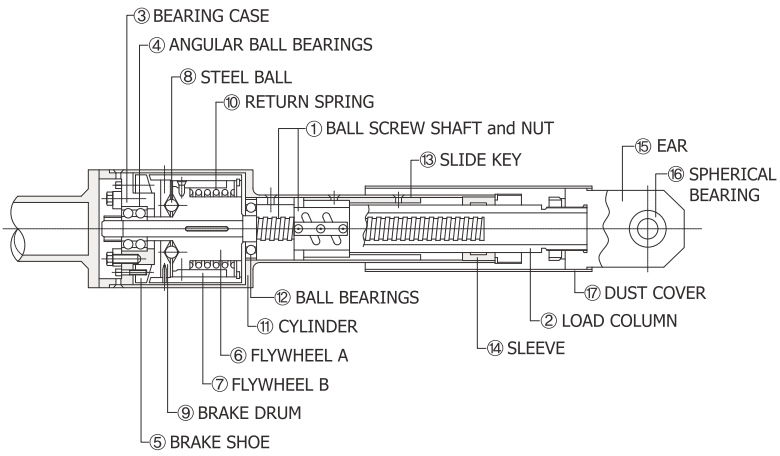
Configuration

MECHANICAL SNUBBER

■ In general, snubbers are required to restrain undesirable displacement of piping systems or components when they are about to oscillate due to seismic or other types of dynamic loading, while, to allow their free movement during the thermal displacement mode. Our mechanical snubber is designed to provide such essential two-way functions by means of a rotary inertia mass, which inherently generates a resistance force against a quick input movement, in combination with a ball screw assembly, which transforms reciprocal linear motions to rotary motions. This simple yet sophisticated design was developed by us as the first invention in the world and patented in many countries including Japan, USA, Canada and U. K. The quality and reliability of our Mechanical Snubbers has been proved and established by comprehensive and thorough testing, and by achievements of completely trouble-free service through the decades with various safety-related piping systems in the world.



■ Design principle of our Mechanical Snubber is a utilization of an inertia mass which generates different magnitude of resistance force against the input load in proportion to its acceleration level.
Namely, M α = F (where : M = Mass, α = acceleration, F = force generated)
Low input acceleration generates a negligible level of resistance force allowing the free
movement of piping, while high acceleration assumes sufficient resistance force to completely
restrain the vibration of piping.

■ The one end of Mechanical Snubber is connected with a structural member through extension attachments, and the other end is pin-connected to the piping or component. It is also a dominant design feature in our Mechanical Snubber that an efficient built-in braking mechanism enhances the function of the inertia mass reducing its size, while developing a clear acceleration threshold in its performance.

① When dynamic (vibration) or gradual (thermal) displacements are developed in the piping system or component, they are instantaneously transferred to the snubber unit, and give telescoping motions to the ball nut.

② The nut, when pushed or pulled, causes rotary motions of the ball screw shaft.

③ The rotary motions of ball screw shaft give integral motions to the inertia mass as it is solidly assembled with the shaft. So far as the input displacement is relatively slow, the inertia mass rotates without assuming any significant inertial force, thus allows the displacement as if the snubber does not exist.

④ On the contrary, when a quick displacement takes place, the mass functions to prevent the screw shaft from rotation because of its inherent inertial force, thus suppressing the dynamic displacement of the system.

Advantages :

① Acceleration-sensitive type.
② Durability guaranteed for 40 years without routine maintenance service.
③ Identical performance against tension and compression displacements.
④ Compact contour with adequate side-load capacity.
⑤ Easy observation of stroke position.
⑥ Factory preset to ready-to-install length.
⑦ Operability can be verified with In-service testing equipment.
⑧ Lubricated with 40-year-life radiation-proof grease.

Major Design Specifications :

1. Applicable Code and Standard

① JIS (Japanese Industrial Standard) Code
② MITI (Ministry of Trade and Industry) Code 501
③ ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section Ⅲ Subsection NF
④ ASTM (American Iron and Steel Institute) Standard
⑤ SSPC (Steel Structure Painting Council) Standard

2. Rated Load (Kgf)

Size No.	Rated Load
SMS 005	50
SMS 01	100
SMS 03	300
SMS 06	600
SMS 1	1,000
SMS 3	3,000
SMS 6	6,000

Size No.	Rated Load
SMS 10	10,000
SMS 16	16,000
SMS 25	25,000
SMS 40	40,000
SMS 60	60,000
SMS 100	100,000

① Service Level A and B ratings defined in ASME Code shall be as same as Design rated Load. Service Level C and D ratings shall be 1.33 and 1.5 times the Design rated Load, respectively

3. Standard Strokes (mm)

100	160	250	Special for extra length

4. Minimum Spring Rate (Kgf/mm)

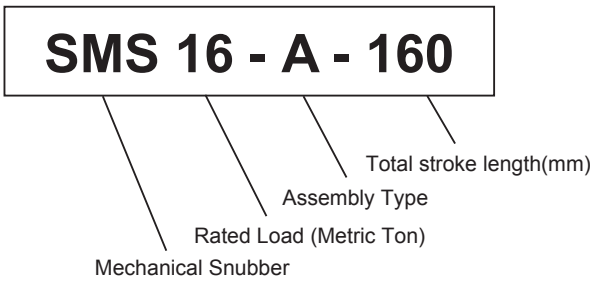
Size/Stroke	100mm	160mm	250mm
SMS 005	100	100	50
SMS 01	200	200	100
SMS 03	300	300	200
SMS 06	300	300	200
SMS 1	500	500	300
SMS 3	1,500	1,500	1,000
SMS 6	3,000	3,000	2,000
SMS 10	5,000	5,000	3,000
SMS 16	8,000	8,000	4,500
SMS 25	10,000	10,000	6,500
SMS 40	12,000	12,000	8,000
SMS 60	14,000	14,000	9,000
SMS 100	23,500	23,500	15,000

5. Design Parameters

Design Parameters	Specifications
Breakaway / Drag Force Limit at the velocity of 0.1cm/sec.	less than 2% of the rated load or 15Kg, whichever is greater.
Operational Frequency Range	3 ~ 33 Hz
Limit of Angular Offset	±6 ° (Spherical Bearing)
Side-load Capacity	6.5g with the Max. pin-to-pin length
Temperature Limit	21℃ - 93℃ in normal operation
Relative Humidity Limit	0% - 100%
Radiation Dosage	1 x 10^9 Rad.
Resonance prevention of overall snubber assembly	Lateral Natural Frequency, not between 3 Hz - 33 Hz

Ordering

■ Designation of Size No.



■ Size Selection Guideline

Selection of the proper size shall be made on the basis of following design elements :

(1) Calculated load to be developed during the dynamic event of piping system.
(2) Amount of thermal displacement (travel) and its direction.
(3) Overall installation length allotted for the snubber assembly.

① Rated Load

The snubber's rated load must be nearest to but greater than the calculated load. For example, when the calculated load is 4500Kg, size SMS 6(rated load = 6000Kg) will be the proper size to select.

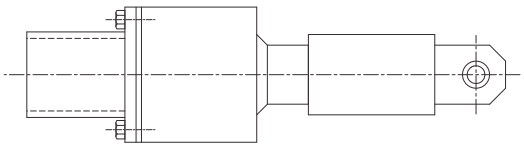
Based on the diameter of the piping to which the snubber assembly is installed, the smallest usable snubber size is designated in this table

Pipe Dia.	Rated Load
5B	03
6B - 10B	06
12B - 16B	1
18B - 24B	3
25B and over	6

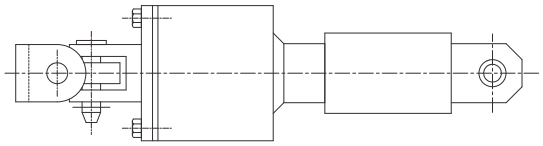
② Assembly Type

Type A : For the longer installation length the snubber unit installed with the extension attachment.

Type B : For the limited installation length, the shortest assembly is employed.



Type A



Type B

③ Stroke

(1) The rated stroke of the snubber unit selected must be sufficiently greater than the calculated travel so as to provide a safety margin for the extra movement not counted in at the designing stage of the piping system.

Combination of total (rated) stroke and design displacement

Design Stroke(mm) (Displacement)	Total(Rated) Stroke(mm)		
	100	160	260
50 and less	○	△	△
51 - 110	X	○	△
111 - 200	X	X	○

○ Optimum
△ Usable
X Not usable

(2) Each snubber unit is pre-set it stroke position at factory to provide the ready-to-install length of the assembly based on the designated amount and direction of the stroke
(displacement of the piping system).