

Structure/Outlines

FMC/FMA Magnum Series

Magnum Series is the newest model of industrial soft absorber implemented with the innovative next generation deceleration technology for self-correction/adjusting type. It consists of four types with external threads of M33, 36, 45, and 64.

The newest sealing technology, high precision bearing, and the design to allow the use of the main unit as a stopper are applied for the internal structure, which achieves high durability in an extreme usage environment.

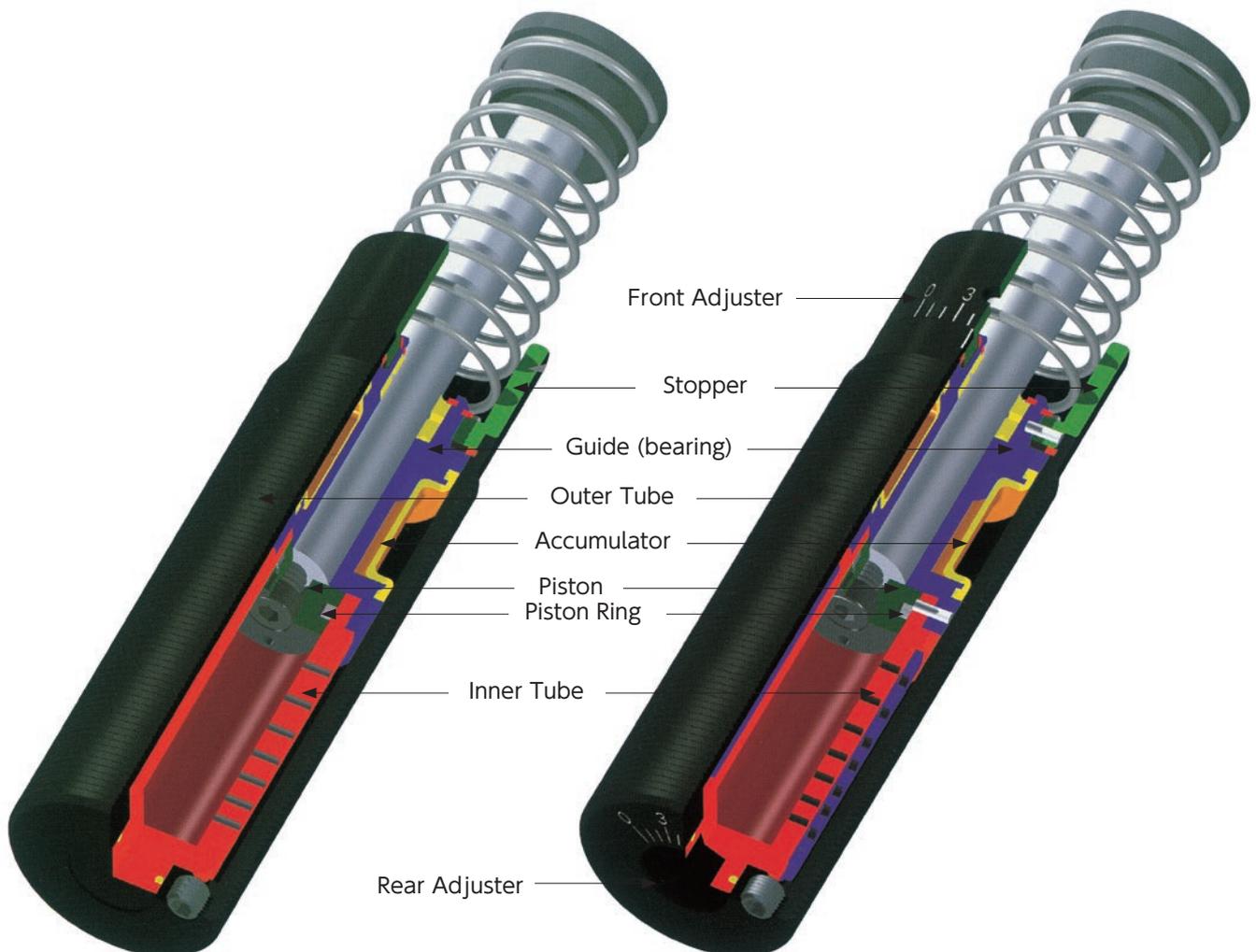
The full thread type main unit makes a wide variety of mountings possible compared to conventional types.

From a performance viewpoint, this series has an increased absorption energy capacity by 50% compared with conventional products, and also has a wider equivalent mass range.

In addition the adjusting type FML model, developed as a low speed specification, provides a wide range of uses in a low speed impact. As explained, the Magnum Series is a new series with the performance and appearance to improve the capability of production machines and equipment by 100%.

FMC33 ~64 (Self-correction type)

FMA & FML33 ~64 (Adjusting type)



<Model number>

FMC - With External Returning Spring (Standard Type)

FMCA - Air Return Type (Without Returning Spring)

* When an external tank is used.

<Model number>

FMA/FML - With External Returning Spring (Standard Type)

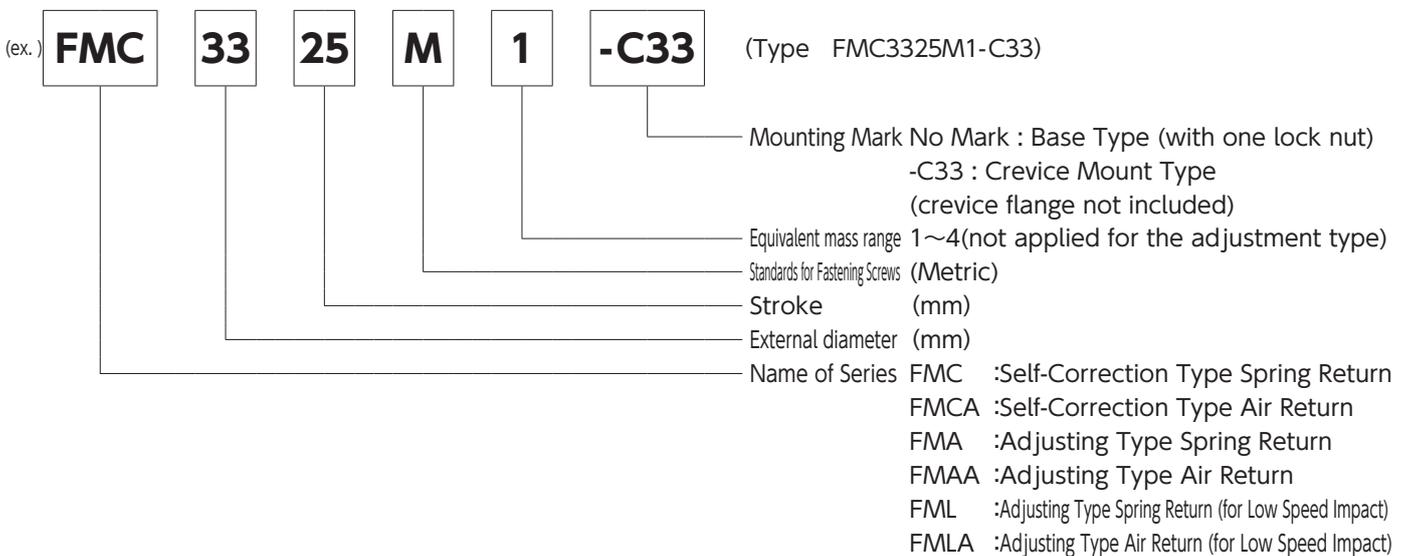
FMAA/FMLA - Air Return Type (Without Returning Spring)

* When an external tank is used.

Outlines

	Self-correction type	Adjusting type	
	FMC·FMCA	FMA·FMAA	FML·FMLA
Range of impact rate	0.15~5m/s	0.15~5m/s	0.02~0.46m/s
Adjustment method	Unnecessary	Adjustable at the front stopper or bottom. (Direction to "0" for harder, Direction to "9" for softer)	
Oil type	Automatic Transmission Fluid (ATF)		
Range of operating temperature	-12°C~66°C		

Key to Model Number



(*) If the mounting parts such as flanges are required, please order together with the models above.

(ex.) QF33 : Square flange
S33 : Side mount fixture

Caution

- For appropriate heat radiation, do not apply a coating on the soft absorber.
If used in an acid, dirt, dust, steam, or water environment, please protect the soft absorber main unit.
Install the soft absorber on a smooth structure with proper strength.
- If a square flange/rectangular flange is used:
Be sure to mount the flange in front of the structure and avoid direct loading on the mounting bolts.
- If side mount fixture is used:
Be sure to support the side mount with a stopper to avoid direct shearing force on the mounting bolts.

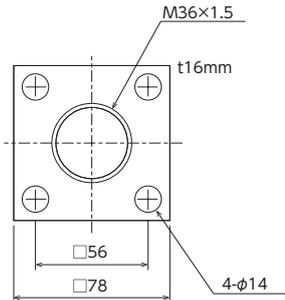
Magnum Series

Self-Correction Type FMC36/Adjustable Type FMA/FML36 Series **RoHS Compliant**

●Products specification might be changed without notice.



OP-040UB Square flange



< FMA36 Series Adjustable Type >

Model
FMA3625M (Spring Turn)
FMA3650M (Spring Turn)

< FML36 Series Low Speed Adjustable Type >

Model
FML3625M (Spring Turn)
FML3650M (Spring Turn)

< FMC36 Series Self-Compensation Type > * □ will be filled in with 1-4.

Model
FMC3625M□ (Spring Turn)
FMC3650M□ (Spring Turn)

< Option >

Model
Lock Nut NM36
Square Flange OP-040UB

Dimensions (mm)

Model	Stroke	A max	B max	L2
FMA, FML, FMC 3625M	25	138	23	83
FMA, FML, FMC 3650M	50	189.0	48.5	108.0

Specifications

Model	Absorption energy per time J	Max. absorption energy per hour J			* Equivalent mass kg				Pis ton rod		Max. allowable	
					Soft		Hard		recovering power N min-max	Returning time s	Eccentric angle °	Mass kg
Standard	External Tank	Oil circulator	1 min-max	2 min-max	3 min-max	4 min-max						
FMC3625M	155	75,000	124,000	169,000	9-40	30-120	100-420	350-1,420	45-90	0.03	4	0.56
FMC3650M	310	85,000	135,000	180,000	18-70	60-250	210-840	710-2,830	45-135	0.06	3	0.68

Model	Absorption energy per time J	Max. absorption energy per hour J			* Equivalent mass kg		Pis ton rod		Max. allowable	
					FMA series	FML series	recovering power N min-max	Returning time s	Eccentric angle °	Mass kg
Standard	External Tank	Oil circulator	min-max	min-max						
FMA, FML3625M	170	75,000	124,000	169,000	9-1,700	300-50,000	45-90	0.03	4	0.56
FMA, FML3650M	340	85,000	135,000	180,000	13-2,500	500-80,000	45-135	0.06	3	0.68

Magnum Series

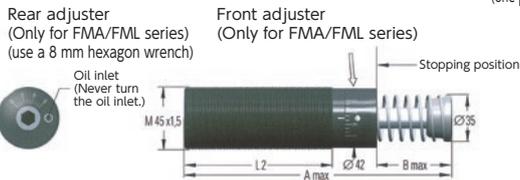
Self-Correction Type FMC45/Adjustable Type FMA/FML45 Series

RoHS Compliant

●Products specification might be changed without notice.

FMC/FMA/FML45 Series

Base type



NM 45

Lock nut

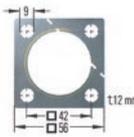
(one piece for the main unit) (A locking nut is unnecessary)



QF 45

Square flange

Tightening torque 27Nm



< FMA45 Series Adjustable Type >

Model
FMA4525M (Spring Turn)
FMA4550M (Spring Turn)
FMA4575M (Spring Turn)

< FML45 Series Low Speed Adjustable Type >

Model
FML4525M (Spring Turn)
FML4550M (Spring Turn)

< FMC45 Series Self-Correction Type > * □ will be filled in with 1-4.

Model
FMC4525M□ (Spring Turn)
FMC4550M□ (Spring Turn)
FMC4575M□ (Spring Turn)

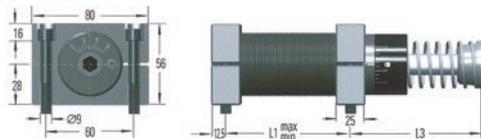
< Option >

Model
Lock Nut NM45
Square Flange QF45
Side Mount Kit S45
Rectangular Flange RFL1400
Clevis Mount Kit C45
Clevis Flange SF45
Inclination Angle adapter BV4525

S 45

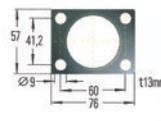
 Side mount fixture
(2 fixtures + 8 screws × 50, 4 pieces)

Tightening torque 27Nm



RFL1400

Rectangle flange



FMC/FMA/FML45 Series

Crevice Mount Type

(The crevice flange SF45 is not included.)

Example model: FMC4525M1-C45

SF 45

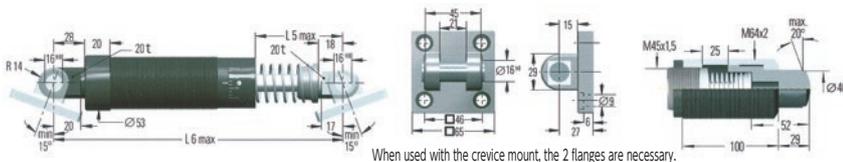
Crevice flange

(flange + 8 screws × 20, 4 pieces)

Tightening torque 7.5Nm

BV 4525 (for 25 stroke)

Eccentric angle adaptor



Dimensions (mm)

Model	Stroke	A max	B max	L1 min	L1 max	L2	L3	L5 max	L6 max
FMA, FML, FMC 4525M	25	145	23	32	66	94.5	66	43	200
FMA, FML, FMC 4550M	50	195	48.5	40	92	120	91	68	250
FMA, FMC 4575M	75	246	74	50	118	145	116	93	300

Specifications

Model	Absorption energy per time J	Max. absorption energy per hour J			* Equivalent mass kg				Pis ton rod		Max. allowable	
					Soft		Hard					
		Standard	External Tank	Oil circulator	1 min-max	2 min-max	3 min-max	4 min-max	recovering power N min-max	Returning time s	Eccentric angle °	Mass kg
FMC4525M	340	107,000	158,000	192,000	20-90	80-310	260-1,050	890-3,540	70-100	0.03	4	1.13
FMC4550M	680	112,000	192,000	248,000	45-180	150-620	520-2,090	1,800-7,100	70-145	0.08	3	1.36
FMC4575M	1,020	146,000	225,000	282,000	70-270	230-930	790-3,140	2,650-10,600	50-180	0.11	2	1.59

Model	Absorption energy per time J	Max. absorption energy per hour J			* Equivalent mass kg		Pis ton rod		Max. allowable	
					FMA series	FML series				
		Standard	External Tank	Oil circulator	min-max	min-max	recovering power N min-max	Returning time s	Eccentric angle °	Mass kg
FMA, FML4525M	390	107,000	158,000	192,000	40-10,000	3,000-110,000	70-100	0.03	4	1.13
FMA, FML4550M	780	112,000	192,000	248,000	70-14,500	5,000-180,000	70-145	0.08	3	1.36
FMA4575M	1,170	146,000	225,000	282,000	70-15,000		50-180	0.11	2	1.59

Magnum Series

Self-Correction Type FMC64/Adjustable Type FMA/FML64 Series **RoHS Compliant**

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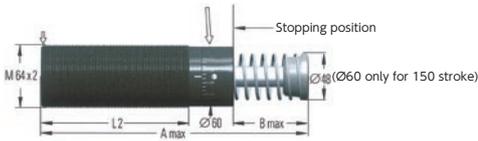
FMC/FMA/FML64 Series

Base type

Rear adjuster
(Only for FMA/FML series)
(use a 8 mm hexagon wrench)



Front adjuster
(Only for FMA/FML series except for 150 stroke)



NM 64

Lock nut

(one piece for the main unit)



< FMA64 Series Adjustable Type >

Model
FMA6450M (Spring Turn)
FMA64100M (Spring Turn)
FMA64150M (Spring Turn)

< FML64 Series Low Speed Adjustable Type >

Model
FML6425M (Spring Turn)
FML6450M (Spring Turn)

< FMC64 Series Self-Correction Type > * □ will be filled in with 1-4.

Model
FMC6450M□ (Spring Turn)
FMC64100M□ (Spring Turn)
FMC64150M□ (Spring Turn)

< Option >

Model
Lock Nut NM64
Square Flange QF64
Side Mount Kit S64
Clevis Mount Kit C64
Clevis Flange SF64

S 64

Side mount fixture
(2 fixtures + 10 screws × 80, 4 pieces)

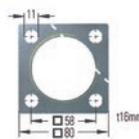
Tightening torque 50Nm



QF 64

Square flange

Tightening torque 50Nm



FMC/FMA/FML64 Series

Crevice Mount Type

(The crevice flange SF64 is not included.)

Example model: FMC6450M1-C64

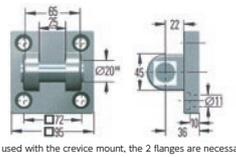


SF 64

Crevice flange

(flange + 10 screws × 20, 4 pieces)

Tightening torque 15Nm



Dimensions (mm)

Model	Stroke	A max	B max	L1 min	L1 max	L2	L3	L5 max	L6 max
FML 6425M	25	174.0	23	40	86	114	75.5	60	260
FMA, FML, FMC 6450M	50	225	48.5	50	112	140	100	85	310
FMA, FMC 64100M	100	326	99.5	64	162	191	152	136	410
FMA, FMC 64150M	150	450	150	80	212	241	226	187	530

Specifications

Model	Absorption energy per time J	Max. absorption energy per hour J			* Equivalent mass kg				Pis ton rod		Max. allowable	
		Standard	External Tank	Oil circulator	Soft		Hard		recovering power N min-max	Returning time s	Eccentric angle °	Mass kg
					1 min-max	2 min-max	3 min-max	4 min-max				
FMC6450M	1,700	146,000	293,000	384,000	140-540	460-1,850	1,600-6,300	5,300-21,200	90-155	0.12	4	2.90
FMC64100M	3,400	192,000	384,000	497,000	270-1,100	930-3,700	3,150-12,600	10,600-42,500	105-270	0.34	3	3.70
FMC64150M	5,100	248,000	497,000	644,000	410-1,640	1,390-5,600	4,700-18,800	16,000-63,700	75-365	0.48	2	5.10

Model	Absorption energy per time J	Max. absorption energy per hour J			* Equivalent mass kg		Pis ton rod		Max. allowable	
		Standard	External Tank	Oil circulator	FMA series	FML series	recovering power N min-max	Returning time s	Eccentric angle °	Mass kg
					min-max	min-max				
FML6425M	1,020	124,000	248,000	332,000		7,000-300,000	120-155	0.06	5	2.50
FMA, FML6450M	2,040	146,000	293,000	384,000	220-50,000	11,000-500,000	90-155	0.12	4	2.90
FMA64100M	4,080	192,000	384,000	497,000	270-52,000		105-270	0.34	3	3.70
FMA64150M	6,120	248,000	497,000	644,000	330-80,000		75-365	0.48	2	5.10

New products
1 Soft Absorber
2 Rotary Damper
3 Magnum Series
4 Speed Controller
5 Helical Isolator
6 Model Selection Form

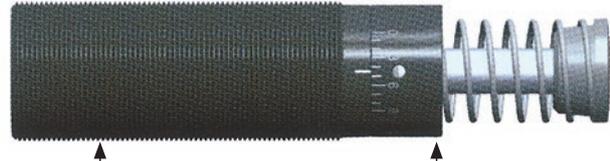
Cautions on Mounting Methods/Mounting Work

No external stopper required

Magnum Series has a stopper integrated into the Soft Absorber.



Rear Adjuster



Adjustment lock screw
(use a 2 mm hexagon wrench)
(for some models)

Stopper combined
with front adjuster

Setting of a most appropriate absorption energy condition.

Self-Correction Type Absorber

FMC model is a Self-Soft Absorber.

Can be used under the varying conditions of weight of impact load/impact rate/thrusting force as long as the condition of use is within the equivalent mass range.

The products for this model are prepared for handling the equivalent mass range (min. - max.) of five stages.

Select the model by the attached tail Nos. -0 (soft) - 4 (hard) of the type in accordance with the condition of use.

The best deceleration performance will be achieved under conditions with no sudden change in the speed of load at the top or end of the absorber piston rod.

If there is an impact at the start of stroke - change to one stage softer model (with smaller tail No.)

If there is an impact at the stroke end - change to one stage harder model (with larger tail No.).

or change to the use of two in parallel.

Adjusting Type Absorber

There is an adjusting scale of 0 ~9 on the FMA/FML models adjustment type soft absorber.

Before starting adjustment, loosen (maximum 1/2 turns) the locking screw (excluding 150mm stroke, FMA/FML 64 series only) located at the side of main unit using a hexagon wrench (2mm).

The Magnum Series is adjustable with the rear adjuster on the bottom of main unit, or the front adjuster (front stopper).

Both of the adjusters are internally linked together, and the adjusted scale of one side will be synchronous with the other scale.

After mounting, check the functioning several times, and turn the adjuster to a scale which provides the best deceleration. (At the start of stroke and stroke end of the piston rod, confirm that there is no impact.)

The soft absorbers are delivered with the adjusting scale positioned at 5.

If there is an impact at the start of stroke, turn the adjusting scale to 9 (soften) .

If there is an impact at the stroke end, turn the adjusting scale to 0 (harden).

* If the adjusting scale indicates 0 or 9, consider changing to another model.

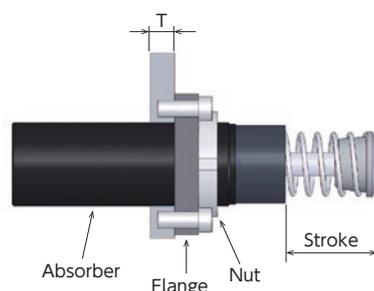
If the adjusting scale indicates 0: A) Due to the very slow impact rate, change to FML model.

or

B) Too small size of absorber, please study the adoption of an absorber that is one stage larger.

Thickness of mounting base/Mounting strength/Tightening torque for the lock nut (recommendation)

Model (External thread)	Thickness T (minimum)	Mounting strength	Tightening torque for the lock nut
FMA, FML, FMC33/36 (M33/36x1.5)	10mm	1,150kg	15~30kgf·m
FMA, FML, FMC45 (M45x1.5)	13mm	1,800kg	30~60kgf·m
FMA, FML, FMC64 (M64x2)	16mm	5,100kg	50~100kgf·m



* Reinforce the thickness T applying a rib etc. as necessary.

Measures for Eccentric Load

The impact of eccentric load over 3° will speed up the wear of the piston rod bearing and rapidly reduce the life cycle of the soft absorber. For maintaining the durability, the use of an eccentric angle adaptor is recommended.

Solutions:

The use of an eccentric angle adaptor is recommended. If possible, dividing the center of stroke to set the impact angle to 1/2 is recommended, as shown below.

Equations:

$$\alpha = \tan^{-1}\left(\frac{s}{2 \cdot R_s}\right) \quad R_{smin} = \frac{s}{2 \cdot \tan \alpha_{max}}$$

Sample Calculations:

$$s = 0.025m$$

$$\alpha_{max} = 25^\circ$$

$$R_s = 0.1m$$

$$\alpha = \tan^{-1}\left(\frac{0.025}{2 \cdot 0.1}\right) \quad R_{smin} = \frac{0.025}{2 \cdot \tan 25}$$

$$\alpha = 7.13^\circ \quad R_{smin} = 0.027m$$

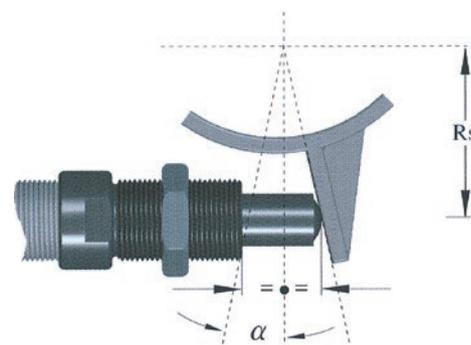
α = Eccentric angle: °

α_{max} = Maximum Allowable Eccentric Angle: °

s = Absorber Stroke: m

R_s = Mounting Distance (radius): m

R_{smin} = Shortest Possible Mounting Distance (radius): m



Eccentric Angle Adaptor:

The durability will be improved by taking a measure for eccentric angle of 3°~ 25° using a BV eccentric angle adaptor.

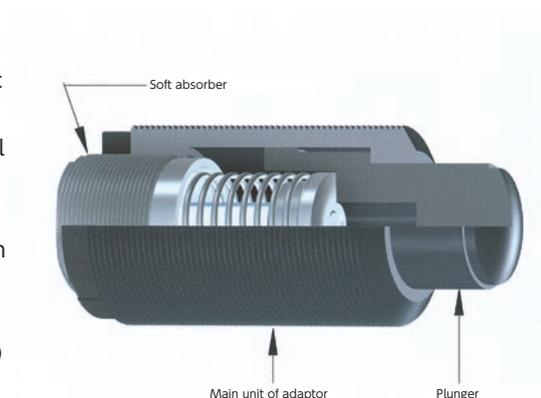
When using the eccentric angle adaptor, screw in the absorber until the end cap of the absorber contacts the plunger.

Be sure to lock the nut for absorber main unit after mounting.

Be careful not to screw in the absorber too deep: the absorption performance may be influenced if the stroke is short.

BV3325 (external diameter M45x1.5) - for FMC, FMA, FML3325 (M33x1.5)

BV4525 (external diameter M64x2) - for FMC, FMA, FML4525(M25x1.5)



Example of installation

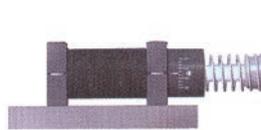
Base type



Flange mount



Side mount



Crevice mount



* For side mountings, be sure to support with the stopper to avoid direct force to the mounting bolt.