CKD

SM-277920-A

INSTRUCTION MANUAL

SHOCK KILLER

FCK

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

For Safety Use

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, read this instruction manual carefully for proper operation.

Observe the cautions on handling described in this manual, as well as the following instructions:

⚠ Precautions

- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.
  Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

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FCK
Shock Killer
Manual No. SM-277920-A

NOTE : Letters & figures enclosed within Gothic style bracket (examples such as [C2-4PP07] · [V2-503-B] etc.) are editorial symbols being unrelated with contents of the book.

Nov.02.1999

1. PRODUCT

1.1 Specification

Model code / Item			FCK-L -0.15	FCK-M-0.18 FCK-H-0.18	FCK-L -0.3	FCK-M-0.5 FCK-H-0.5	FCK-L -0.4	FCK-M-0.6 FCK-H-0.6
Max. absorption energy		J	1.5	1.8	2.9	4.9	3.9	5.9
Stroke		mm	8		10			
Max. absorption energy per an hour		J/H	3,528		5,880		3,528	
Impact speed range m/s		L	0.3 - 1	—	0.3 - 1	—	0.3 - 1	—
		M	—	0.3 - 2	—	0.3 - 2	—	0.3 - 2
		H	—	0.7 - 3	—	0.7 - 3	—	0.7 - 3
Max. frequency of repetition (20°C)		Times / min	60					
Ambient working temperature range		°C	−5 - 70					
Max. load (reaction)		N	637		1,470		1,813	
Reverting time		S	0.5 or less					
Mass of product	Without tip cap		26.5		44		68	
	With tip cap		27		47		73	
Returning force of spring	When elongated	N	2.9		4.9		4.5	
	When compressed	N	5.9		9.8			

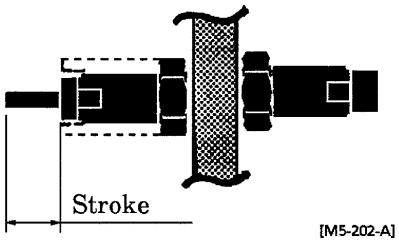
Model code / Item			FCK-※-1	FCK-※-3	FCK-※-5	FCK-※-6.5	FCK-※-8.1	FCK-M-20 FCK-H-20	FCK-M-40 FCK-H-40	FCK-M-45 FCK-H-45	FCK-M-73.5 FCK-H-73.5
Max. absorption energy		J	9.8	29.4	49	63.7	79.3	196	392	441	720
Stroke		mm	12	16	30	40	25	35	50		80
Max. absorption energy per an hour		J/H	14,112	20,580	29,400	38,220	32,340	70,560	141,120	164,640	264,600
Impact speed range m/s		L	0.3 - 1					—			
		M	0.3 - 2					0.3 - 2			
		H	0.7 - 3					0.7 - 3			
Max. frequency of repetition (20°C)		Times / min	60					30		10	6
Ambient working temperature range		°C	−5 - 70								
Max. load (reaction)		N	2,646	4,900 (FLK-L) 3,528 (FCK-M/H)	3920 (FCK-M/H)		6,370	16,660	23,520	27,028	
Reverting time		S	0.5 or less					1 or less		2 or less	
Mass of product	Without tip cap		108	180	406	—	441	710	1,330	—	—
	With tip cap		117	202	436	459	460	760	1,410	1,560	2,010
Returning force of spring	When elongated	N	5.4	12.0	16.6	23.8	16.2	19.6	22.5	24.5	
	When compressed	N	14.7	18.0	33.1	71.4	27.2	44.1	68.6	83.3	98

Replace ※ with a character L for low speed, M for medium speed, or H for high speed;. you may specify any of these characters.

2. CAUTION

2.1 Selection of appropriate model

1) Select the model with ample reserve of max. energy absorption by calculating the energy generated when shock killer is activated.
2) Shock killer absorbs rated energy with rated stroke. The shorter the stroke is adjusted by means of stop nut, the less energy absobed than the rated energy.



<Fig. 19>

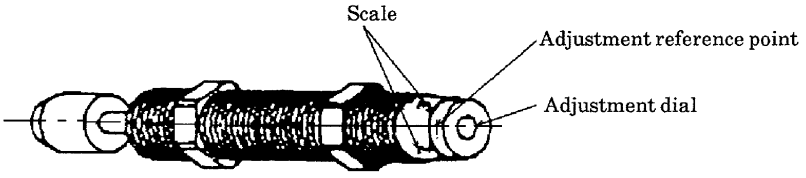
2.2 Joint use with other function

1) Plan to control the speed making use of the speed controller of cylinder when the system is being driven by a cylinder.
2) When a cylinder with air cushion functions at its stroke end is combined, it is recommended to set needle open condition (voiding its function).

3. OPERATION

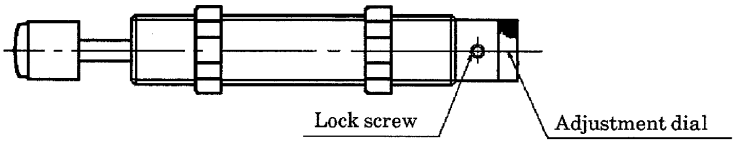
Each FCK model has an adjustment mechanism. Follow the procedure below to adjust the energy absorption:

① Temporarily set the adjustment dial to a position around "2".



② Under the production load, set the adjustment dial to the optimum position. (Fine tune by several trials.)

③ After completing the adjustment, secure the adjustment dial using the lock screw if present.
(The following models do not have a lock screw mechanism: FCK-L-0.15, FCK-M-0.18, FCK-L-0.3, FCK-M-0.5, and FCK-H-0.5.)



Note1 : If the energy absorption is set excessively higher than the actual load, the operation cycle may be prolonged or interrupted.

Note2 : Ensure that you tighten the lock screw after changing the adjustment dial position. Otherwise the adjustment dial position may change accidentally, causing the energy absorption to deviate from the set value.

4. INSTALLATION

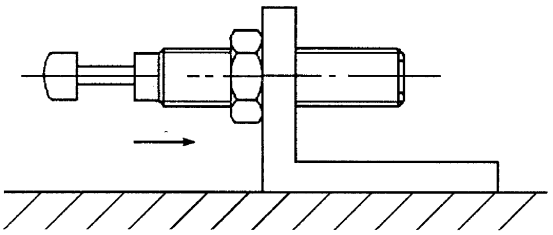
Body stem is threaded all the way. Make use of the thread for mounting the shock killer.

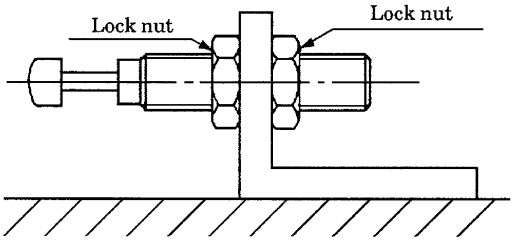
4.1 Sizes of thread

Model No.	FCK-L-0.15	FCK-M-0.18 FCK-H-0.18	FCK-L-0.3	FCK-M-0.5 FCK-H-0.5	FCK-L-0.4	FCK-M-0.6 FCK-H-0.6	FCK-※-1	FCK-※-3
Size of thread	M10×1.0	M10×1.0	M12×1.0	M12×1.0	M14×1.5	M14×1.5	M16×1.5	M20×1.5

Model No.	FCK-※-5	FCK-※-6.5	FCK-※-68.1	FCK-M-20 FCK-H-20	FCK-M-40 FCK-H-40	FCK-M-45 FCK-H-45	FCK-M-73.5 FCK-H-73.5
Size of thread	M25×1.5	M25×1.5	M27×1.5	M30×1.5	M36×1.5	M42×1.5	M42×1.5

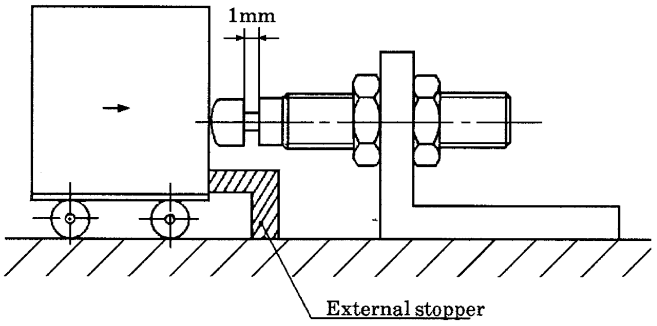
4.2 Mounting procedure and position adjustment





1) Make use of sidings for wrench to screw-in the shock killer itself. (Remove a spacer and lock nut on the end of body to be screwed-in.)

2) Apply a lock nut tentatively when the shcok killer is screwed-in to an approximate position.



3) Position adjustment and final tightening

Set the position of killer so as to retain 1mm residual stroke when work is held stopped by an external stopper.

Give final tightening to lock nuts.

4) Note the recommended tightening torque for the shock killer mounting screws:

(N · m)

Model	Range of tightening torque	Model	Range of tightening torque
FCK-L-0.15	5.9 - 7.8	FCK-※-5	49.0 - 61.0
FCK-M-0.18 FCK-H-0.18	5.9 - 7.8	FCK-※-6.5	49.0 - 61.0
		FCK-※-8.1	58.8 - 73.5
FCK-L-0.3	5.9 - 7.8	FCK-M-20 FCK-H-20	78.4 - 98.0
FCK-M-0.5 FCK-H-0.5	5.9 - 7.8		
		FCK-M-40 FCK-H-40	98.0 - 122.5
FCK-L-0.4	8.3 - 9.8		
FCK-M-0.6 FCK-H-0.6	8.3 - 9.8	FCK-M-45 FCK-H-45	392.0 - 490.0
FCK-※-1	11.8 - 14.7	FCK-M-73.5 FCK-H-73.5	392.0 - 490.0
FCK-※-3	29.4 - 35.3		

4.3 Considerations during installation

1) Mount it aligning with load.

Mount it so as to bear colliding object at center of rod while aligning direction of rod center movement with that of object motion. Keep collision angle within 5°.

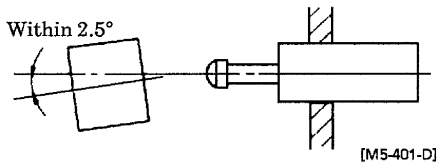
2) Retain residual stroke of 2 - 3mm at final stop of load.

It is necessary to have an external stopper installed to provide 2 - 3mm of residual stroke of shock killer for its protection. It is particularly true when propulsion is fairly large or it is perpendicular drop motion.

3) Intermediate slip board for rolling object

Provide an intermediate slip board when rolling object is to collide to prevent rod from receiving turning force of load.

4) In cases where the mounted portion does not have sufficient strength, the shock killer body and mounted machines may be damaged. Ensure there is sufficient strength.



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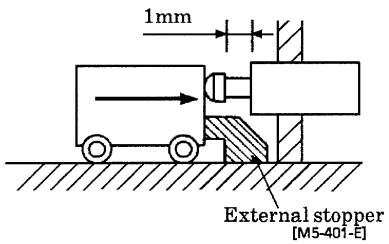

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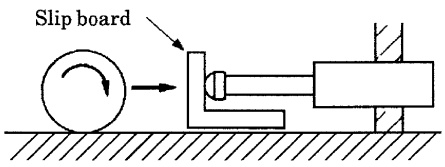

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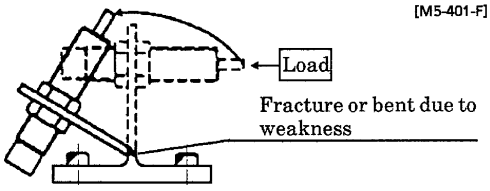


5) Do not use the shock killer under conditions where splashed oil or watermay stick to the surface of the Piston rod.
Energy will not be properly absorbed and failure may result.

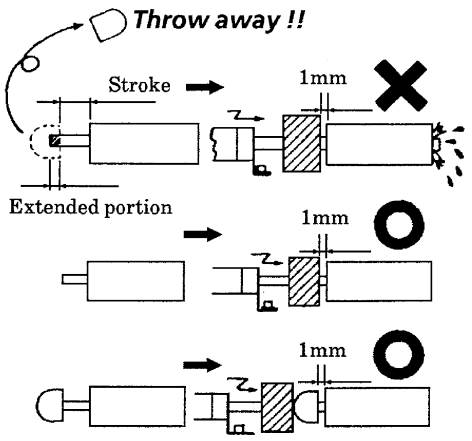
6) Prevent giving rod a scratch mark or allowing foreign particle sticking on the rod surface. (It may cause an oil leakage.)
Example 1) Scratches of the rod caused by scattering metal chips
Example 2) Contamination on the rod by grease scattering from other equipment

4.4 Operating Environment

(1) Protect the product against rain, water, and direct sunlight.
(2) Avoid using the product in a corrosive atmosphere; otherwise, damage or malfunction may ensue.
(3) Use the product always under the normal barometric pressure and never under the vacuum or under a high pressure.
(4) Prevent splashing or sticking of metal flakes, cutting fluid, water, or any other foreign matter on the piston rod.
(5) Presence of ozone in the atmosphere may decrease the service life of the product.
(6) Control the relative humidity in the range between 0% and 80%.

4.5 Other consideration

1) When FCK with tip cap is used, keep its cap on. Operation with the cap removed will cause damage to the other end of FCK due to extended length of rod provided to mount a cap.



2) Do not throw the shock killer into fire because it has oil sealed within it and there may be a high risk of ignition or explosion.

3) In cases where the mounted portion does not have sufficient strength, the shock killer body and mounted machines may be damaged. Ensure there is sufficient strength.

4) If the colliding object is oscillating, guide the object properly using a guiding structure. If the oscillation of the colliding object may apply a force radial to the piston rod, a rigid structure is required to guide the object.
5) Before mounting, dismounting, or adjusting the stroke of the product, turn off the power of the equipment and ensure that the machine has stopped.
6) Do not attempt to use the product in a clean room because the product may be a source of contamination.
7) Never use the product without an external stopper.
If the shock killer is used without an external stopper, a bottoming may ensue and damage the machine to which the shock killer is installed.
Always use an external stopper to prevent the bottoming.
8) Do not use two or more shock killers in parallel because it is difficult to synchronize the energy absorption among multiple shock killers.

5. MAINTENANCE

5.1 Periodic inspection

1) Carry out a periodic inspection over the following items.
The shock killer does not allow repairing by disassembly. Replace the shock killer if it has failed. Careless disposal of the oil inside the shock killer may contaminate the environment. Follow the waste oil disposal rules when disposing of the oil.

2) Check the following.
(1) Loosened body-mounting nut
(2) Scratch and deformation of body
(3) Scratch and deformation of rod
(4) Trace of oil leakage
(5) Check for improper stroke.
(6) Change in noise during operation
If any problems are detected, refer to "5.2 Troubles and corrective measures" and implement proper measures.

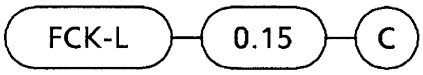
5.2 Trouble Shooting

Trouble	Cause	Correction
Mounting nut becomes loosened.	Tightening torque is small.	Retighten. (Use the tightening torque listed on page 5.)
	Nut becomes loose due to vibration, etc. of device	Control vibration of device.
Shock is not being absorbed completely.	Applied energy is too large.	Replace shock killer with the next largest size.
	Stroke is suspended halfway by external stopper.	Adjust external stopper and extend absorption stroke.
	Moving direction of contacting work shifts from the axial center line of the rod.	Align moving direction of contacting work with the axial center line of the rod.
	Contacting angle of contacting work shifts 2.5 degrees or more from the axial center line of the rod.	Align contacting angle of contacting work with the axial center line of the rod.
	Vibration occurs during contacting work.	Provide contacting work with a secure guide to prevent vibration.
	Shock killer body is being used as a stopper.	Provide a stop nut or an external stopper.
	Ambient temperature is too high.	Cool shock killer temperature to below 70°C.
	Foreign objects attach to rod surface and oil seal is damaged.	Provide a cover to prevent foreign objects from attaching to rod.
	Rolling work makes direct contact with shock killer.	Provide a slip plate to prevent rolling work from directly contacting the rod.
	Product life	Replace shock killer.

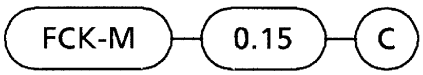
Trouble	Cause	Correction
Piston stops at a halfway point of stroke or repulses.	Energy caused by contacting work is small in respect to the allowable absorbed energy.	Shorten the shock killer stroke using the stop nut or the external stopper.
		Replace the shock killer with one that is one size smaller.
	Shock killer is in contact with the external stopper before energy absorption is completed.	Adjust the position of the external stopper.
	Oil or water drips, etc. attached to the shock killer have entered the inside of shock killer.	Install a cover on the rod to prevent oil drips and water drips, etc. from attaching to it.
	Low ambient temperature	Heat the shock killer to raise the temperature above −5°C.
Inner oil is leaking.	Foreign objects attach to rod surface and oil seal is damaged.	Provide a cover to prevent foreign objects from attaching to rod.
	Low ambient temperature	Heat the shock killer to raise the temperature above −5°C.
	Product life	Replace shock killer.
Rod does not reset.	Moving direction of contacting work shifts from the axial center line of the rod.	Align moving direction of contacting work with the axial center line of the rod.
	Contacting angle of contacting work shifts 2.5 degrees or more from the axial center line of the rod.	Align contacting angle of contacting work with the axial center line of the rod.
	Vibration occurs during contacting work.	Provide contacting work with a secure guide to prevent vibration.
	Shock killer body is being used as a stopper.	Provide a stop nut or an external stopper.
	Low ambient temperature	Heat the shock killer to raise the temperature above −5°C.
	Product life	Replace shock killer.
Large noise generated when impact is absorbed	Applied energy is too large.	Replace shock killer with the next largest size.
	Stroke is suspended halfway by external stopper.	Adjust external stopper and extend absorption stroke.
	Moving direction of contacting work shifts from the axial center line of the rod.	Align moving direction of contacting work with the axial center line of the rod.
	Contacting angle of contacting work shifts 5 degrees or more from the axial center line of the rod.	Align contacting angle of contacting work with the axial center line of the rod.
	Vibration occurs during contacting work.	Provide contacting work with a secure guide to prevent vibration.
	Shock killer body is being used as a stopper.	Provide a stop nut or an external stopper.
	Ambient temperature is too high.	Cool shock killer temperature to below 70°C.
	Foreign objects attach to rod surface and oil seal is damaged.	Provide a cover to prevent foreign objects from attaching to rod.
	Rolling work makes direct contact with shock killer.	Provide a slip plate to prevent rolling work from directly contacting the rod.
	Product life	Replace shock killer.

6. HOW TO ORDER

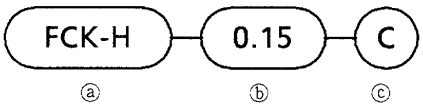
• Low speed type



• Middle speed type



• High speed type

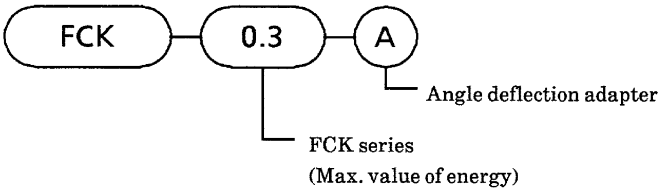


Note: The following specifications dictate the use of a tip cap always: 6.5 (63.7J), 45 (441J), and 73.5 (720J).
Two bars (——) indicate an unallowable combination.

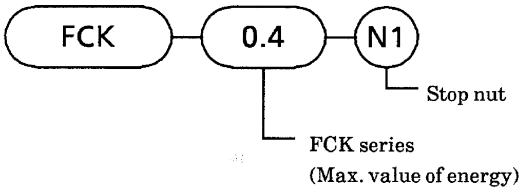
Code	Discription	ⓐ Model series (Model no.) Low speed type FCK-L	Middle speed type FCK-M	High speed type FCK-H
ⓑ Series (Max. value of energy absorption)				
0.15	1.5J	●	——	——
0.18	1.8J	——	●	●
0.3	2.9J	●	——	——
0.4	3.9J	●	——	——
0.5	4.9J	——	●	●
0.6	5.9J	——	●	●
1	9.8J	●	●	●
3	29.4J	●	●	●
5	49J	●	●	●
6.5	63.7J	●	●	●
8.1	79.3J	●	●	●
20	196J	——	●	●
40	392J	——	●	●
45	441J	——	●	●
73.5	720J	——	●	●
ⓒ Option				
NO code	Without tip cap	●	●	●
C	With tip cap	●	●	●

MODEL CODE OF ACCESSORIES

• Angle deflection adapter



• Stop nut



• Stop nut for a model with a tip cap