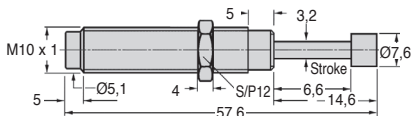


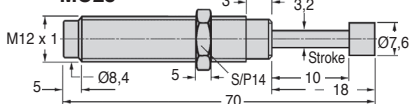
MC

Not adjustable

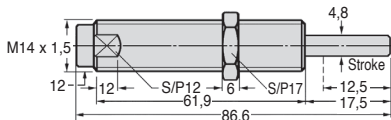
- MC25 and MC75: integrated stroke end stop and noise reducing buffer
- Working temperature 0 to +65°C
- Materials:
 - Body: blackened steel
 - Rod: stainless steel
 - Buffer: steel with elastomer insert (MC25 and MC75 only)



MC25



MC75



MC150M

Info.

- MC150: to avoid damaging the EPDM membrane **do not turn the rod**
- For better heat dissipation, do not paint shock-absorbers

Accessories

- See stroke end stop **STC** (tome 1 p.337) and universal flange **MF** (tome 1 p.336)

DISCOUNTS

Qty	1+	4+	6+
Disc.	List	-10%	On request

Part number	Effective Weight (kgme)		Max capacity (Nm)		Return spring force (N)	Rod reset time (S)	Max. side load angle	Stock*	Price each 1 to 3
	Min	Max	Per cycle W3	Per hour W4					
MC25-ML	0,7	2,2	2,8	22600	3-6	0,3	2°	-	91,32 €
MC25-M	1,8	5,4	2,8	22600	3-6	0,3	2°	✓	76,97 €
MC25-MH	4,6	13,6	2,8	22600	3-6	0,3	2°	✓	78,36 €
MC75-M1	0,3	1,1	9,0	28200	4-9	0,3	2°	-	123,48 €
MC75-M2	0,9	4,8	9,0	28200	4-9	0,3	2°	✓	123,48 €
MC75-M3	2,7	36,2	9,0	28200	4-9	0,3	2°	✓	123,48 €
MC150-M	0,9	10,0	20,0	34000	3-8	0,4	4°	✓	163,57 €
MC150-MH	8,6	86,0	20,0	34000	3-8	0,4	4°	✓	163,57 €
MC150-MH2	70,0	200,0	20,0	34000	3-8	0,4	4°	-	191,99 €

*Depending on availability - Dimensions in mm



Adjustable shock absorber

Can be adjusted

RMSA

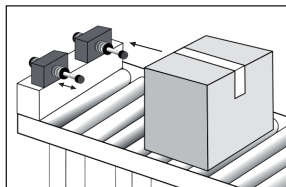
- Standard part with locknut and knob

- Materials:

Body: blackened steel

Rod: stainless steel

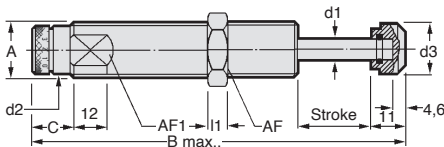
- Adjustment. The adjustment ring is calibrated from 0 to 9. The adjustment knob is secured by a set screw which must be slackened with a 1.5mm Allen key before carrying out adjustment (do not remove completely). After installing the shock absorber, cycle the machine a few times and alter the adjustment so that optimum deceleration is achieved. For hard impact at start of stroke turn ring towards 9, for harder impact at the end of the stroke, turn towards 0. Retighten the set screw.
- Max. impact velocity 3,6m/s
- Working temperature -12° to +90°C
- Stroke end stop and anti-noise buffer are both integrated
- Max. side local angle: 2° (except RMSA-900 : 1°)



Typical application

Uses

- Upon impact of the load the piston moves back causing an immediate build up of internal pressure. Oil is then allowed to pass through the metering orifices bringing the load smoothly to rest. Fast reset is assured by an anti-return valve and spring incorporated in the piston.



DISCOUNTS

Qty	1+	4+	6+
Disc.	List	-10%	On request

Accessories

- Universal flange STC (tome 1 p.337)
- Stroke end stop MF (tome 1 p.336)

Part number	Stroke (mm)	A	B	C	d1	d2	d3	l1	AF	AF1
RMSA-500	19,00	M20 x 1,5	118	13,5	4,8	17,0	17,0	8	23	18
RMSA-600	25,40	M25 x 1,5	143	16,5	6,3	22,4	23,0	10	30	23
RMSA-900	40,00	M25 x 1,5	189	16,5	6,3	22,4	23,0	10	30	23

Part number	Max. energy capacity (Nm)		Effective weight (kgme)		Return spring force		Rod reset (S)	Weight (kg)	Price each 1 to 3
	per cycle W3	per hour W4	Min (kg)	Max (kg)	Min. (N)	Max. (N)			
RMSA-500	25	45 000	2,30	226	5	10	0,10	0,13	175,06 €
RMSA-600	68	68 000	9,00	1 360	10	30	0,20	0,31	298,38 €
RMSA-900	100	90 000	14,00	2 040	10	35	0,40	0,40	419,16 €

*Depending on availability - Dimensions in mm

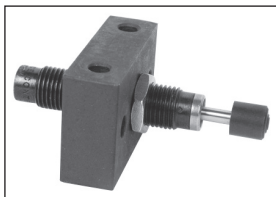
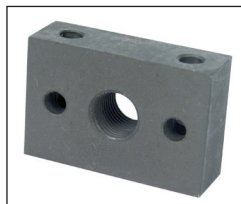
Shock absorber - universal flange



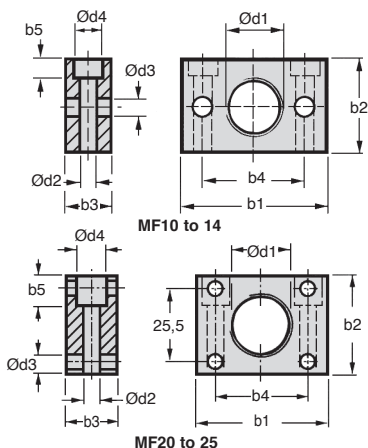
MF

Mounting accessory

- Universal flange for shock absorber



Typical application



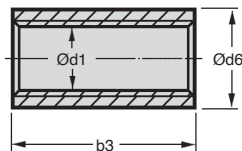
DISCOUNTS

Qty	1+	6+	10+	15+
Disc.	List	-10%	-15%	On request

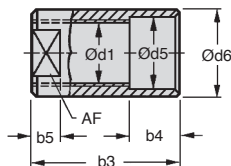
Part number	Ød1	Ød2	Ød3	Ød4	b1	b2	b3	b4	b5	For shock absorber		Price each
											Stock*	1 to 5
MF-10	M10x1	4,5	4,5	8	38	25	12	25	5	MC25	✓	34,28 €
MF-12	M12x1	4,5	4,5	8	38	25	12	25	5	MC75	✓	39,18 €
MF-14	M14x1,5	4,5	4,5	8	45	29	16	35	5	MC150	-	42,16 €
MF-20	M20x1,5	5,5	5,5	10	47	35	16	35	10	RMSA500	-	52,39 €
MF-25	M25x1,5	5,5	5,5	10	47	35	16	35	10	RMSA600-900	-	65,47 €

*Depending on availability - Dimensions in mm

- **Stop collar for shock absorber**
- Please note: for certain shock absorbers, the use of this stop collar is essential



STC10 to 12



STC14 to 25



Typical application

DISCOUNTS

Qty	1+	4+	6+
Disc.	List	-10%	On request

Part number	Ød1	Ød5	Ød6	b3	b4	b5	AF	For shock absorber	Stock*	Price each 1 to 3
STC10	M10x1	-	14,3	20	-	-	-	MC25	✓	13,82 €
STC12	M12x1	-	16,0	20	-	-	-	MC75	✓	13,82 €
STC14	M14x1,5	14,5	18,0	19	12	6	13	MC150	-	15,00 €
STC20	M20x1,5	20,5	25,0	25	12	8	22	RMSA500	-	22,35 €
STC25	M25x1,5	25,5	32,0	45	16	10	27	RMSA600-900	-	40,88 €

*Depending on availability - Dimensions in mm

Shock absorber

Formulae and examples of calculation

A shock absorber decelerates linearly. Roughly 90% of shock absorber applications can be modelled if the following 4 factors are known:

1. Mass to slow down m (kg)
2. Impact velocity v_i (m/s)
3. Propelling force F (N)
4. Shocks per hour C (hr)

Symbols used in the formulae:

W_1	Kinetic energy	(Nm)
W_2	Propelling energy	(Nm)
W_3	Total energy per cycle (W_1+W_2)	(Nm)
W_4	Total energy per hour ($W_3 \cdot C$)	(Nm/hr)
me	Effective weight	(kgme)
m	Mass to slow down	(kg)
v	Velocity or moving mass	(m/s)
v_0	Impact velocity of shock absorber	(m/s)
ω	Angular velocity	(rad/s)
F	Propelling force	(N)
C	Number of shocks per hour	(/hr)
P	Motor power	(kW)
ST	Setting coefficient (normally 2.5)	1 à 2.5

M	Propelling torque	(Nm)
I	Moment of inertia	(kgm ²)
g	Gravity = 9.81	(m/s ²)
h	Drop height exc. shock abs. stroke	(m)
s	Shock absorber stroke	(m)
Q	Reactive force	(N)
μ	Friction coefficient	
t	Braking time	(sec)
a	Side load inclination	(m/sec ²)
α	Radius of inclination	(°)
β	Angle of inclination	(°)
L	Radius of mass	(m)
R	Dist. pivot/installation pt. of damp.	(m)
r	Dist. pivot/force application pt.	(m)

1. Mass without propelling force

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,5$$

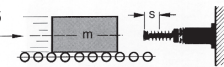
$$W_2 = 0$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = v$$

$$me = m$$



2. Mass with propelling force

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,5$$

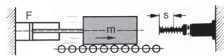
$$W_2 = F \cdot s$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = v$$

$$me = \frac{2 \cdot W_3}{v_0^2}$$



2.1 Mass moving upwards

$$W_2 = (F - m \cdot g) \cdot s$$

2.2 Mass moving downwards

$$W_2 = (F + m \cdot g) \cdot s$$

3. Mass pulled by a motor

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,5$$

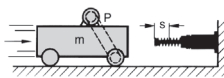
$$W_2 = \frac{1000 \cdot P \cdot ST \cdot s}{v}$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = v$$

$$me = \frac{2 \cdot W_3}{v_0^2}$$



4. Mass on motorised rollers

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,5$$

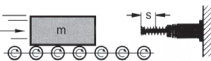
$$W_2 = m \cdot \mu \cdot g \cdot s$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = v$$

$$me = \frac{2 \cdot W_3}{v_0^2}$$



5. Swinging mass with propelling force

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,5$$

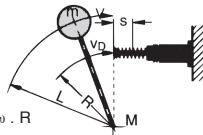
$$W_2 = \frac{M \cdot s}{R}$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = \frac{v \cdot R}{L} = \omega \cdot R$$

$$me = \frac{2 \cdot W_3}{v_0^2}$$



* v or v_0 is the impact velocity of the mass.

In the case of an accelerated movement (for example when the mass is displaced by a pneumatic cylinder), the impact velocity can be 1.5 to 2 times greater than the average velocity.

Shock absorber

Formulae and examples of calculation

6. Free falling mass

Formulae :

$$W_1 = m \cdot g \cdot h$$

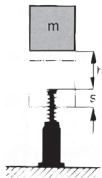
$$W_2 = m \cdot g \cdot s$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = \sqrt{2 \cdot g \cdot h}$$

$$me = \frac{2 \cdot W_4}{v_0^2}$$



6.1 Mass rolling or sliding on an inclined plane

Formulae :

$$W_1 = m \cdot g \cdot h = m \cdot v_0^2 \cdot 0,5$$

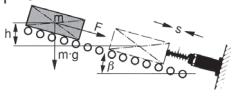
$$W_2 = m \cdot g \cdot \sin\beta \cdot s$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = \sqrt{2 \cdot g \cdot h}$$

$$me = \frac{2 \cdot W_4}{v_0^2}$$



6.1a Mass with upwards propelling force

$$W_2 = (F - m \cdot g \cdot \sin\beta) \cdot s$$

6.1b Mass with downwards propelling force

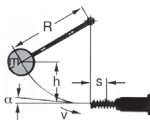
$$W_2 = (F + m \cdot g \cdot \sin\beta) \cdot s$$

6.2 Mass free falling about a pivot point

Formulae:

Follow calculation for example 6.1. Verify the radial load.

$$\tan \alpha = \frac{s}{R}$$



7. Rotary index table with propelling torque

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,25$$

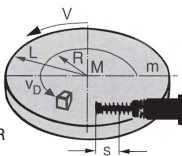
$$W_2 = \frac{M \cdot s}{R}$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = \frac{v \cdot R}{L} = \omega \cdot R$$

$$me = \frac{2 \cdot W_4}{v_0^2}$$



NOTE: mass evenly spread

8. Rotating mass with propelling torque

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,18 \quad \text{NOTE: mass evenly spread}$$

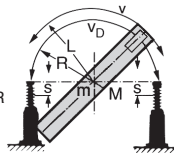
$$W_2 = \frac{M \cdot s}{R}$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = \frac{v \cdot R}{L} = \omega \cdot R$$

$$me = \frac{2 \cdot W_4}{v_0^2}$$



9. Rotating mass with propelling force

Formulae :

$$W_1 = m \cdot v_0^2 \cdot 0,18 \quad \text{NOTE: mass evenly spread}$$

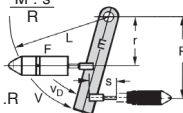
$$W_2 = \frac{F \cdot r \cdot s}{R} = \frac{M \cdot s}{R}$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = \frac{v \cdot R}{L} = \omega \cdot R$$

$$me = \frac{2 \cdot W_4}{v_0^2}$$



10. Mass in controlled descent without propelling force

Formulae :

$$W_1 = m \cdot v^2 \cdot 0,5$$

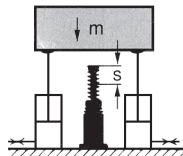
$$W_2 = m \cdot g \cdot s$$

$$W_3 = W_1 + W_2$$

$$W_4 = W_3 \cdot C$$

$$v_0 = v$$

$$me = \frac{2 \cdot W_4}{v_0^2}$$



These formulae will give you approximate values to assist in the selection of a shock absorber but a safety margin should always be applied. (Precise values can only be calculated if actual parameters are known).

Reactive force Q(N)

$$Q = \frac{1,2 \cdot W_4}{s}$$

Braking time (s)

$$t = \frac{2,6 \cdot s}{v_0}$$

Deceleration (m/s²)

$$a = \frac{0,6 \cdot v_0^2}{s}$$

