | 315 | 350 | 360 | 400 |

## Switch specifications

● 1 color/2 color indicator/strong magnetic field proof

| Descriptions | Proximity 2 wire | | Proximity 3 wire | | | Proximity 2 wire |
|---|---|---|---|---|---|---|
| | M2V and M2H | M2WV (2 color indicator type) | M3H/M3V | M3PH/M3PV (custom order) | M3WV | T2YD/T2YDT |
| Applications | PLC only | | PLC, relay, IC circuit or small solenoid valve | | | PLC |
| 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 | | | 24 VDC ±10% |
| Load current | 5 to 30mA | | 200mA or less | 100mA or less | 150mA or less | 5 to 20mA |
| Light | LED (ON lighting) | Red/green LED (ON lighting) | LED (ON lighting) | Yellow LED (ON lighting) | Red/green LED (ON lighting) | Red/green LED (ON lighting) |
| Leakage current | 1mA or less | | 10μA or less | 0.05mA or less | 10μA or less | 1.0mA or less |

| Descriptions | Reed 2 wire | | | |
|---|---|---|---|---|
| | MOV and MOH | | M5V and M5H | |
| Applications | PCL, relay | | | |
| Power voltage | – | | – | |
| Light | 12/24 VDC | 110 VAC | 5/12/24 VDC or less | 110 VAC or less |
| Load voltage | 5 to 50mA | 7 to 20mA | 50mA or less | 20mA or less |
| Load current | LED (ON lighting) | | Without indicator light | |
| Leakage current | 0mA | | | |

Note 1: When load current range is within 7 to 20mA, M0* switch can be used with 24 VAC , and 48 VAC .
Note 2: Refer to Ending 1 for other switch specifications.

● With preventive maintenance output

| 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 | | 10μA or less | |

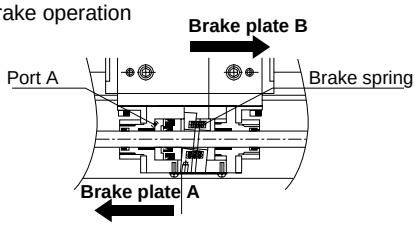
## Cylinder weight

Unit: kg

| Bore size (mm) | Weight when stroke length is 0mm | | | Additional weight for 100mm of stroke |
|---|---|---|---|---|
| | Basic type (00) | Foot type (LB) | Weight per switch (Including bracket) | |
| ø12 | 0.83 | 0.84 | 0.02 | 0.18 |
| ø16 | 0.95 | 0.96 | | 0.21 |
| ø20 | 1.17 | 1.19 | | 0.26 |
| ø25 | 2.24 | 2.34 | | 0.43 |
| ø32 | 3.8 | 3.9 | | 0.54 |
| ø40 | 5.0 | 5.1 | | 0.71 |
| ø50 | 7.4 | 7.5 | | 0.96 |
| ø63 | 12.4 | 12.7 | | 14.6 |

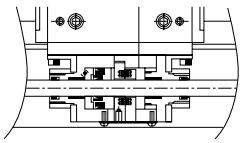
## Operational principle

Brake operation



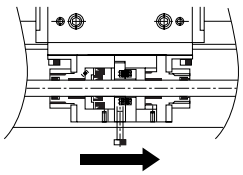

When air is exhausted from port Ⓐ, the brake plate Ⓐ, Ⓑ is pushed by the spring force, then the brake plate Ⓐ, Ⓑ tilts to the arrow direction with using each fulcrum. This boosts the brake force by cylinder thrust, then the position of piston rod is held.

Brake release



When air supplied from port Ⓐ, the brake plate Ⓐ, Ⓑ is pushed by the release piston, then the brake plate Ⓐ, Ⓑ tilts at right angle to the piston rod. A clearance is created between them, and the rod can be moved freely.

Brake release caused by manual



Remove the cover, screw a hexagon socket head cap screw etc. into the brake plate Ⓐ, then tilt the plate to the arrow direction. This makes brake plate Ⓐ and Ⓑ in parallel, then releases the piston rod as freely moved. (The brake can be release by tilting the brake back to the original position using a slotted driver) )

## How to order

Without switch

SRT3 - 00 - 32 B - 200 ——— Y

With switch

SRT3 - 00 - 32 B - 200 - M0H - R - Y

Ⓐ Mounting style

| Symbol | Descriptions |
|---|---|
| **Ⓐ Mounting style** | |
| **00** | Basic type |
| **LB** | Axial foot type |

Ⓑ Bore size

| **Ⓑ Bore size (mm)** | |
|---|---|
| **12** | ø12 |
| **16** | ø16 |
| **20** | ø20 |
| **25** | ø25 |
| **32** | ø32 |
| **40** | ø40 |
| **50** | ø50 |
| **63** | ø63 |

Ⓒ Cushion

| **Ⓒ Cushion** | |
|---|---|
| **B** | Both sides cushioned |
| **R** | R side cushioned |
| **L** | L side cushioned |
| **N** | No cushion |

Ⓓ Stroke length

| **Ⓓ Stroke length (mm)** | | |
|---|---|---|
| **Bore size** | **Stroke length Note 1** | **Custom stroke length** |
| ø12 to ø20 | **1 to 1000** | **By 1 mm increment** |
| ø25 to ø40 | **1 to 1500** | |
| ø50, ø63 | **1 to 2000** | |

Ⓔ Switch model no.
Note 2, Note 3

| **Ⓔ 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

| **Ⓕ 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
Note 4, Note 5

| **Ⓖ Option** | |
|---|---|
| **Y** | Floating joint |
| **C** | C mount bracket |

### ⚠ Note on model no. selection

Note 1: Refer to page 2144 for minimal stroke with switch.
Note 2: Switches other than switch model no. Ⓔ are also available. (Custom order) Refer to page Ending 1 for details.
Note 3: Do not use in environment where cylinder contacts welding spatter. Take extra care when using T2YD or T2YDT.
Note 4: Radial M switch lead wire, T types switch for "C" An use can not be made.
Note 5: When "C", M type switch with radial lead wire and T type switches are not available.

<Example of model number>

**SRT3-00-32B-200-M0H-R-Y**

Model: Rodless cylinder with brake
Ⓐ Mounting style : Basic type
Ⓑ Bore size : ø32mm
Ⓒ Cushion : Both sides cushioned
Ⓓ Stroke length : 200mm
Ⓔ Switch model no. : Reed switch M0H
Ⓕ Switch quantity : One on R side
Ⓖ Option : Floating joint

## How to order switch

○Switch body + mounting bracket (Note 1)

**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**

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

(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) Brackets are different for M and T type switches.
(Note 3) Lead wire holder comes in a set of 10 pieces.

## How to order discrete C mount bracket

**SRL3 – 40 - C**

Bore size
(Previous page section Ⓑ)
(C mount bracket and mounting bolt 4 pc.)

## Floating joint set model no. display

**SRL3 – 40 - Y**

Bore size
(Previous page section Ⓑ)
(Mount, mount base, pin, plain washer, pan head machine screw with spring washer, 4 mounting bolts)

## Repair parts model no. display

**SRL3 – 40 K - 200**

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

## Mounting bracket model no. display

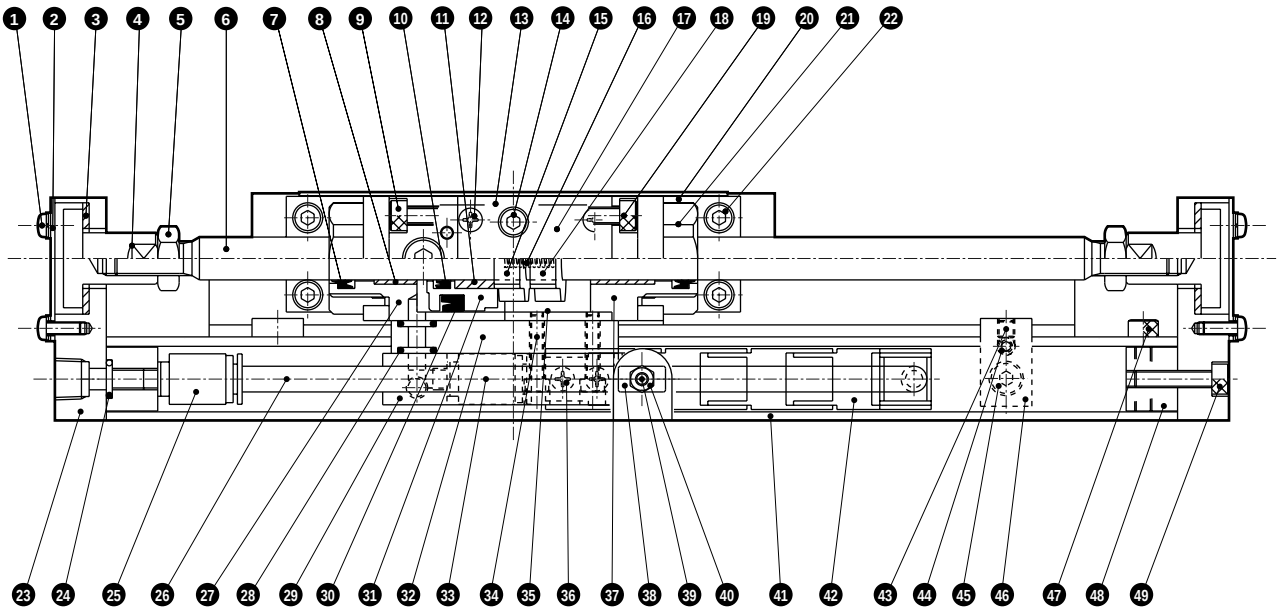
**SRT3 – Mounting style (LB) - 40**

(Bracket 2 piece and mounting bolt 4 pc.)

Bore size
(Previous page section Ⓑ)

Note: Switch bracket, C mount bracket , floating joint is common with SRL3.

## Internal structure drawing and parts list (ø12 to ø63)




## Parts list

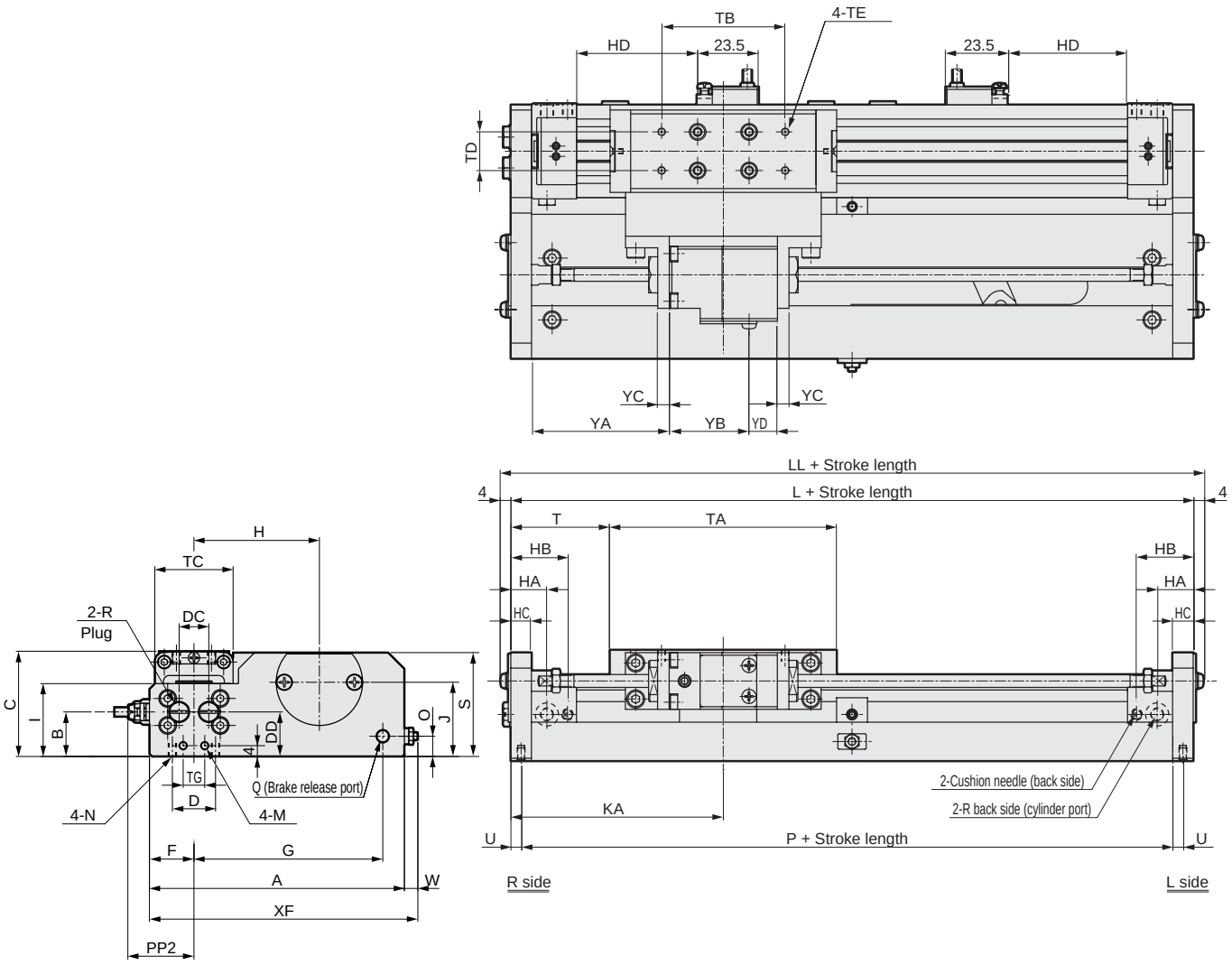
| No. | Parts name | Material | Remarks | No. | Parts name | Material | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Pan head machine screw | Carbon steel | Galvanizing | 27 | Body A | Aluminum alloy | Alumite |
| 2 | Joint section guard | Aluminum alloy | Black alumite | 28 | Gasket | O ring | |
| 3 | Slide plate | Dry bearing | | 29 | Adaptor | Aluminum alloy | Alumite |
| 4 | Floating joint | Steel | Phosphoric acid mangan treatment | 30 | Piston packing seal | Nitrile rubber | |
| 5 | Square nut: 3 types | Carbon steel | Galvanizing | 31 | Release piston | Aluminum alloy | Alumite |
| 6 | Brake shaft | Steel | Rigid plating | 32 | Spacer | Aluminum alloy | Alumite |
| 7 | Rod packing seal | Nitrile rubber | | 33 | Push-in joint | | |
| 8 | Bearing bush | Dry bearing | | 34 | Hexagon socket head cap bolt | Steel | Blackening |
| 9 | Hexagon socket head cap bolt | Steel | Blackening | 35 | Body B | Aluminum alloy | Alumite |
| 10 | Rod packing seal | Nitrile rubber | | 36 | Pan head machine screw | Carbon steel | Galvanizing |
| 11 | Bearing bush | Copper-infiltrated nikkaloy | | 37 | Brake end guard | Aluminum alloy | Alumite |
| 12 | Pan head machine screw | Carbon steel | Galvanizing | 38 | Square nut | Carbon steel | Galvanizing |
| 13 | Brake mounting base | Aluminum alloy | Alumite | 39 | Pan head machine screw | Carbon steel | Galvanizing |
| 14 | Hexagon socket head cap bolt | Steel | Blackening | 40 | Square nut: 3 types | Carbon steel | Galvanizing |
| 15 | Brake plate A | Special steel | Galvanizing | 41 | Cable holder | Aluminum alloy | Alumite |
| 16 | Brake spring | Steel | Blackening | 42 | Cable bearer | Special plastic | |
| 17 | Guard | Aluminum alloy | Alumite | 43 | ø12 to ø40: hexagon socket head set screw | Steel | Blackening |
| 18 | Brake plate B | Special steel | Galvanizing | | ø50, ø63: – | – | – |
| 19 | Hexagon socket head cap bolt | Steel | Blackening | 44 | ø12 to ø40: hexagon socket head set screw<br>ø50, ø63: hexagon socket head button bolt | Steel | Blackening |
| 20 | Brake foot bracket | Steel | Galvanizing | | | | |
| 21 | Square nut | Steel | Galvanizing | 45 | Hexagon socket head button bolt | Steel | Blackening |
| 22 | Hexagon socket head cap bolt | Steel | Blackening | 46 | Rail stop plate | Steel | Galvanizing |
| 23 | Edge flange | Aluminum alloy | Black alumite | 47 | Hexagon socket head cap bolt | Steel | Blackening |
| 24 | Gasket | O ring | | 48 | Cable holder stopper | Aluminum alloy | Alumite |
| 25 | Push-in joint | | | 49 | Hexagon socket head cap bolt | Steel | Blackening |
| 26 | Tube | Polyamide | | | | | |

MEMO

## Dimensions (bore size ø12, ø16, mounting style: 00)

CAD

● SRT3-00-**-***-M*V*with cylinder switch (radial lead wire)




RD: Max. sensitive position HD: Max. sensitive position

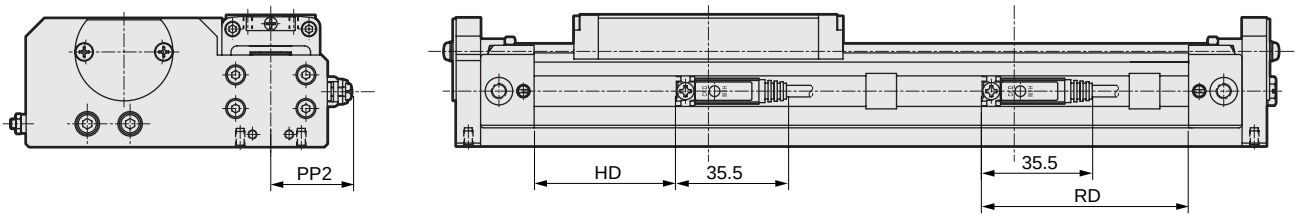
| Symbol / Bore size (mm) | A | B | C | D | DC | DD | F | G | H | HA | HB | HC | I | J | KA | L | LL | M | N | O | P | Q | R | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø12 | 94.5 | 16.5 | 39 | 16 | 11 | 16.5 | 16.5 | 70 | 46 | 14 | 22 | 8 | 27 | 27.5 | 76 | 152 | 160 | M3 depth 5 | M3 depth 5 | 7.5 | 144 | M5 | M5 | 38.5 |
| ø16 | 98.5 | 18 | 43 | 20 | 12 | 18 | 18.5 | 72 | 48 | 14 | 22 | 8 | 30 | 31 | 82.5 | 165 | 173 | M3 depth 5 | M3 depth 5 | 7.5 | 157 | M5 | M5 | 42 |

| Symbol / Bore size (mm) | T | TA | TB | TC | TD | TE | TG | U | W | XF | YA | YB | YC | YD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø12 | 35.5 | 81 | 42 | 29 | 13 | M3 depth 5 | 8 | 4 | 5 | 99.5 | 47 | 34 | 4.5 | 8 |
| ø16 | 38.5 | 88 | 48 | 32 | 15 | M3 depth 5 | 12 | 4 | 5 | 99.5 | 53.5 | 34 | 4.5 | 8 |

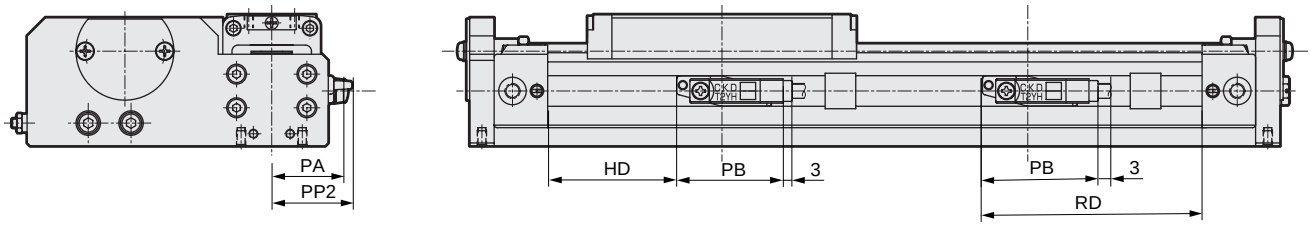
| Symbol | With switch | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bore size (mm) | HD | | | RD | | | PA | PB | | | PP2 | | | | | | |
| | M* | T*Y* | T*W | M* | T*Y* | T*W | | T*Y* | T2YD | T*W* | M*V | M*H | T*YV | T*YH | T2YD | T*WV | 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 |

## Dimensions (bore size ø12, ø16, mounting style: 00)

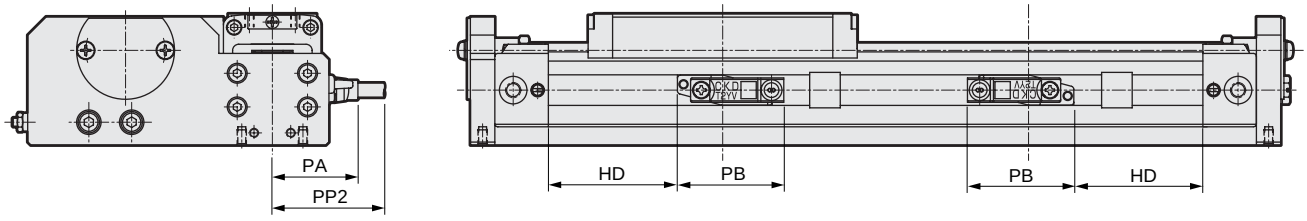
● SRT3-00-**-***-M*H*with cylinder switch (axial lead wire)




● SRT3-00-**-***-T*H with cylinder switch (T*W, T*Y or T2YD)

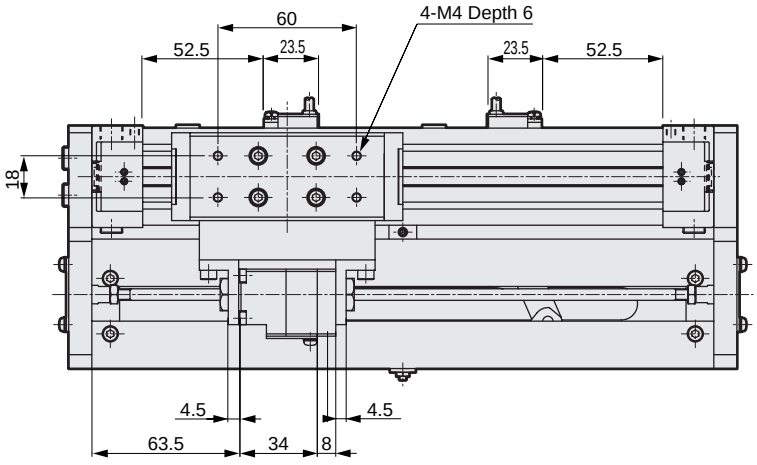


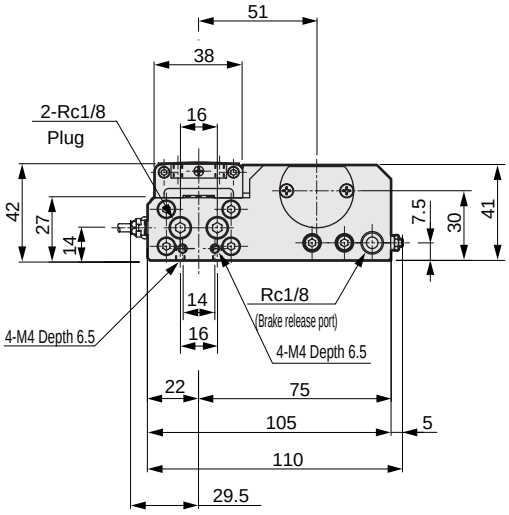

● SRT3-00-**-***-T*V with cylinder switch (T*W and T*Y)

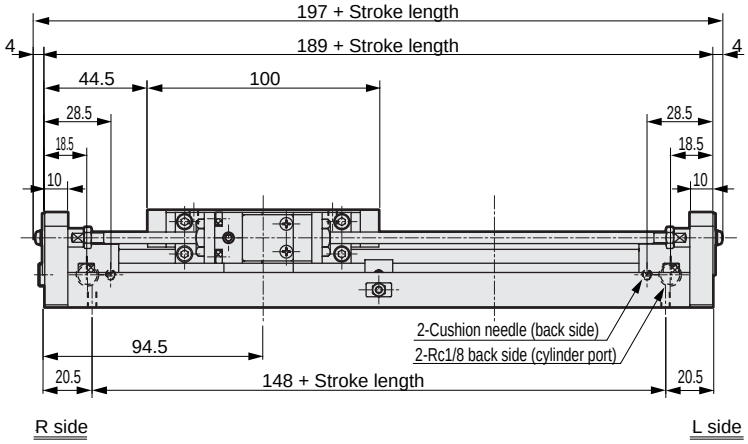


## Dimensions (bore size ø20, mounting style: 00)

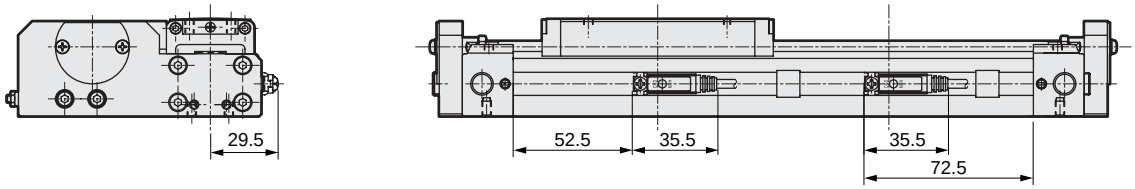
● SRT3-00-20-***-M*V*with cylinder switch (radial lead wire)



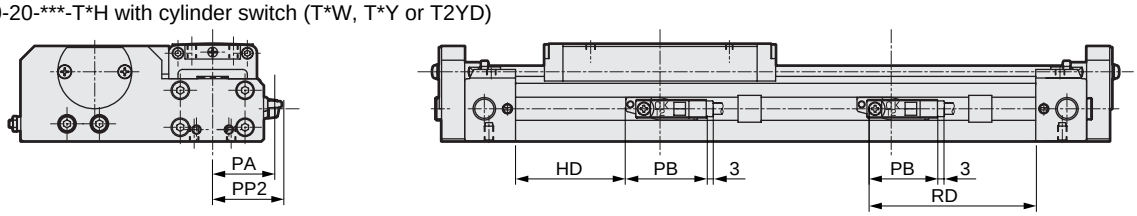



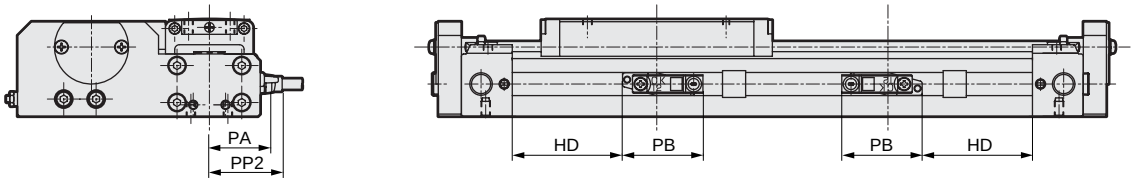

● SRT3-00-20-***-M*H*with cylinder switch (axial lead wire)




● SRT3-00-20-***-T*H with cylinder switch (T*W, T*Y or T2YD)

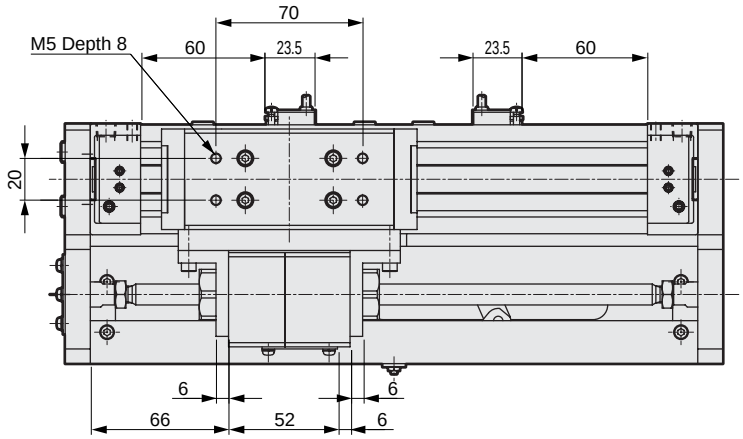


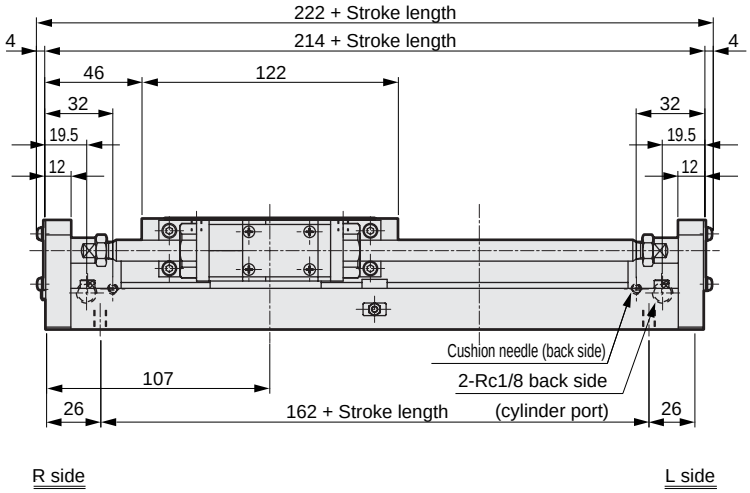

● SRT3-00-20-***-T*V with cylinder switch (T*W and T*Y)

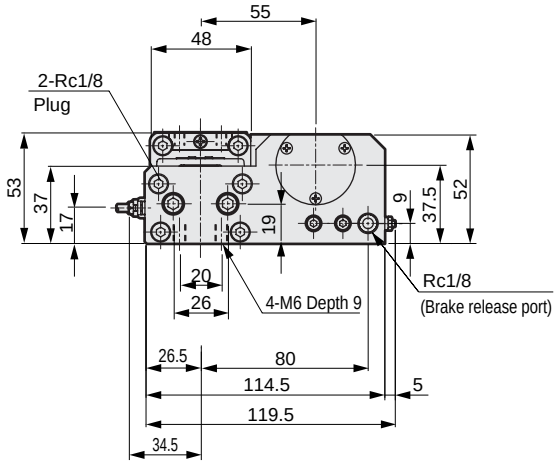


## Dimensions (bore size: ø25, mounting style: 00)

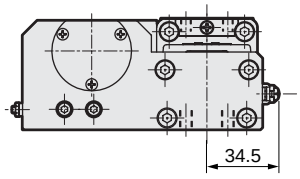
● SRT3-00-25-***-M*V*with cylinder switch (radial lead wire)

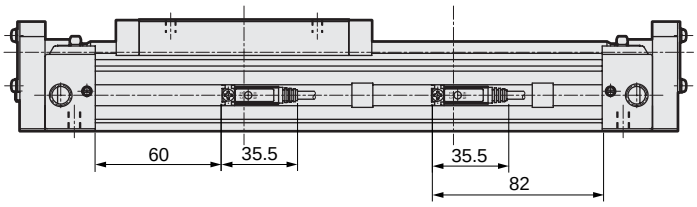


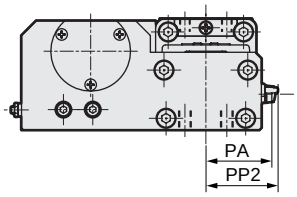



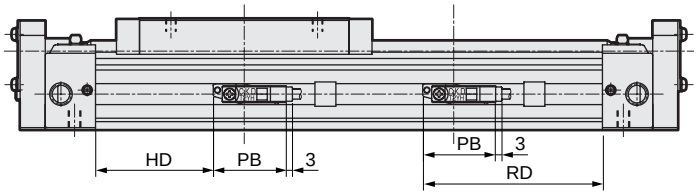

● SRT3-00-25-***-M*H*with cylinder switch (axial lead wire)



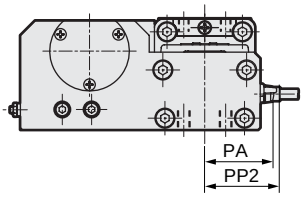



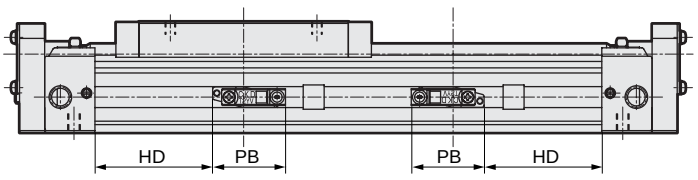

● SRT3-00-25-***-T*H with cylinder switch (T*W, T*Y or T2YD)




● SRT3-00-25-***-T*V with cylinder switch (T*W and T*Y)

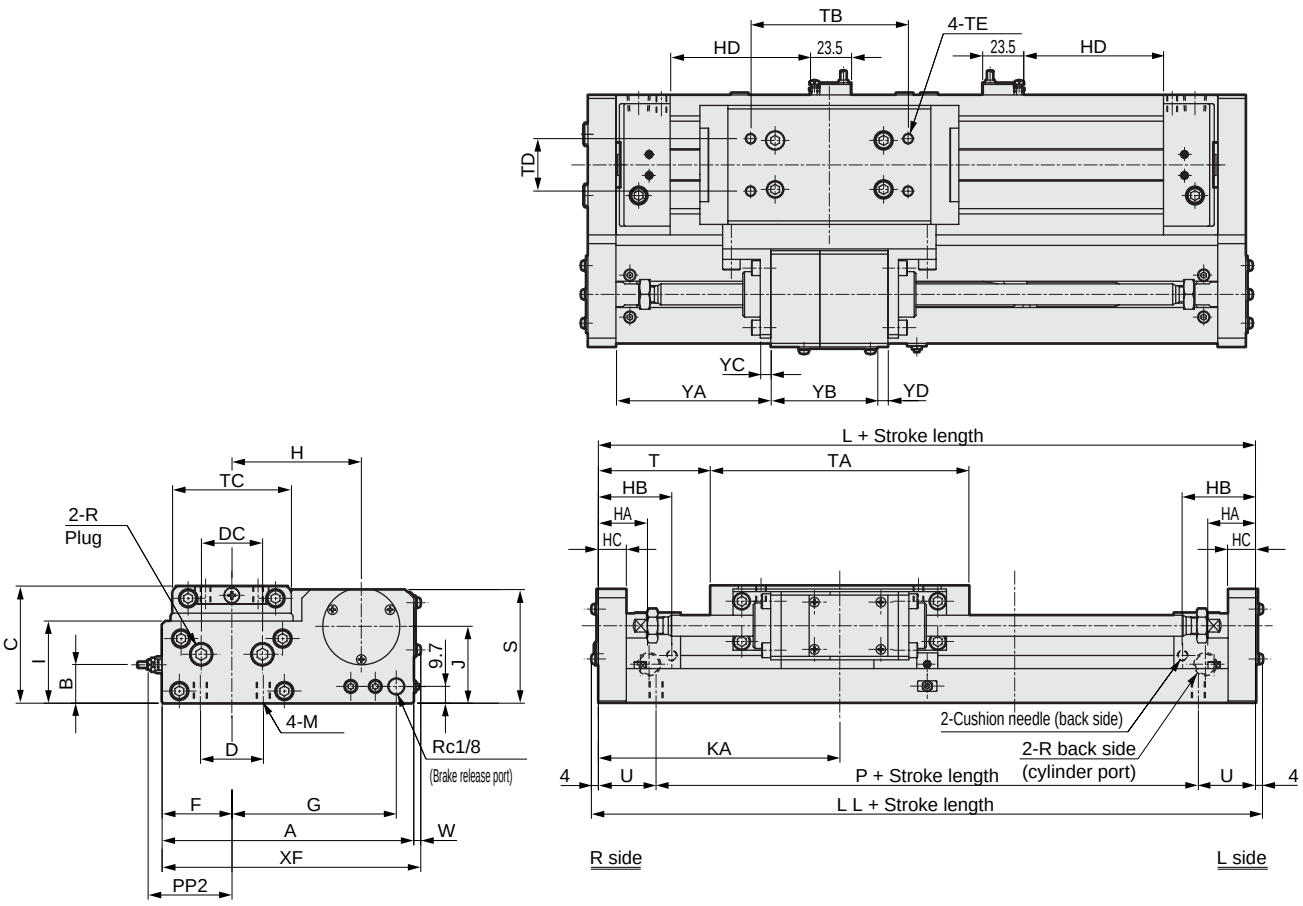


## Dimensions (bore size: ø32 to ø63, mounting style: 00)

CAD

● SRT3-00-**-***-M*V*with cylinder switch (radial lead wire)




RD: Max. sensitive position HD: Max. sensitive position

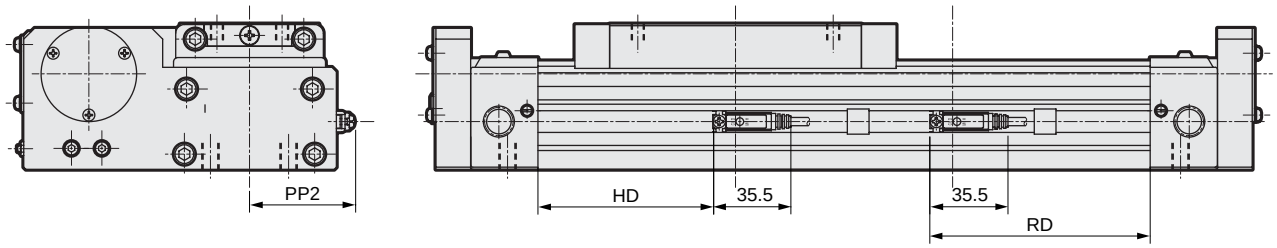
| Symbol / Bore size (mm) | A | B | C | D | DC | DD | F | G | H | HA | HB | HC | I | J | KA | L | LL | M | P | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø32 | 129 | 18.5 | 57 | 32 | 27 | 21 | 33 | 86 | 66 | 24 | 37.5 | 14 | 39 | 39 | 127 | 254 | 262 | M6 depth 9 | 196 | Rc1/4 | 56 | 60 |
| ø40 | 144 | 22 | 67 | 36 | 35 | 28 | 40 | 93 | 74 | 29 | 42 | 16 | 47 | 44 | 138 | 276 | 284 | M8 depth 12 | 210 | Rc1/4 | 65 | 64 |
| ø50 | 177 | 28 | 82 | 45 | 35 | 35 | 48 | 101 | 89 | 33 | 51 | 18 | 57 | 52 | 147 | 294 | 302 | M8 depth 12 | 212 | Rc3/8 | 77 | 71 |
| ø63 | 209 | 35 | 95 | 50 | 39 | 42 | 59 | 112 | 105 | 35 | 52 | 20 | 68 | 58 | 168 | 336 | 344 | M10 depth 15 | 258 | Rc3/8 | 93 | 84 |

| Symbol / Bore size (mm) | TA | TB | TC | TD | TE | U | W | XF | YA | YB | YC | YD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø32 | 134 | 80 | 56 | 20 | M6 depth 9 | 29 | 4 | 133 | 78.5 | 61 | 6 | 8 |
| ø40 | 148 | 90 | 68 | 30 | M6 depth 11 | 33 | 4 | 148 | 88.5 | 61 | 6 | 6 |
| ø50 | 152 | 100 | 80 | 30 | M8 depth 13 | 41 | 4 | 181 | 92.5 | 65 | 8 | 8 |
| ø63 | 168 | 110 | 102 | 40 | M8 depth 13 | 39 | 1 | 210 | 98.5 | 89 | 9 | 10 |

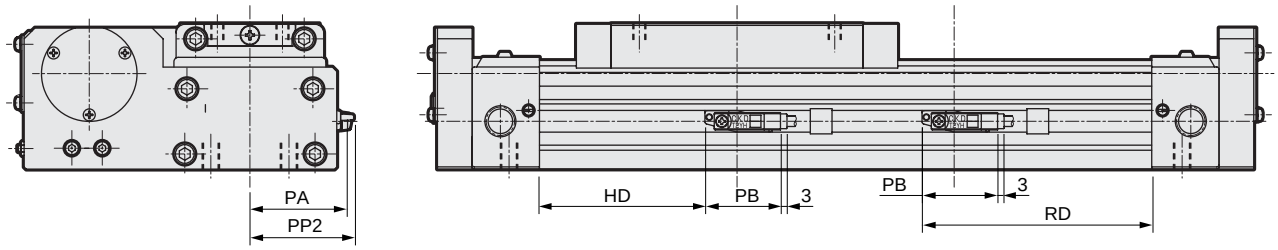
| Symbol / Bore size (mm) | With switch | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HD | | | RD | | | PA | PB | | | PP2 | | | | | | |
| | M* | T*Y* | T*W | M* | T*Y* | T*W | | T*Y* | T2YD | T*W* | M*V | M*H | T*YV | T*YH | T2YD | T*WV | T*WH |
| ø32 | 74 | 70 | 66 | 96 | 100 | 104 | 41.3 | 35 | 34 | 33.5 | 41.5 | 41.5 | 43 | 40 | 45.4 | 37.7 | 34.2 |
| ø40 | 80 | 76 | 72 | 102 | 106 | 110 | 48.3 | 35 | 34 | 33.5 | 48.5 | 48.5 | 50 | 47 | 52.4 | 44.7 | 41.2 |
| ø50 | 79 | 75 | 71 | 101 | 105 | 109 | 56.3 | 35 | 34 | 33.5 | 56.5 | 56.5 | 58 | 55 | 60.4 | 52.7 | 49.2 |
| ø63 | 98 | 94 | 90 | 120 | 124 | 128 | 67.3 | 35 | 34 | 33.5 | 67.5 | 67.5 | 69 | 66 | 71.4 | 63.7 | 60.2 |

## Dimensions (bore size ø32 to ø63, mounting style: 00)

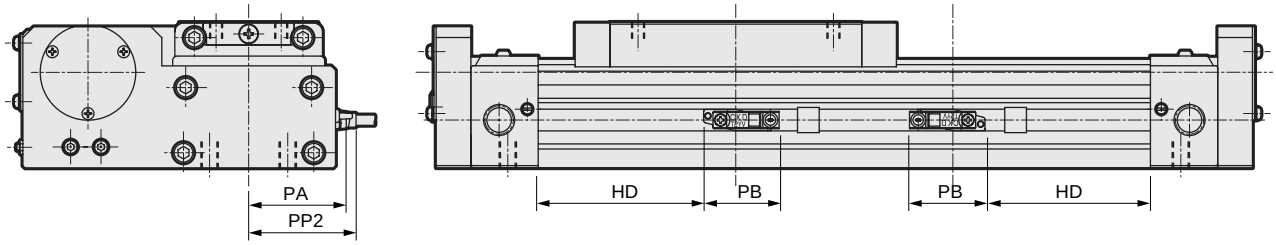
● SRT3-00-**-***-M*H*with cylinder switch (axial lead wire)




● SRT3-00-**-***-T*H with cylinder switch (T*W, T*Y or T2YD)

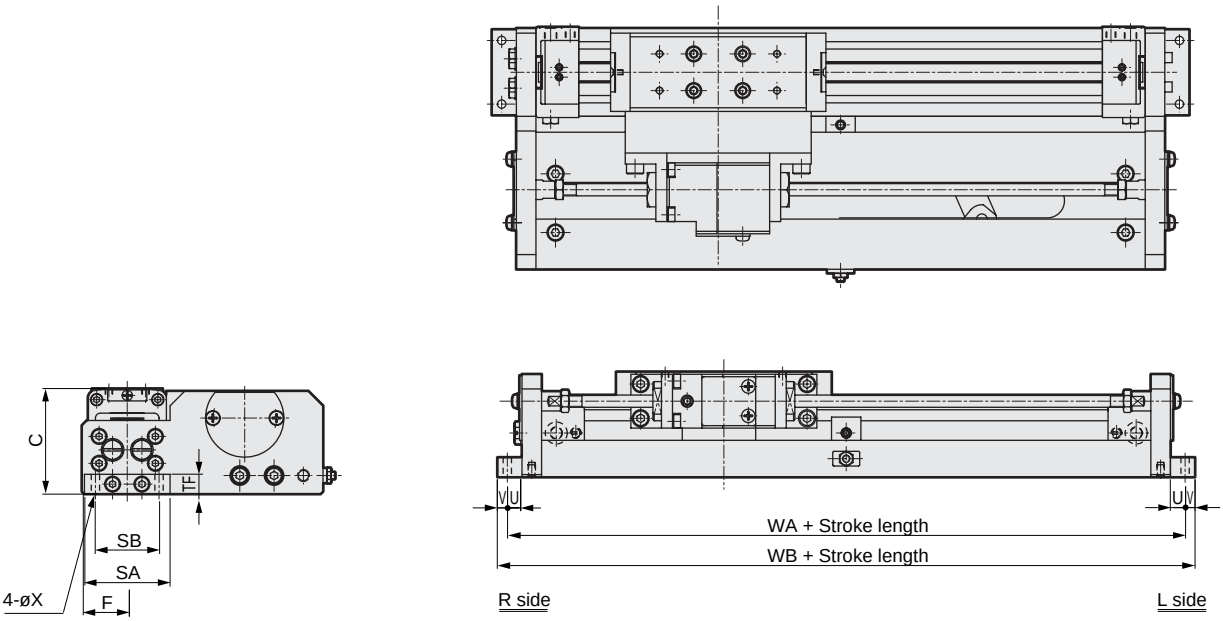



● SRT3-00-**-***-T*V with cylinder switch (T*W and T*Y)



## Dimensions (bore size: ø12, ø16, mounting style: LB)

● SRT3-LB-**-***with foot bracket




| Symbol / Bore size (mm) | C | F | How to install the product | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | SA | SB | TF | U | V | X | WA | WB |
| ø12 | 39 | 16.5 | 32 | 24 | 8 | 6 | 4 | 3.4 | 164 | 172 |
| ø16 | 43 | 18.5 | 35 | 26 | 8 | 6 | 4 | 3.4 | 177 | 185 |

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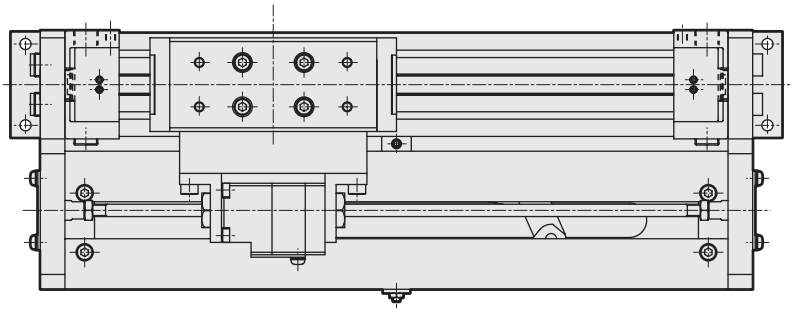
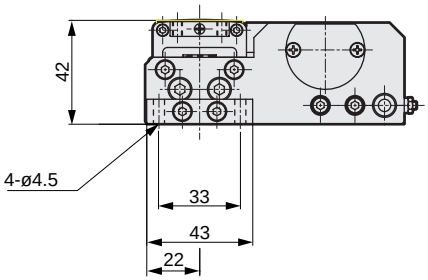
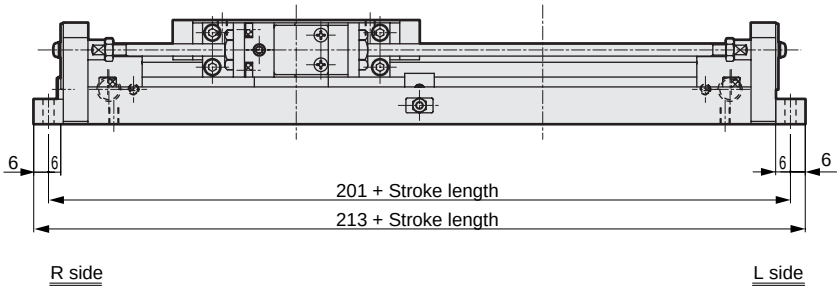
## Dimensions (bore size: ø20, mounting style: LB)

● SRT3-LB-20-***with foot bracket

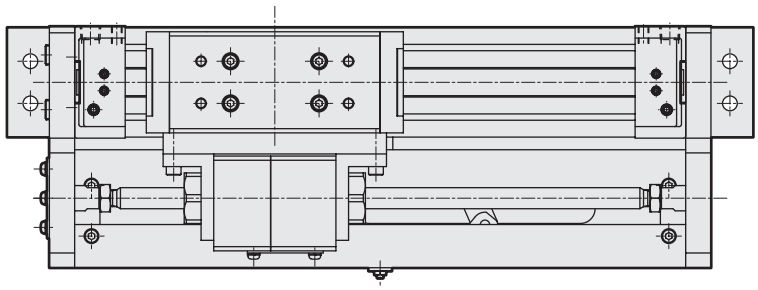


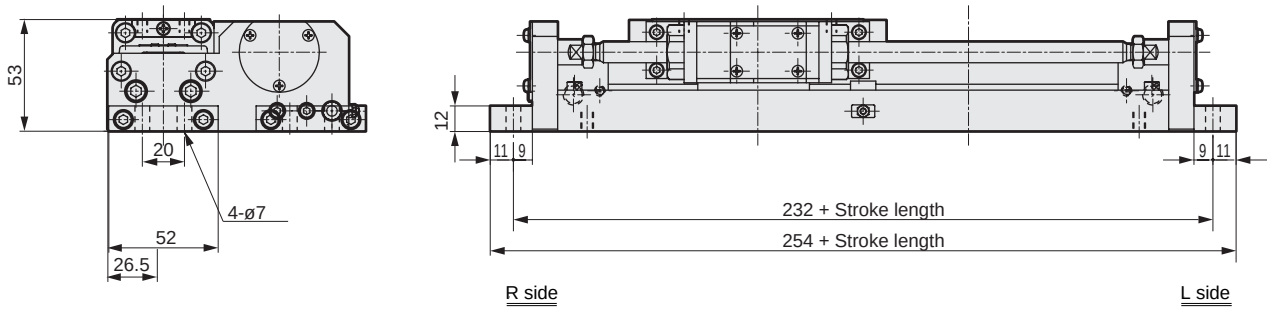


## Dimensions (bore size: ø25, mounting style: LB)

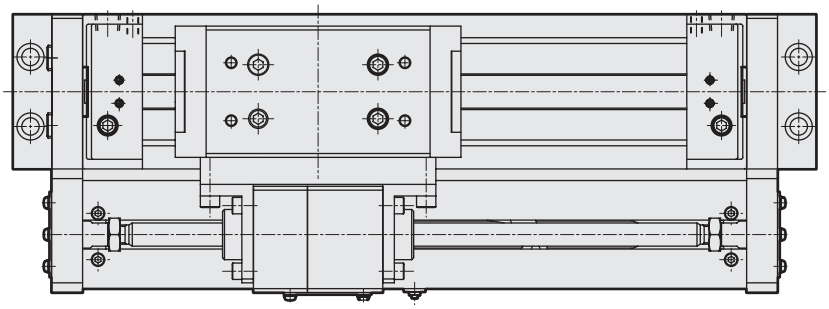
● SRT3-LB-25-***with foot bracket

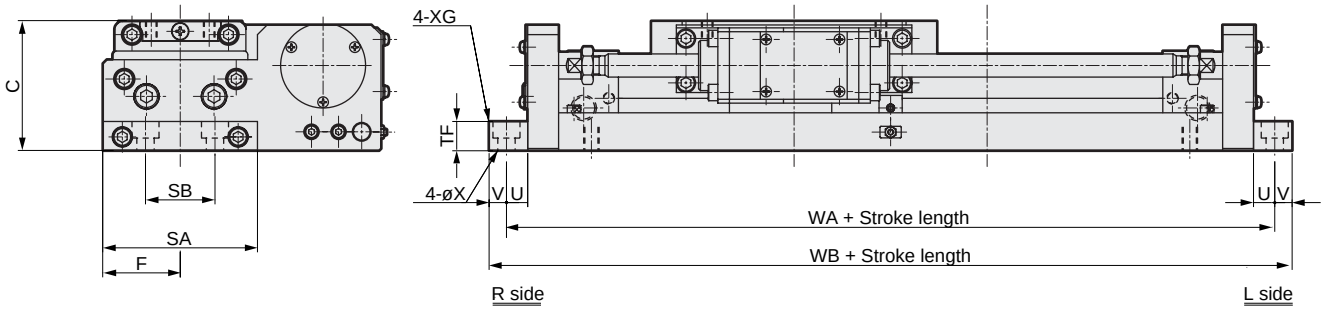




## Dimensions (bore size ø32 to ø63, mounting style: LB)

● SRT3-LB-**-***with foot bracket






RD: Max. sensitive position HD: Max. sensitive position

| Symbol / Bore size (mm) | C | F | How to install the product | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SA | SB | TF | U | V | WA | WB | X | XG |
| ø32 | 57 | 33 | 64 | 32 | 12 | 9 | 11 | 272 | 294 | 7 | – |
| ø40 | 67 | 40 | 80 | 36 | 15 | 11 | 9 | 298 | 316 | 9 | 14 spot face depth 8.6 |
| ø50 | 82 | 48 | 94 | 45 | 20 | 11 | 9 | 316 | 334 | 9 | 14 spot face depth 8.6 |
| ø63 | 95 | 59 | 116 | 50 | 25 | 13 | 12 | 362 | 386 | 11 | 17.5 spot face depth 10.8 |

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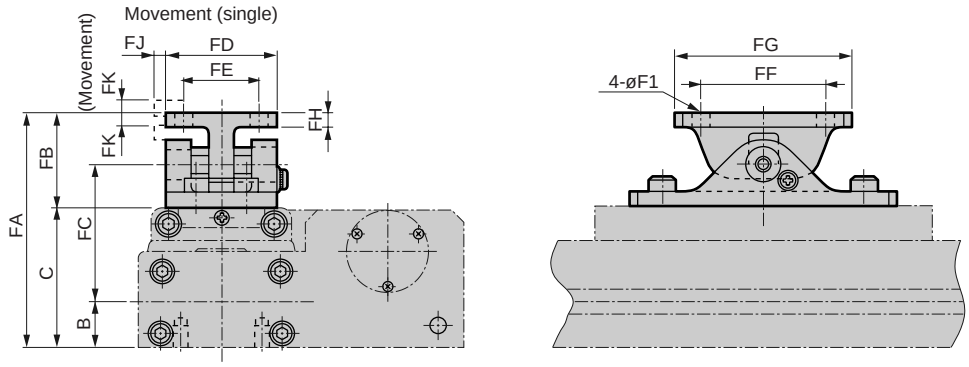
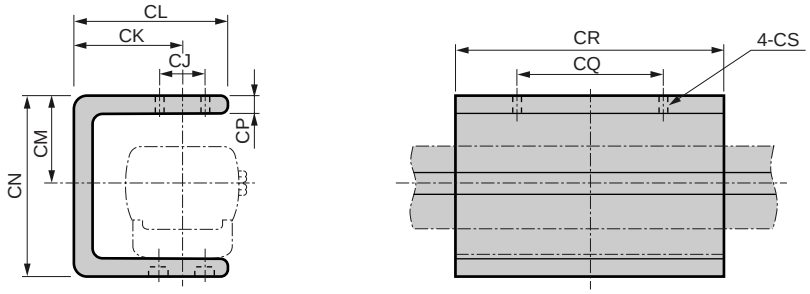
## Dimensions: Option

● Floating joint




| Symbol / Bore size (mm) | FA | FB | FC | FD | FE | FF | FG | FH | FI | FJ | FK | B | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø12 | 54 | 21 | 31.5 | 24 | 16 | 30 | 40 | 3 | 3.4 | 3 | 3 | 10.5 | 33 |
| ø16 | 58 | 21 | 34 | 24 | 16 | 30 | 40 | 3 | 3.4 | 3 | 3 | 12 | 37 |
| ø20 | 67 | 25 | 39 | 30 | 20 | 40 | 56 | 4 | 4.5 | 3 | 3 | 14 | 42 |
| ø25 | 78 | 25 | 47 | 30 | 20 | 40 | 56 | 4 | 6 | 3 | 3 | 17 | 53 |
| ø32 | 95 | 38 | 55.5 | 45 | 30 | 50 | 70 | 6 | 7 | 5 | 5 | 18.5 | 57 |
| ø40 | 105 | 38 | 62 | 45 | 30 | 50 | 70 | 6 | 7 | 5 | 5 | 22 | 67 |
| ø50 | 126 | 44 | 73 | 60 | 40 | 70 | 90 | 8 | 9 | 5 | 5 | 28 | 82 |
| ø63 | 139 | 44 | 79 | 60 | 40 | 70 | 90 | 8 | 9 | 5 | 5 | 35 | 95 |

● C mount bracket




| Symbol / Bore size (mm) | CJ | CK | CL | CM | CN | CP | CQ | CR | CS |
|---|---|---|---|---|---|---|---|---|---|
| ø12 Note 1 | 13 | 27 | 40 | 22.5 | 50 | 5 | 42 | 81 | M3 |
| ø16 Note 1 | 15 | 35.5 | 50 | 29 | 60 | 6 | 48 | 88 | M3 |
| ø20 Note 1 | 18 | 32.5 | 50 | 26 | 60 | 6 | 60 | 100 | M4 |
| ø25 | 20 | 45 | 69 | 28 | 71 | 5 | 70 | 116 | M5 |
| ø32 | 20 | 54 | 81.5 | 33.5 | 80 | 7 | 80 | 128 | M6 |
| ø40 | 30 | 63 | 95.5 | 38 | 91.5 | 8 | 90 | 138 | M6 |
| ø50 | 30 | 74 | 113 | 48 | 112.5 | 10 | 100 | 142 | M8 |
| ø63 | 40 | 88 | 138 | 58 | 131 | 13 | 110 | 158 | M8 |

Note 1: Can not be used with switch.

# Rodless cylinder with brake (SRT3) selection guide

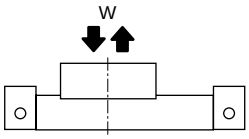
## <Step 1>

**1** Find the static moment.

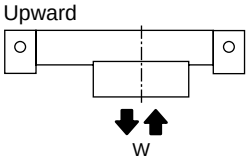
● How to find moment

(vertical load) W= (N)

Downward




Upward

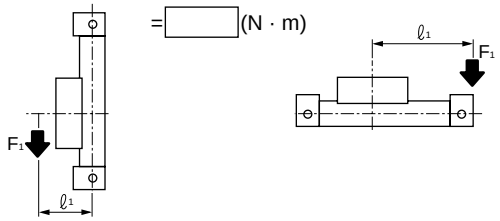



(Radial moment) M2 = F2 x ℓ2

= (N · m)

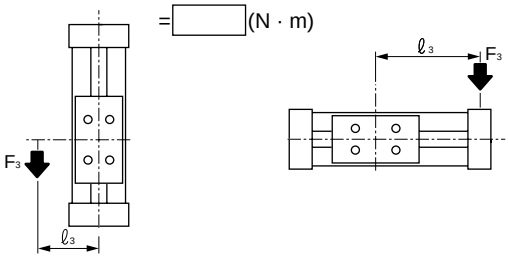

<Bend moment> M1=F1 x ℓ1

= (N · m)




<Twist moment> M3=F3 x ℓ3

= (N · m)




**2** Find a rough value of coefficient G according to Table 1.

<Table 1>

$$\text{Va (average speed)} = \frac{\text{Moving distance}}{\text{Moving time}} \text{ (m/s)}$$

| Va (average speed) (m/s) | Vm (speed at stroke limit) (m/s) | G coefficient |
|---|---|---|
| 0.3 | To 0.65 | 9 |
| 0.6 | To 1.00 | 15 |
| 0.9 | To 1.30 | 23 |
| 1.2 | To 2.00 | 40 |

G coefficient =

(Table 2) Allowable value

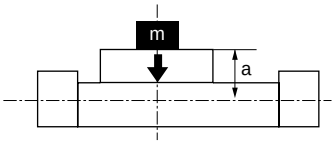
Value inside ( ) are for models with C mount bracket.

| Descriptions / Bore size (mm) | Wmax. (N) | M1max. (N · m) | M2max. (N · m) | M3max. (N · m) |
|---|---|---|---|---|
| ø12 | 30 (15) | 1.5 (1) | 0.6 (0.3) | 0.6 (0.6) |
| ø16 | 140 (70) | 5 (3.5) | 1 (0.5) | 1 (1) |
| ø20 | 200 (100) | 10 (7) | 1.5 (0.7) | 3 (3) |
| ø25 | 360 (180) | 17 (12) | 5 (2.5) | 10 (10) |
| ø32 | 620 (310) | 36 (25) | 10 (5) | 21 (21) |
| ø40 | 970 (485) | 77 (54) | 23 (11.5) | 26 (26) |
| ø50 | 1470 (735) | 154 (108) | 32 (16) | 42 (42) |
| ø63 | 2320 (1160) | 275 (193) | 52 (26) | 76 (76) |

Note) C mount can make installation on the brake free.
(Can not be mounted on brake side )

(Table 3) a value

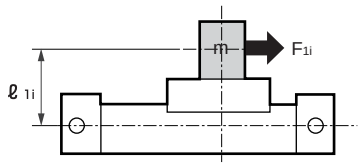
| Bore size | a (m) |
|---|---|
| ø12 | 0.023 |
| ø16 | 0.025 |
| ø20 | 0.028 |
| ø25 | 0.036 |
| ø32 | 0.039 |
| ø40 | 0.045 |
| ø50 | 0.054 |
| ø63 | 0.060 |



## 3 Obtain the dynamic moment generated ty the inertia of the load at the stroke end.

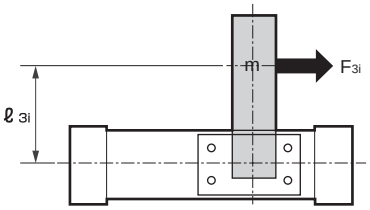
(Bending moment) $M1_i = F_{1i} \times \ell_{1i}$ ($F_{1i}$ = m x 9.8)

= ☐ (N · m)




(Twist moment) $M3_i = F_{3i} \times \ell_{3i}$ ($F_{3i}$ = m x 9.8)

= ☐ (N · m)




## 4 Select bore size roughly.

Select bore size roughly.

| | | |
|---|---|---|
| M1 + M1i x G | = ☐ (N · m) | → (ø ) |
| M2 | = ☐ (N · m) | → (ø ) |
| M3 + M3i x G | = ☐ (N · m) | → (ø ) |
| W | = ☐ (N) | → (ø ) |
| $E_0 = \frac{1}{2} \times m \times Vm^2$ ($m \fallingdotseq \frac{W}{9.8}$) | = ☐ (J) | → (ø ) |

Select the maximum bore size temporally.

ø ☐

(Table 4) Allowable energy absorption ($E_0$)

| Bore size (mm) | Integrated air cushion (J) | Shock absorber (J) | Shock absorber Model no. |
|---|---|---|---|
| ø12 | 0.03 | 2.4 | NCK-00-0.3-C |
| ø16 | 0.22 | 2.4 | NCK-00-0.3-C |
| ø20 | 0.59 | 5.7 | NCK-00-0.7-C |
| ø25 | 1.40 | 10.0 | NCK-00-1.2 |
| ø32 | 2.57 | 18.0 | NCK-00-2.6 |
| ø40 | 4.27 | 50.0 | NCK-00-7 |
| ø50 | 9.13 | 86.0 | NCK-00-12 |
| ø63 | 17.4 | 86.0 | NCK-00-12 |

Note) Shock absorber can not be mounted on SRT.
Use the shock absorber above as an external damper.

## 5 Obtain the composite of the moment at stroke end.

(4 Confirm if the bore size temporally selected at 4 meets the following formula.)

$$M_T = \frac{M1 + M1_i \times G}{M1max.} + \frac{M2}{M2max.} + \frac{M3 + M3i \times G}{M3max.} + \frac{W}{Wmax.} < 1$$

M : Composite moment (must be less than 1 )
G : G coefficient
Wmax. : Max. allowable of W (from table 2)
M1max. : M1 max. allowable (from table 2)
M2max. : M2 max. allowable (from table 2)
M3max. : M3 max. allowable (from table 2)

## <Step 2>

Then, increase the accuracy of load factor, effective thrust, speed at stroke end, and composite moment value.

●Find load factor.

$$\alpha = \frac{F_0}{F} \times 100\ (\%)$$

$\alpha$ : load factor
$F_0$: A necessary force to of movement a F0: workpiece is caused. (N)
F : Cylinder effective thrust (N)(Fig. 1 to 3)

| During horizontal operation | During vertical operation |
|---|---|
| $F_0 = F_W + F_1 + F_2 + F_3 + F_L$ | $F_0 = W + F_1 + F_2 + F_3 + F_L$ |
| $F_W$: W x 0.2 (N) | $F_1$: $M_1$ x C1 note (N) |
| $F_2$: M2 x C2 note (N) | $F_3$: $M_3$ x C3 note (N) |
| $F_L$: Other resistance (guide resistance etc.)(N) | W: load (N) |

Note: The coefficient which compensates the increase of the frictional force which during moment was applied.

(Table 5) Friction force coefficient per moment 1/m

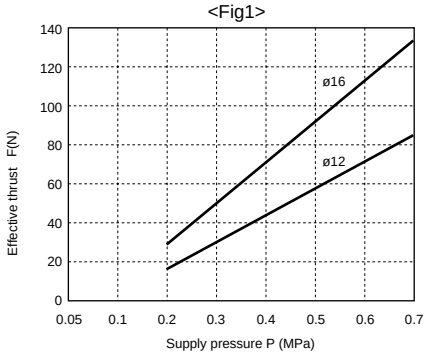
| Bore size (mm) | C1 | C2 | C3 |
|---|---|---|---|
| ø12 | 8 | 27 | 8 |
| ø16 | 7 | 24 | 7 |
| ø20 | 6 | 21 | 6 |
| ø25 | 5 | 16 | 5 |
| ø32 | 4 | 13 | 4 |
| ø40 | 4 | 11 | 4 |
| ø50 | 4 | 9 | 4 |
| ø63 | 3 | 8 | 3 |

(Table 6) Reference load factor

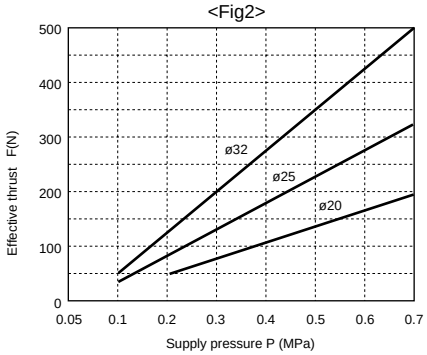
| Working pressure (MPa) | Load factor (%) |
|---|---|
| 0.2 to 0.3 | $\alpha \leqq 40$ |
| 0.3 to 0.6 | $\alpha \leqq 50$ |
| 0.6 to 0.7 | $\alpha \leqq 60$ |

●Graph of effective thrust

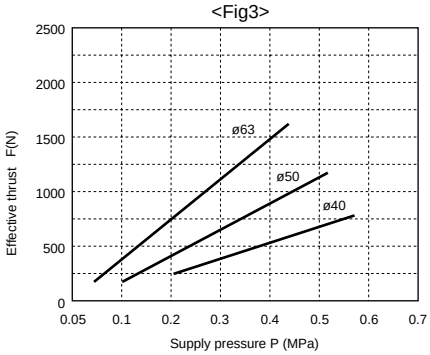
<Fig1>




<Fig2>



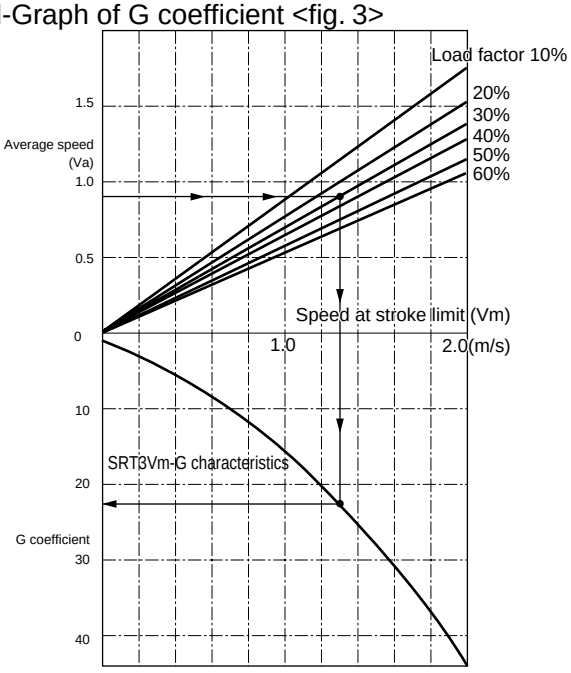

<Fig3>




## <Step 3>

Obtain the stroke end speed (Vm) from<Fig. 3> and G coefficient from the average speed (Va) and load rate obtained in STEP-2.

●Speed-Graph of G coefficient <fig. 3>




● Arrow (→) in figure shows
[ Average speed :0.9m/s
[ Load factor :30%

[ Speed at stroke end:1.3m/s
[ G coefficient :22.5
is shown.

## <Step 4>

●Confirm the composite moment (MT) with coefficient G found at STEP-3.

$M1 + M1i \times G$ = ☐ (N · m)

$M2$ = ☐ (N · m)

$M3 + M3i \times G$ = ☐ (N · m)

$W$ = ☐ (N)

$$M_T = \frac{M1 + M1i \times G}{M1max} + \frac{M2}{M2max} + \frac{M3 + M3i \times G}{M3max} + \frac{W}{Wmax}$$

**$M_T \leqq 1$**

↓

**Determining bore size** (*Refer to the (table 2) of the STEP1.)

↓

**Cushion performance confirmation**

## <Step 5>

●Confirmation of cushion performance

$$E = \frac{1}{2} \times m \times Vm^2$$

E : Kinetic energy at stroke final end (J)
m : Load weight (kg)
Vm : Piston entry speed into cushion (m/s)

| Bore size (mm) | Integrated air cushion (J) | Shock absorber (J) | Shock absorber Model no. |
|---|---|---|---|
| ø12 | 0.03 | 2.4 | NCK-00-0.3-C |
| ø16 | 0.22 | 2.4 | NCK-00-0.3-C |
| ø20 | 0.59 | 5.7 | NCK-00-0.7-C |
| ø25 | 1.40 | 10.0 | NCK-00-1.2 |
| ø32 | 2.57 | 18.0 | NCK-00-2.6 |
| ø40 | 4.27 | 50.0 | NCK-00-7 |
| ø50 | 9.13 | 86.0 | NCK-00-12 |
| ø63 | 17.4 | 86.0 | NCK-00-12 |

Note) Shock absorbers can not be mounted on SRT3.
Use the shock absorbers above as an external damper.

## <Step 6>

●Bore size determined by cushion performance: ☐øA☐ (Bore size determined on step 5)

●Bore size determined according to load conditions: ☐øB☐ (Bore size determined on step 4)

☐øA ≧ øB☐ → Select ☐øA☐.

or

→ Can be accommodated by using ☐øB☐ and external damper.
(Note) Refer to <table 4> on <Step 5>

☐øA < øB☐ → Select ☐øB☐.