



# Cautions for Using Soft Absorbers 1

## 1. Parallel Use of Small Absorbers

### 1-1. Fixed soft absorbers

Fixed soft absorbers can be used in parallel, as they perform in a similar manner.

### 1-2. Adjustable soft absorbers

Parallel use of adjustable soft absorbers is not recommended, as some cannot be adjusted to perform equally. However, please contact our sales department when the following conditions apply.

1. The colliding work is guided and there is no risk of eccentric load.
2. When N is the number of receiving units and A is the required absorption energy capacity,  $A/N$  (absorption energy capacity per one unit) is sufficiently lower than the absorption capacity of the soft absorber to be used.

## 2. Operating Environment of Soft Absorbers

### 2-1. Do not use in an environment where oil mist, cutting oil, etc. may come in contact with a soft absorber. This is because oil can penetrate through the piston rod, disabling the stroke. When using under such circumstances, the soft absorber must be liquid-proofed.

1. Using absorbers with coolant specifications

There are models with triple packing.

(This does not protect against all damages.)

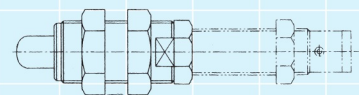
2. Covering the piston rod with eccentric angle adaptors, etc.

Although it will protect against direct oil contact, oil may still penetrate through a gap between the eccentric angle adaptor and the cap.

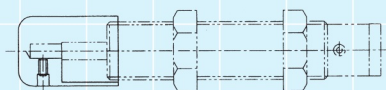
(This does not protect against all damages.)

3. Using absorbers with liquid-proof cap specifications

Although it is effective when the rod is facing upward, it cannot be used when the rod is facing sideways or downward. It may also not be effective against oil mist.



(Eccentric angle adaptor)



(Liquid-proof cap)

### 2-2. Using soft absorbers in a vacuum

Soft absorbers cannot be used in a vacuum. The absorber itself must be used outside the vacuum environment.

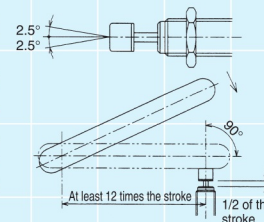


### 2-3. Using soft absorbers in dusty environments

Please use absorbers with dust seals. (However, depending on the environment, they may not be fully effective for ensuring durability.)

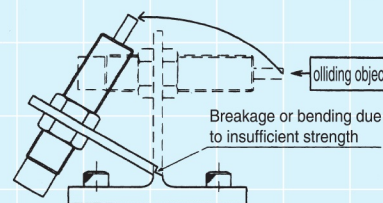
## 3. Protecting soft absorbers from eccentric load

Ensure that the angle of impact with respect to the soft absorber is  $2.5^\circ$  or less. A rod guide that acts as an eccentric load adaptor is required for an eccentric load with an angle of impact of over  $2.5^\circ$ . In principle, an adaptor that undergoes a rotating motion must be set in a location where the distance from the rotational centre of work is at least 12 times the stroke length, as well as where the collision occurs at a right angle at  $1/2$  of the stroke length. In the event that it is perpendicular at the stroke end, please secure a distance that is at least 24 times the stroke length from the work's rotational centre.



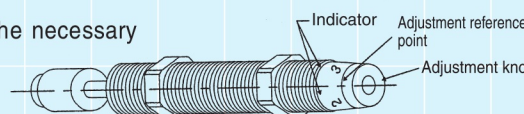
## 4. Mounting strength of soft absorbers

The impact absorption of a soft absorber requires sufficient mounting strength. A good guideline is to secure a mounting strength that is 2 to 3 times larger than the max. drag based on the absorber specifications.



## 5. Adjusting soft absorbers

When using an adjustable soft absorber, turn the adjustment knob to make the necessary adjustment. A smaller number on the indicator means a smaller equivalent mass. Turn to a smaller number for high-speed impact, and turn to a larger





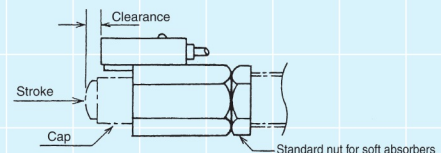


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number for slow-speed impact. The adjustment knob can also be set between two integers. The adjustment knob can rotate more than 360°. Once the adjustment is complete, secure it firmly with a lock screw. (Please note that certain types do not come with a lock screw.)

## 6. Cautions for attaching a holder with a switch

1. When attaching a holder with no stopper function, ensure that there is a gap between the switch and the cap's tip when the piston rod is pressed all the way down to the stroke end. Otherwise, the switch may become damaged by the impact.
2. Set the holder's position so that the switch's tip and the edge of the metallic ring on the rod cap are at least 0.5mm apart. Otherwise, it will not work properly.
3. When attaching a holder with a switch to an adaptor, please be extremely careful not to screw it into the adaptor more than is necessary. This may cause the adaptor to press against the switch's sensor, damaging the switch. (When attaching, please ensure that the absorber's edge is not protruding out of the holder's edge.)



## 7. Cautions for Using the Switch

1. Do not use when it is in a transient state after the power is turned on (approx. 10ms).
2. Keep the cables as short as possible when using in places with a lot of noise. Also, please take all precautions, such as avoiding the parallel wiring of electric lines and power lines, as well as wiring within the same conduit.
3. Ensure that the switch does not come into direct contact with thinner-type chemicals.
4. Because it does not have a short-protection circuit, wiring must be done correctly.

## 8. Equivalent Mass of Soft Absorbers

During the soft absorber selection process, sometimes the absorption energy alone is considered without confirming the equivalent mass, or the maximum mass of the colliding object is confused with the equivalent mass. In order to make the most appropriate selection, the equivalent mass conditions must be satisfied. But why is satisfying the equivalent mass conditions so vital to securing optimal impact absorption? Selecting the best soft absorber means selecting the soft absorber that can generate the optimal drag. What are the factors that determine the optimal drag? Let us review the principles of soft absorbers.

**F P A** (P: Generated internal pressure of the absorber, A: Pressure-receiving piston area)

Based on the above equation, it is clear that if an appropriate P (Pressure) can be generated, the appropriate drag F can be obtained. One of the factors that determines the pressure P is the orifice area. An overview of the relationship between the orifice area, equivalent mass, and internal pressure is shown below. Considering the relationship between impact rate and orifice area, using an absorber with a small orifice area to receive an impact from a high-speed collision results in an excessive increase in the internal pressure, causing a jolt. On the other hand, using an absorber with a large orifice area to receive a low-speed impact does not generate enough internal pressure, which in turn prevents the necessary drag from being generated.

An adjustable absorber can adjust the size of the orifice area, allowing the absorber to generate the appropriate hardness, in another words, the drag, according to the impact rate. Consequently, maximum equivalent mass can be defined as the smallest possible orifice area in an adjustable absorber based on the relationship between equivalent mass and impact rate. In other words, it is the adjustable state in which the slowest impact rate under the operating conditions can be handled. Therefore, if the energy calculation and equivalent mass calculation based on the operating conditions result in a value that exceeds the maximum equivalent mass, the orifice area of the absorber cannot be set to the ideal size. In other words, it will not be able to decelerate the impact rate properly. The maximum absorption energy capacity of a soft absorber is a crucial factor in preventing the absorber from being damaged, and confirming the equivalent mass is therefore vital to the rate control for impact absorption. Therefore, both conditions must be satisfied for the absorber to function properly.

## Model GXL-8F specifications Manufactured by SUNX

Item	Summary	Specification
Detection distance	Standard detected object 15X15X1 (Iron)	1.8mm
Power voltage		12~24VDC±10%
Consumption current		15mA or lower
Behaviour form		NO type
Output form		NPN open collector
Output capacity (with 24VDC power voltage)		100mA or lower
Protection feature		Comes with a surge absorption circuit
Residual voltage	At 100mA inflowing current	1V or lower
	At 60mA inflowing current	0.4V or lower
Input/Output circuit diagram		Operation indicator light Red LED (lights up when the output is ON)
Response frequency		500Hz
Ambient operating temperature		0~55°C
Ambient storage temperature		-30~80°C
Ambient operating humidity		45~85%RH
Ambient storage humidity		35~95%RH
Lead wire length		Approx. 1m
Mass	Including cable	Approx. 11g

Orifice area	Equivalent mass Me	Generated internal pressure P	
Large	Small	Small	
Small	Large	Large	