

Miniature Shock Absorbers

MC 5 to MC 75

Self-Compensating



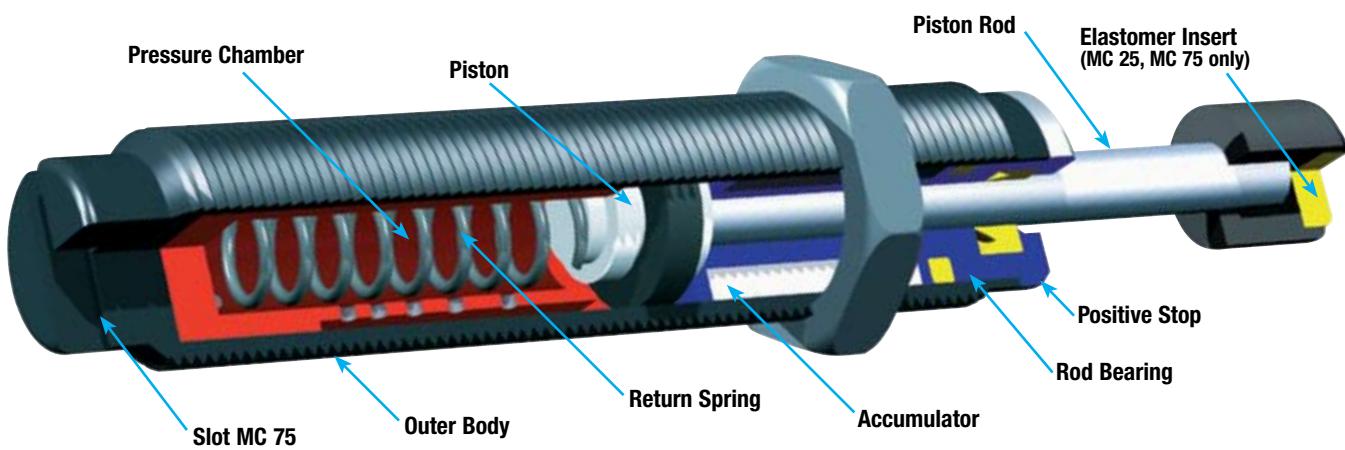
Miniature Shock Absorbers MC 5 to MC 75

Self-Compensating

ACE Miniature Shock Absorbers

are self-contained hydraulic units. The MC 5 to MC 75 model range has a very short overall length and low return force. Its small size allows for high energy absorption in confined spaces, while the wide effective weight ranges accommodate a variety of load conditions. With threaded outer bodies and multiple accessories, MC models can be mounted in numerous configurations.

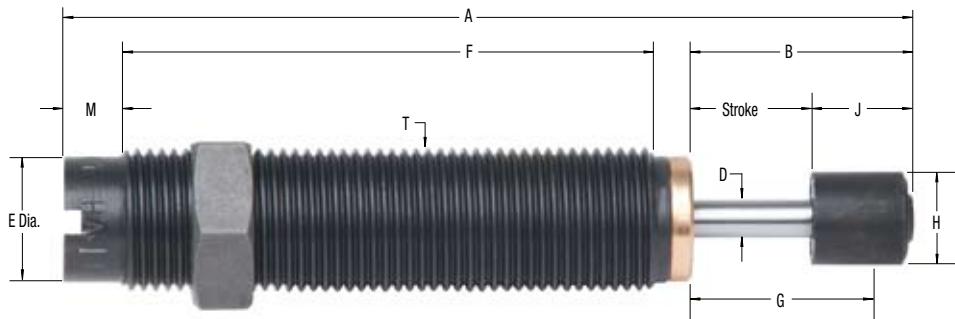
Applications include: small linear slides, material handling and packaging equipment, small robotics, office and medical equipment, as well as instrumentation.



Ordering Information

MC 75 -1

MC Series	Model Number	Mounting Thread	Effective Weight	Button Options
	5		MC 5M	MC 5M
	9	M M5 x 0.5	1 Light	Standard No Button
	10		2 Medium	-B Delrin Button
	25		3 Heavy	-880 No Button, Longer Rod
	30	M M6 x 0.5 Metric		
	75		MC 9M	MC 9M & 10
			1 Light	Standard No Button
		M M8 x 1 Metric	2 Medium	-B Delrin Button
		E M8 x 0.75 Metric		-880 No Button, Longer Rod
			MC 10	MC 25 & 75
			L Light Range	Standard with Button
			H Heavy Range	-NB No Button, Short Rod
		M M10 x 1 Metric		-880 No Button, Standard Rod
			MC 25	-BP Steel Button/Urethane
			L Light Range	Cap Assembly
			H Heavy Range	
		MC 30M & MC 30M-Z		
		M M8 x 1 Metric	MC 30 & MC 30M-Z	MC 30 & MC 30M-Z
			1 Light	Standard with Steel Button
			2 Medium	-NB No Button, Short Rod
			3 Heavy	-BP Steel Button/Urethane
				Cap Assembly (MC 30 On)
		MC 75		
		— Standard (UNF)	-1 Light	
		M M12 x 1 Metric	-2 Medium	
			-3 Heavy	

Self-Compensating

See page 45 for steel button/urethane cap assembly (-BP) dimensions.

For overall length of MC 5, MC 9, MC 10, and MC 25 without buttons, deduct the J dimension from the A dimension.

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Dimensions in inches (millimeters)												
Model	Stroke	A	B	C	D	E	F	G	H	J	M	T
MC 5M	.16 (4.1)	1.34 (34.0)	.32 (8.2)	N/A	.06 (1.5)	.16 (4.1)	.83 (21.1)	.27 (7.1)	.13 (3.3)	.16 (4.1)	.10 (2.5)	M5x0.5
MC 9M	.20 (5.0)	1.42 (36.0)	.40 (10.0)	N/A	.08 (2.0)	.20 (5.0)	.83 (21.1)	.31 (7.9)	.19 (4.7)	.20 (5.0)	.10 (2.5)	M6x0.5
MC 10E MC 10M	.20 (5.0)	1.52 (38.6)	.40 (10.0)	N/A	.08 (2.0)	.25 (6.4)	.83 (21.1)	.31 (7.9)	.19 (4.7)	.20 (5.0)	.19 (4.8)	M8x0.75 M8x1
MC 25 MC 25M	.26 (6.6)	2.27 (57.7)	.57 (14.5)	N/A	.13 (3.3)	.33 (8.4)	1.3 (33.0)	.45 (11.4)	.30 (7.6)	.32 (8.1)	.20 (5.0)	3/8-32 UNEF M10x1
MC 30M	.32 (8.1)	2.13 (54.0)	.52 (13.2)	N/A	.10 (2.5)	.25 (6.5)	1.35 (34.3)	N/A	.25 (6.5)	.20 (5.0)	.16 (4.1)	M8x1
MC 30M-Z	.32 (8.1)	2.96 (75.1)	.52 (13.2)	N/A	.10 (2.5)	.25 (6.5)	2.18 (55.4)	N/A	.25 (6.5)	.20 (5.0)	.16 (4.1)	M8x1
MC 75 MC 75M	.40 (10.2)	2.76 (70.1)	.72 (18.1)	N/A	.13 (3.3)	.41 (10.4)	1.74 (44.2)	.60 (15.2)	.30 (7.6)	.32 (8.1)	.18 (4.6)	1/2-20 UNF M12x1

Specifications

Model	We		E ₃		E ₄		Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
	Effective Weight lbs	(kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)	Energy per Hour in lbs/hour (Nm/hour)	Energy per Hour in lbs/hour (Nm/hour)			
MC 5M1	.22 - 2.0	(0.1 - .91)							
MC 5M2	1.7 - 4.9	(.77 - 2.2)							
MC 5M3	4.4 - 11.1	(2.0 - 5.0)							
MC 9M1	1.35 - 7.0	(0.6 - 3.2)							
MC 9M2	1.75 - 9.0	(0.8 - 4.1)	6 (0.68)	18,000 (2,000)	0.31 - 0.85 (1.38 - 3.78)	0.20	0.007 (0.003)		
MC 10L	0.75 - 6.0	(0.34 - 3)							
MC 10H	1.5 - 11	(0.68 - 5)	11.0 (1.24)	35,000 (3,950)	0.5 - 1.0 (2.22 - 4.45)	0.20	0.02 (0.01)		
MC 25L	1.5 - 5.0	(0.68 - 2)							
MC 25	4 - 12	(2 - 5)	20 (2)	200,000 (22,500)	0.8 - 1.7 (3.56 - 7.56)	0.20	0.06 (0.03)		
MC 25H	10 - 30	(5 - 14)							
MC 30M1	1.0 - 4.3	(0.45 - 1.95)							
MC 30M2	3.97 - 11.9	(1.8 - 5.4)	31 (3.5)	50,000 (5,650)	1.16 - 1.57 (5.1 - 7.0)	0.30	0.02 (0.01)		
MC 30M3	11.02-33.0	(5.0-15.0)							
MC 30M1-Z	1.0 - 4.3	(0.45 - 1.95)							
MC 30M2-Z	3.97 - 11.9	(1.8 - 5.4)	31 (3.5)	50,000 (5,650)	0.57 - 1.56 (2.53 - 6.93)	0.30	0.03 (0.011)		
MC 30M3-Z	11.02 - 33.7	(0 - 15)							
MC 75-1	.5 - 2.5	(0.23 - 1)							
MC 75-2	2 - 14	(0.91 - 6)	75 (8)	250,000 (28,240)	1.0 - 2.5 (4.45 - 11.12)	0.30	0.1 (0.04)		
MC 75-3	6 - 80	(3 - 36)							

Technical Data**Impact velocity range:**

MC 5M: 1.89 to 11.58 ft/sec (0.58 to 3.53 m/sec)

MC 9M: 0.5 to 6 ft/sec (0.15 to 1.8 m/sec)

MC 10: 0.5 to 5 ft/sec (0.15 to 1.5 m/sec)

MC 25: 0.5 to 8 ft/sec (0.15 to 2.4 m/sec)

MC 30M & MC 30M-Z: 2.2 to 12.9 ft/sec (0.67 to 3.93 m/sec)

MC 75: 0.5 to 12 ft/sec (0.15 to 3.66 m/sec)

Operating temperature:

MC 9M and MC 10: 14° to 150°F (-10° to 66°C)

MC 5M, MC 25, 30M, 30M-Z & 75: 32° to 150°F (0° to 66°C)

Mechanical stop: Integral mechanical stop built into front of units.

Oil type: Silicone

Oil type MC 5M1 & M3: HPP-200, HPP-1000

Oil type MC 5M2: MVO (#600W cylinder oil)

Oil type MC 30M & MC 30M-Z: ACE oil #5

Materials

MC 5M, MC 9M, MC 10, MC 30M, MC 30M-Z: Steel body with black oxide finish.

Hardened stainless steel piston rod.

MC 25 & MC 75: Steel body with Weartec Plus finish.

Hardened stainless steel piston rod.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

Lock nut included with each shock absorber.

Miniature Shock Absorbers MC 150 to MC 600

Self-Compensating



ACE MC 150, 225 and 600 miniature series shock absorbers feature significant increases in energy per cycle (E3) over previous models. Select MC miniature models now have the energy capability of former middle bore models. This reliable series also features a rolling diaphragm seal system that offers the longest possible cycle life.

The versatile MC 150, 225 and 600 series offers three effective weight ranges and is capable of handling numerous applications. These models are ideal for mounting into the end covers of pneumatic cylinders and provide superior damping compared to normal cylinder cushions,

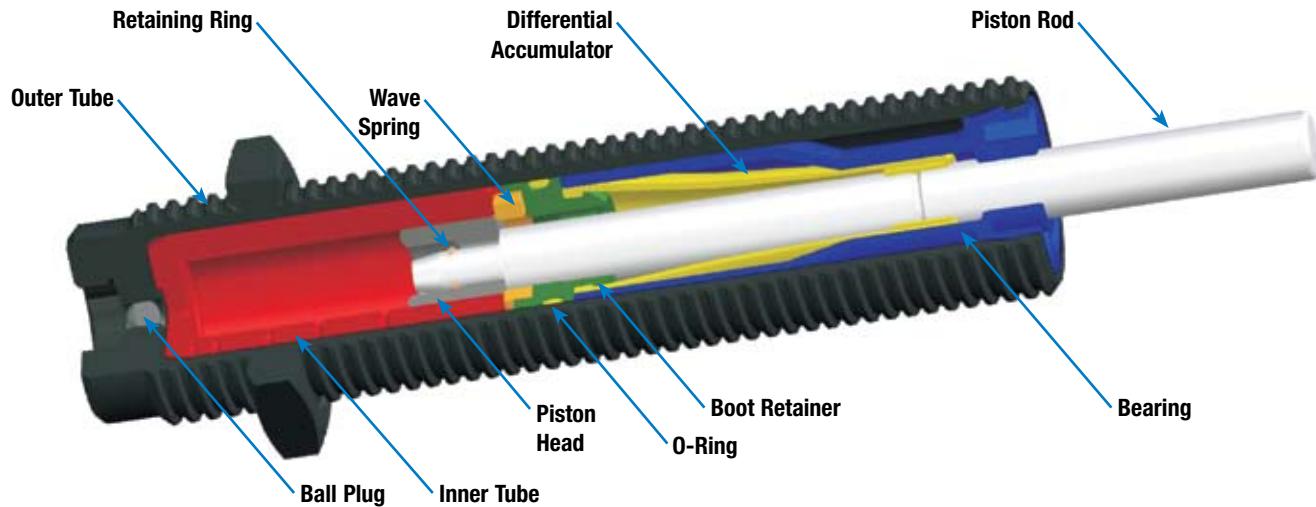
Applications for this durable MC Series include: material handling equipment, medium robotics, machine tools, pick and place systems and packaging equipment.

Emergency application ratings: MC 150, 225 and 600 Series shock absorbers are capable of handling **4 times the maximum energy** per cycle for a single cycle and **2 times the maximum energy** per cycle for 1,000 cycles.

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Miniature Shock Absorbers MC 150, MC 225 and MC 600

Self-Compensating



Ordering Information

MC 225 -

MC Series	Model Number	Mounting Thread	Effective Weight	Button Options
150	-	Standard (UNF)	Standard Range	Standard No Button
225	M	Metric	H Heavy Range	-B Nylon Glass/Fiber Button
600	ME*	Fine Metric	H2 Extra Heavy Range	-BS Steel Button
	ML**	Coarse Metric	H3 Ultra Heavy Range	-BP Steel Button/Urethane Cap Assembly
* MC 150 only				
** MC 600 only				

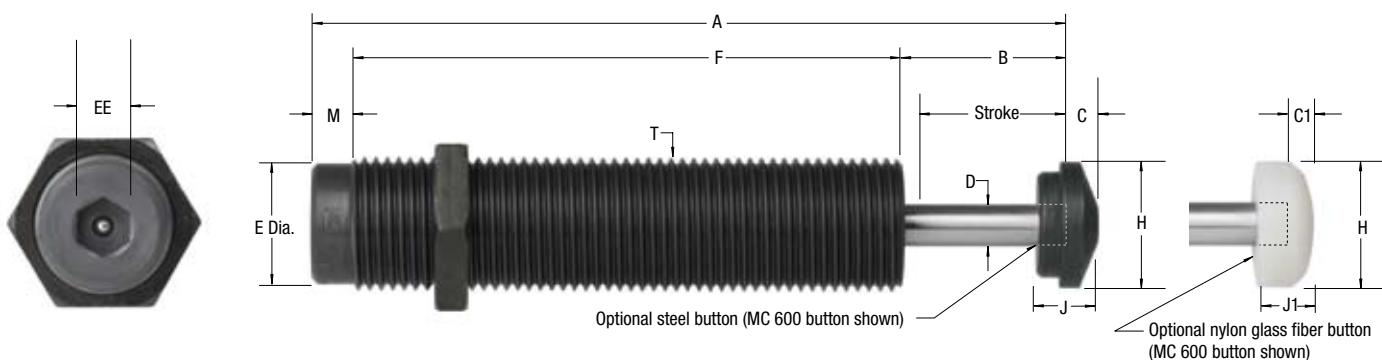
Button Option:

The ACE steel button/urethane cap assembly (-BP) is available if more quiet equipment operation is desired.

Nylon/Glass Fiber Button Energy Ratings Chart:

Model	Maximum Energy per Cycle - inch lbs. (Nm)	Percent of Rated Energy per Cycle
MC 150	123 (14)	70%
MC 225	288 (33)	80%
MC 600	600 (68)	50%



Self-Compensating

See page 45 for steel button/urethane cap assembly (-BP) dimensions.

Dimensions in inches (millimeters)

Model	Stroke	A	B	C	C1	D	E	F	H	J	J1	M	T	EE
MC 150	.50 (12.7)	3.41 (86.6)	.69 (17.4)	.25 (6.3)	.18 (4.7)	.19 (4.8)	.46 (11.6)	2.44 (62.0)	.47 (11.9)	.43 (10.9)	.37 (9.4)	.28 (7.1)	9/16-18 UNF M14x1.5 M14x1	.25 (6.4)
MC 150M														
MC 150ME														
MC 225	.50 (12.7)	3.81 (96.8)	.69 (17.6)	.26 (6.6)	.19 (4.9)	.25 (6.3)	.66 (16.7)	2.84 (72.1)	.66 (16.7)	.43 (10.9)	.34 (8.8)	.28 (7.1)	3/4-16 UNF M20x1.5	.32 (8.0)
MC 225M														
MC 600	1.00 (25.4)	5.58 (141.8)	1.24 (30.9)	.18 (4.6)	.20 (5.2)	.31 (7.9)	.89 (22.7)	4.06 (103.1)	.90 (23.0)	.39 (9.9)	.42 (10.5)	.28 (7.1)	1-12 UNF M25x1.5 M27x3	.38 (9.6)
MC 600M														
MC 600ML														

Specifications

Model	We		E ₃		E ₄		Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
	Effective lbs (kg)	Weight (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)					
MC 150	2 - 22 (0.91 - 10)								
MC 150H	20 - 200 (9 - 91)		175 (20)						
MC 150H2	150 - 450 (68 - 204)		350* (39)						
MC150H3	400-900 (181-408)								
									1.0
MC 225	5 - 55 (2 - 25)								
MC 225H	50 - 500 (23 - 227)		360 (41)						
MC 225H2	400 - 2,000 (181 - 907)		700* (79)						
MC 225H3	1,800-4,000 (816-1,814)								
MC 600	20 - 300 (9 - 136)								
MC 600H	250 - 2,500 (113 - 1,134)		1,200 (135)						
MC 600H2	880 - 5,000 (399 - 2,268)		2,200* (248)						
MC 600H3	4,800-10,000 (2,177-4,536)								

*Hydro Shock ratings, consult factory

Technical Data

Impact velocity range: 0.26 to 19.7 ft/sec (0.08 to 6 m/sec)

Impact velocity range

MC 150H3: 0.32 to 1.53 (0.09 to 0.46)

MC 225H3: 0.22 to 1.03 (0.06 to 0.31)

MC 600H3: 0.25 to 1.15 (0.07 to 0.35)

Operating temperature: 32° to 150°F (0° to 66°C)

Positive stop: Piston and piston rod serves as positive stop at end of stroke

Oil type: Silicone

Materials: Steel body with Weartec Plus finish.

Hardened stainless steel piston rod.

Rolling seal is EPDM and not compatible with petroleum based fluids. If shock absorber is to be used in contact with such fluids, specify neoprene rolling seal.

Consider the SC2 Series as an alternative.

Technical data applies to standard and metric threaded models.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

Lock nut included with each shock absorber.

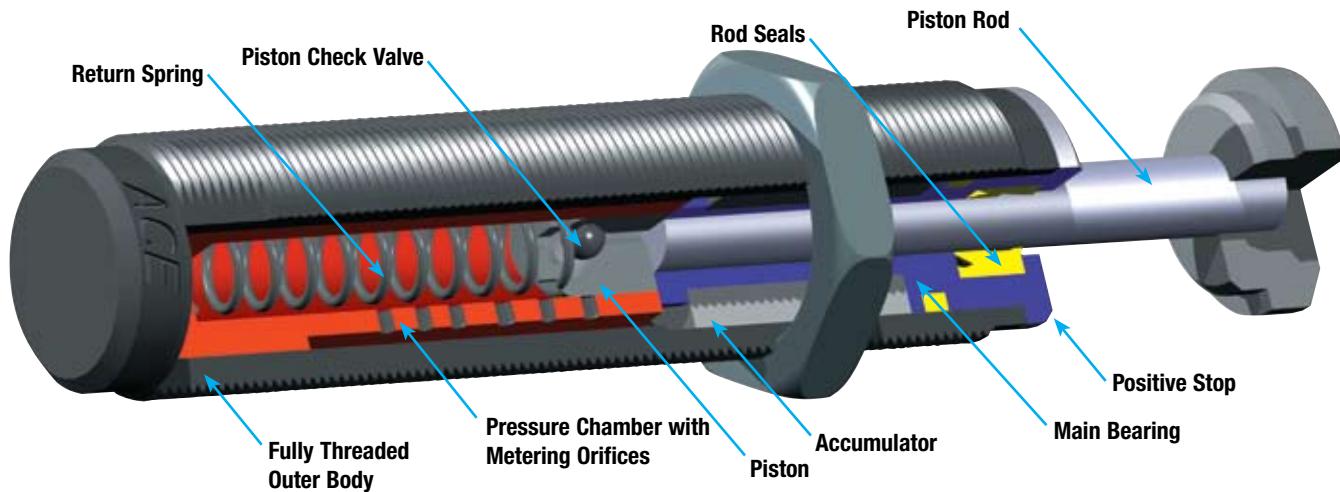
MC 150, 225 and 600 models are ideal for mounting into pressure chambers of pneumatic actuators.

Soft Contact and Self-Compensating

ACE SC² Series Miniature Shock Absorbers provide dual performance benefits. They offer **soft contact deceleration** where initial impact reaction forces are very low, with the advantages of **self-compensation** to react to changing energy conditions, without adjustment. They have long stroke lengths, **SC² 925 with 1.58 inch (40 mm) superstroke**, to provide smooth deceleration and low reaction forces.

With the addition of the **optional side load adapter** (SC² 190M, 300M, and 650M models only), SC² Series shock absorbers can handle side loads up to 25°. SC² Series shock absorbers are fully interchangeable with the adjustable MA range.

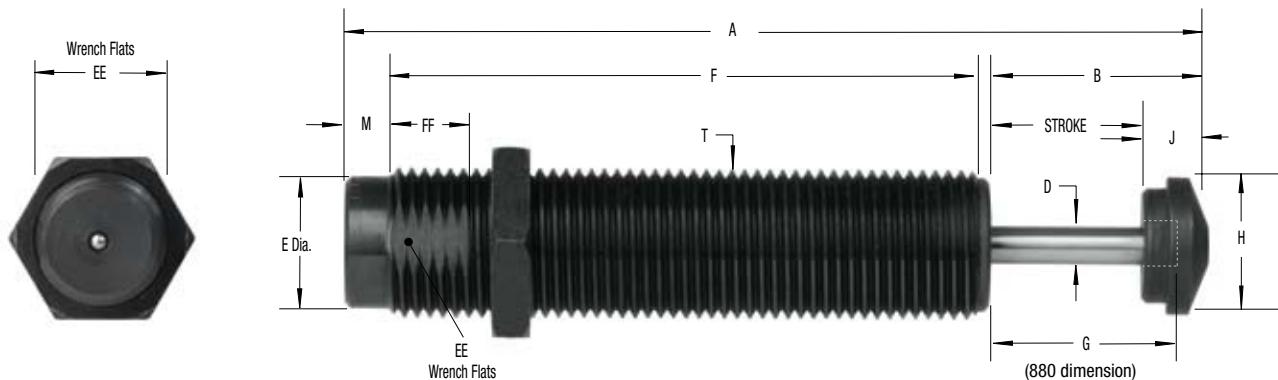
Applications include: material handling, medium robotics, machine tools, pick and place systems, rodless cylinders and packaging equipment.

Miniature Shock Absorbers **SC² 190 to SC² 925****Soft Contact and Self-Compensating****Ordering Information****SC 300 - 1**

SC ² Series	Model Number	Mounting Thread	Effective Weight	Button Options
Soft Contact Self-Compensating	190	- Standard (UNF)	-1 Ultra Light	- Standard with Button
	300	M Metric	-2 Light	-NB No Button, Short Rod
	650		-3 Medium	-880 No Button, Standard Rod
	925		-4 Heavy	-BP Steel Button/Urethane Cap Assembly

Button Option:

The ACE steel button/urethane cap assembly (-BP) is available if more quiet equipment operation is desired.

Soft Contact and Self-Compensating

See page 45 for steel button/urethane cap assembly (-BP) dimensions.

Dimensions in inches (millimeters)

Model	Stroke	A	B	D	E	F	G	H	J	M	T	EE	FF
SC 190	.63	4.50	1.06	.16	.46	3.00	.88	.47	.43	.28	9/16-18 UNF	1/2	.50
SC 190M	(16.0)	(114.3)	(26.9)	(4.1)	(11.7)	(76.2)	(22.4)	(11.9)	(11.0)	(7.1)	M14x1.5	(12.0)	(12.7)
SC 300	.75	4.62	1.18	.19	.66	3.09	1.00	.66	.43	.28	3/4-16 UNF	11/16	.50
SC 300M	(19.1)	(117.5)	(30.0)	(4.8)	(16.8)	(78.5)	(25.4)	(16.8)	(11.0)	(7.1)	M20x1.5	(18.0)	(12.7)
SC 650	1.00	5.62	1.43	.25	.87	3.83	1.25	.90	.43	.28	1-12 UNF	7/8	.50
SC 650M	(25.4)	(142.6)	(36.3)	(6.3)	(22.1)	(97.3)	(31.8)	(22.9)	(11.0)	(7.1)	M25x1.5	(23.0)	(12.7)
SC 925	1.58	7.44	2.01	.25	.87	5.1	1.82	.90	.43	.28	1-12 UNF	7/8	.50
SC 925M	(40.0)	(189.1)	(51.1)	(6.3)	(22.1)	(129.5)	(46.4)	(22.9)	(11.0)	(7.1)	M25x1.5	(23.0)	(12.7)

Specifications

Model	Soft Contact We	Self-Compensating We	E ₃	E ₄	Specifications			
	Effective Weight lbs (kg)	Effective Weight lbs (kg)			Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)	Return Force lbs (N)	Return Time sec
SC 190-1	5 - 13 (2 - 6)	3 - 15 (1.4 - 7)						
SC 190-2	12 - 36 (5 - 16)	8 - 40 (4 - 18)	225 (25)	300,000	0.90 - 1.90	0.25	0.18	
SC 190-3	30 - 90 (14 - 41)	20 - 100 (9 - 45)	*300 (33)	(34,000)	(4.00 - 8.95)			(0.08)
SC 190-4	75 - 200 (34 - 91)	50 - 225 (23 - 102)						
SC 300-1	5 - 15 (2 - 7)	3 - 18 (1.4 - 8)						
SC 300-2	15 - 50 (7 - 23)	10 - 60 (5 - 27)	300 (33)	400,000	1.05 - 2.15	0.10	0.25	
SC 300-3	50 - 150 (23 - 68)	30 - 180 (14 - 82)	*500 (56)	(45,000)	(4.67 - 9.56)			(0.11)
SC 300-4	150 - 400 (68 - 181)	70 - 450 (32 - 204)						
SC 650-1	24 - 80 (11 - 36)	17 - 100 (8 - 45)						
SC 650-2	75 - 250 (34 - 113)	50 - 300 (23 - 136)	650 (73)	600,000	2.40 - 6.87	0.20	0.67	
SC 650-3	240 - 800 (109 - 363)	150 - 900 (68 - 408)	*1,000 (113)	(68,000)	(10.67 - 30.55)			(0.31)
SC 650-4	800 - 2400 (363 - 1089)	450 - 2600 (204 - 1180)						
SC 925-1	50 - 160 (22 - 72)	30 - 200 (14 - 90)						
SC 925-2	130 - 460 (59 - 208)	90 - 600 (40 - 272)	975 (110)	800,000	2.40 - 7.40	0.40	0.87	
SC 925-3	400 - 1,350 (181 - 612)	250 - 1,600 (113 - 726)	*1,700 (192)	(90,000)	(10.67 - 30.55)			(0.39)
SC 925-4	1200 - 4300 (544 - 1952)	750 - 4600 (340 - 2088)						

* Hydro shock energy ratings. Consult factory.

Technical Data**Impact velocity range:** 0.5 to 12 ft/sec (0.15 to 3.66 m/sec)**Operating temperature:** 32° to 150°F (0° to 66°C)**Mechanical stop:** Integral mechanical stop built into front of units.**Oil type:** ACE #5**Materials:** Steel body with Weartec Plus finish. Hardened stainless steel piston rod.

Technical data applies to standard and metric threaded models.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

Lock nut included with each shock absorber.

Self-Compensating

ACE Controls new ultra-high energy SC 25, SC 75 and SC 190 **Heavyweight models** are the newest additions to the award winning SC² 300 and SC² 650 Heavyweight Series, delivering up to 950% of effective weight capacity and 280% of the energy absorption capacity of previous models.

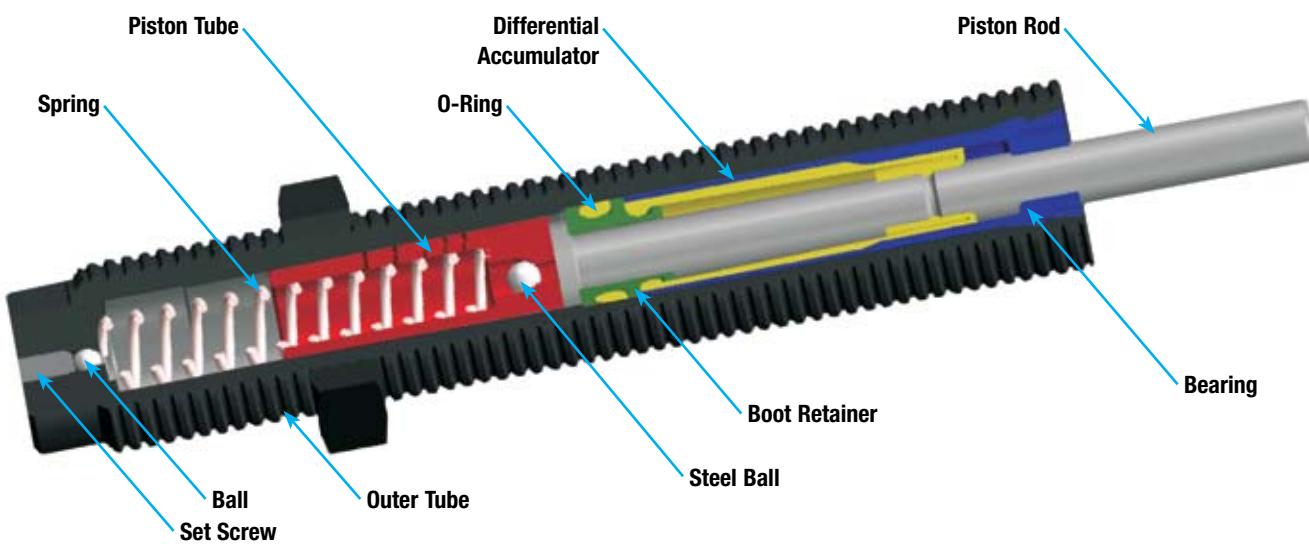
These versatile miniatures **combine the piston and inner tube into a single component, the piston tube**. It serves as both the pressure creating and pressure controlling device.

SC 190 models include a hermetically sealed rolling diaphragm seal system that provides for long cycle life. Durable SC 25 and SC 75 models include a stretch seal design.

SC 25, SC 75 and SC 190 shock absorbers are ideal for mounting into pressure chambers of pneumatic cylinders and provide superior damping compared to normal cylinder cushions.

Wide effective weight ranges are available for a multitude of applications.

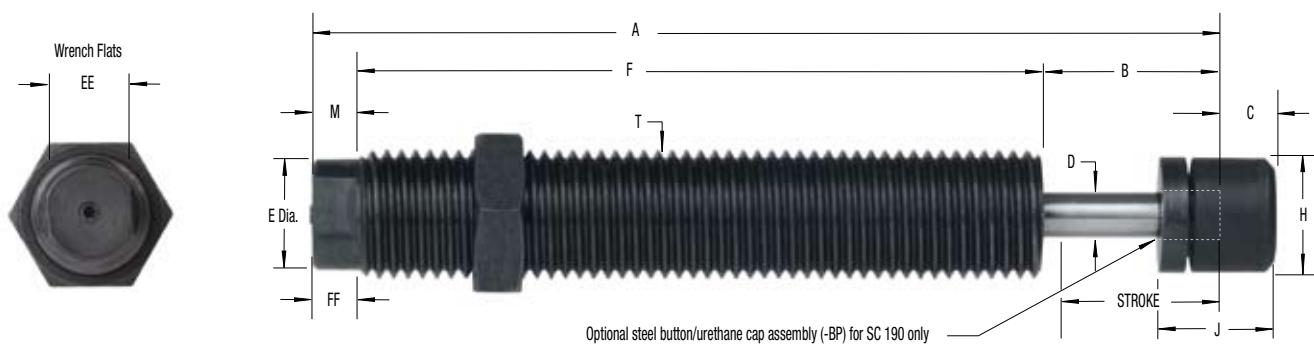
Applications include: new higher propelling force pneumatic actuators, rotary actuators and new rail slides.

Heavyweight Shock Absorbers (SC 190 Shown)**Self-Compensating****Ordering Information****SC 25 M 5**

SC Series	Model Number	Mounting Thread	Effective Weight	Button Options
Self-Compensating	25	SC 25M	5 Heavy	Standard No Button
	75	M M10 x 1 Metric	6 Heavy Plus	-BP Steel Button/Urethane Cap Assembly (SC 190 only)
	190	SC 75M M M12 x 1 Metric SC 190M M M14 x 1.5 Metric	7 Heavy Duty	-880 No Button, Standard Rod (available on SC 75M)

Button Option:

The ACE steel button/urethane cap assembly (-BP) is available if more quiet equipment operation is desired (SC 190 only).

Self-Compensating**Dimensions in inches (millimeters)**

Model	Stroke	A	B	C	D	E	F	H	J	M	T	EE	FF
SC 25M	.32 (8.0)	3.27 (83.0)	.43 (11.0)	N/A	.12 (3.1)	.34 (8.6)	2.64 (67.0)	N/A	N/A	.20 (5.0)	M10 x 1	.27 (6.9)	.18 (4.6)
SC 75M	.39 (10.0)	3.62 (92.0)	.55 (14.1)	N/A	.16 (4.0)	.40 (10.2)	2.82 (71.5)	N/A	N/A	.23 (5.9)	M12 x 1	.31 (7.9)	.18 (4.6)
SC 190M	.47 (12.0)	3.70 (94.0)	.67 (17.0)	.30 (7.6)	.19 (4.8)	.47 (12.0)	2.83 (72.0)	.48 (12.1)	.48 (12.1)	.20 (5.0)	M14 x 1.5	.39 (9.8)	.18 (4.6)

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Specifications

We	E ₃	E ₄	Model	Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)	Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
SC 25M5	2.2 - 11 (1 - 5)								
SC 25M6	9 - 97 (4 - 44)								
SC 25M7	93 - 1,100 (42 - 500)	89 (10)	142,000 (16,000)				.90 - 3.07 (4.0 - 13.7)	0.30	.06 (0.03)
SC 75M5	2.2 - 18 (1 - 8)								
SC 75M6	15 - 172 (7 - 78)								
SC 75M7	165 - 1,760 (75 - 800)	142 (16)	266,000 (30,000)				.69 - 3.40 (3.1 - 15.1)	0.40	.10 (0.04)
SC 190M5	4.4 - 35.2 (2 - 16)								
SC 190M6	29 - 309 (13 - 140)								
SC 190M7	300 - 3,400 (136 - 1,550)	274 (31)	443,000 (50,000)				.97 - 5.57 (4.3 - 24.8)	0.40 0.40 0.50	.13 (0.06)

Technical Data**Impact velocity range:****SC 25M5:** 2.9 to 14.7 ft/sec (0.88 to 4.5 m/sec)**SC 25M6:** 0.99 to 7.3 ft/sec (0.30 to 2.2 m/sec)**SC 25M7:** 0.29 to 2.3 ft/sec (0.09 to 0.70 m/sec)**SC 75M5:** 2.9 to 18.6 ft/sec (0.88 to 5.7 m/sec)**SC 75M6:** 0.94 to 7.1 ft/sec (0.29 to 2.2 m/sec)**SC 75M7:** 0.29 to 2.1 ft/sec (0.09 to 0.66 m/sec)**SC 190M5:** 2.9 to 18.3 ft/sec (0.88 to 5.6 m/sec)**SC 190M6:** 0.98 to 7.1 ft/sec (0.30 to 2.2 m/sec)**SC 190M7:** 0.29 to 2.2 ft/sec (0.09 to 0.67 m/sec)**Operating temperature:** 32° to 150°F (0° to 66°C)**Mechanical stop:** Integral mechanical stop built into shock absorber.**Oil type:** SF-500**Materials:** Steel body with Weartec Plus finish. Hardened stainless steel piston rod.**SC 190 models:** rolling seal EPDM and not compatible with petroleum based fluids. If shock absorber is to be used in contact with such fluids, specify neoprene rolling seal.**SC 25 and SC 75 models:** stretch seal is nitrile and is compatible with petroleum based fluids.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

Lock nut included with each shock absorber.

SC 25, 75 and 190 models are ideal for mounting into pressure chambers of pneumatic actuators.

Soft Contact and Self-Compensating

SC² Heavyweight Series...
Named One of Best Products of the Year in Fluid Power by Design News.



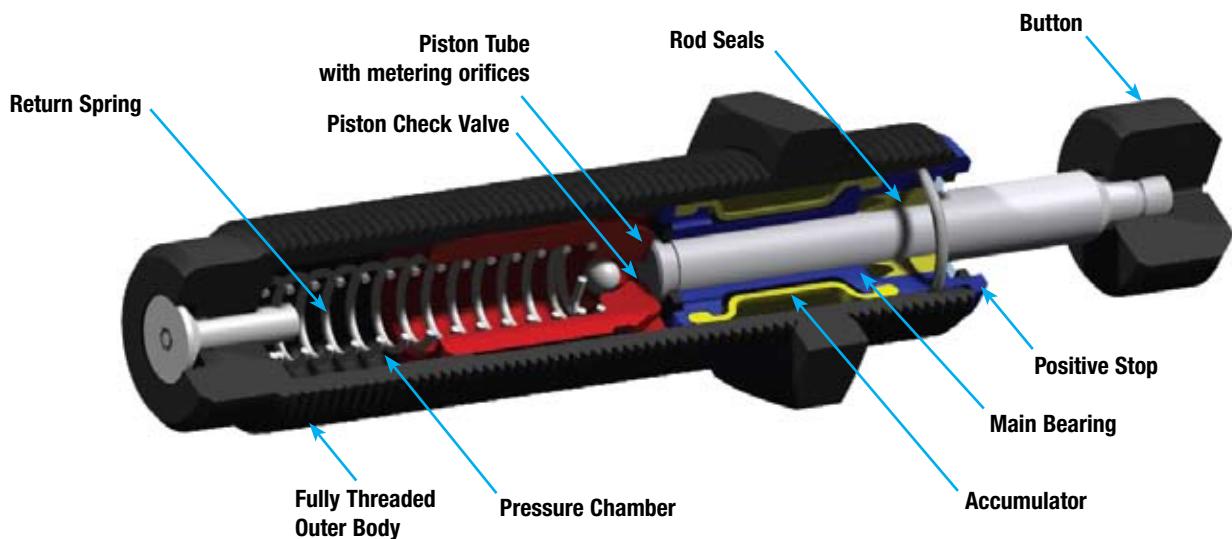
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ACE's award winning SC² 300 and SC² 650 Heavyweight Series Shock Absorbers deliver up to 950% of the effective weight capacity and 280% of the energy absorption capability of standard models. These durable units are ideal for decelerating heavy weights moving at low velocities. The Heavyweight Series design combines the piston and the inner tube into a single component, the piston tube. It acts as both the pressure creating and pressure controlling device.

ACE's SC² 300 and SC² 650 Heavyweight Series Shock Absorbers offer expanded effective weight ranges and dramatic increases in energy absorption capability, for handling a wider range of applications.

These revolutionary shock absorbers provide dual performance benefits. They offer **soft contact** deceleration where initial impact reaction forces are very low with the advantages of **self-compensation** to cope with changing input energy conditions without adjustment.

Applications include: rotary actuators, rodless cylinders, conveyors, pick and place operations, slides as well as operations turning heavy weights at slow speeds.

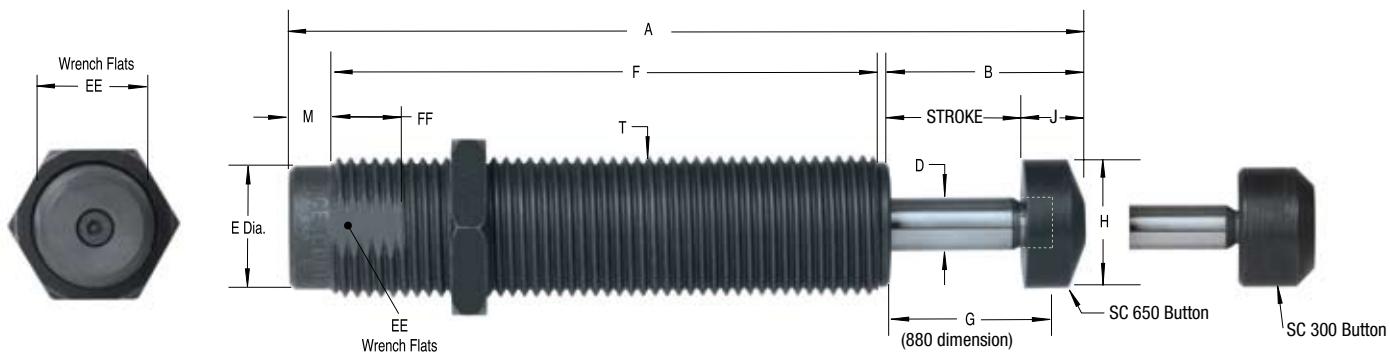
Heavyweight Shock Absorbers SC² 300 and SC² 650**Soft Contact and Self-Compensating****Ordering Information****SC 300 - 5**

SC ² Series	Model Number	Mounting Thread	Effective Weight	Button Options
Soft Contact Self-Compensating	300	- Standard (UNF)	-5 Heavy	- Standard with Button
	650	M Metric	-6 Heavy Plus	-NB No Button, Short Rod
			-7 Heavy Duty	-880 No Button, Standard Rod
			-8 Extra Heavy	
			-9 Ultra Heavy	

SC² 300 and SC² 650

SC² Heavyweight Series

Soft Contact and Self-Compensating



Heavyweight Series Dimensions in inches (millimeters)

Model	Stroke	A	B	D	E	F	G	H	J	M	T	EE	FF
SC 300-5													
SC 300-6													
SC 300-7													
SC 300-8													
SC 300-9	.59 (15.0)	4.15 (105.4)	1.02 (25.9)	.25 (6.4)	.66 (16.8)	2.78 (70.6)	.84 (21.3)	.66 (16.8)	.42 (10.7)	.28 (7.1)	3/4-16 UNF M20x1.5	11/16 (17.4)	.50 (12.7)
SC 300M5													
SC 300M6													
SC 300M7													
SC 300M8													
SC 300M9													
SC 650-5													
SC 650-6													
SC 650-7													
SC 650-8													
SC 650-9	.91 (23.1)	5.51 (140.0)	1.33 (33.8)	.38 (9.6)	.86 (22.0)	3.80 (96.6)	1.16 (29.5)	.90 (22.9)	.43 (10.9)	.28 (7.1)	1-12 UNF M25x1.5	7/8 (22.2)	.50 (12.7)
SC 650M5													
SC 650M6													
SC 650M7													
SC 650M8													
SC 650M9													

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Specifications

Model	Soft Contact We		Self-Compensating We		E_3	E_4	Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
	Effective Weight lbs (kg)	Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)					
SC 300-5	38 - 90 (17 - 41)	25 - 100 (11 - 45)			650	400,000	1.70 - 4.00	0.20	0.33 (0.15)
SC 300-6	115 - 270 (52 - 123)	75 - 300 (34 - 136)			(73)	(45,194)	(7.56 - 17.79)		
SC 300-7	300 - 360 (136 - 163)	200 - 400 (91 - 181)							
SC 300-8	450 - 1,350 (204 - 612)	300 - 1,500 (136 - 680)	620	400,000		1.70 - 4.00	(7.56 - 17.79)	0.20	0.33 (0.15)
SC 300-9	1,050 - 3,900 (476 - 1,769)	700 - 4,300 (318 - 1,950)	(70)	(45,194)					
SC 650-5	75 - 225 (34 - 102)	50 - 250 (23 - 113)			1,860	600,000	2.40 - 7.30	0.25	0.76 (0.34)
SC 650-6	300 - 720 (136 - 327)	200 - 800 (91 - 363)			(210)	(67,791)	(10.68 - 32.99)		
SC 650-7	1,050 - 2,150 (476 - 975)	700 - 2,400 (317 - 1089)							
SC 650-8	2,500 - 5,200 (1,134 - 2,359)	1,700 - 5,800 (771 - 2,631)	1,860	600,000		2.40 - 7.30	(10.68 - 32.47)	0.30	0.76 (0.34)
SC 650-9	6,000 - 12,500 (2,722 - 5,670)	4,000 - 14,000 (1,814 - 6,350)	(210)	(67,791)					

Technical Data

Impact velocity range: .30 to 12.0 ft/sec (0.09 to 3.66 m/sec)

Operating temperature: 32° to 150°F (0° to 66°C)

Mechanical stop: Integral mechanical stop built into front of units.

Oil type: ACE #5

Materials: Steel body with Weartec finish. Hardened stainless steel piston rod.

Technical data applies to standard and metric threaded models.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

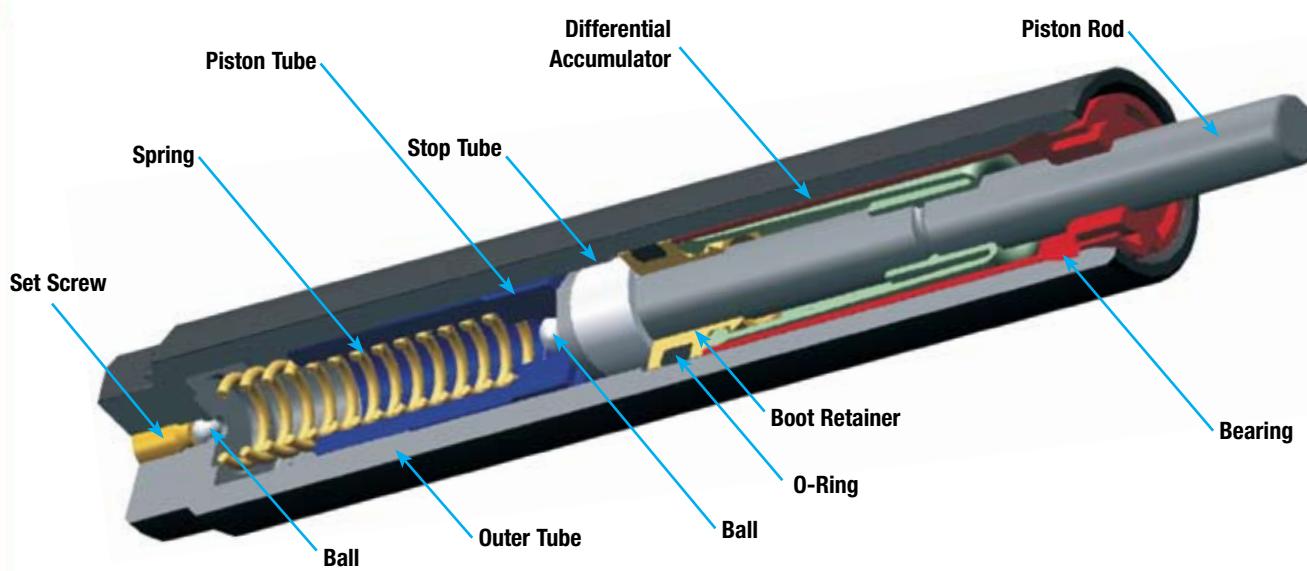
Lock nut included with each shock absorber.

Self-Compensating

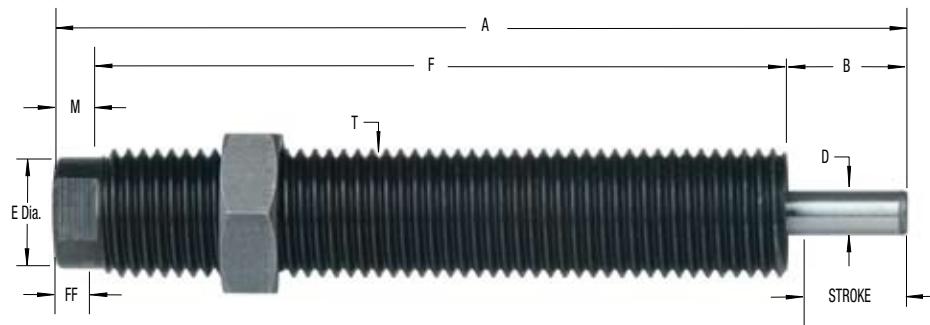
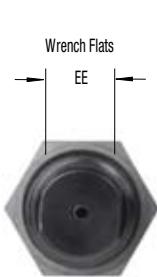
ACE Controls SC 25, 75 & 190-HC High-Cycle shock absorbers are engineered for high-speed equipment applications. These rugged performers are ideal for the packaging industry. They offer a short stroke, quick time through stroke and quick rod-ready time. In addition, these dependable self-compensating miniatures are capable of rapid repeat strokes. **The result is faster cycling for your equipment and gains in production time for you.**

Applications include: packaging equipment, slides, rotary actuators, small and medium robotics, machine tools, pick & place operations and more.

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High-Cycle Shock Absorbers (SC 190 Shown)***Self-Compensating*****Ordering Information****SC 190 M 5 - HC**

SC Series	Model Number	Mounting Thread	Effective Weight	High-Cycle	Button
Self-Compensating	25	SC 25M	5 Heavy		Standard No Button
	75	M M10 x 1 Metric	6 Heavy Plus		
	190	SC 75M	7 Heavy Duty		
		M M12 x 1 Metric			
		SC 190M			
		M M14 x 1.5 Metric			

Self-Compensating**Dimensions in inches (millimeters)**

Model	Stroke	A (mm)	B (mm)	C	D (mm)	E (mm)	F (mm)	H	J	M (mm)	T	EE (mm)	FF (mm)
SC 25M	.16 (4.2)	3.11 (79.1)	.28 (7.1)	N/A	.12 (3.1)	.33 (8.4)	2.64 (67.0)	N/A	N/A	.20 (5.0)	M10 x 1	.27 (6.9)	.18 (4.5)
SC 75M	.20 (5.1)	3.43 (87.1)	.36 (9.1)	N/A	.16 (4.0)	.40 (10.2)	2.82 (71.5)	N/A	N/A	.23 (5.9)	M12 x 1	.31 (7.9)	.18 (4.5)
SC 190M	.30 (7.6)	3.53 (89.5)	.50 (12.6)	N/A	.19 (4.8)	.47 (11.9)	2.83 (72.0)	N/A	N/A	.20 (5.0)	M14 x 1.5	.39 (9.8)	.20 (5.1)

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Specifications

Model	We	E ₃	E ₄	Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
	Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)			
SC 25M5-HC	2.2 - 11 (1 - 5)	20	142,000 (16,000)	1.98 - 3.08 (8.8 - 13.7)	0.20	.06 (0.03)
SC 25M6-HC	9 - 97 (4 - 44)					
SC 25M7-HC	93 - 1,100 (42 - 499)	(2)				
SC 75M5-HC	2.2 - 18 (1 - 8)	75	266,000 (30,000)	1.94 - 3.4 (8.6 - 15.1)	0.30	.10 (0.04)
SC 75M6-HC	15 - 172 (7 - 78)					
SC 75M7-HC	165 - 1,760 (75 - 798)	(8)				
SC 190M5-HC	4 - 35 (2 - 16)	175	443,000 (50,000)	2.67 (11.88)	0.30	.13 (0.06)
SC 190M6-HC	29 - 309 (13 - 140)					
SC 190M7-HC	300 - 3,400 (136 - 1,542)	(20)				

Technical Data**Impact velocity range:****SC 25M5-HC:** 0.98 to 6.98 ft/sec (0.30 to 2.12 m/sec)**SC 25M6-HC:** 0.33 to 3.45 ft/sec (0.10 to 1.05 m/sec)**SC 25M7-HC:** 0.09 to 1.07 ft/sec (0.03 to 0.32 m/sec)**SC 75M5-HC:** 1.49 to 13.52 ft/sec (0.46 to 4.12 m/sec)**SC 75M6-HC:** 0.48 to 5.18 ft/sec (0.15 to 1.58 m/sec)**SC 75M7-HC:** 0.15 to 1.56 ft/sec (0.05 to 0.48 m/sec)**SC 190M5-HC:** 1.63 to 14.60 ft/sec (0.49 to 4.45 m/sec)**SC 190M6-HC:** 0.55 to 5.69 ft/sec (0.17 to 1.73 m/sec)**SC 190M7-HC:** 0.16 to 1.76 ft/sec (0.05 to 0.54 m/sec)**Operating temperature:** 32° to 150°F (0° to 66°C)**Mechanical stop:** Integral mechanical stop built into shock absorber.**Oil type:** SF 96-500**Materials:** Steel body with Weartec Plus finish. Hardened stainless steel piston rod.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

Lock nut included with each shock absorber.

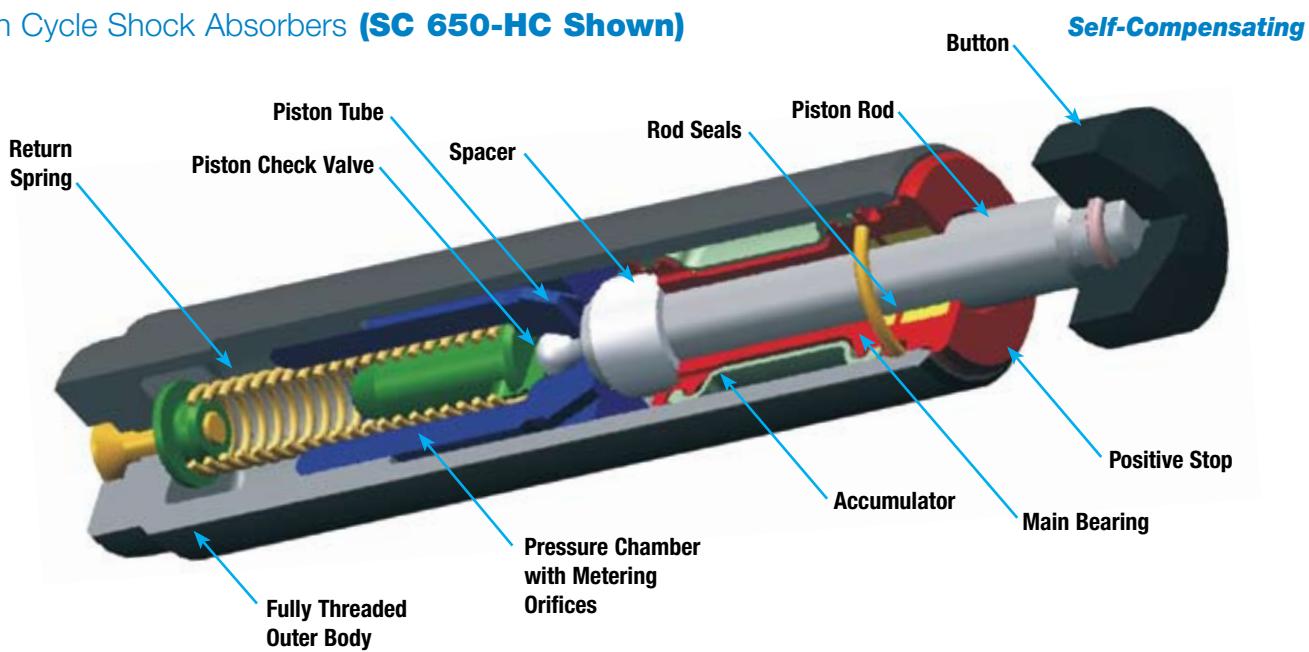
Self-Compensating

ACE Controls SC 300 & 650-HC High-Cycle shock absorbers were designed for high-speed equipment applications. Ideal for the packaging industry, these reliable self-compensating miniatures offer a short stroke, quick time through stroke and quick rod-ready time. In addition, they are capable of rapid repeat strokes. This translates to faster cycling for your equipment and gains in production time for you.

Applications include: packaging equipment, slides, rotary actuators, small and medium robotics, machine tools, pick & place operations and more.



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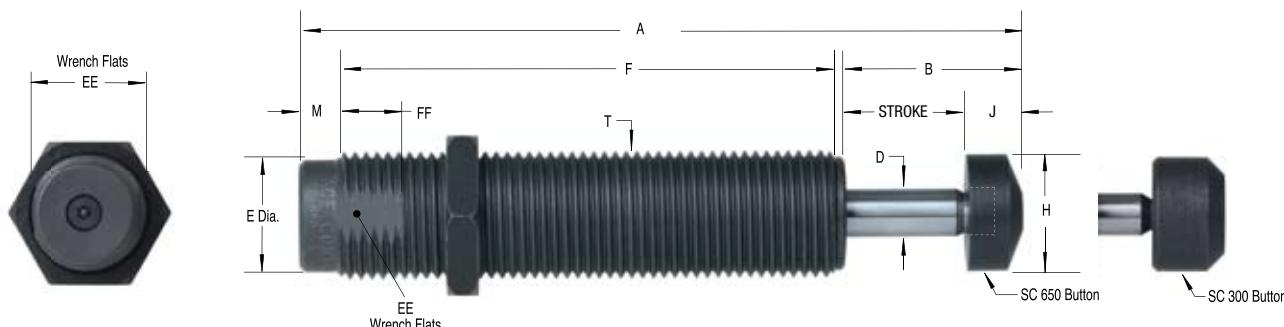
High Cycle Shock Absorbers (SC 650-HC Shown)**Ordering Information****SC 650 - 5 - HC**

SC Series	Model Number	Mounting Thread	Effective Weight	High-Cycle	Button Options
Self-Compensating	300 650	- Standard (UNF) M Metric	-5 Heavy -6 Heavy Plus -7 Heavy Duty -8 Extra Heavy -9 Ultra Heavy		Standard with Button -NB No Button, Short Rod

SC 300 and SC 650-HC

SC High-Cycle Series

Self-Compensating



Dimensions in inches (millimeters)

Model	Stroke	A	B	D	E	F	G	H	J	M	T	EE	FF
SC 300-5-HC													
SC 300-6-HC													
SC 300-7-HC													
SC 300-8-HC													
SC 300-9-HC	.33 (8.5)	3.88 (98.7)	.76 (19.2)	.25 (6.3)	.66 (16.8)	2.78 (70.6)	N/A	.66 (16.8)	.42 (10.7)	.28 (7.1)		11/16 (17.4)	.50 (12.7)
SC 300M5-HC													
SC 300M6-HC													
SC 300M7-HC													
SC 300M8-HC													
SC 300M9-HC													
SC 650-5-HC													
SC 650-6-HC													
SC 650-7-HC													
SC 650-8-HC													
SC 650-9-HC	.59 (15.0)	5.20 (132.2)	1.02 (25.9)	.38 (9.6)	.86 (22.0)	3.80 (96.6)	N/A	.90 (22.9)	.43 (10.9)	.28 (7.1)		7/8 (22.2)	.50 (12.7)
SC 650M5-HC													
SC 650M6-HC													
SC 650M7-HC													
SC 650M8-HC													
SC 650M9-HC													

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Specifications

Model	We	E ₃	E ₄	Return Force	Return Time	Shipping Weight
Model	Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)	Ibs (N)	sec	lbs (kg)
SC 300-5-HC	25 - 100 (11 - 45)					
SC 300-6-HC	75 - 300 (34 - 136)					
SC 300-7-HC	200 - 400 (91 - 181)	360 (41)	400,000	2.63 - 3.91 (11.70 - 17.39)	0.20	0.33 (0.15)
SC 300-8-HC	300 - 1,500 (136 - 680)	700 (79)	(45,194)			
SC 300-9-HC	700 - 4,300 (318 - 1,950)					
SC 650-5-HC	50 - 250 (23 - 113)					
SC 650-6-HC	200 - 800 (91 - 363)					
SC 650-7-HC	700 - 2400 (317 - 1089)	1,200 (135)	600,000 (67,791)	4.94 - 8.30 (21.97 - 36.92)	0.20	0.76 (0.34)
SC 650-8-HC	1,700 - 5,800 (771 - 2,631)					
SC 650-9-HC	4,000 - 14,000 (1,814 - 6,350)					

Technical Data

Impact velocity range:

SC 300-5-HC: 1.39 to 8.79 ft/sec (0.42 to 2.68 m/sec)

SC 300-6-HC: 0.80 to 5.07 ft/sec (0.24 to 1.55 m/sec)

SC 300-7-HC: 0.69 to 3.11 ft/sec (0.21 to 0.95 m/sec)

SC 300-8-HC: 0.36 to 2.54 ft/sec (0.11 to 0.77 m/sec)

SC 300-9-HC: 0.21 to 1.66 ft/sec (0.06 to 0.51 m/sec)

SC 650-5-HC: 1.60 to 11.34 ft/sec (0.49 to 3.46 m/sec)

SC 650-6-HC: 0.90 to 5.67 ft/sec (0.27 to 1.73 m/sec)

SC 650-7-HC: 0.52 to 3.03 ft/sec (0.16 to 0.92 m/sec)

SC 650-8-HC: 0.33 to 1.95 ft/sec (0.10 to 0.59 m/sec)

SC 650-9-HC: 0.21 to 1.27 ft/sec (0.06 to 0.39 m/sec)

Oil Type: ACE #5

Operating temperature: 32° to 150°F (0° to 66°C)

Mechanical stop: Integral mechanical stop built into front of units.

Materials: Steel body with Weartec Plus finish. Hardened stainless steel piston rod.

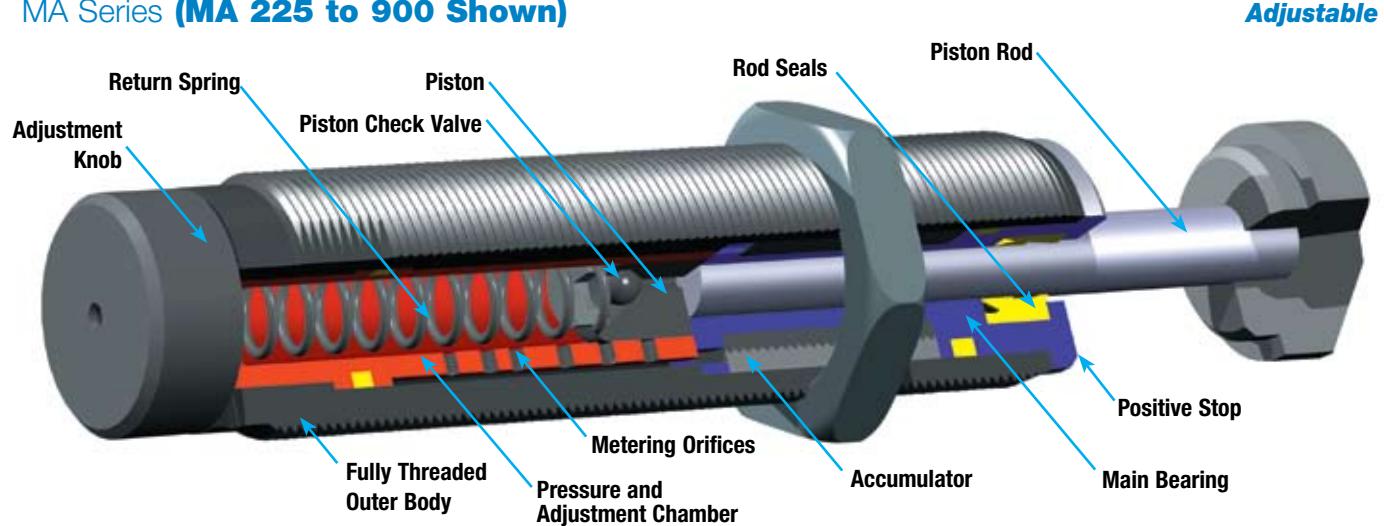
Technical data applies to standard and metric threaded models.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

Lock nut included with each shock absorber.



MA Series (MA 225 to 900 Shown)



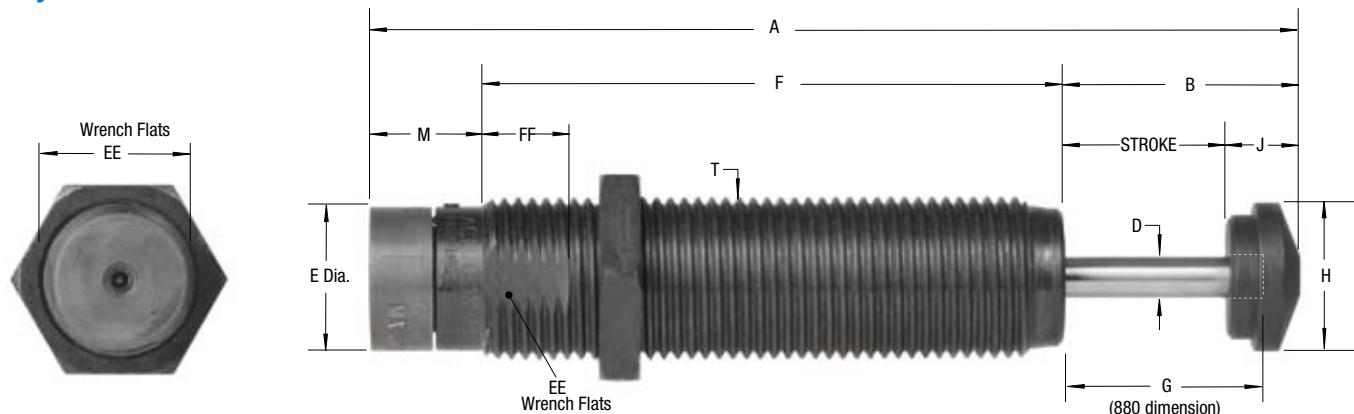
Ordering Information

MA 225 -

MA Series	Model Number	Mounting Thread	Button Options
MA = Miniature Adjustable	30	MA 30M	MA 30M Standard with Button
	35	M Metric	-NB No Button, Short Rod MA 35
	50	MA 35 to MA 900	Standard with Button
	150	- Standard (UNF)	-NB No Button, Short Rod
	225	M Metric	-880 No Button, Standard Rod
	600	ME Fine Metric (MA 150 only)	MA 50M Standard No Button
	900	MA 50M	-B Button (Steel with Elastomer Insert)
		M Metric	MA 150 Standard No Button
			-B Nylon Button
			-BS Steel Button
			MA 225-900 Standard Steel Button
			-NB No Button, Short Rod
			-880 No Button, Standard Rod

Button Option: MA 30 to MA 900

The ACE steel button/urethane cap assembly (-BP) is available if more quiet equipment operation is desired.

Adjustable

See page 45 for steel button/urethane cap assembly (-BP) dimensions.

Model	Stroke	Dimensions in inches (millimeters)											
		A	B	D	E	F	G	H	J	M	T	EE	FF
MA 30M	.32 (8.1)	2.42 (61.4)	.52 (13.2)	.10 (2.5)	.25 (6.5)	1.64 (41.7)	N/A	.25 (6.5)	.20 (5.0)	.16 (4.1)	M8x1	N/A	N/A
MA 35	.40	3.31	.72	.13	.42	2.41	.60	.30	.32	.18	1/2-20 UNF	N/A	N/A
MA 35M	(10.1)	(84.1)	(18.3)	(3.3)	(10.6)	(61.2)	(15.3)	(7.6)	(8.0)	(4.6)	M12x1	N/A	N/A
MA 50M	.28 (7.2)	*2.55 (64.7)	.69 (17.5)	.12 (3.2)	.34 (8.5)	1.66 (42.2)	N/A	.30 (7.7)	.31 (7.8)	.20 (5.1)	M10x1	N/A	N/A
MA 150	.50	**3.67	.95	.19	.46	2.44	.70	.47	.43	.28	9/16-18 UNF	.49	.50
MA 150M	(12.7)	(93.2)	(24.1)	(4.8)	(11.6)	(62.0)	(17.7)	(11.9)	(11.0)	(7.1)	M14x1.5	(12.7)	(12.7)
MA 150ME											M14x1		
MA 225	.75	4.67	1.18	.19	.66	2.94	1.00	.66	.43	.55	3/4-16 UNF	11/16	.50
MA 225M	(19.1)	(118.6)	(30.0)	(4.8)	(16.8)	(74.7)	(25.3)	(16.8)	(11.0)	(14.0)	M20x1.5	(18.0)	(12.7)
MA 600	1.00	5.60	1.43	.25	.88	3.54	1.25	.90	.43	.65	1-12 UNF	7/8	.50
MA 600M	(25.4)	(142.2)	(36.3)	(6.3)	(22.4)	(90.0)	(31.8)	(22.9)	(11.0)	(16.5)	M25x1.5	(23.0)	(12.7)
MA 900	1.58	7.44	2.01	.25	.88	4.78	1.85	.90	.43	.65	1-12 UNF	7/8	.50
MA 900M	(40.0)	(189.0)	(51.1)	(6.3)	(22.4)	(121.4)	(46.4)	(22.9)	(11.0)	(16.5)	M25x1.5	(23.0)	(12.7)

* A dimension w/o button is 2.24 (57.0) ** A dimension w/o button is 3.42 (86.7)

We	E ₃	E ₄	Specifications			
			Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)	Return Force lbs (N)
MA 30M	0.5 - 31.0 (0.23 - 15.0)	31 (3.5)		50,000 (5,650)	1.16 - 1.57 (5.1 - 7)	0.30
MA 35	13 - 125 (6 - 57)	35 (4)		53,000 (5,988)	1.20 - 2.60 (5.33 - 11.56)	0.17
MA 50M	10 - 45 (4.5 - 20.4)	50 (5.6)		120,000 (13,440)	.47 - 1.8 (2.1 - 8.0)	0.2
MA 150	2 - 240 (0.91 - 109)	200 (23)		300,000 (33,890)	0.70 - 1.20 (3.12 - 5.34)	0.40
MA 225	5 - 500 (2 - 227)	300 (34)		400,000 (45,190)	1.05 - 2.15 (4.67 - 9.56)	0.10
MA 600	20 - 3,000 (9 - 1,361)	600 (68)		600,000 (67,790)	2.40 - 6.87 (10.67 - 30.56)	0.20
MA 900	30 - 4,500 (14 - 2,041)	900 (102)		800,000 (90,380)	2.40 - 7.40 (10.67 - 32.92)	0.40

Technical Data**Impact velocity range**

MA 30M: 2.2 - 14.6 ft/sec (0.67 - 4.45 m/sec)

MA 35: Maximum 3.3 ft/sec (1.0 m/sec)

MA 50M: 2.4 to 5.2 ft/sec (.73 to 1.6 m/sec)

MA 150, 225, 600, 900: 0.5 to 12 ft/sec (0.15 to 3.66 m/sec)

Operating Temperature: 32° to 150°F (0° to 66°C)

Mechanical Stop: Integral mechanical stop built into front of units. MA 150 designed with internal positive stop, 0.20 (5 mm) rod extension at end of stroke with no button model.

Oil type:

MA 30M, MA 35: ACE #5

MA 50M: CADCO X-900

MA 150: Silicone

MA 225, 600, 900: ATF

Materials: Steel body with Weartec Plus finish. MA 30M has black oxide finish. Hardened stainless steel piston rod.

Adjustment: On models MA 30M, MA 35, MA 50M and MA 150: by turning the adjustment screw at rear. On the larger sizes: by turning the adjustment knob against the scale marked 0 to 9. After installation, cycle the machine a few times and turn the adjustment knob until optimum deceleration is achieved (i.e. smooth deceleration throughout stroke).

Hard impact at start of stroke-turn adjuster toward 9.

Hard set-down at end of stroke-turn adjuster toward 0.

Technical data applies to standard and metric threaded models.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

MA 150 models may be mounted into pressure chambers of pneumatic actuators.

Lock nut included with each shock absorber.

MA 30, MA 35 and MA 150 models can be utilized as velocity controls or timers.

Adjustable

ACE Controls 3/8 x 1" bore adjustable miniature shock absorber offers high energy capacity and a wide effective weight range for handling a variety of applications. A unique feature of the multi-orifice 3/8 x 1" bore is the optional rear slot adjuster. Adjustment can be made by turning the frontal adjuster to the preferred setting, or by turning the rear slot adjuster if desired.

Applications include: slides, material handling equipment, robotics, machine tools, pick and place systems, packaging equipment and more.

Technical Data

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Impact velocity range: 1.6 - 15 ft/sec (0.49 - 4.6 m/sec)

Operating temperature: 10° to 150°F (-12° to 66°C)

Oil type: CADCO X-900

Materials: Steel body with black oxide finish. Piston rod high tensile steel, hardened and chrome plated.

Technical data applies to standard and metric threaded models.

Maximum side load depends on application. For additional information contact ACE Controls' Applications Department.

Lock nut included with each shock absorber.

Ordering Information**AS 3/8 x 1**

Return Method & Accumulator Style	Bore	Stroke	Mounting Thread	Button Options	Adjuster
AS Spring Return, Internal Accumulator NA Mechanical (clevis) Return, Internal Accumulator	3/8	1	- Standard UNF M Metric	Standard with Button	-D Optional Rear Adjuster For Double Adjustment

ACE Controls Inc. US Patents

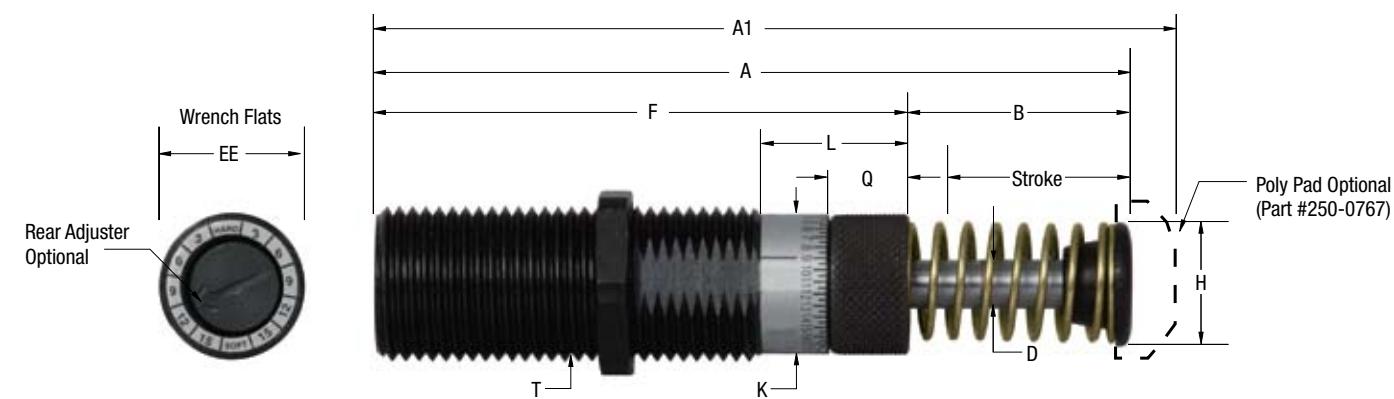
SC² 190 to SC² 925 (0 to -4) Miniature Shock Absorbers

Self-compensating (patent no. 5,682,967)

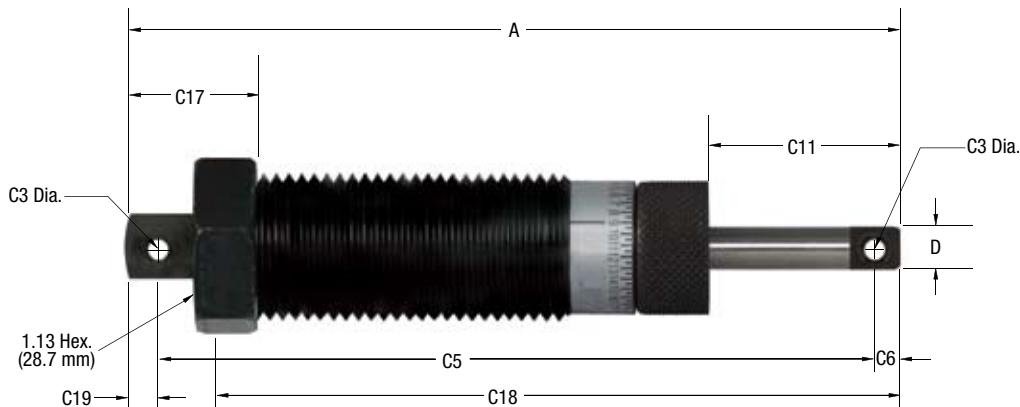
Soft contact (patent no. 5,566,794)

3/8 x 1" Bore Miniature Adjustable Shock Absorber (patent no. 6,974,002)

Piston Tube (patent no. 6,006,873)

Adjustable**Dimensions in inches (millimeters)**

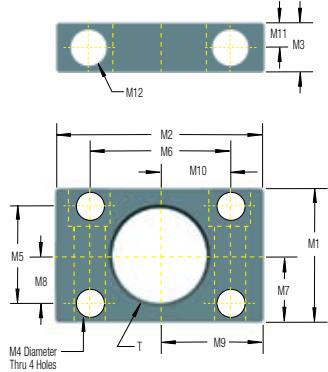
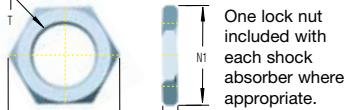
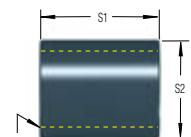
Model	Stroke	A	A1	B	D	F	H	K	L	Q	T	EE
AS 3/8 x 1	1	4.75	5.00	1.38	0.31	3.37	0.75	0.87	0.93	0.5	1-12 (M25 x 1.5)	0.88
AS 3/8 x 1M	(25.4)	(120.7)	(127.0)	(35.0)	(7.9)	(85.6)	(19.1)	(22.1)	(23.6)	(12.7)		(22.2)

Clevis Mount

Model	A	C3	C5	C6	C11	C17	C18	C19	D
NA 3/8 x 1	5.50 (139.7)	0.16 (4.0)	5.13 (130.2)	0.19 (4.8)	1.50 (38.1)	1.06 (27.0)	4.13 (104.9)	0.19 (4.8)	0.31 (7.9)

Specifications

	We	E ₃	E ₄	Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
	Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)			
3/8 x 1	10 -1,250	600	600,000	6 - 11	0.03	.50
3/8 x 1M	(4.5 - 545)	(68)	(67,791)	(27 - 49)		(0.22)

Mounting Block**Lock Nut****Stop Collar**

Side load adapters are available for select models, see pages 46 and 47.

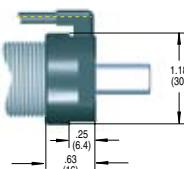
Mounting Block in inches (millimeters)**Lock Nut****Stop Collar**

Used With	Part #	T	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Part#	N1	N2	N3	Part#	S1	S2
MC 5M	N/A		M5x0.5												0801-001	.31 (8)	.34 (8.8)	.16 (4.0)	N/A		
MC 9M	N/A		M6x0.5												250-0716	.31 (8)	.36 (9.3)	.09 (2.5)	N/A		
MC 10E	N/A		M8x0.75												250-0362	.43 (11)	.48 (12.3)	.08 (2.0)	N/A		
MC 10M	N/A		M8x1												250-0482	.39 (10.0)	.44 (11.3)	.12 (3.0)	N/A		
MC 30M	N/A		M8x1												250-0482	.39 (10.0)	.44 (11.3)	.12 (3.0)	N/A		
MA 30M															250-0404	.50 (12.7)	.56 (14.2)	.09 (2.3)	250-0406	.81 (20.6)	.56 (14.2)
MC 25	250-0306	3/8-32 UNF	1.00 (25.4)	1.50 (38.1)	.47 (11.9)	See DIM M12	0 (0)	1.00 (25.4)	.50 (12.7)	0 (0)	.75 (19.1)	.50 (12.7)	.28 (7.1)		250-0315	.47 (12.0)	.53 (13.6)	.16 (4.0)	250-0408	.79 (20.0)	.56 (14.3)
MC 25M SC 25M SC 25MHC MA 50M	250-0307	M10x1													250-0405	.62 (16.5)	.70 (17.8)	.13 (3.3)	250-0407	.81 (20.6)	.62 (15.7)
MA 35M MC 75M	250-0308	1/2-20 UNF	1.00 (25.4)	1.50 (38.1)	.56 (14.2)	See DIM M12	0 (0)	1.00 (25.4)	.50 (12.7)	0 (0)	.75 (19.1)	.50 (12.7)	.28 (7.1)		250-0317	.55 (14.0)	.62 (15.8)	.20 (5.0)	250-0409	.79 (20.0)	.63 (16.0)
SC 75M SC 75MHC															250-0231	.87 (22.2)	1.00 (25.4)	.31 (7.9)	250-0271	.75 (19.1)	.69 (17.5)
MA 150M MC 150M	250-0318	9/16-18 UNF	1.37 (34.8)	1.81 (46.0)	.62 (15.7)	.22 (5.6)	1.00 (25.4)	1.38 (35.1)	.69 (17.5)	.50 (12.7)	.91 (23.1)	.69 (17.5)	.31 (7.9)		250-0233	.67 (17.0)	.76 (19.4)	.23 (6.0)	250-0272	.79 (20.0)	.69 (17.5)
SC 190M SC 190MHC															250-0232	.67 (17.0)	.77 (19.5)	.20 (5.0)	250-0261	.75 (19.0)	.71 (18.0)
MA 150ME	N/A	M14x1													250-0399	1.00 (25.4)	1.15 (29.2)	.25 (6.4)	250-0403	1.25 (38.1)	1.00 (25.4)
MC 225M MA 225M	250-0401	3/4-16 UNF	1.50 (38.1)	2.00 (50.8)	.62 (15.7)	.22 (5.6)	1.12 (28.4)	1.50 (38.1)	.75 (19.1)	.56 (14.2)	1.00 (25.4)	.75 (19.1)	.31 (7.9)		250-0207	.90 (23.0)	.96 (24.6)	.31 (8.0)	250-0410	.98 (25.0)	.98 (25.0)
MVC 225M SC 300M	250-0353	M20x1.5	1.38 (35.0)	1.85 (47.0)	.63 (16.0)	.22 (5.6)	1.00 (25.4)	1.38 (35.0)	.69 (17.5)	.50 (12.7)	.93 (23.5)	.69 (17.5)	.31 (7.9)		250-0400	1.25 (31.8)	1.44 (36.6)	.25 (6.4)	250-0275	1.75 (44.5)	1.25 (31.8)
SC 300HC SC 300MHC															0801-041	1.50 (38.1)	1.73 (44.0)	.57 (14.6)	250-0275		
MC 600M MA 600M	250-0402	1-12 UNF	1.50 (38.1)	2.00 (50.8)	.62 (15.7)	.22 (5.6)	1.12 (28.4)	1.50 (38.1)	.75 (19.1)	.56 (14.2)	1.00 (25.4)	.75 (19.1)	.31 (7.9)		250-0400	1.25 (31.8)	1.44 (36.6)	.25 (6.4)	250-0774	2.19 (55.6)	1.25 (31.8)
MVC 600M SC 650M															250-0239	1.25 (31.8)	1.44 (36.6)	.31 (7.9)	250-0263	1.77 (45.0)	1.26 (32.0)
SC 650HC MA 900M	250-0404	M25x1.5	1.38 (35.0)	1.85 (47.0)	.63 (16.0)	.22 (5.6)	1.00 (25.4)	1.38 (35.0)	.69 (17.5)	.50 (12.7)	.93 (23.5)	.69 (17.5)	.31 (7.9)		250-0040	1.18 (30.0)	1.24 (31.6)	.39 (10.0)	250-0276	1.26 (32.0)	1.18 (30.0)
MVC 900M SC 925M															250-0766	2.19 (55.6)	1.25 (31.8)				
AS3/8x1M	250-0404																				
MC 600ML	N/A	M27x3																			
MC 600M MA 600M	250-044																				
MVC 600M SC 650M																					
SC 650MHC MA 900M	250-044																				
MVC 900M SC 925M																					
AS3/8x1M	250-044																				

Air Bleed Collar

Used With Part#

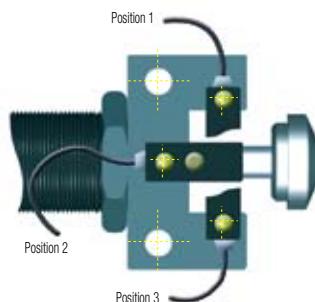
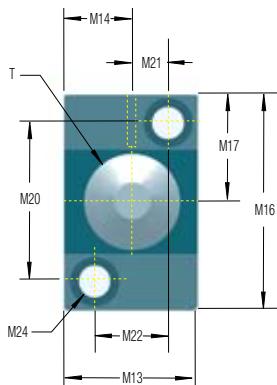
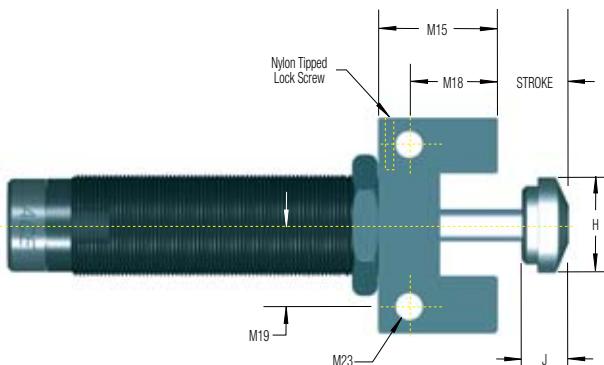
MC 150 M	SP-14-10781
MC 225 M	SP-20-10782
MC 600 M	SP-25-10783
MA 150 M	SP-14-10781



Lock Nut

Used with	Part #	N1	N2	N3
SC 650 (-5 to -9)	0801-041	1.50 (38.1)	1.73 (44.0)	.57 (14.6)
SC 650M (-5 to -9)	250-0040	1.18 (30.1)	1.36 (34.6)	.31 (7.9)

StopLight™



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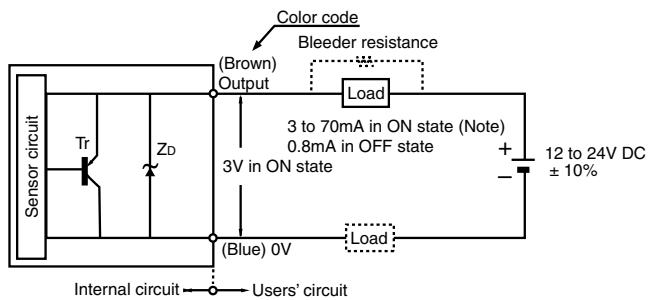
Mounting Block in inches (millimeters)

Used With	Part #	T	H	J	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
MA 150*	250-0377	9/16-18 UNF														
MC 150*																
SC 190																
MA 150M*	250-0378	M14x1.5														
MC 150M*																
SC 190M																
MC 225*	250-0379	3/4-16 UNF														
MA 225																
MVC 225																
SC 300																
MC 225M*	250-0380	M20x1.5														
MA 225M																
MVC 225M																
SC 300M																
MC 600*	250-0381	1-12 UNF														
MA 600																
MVC 600																
MA 900																
MVC 900																
SC 650																
SC 925																
MC 600M*																
MA 600M																
MVC 600M																
MA 900M	250-0382	M25x1.5														
MVC 900M																
SC 650M																
SC 925M																

StopLight™ Switches are available in both NPN and PNP styles. Part numbers are 250-3 NPN and 250-3 PNP, respectively. The switches can be used with any StopLight mounting blocks.

* A complete StopLight assembly includes mounting block, proximity switch and steel button. Use the table below to order MC Series buttons. Steel buttons are an integral part of series MA and SC² and MVC units. Shock absorbers are ordered separately.

Model	Steel Button Part #
MA 150, MA 150M	250-0111
MC 150, MC 150M	250-0111
MC 225, MC 225M	250-0112
MC 600, MC 600M	250-0113

Specifications**DC 2-Wire Type
I/O Circuit Diagram****Detecting Distance:** 2.5 mm ± 15% (with standard target)**Setting Distance:** 0 to 1.9 mm (with standard target)**Standard Target:** Iron: 15 x 15 x 1 mm**Differential Travel:** 10% max of detecting distance**Supply Voltage:** 12 to 24 V DC, ripple (P-P)" 10% max**Current Consumption:** 3-70 mA (at 24 V DC with no load)**Response Frequency:** 1 KHz min.

- Max load current: 50 mA
- Switching capacity: 30 V DC max
- Residual voltage: 3.0 V max

Ambient Temperature: Operating: -25° to 70°C

Storage: -40° to 85°C

Humidity: Operating: 45% to 80%

Storage: 35% to 95%

Weartec Plus a life saver for Harsh Environments

Standard Corrosion Protection

Ideal for
Food & Packaging
Industries in
Wash Down Areas.

Need protection against
corrosion, erosion and
the ravages of time?

Then look to ACE
Controls for
Weartec Plus
protection...
standard on the
majority of
ACE's industrial
shock absorber
and feed controller
threaded outer tubes.

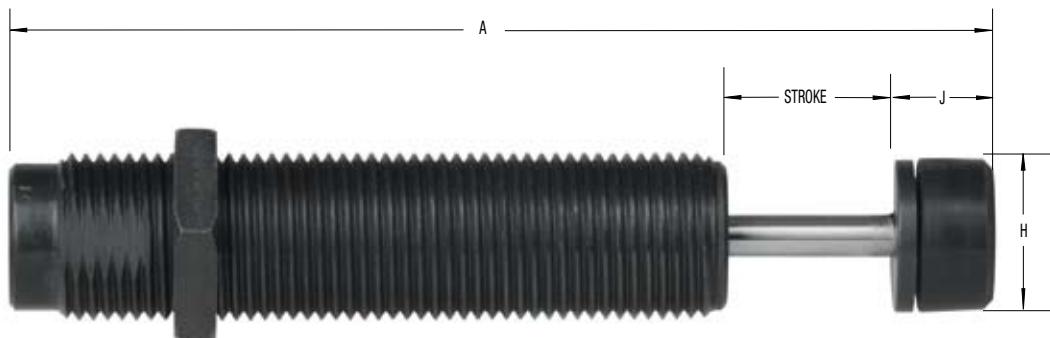
Aggressive independent
laboratory salt-spray
testing confirms that
Weartec Plus offers superior corrosion
protection compared to: Armoloy, nickel plate,
hard chrome, black oxide and platinum. It's the
ideal corrosion fighter in wash down areas for
the food and packaging industries as well as
outdoor environments.

Weartec Plus, available now
on UNF and metric threaded
models at no additional cost.



Steel Button/Urethane Cap Assembly (-BP)

The steel button/urethane cap assembly (-BP) for noise level reduction is available for the models listed below.



Dimensions in inches (millimeters)

Model	Stroke	A	H	J
MA 30	0.32 (8.0)	2.45 (62.2)	0.25 (6.4)	0.23 (5.8)
MA 35	0.40 (10.2)	3.36 (85.4)	0.43 (10.8)	0.38 (9.5)
MA 50	0.28 (7.1)	2.58 (65.5)	0.33 (8.3)	0.34 (8.6)
MA 150	0.50 (12.7)	3.73 (94.7)	0.48 (12.2)	0.48 (12.2)
MA 225	0.73 (18.5)	4.73 (120.2)	0.68 (17.2)	0.52 (13.1)
MA 600	0.99 (25.0)	5.74 (145.8)	0.91 (23.1)	0.58 (14.6)
MA 900	1.56 (39.6)	7.57 (192.2)	0.91 (23.1)	0.58 (14.6)
MC 25	0.26 (6.6)	2.33 (59.2)	0.43 (10.8)	0.38 (9.5)
MC 30	0.32 (8.0)	2.16 (54.9)	0.25 (6.4)	0.23 (5.8)
MC 75	0.40 (10.2)	2.79 (70.9)	0.43 (10.8)	0.38 (9.5)
MC 150	0.50 (12.7)	3.73 (94.7)	0.48 (12.2)	0.48 (12.2)
MC 225	0.50 (12.7)	4.15 (105.5)	0.68 (17.2)	0.52 (13.1)
MC 600	1.00 (25.4)	5.95 (151.0)	0.91 (23.1)	0.58 (14.6)
SC 190 (-1 to -4)	0.60 (15.2)	4.51 (114.6)	0.48 (12.2)	0.48 (12.2)
SC 190 (-5 to -7)	0.47 (12.0)	4.00 (101.6)	0.48 (12.2)	0.48 (12.2)
SC 300 (-1 to -4)	0.73 (18.5)	4.69 (119.0)	0.68 (17.2)	0.52 (13.1)
SC 650 (-1 to -4)	0.99 (25.0)	5.75 (145.9)	0.91 (23.1)	0.58 (14.6)
SC 925	1.56 (39.6)	7.57 (192.3)	0.91 (23.1)	0.58 (14.6)
MVC 225	0.73 (18.5)	4.73 (120.2)	0.68 (17.2)	0.52 (13.1)
MVC 600	0.99 (25.0)	5.74 (145.8)	0.91 (23.1)	0.58 (14.6)
MVC 900	1.56 (39.6)	7.57 (192.2)	0.91 (23.1)	0.58 (14.6)

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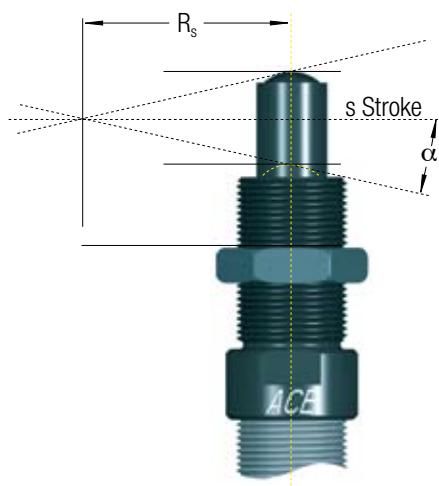
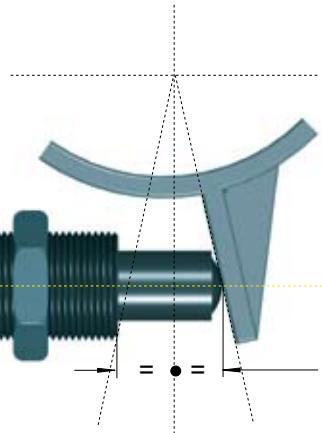
For Side Load in Excess of 5°

With side load impact angles of more than 5° the operating lifetime of the shock absorber reduces rapidly due to increased wear of the rod bearings. The optional side load adapter provides a long lasting solution.

Material: Threaded body and plunger, hardened high tensile steel



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Problem: Rotary motion of the striking surface creates side load, which develops a bending moment on the piston rod. This can bend the rod in some cases. In all cases, side load will reduce seal and bearing life.

Solution: Use side load adapter.

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

Example: $s = .98$ (25mm) $\alpha_{\max} = 25^\circ$ (adapter 250-0560)

$$R_s = 3.94 \text{ (100mm)} \quad R_{s\min} = \frac{.98}{2 \cdot \tan 25^\circ}$$

$$\alpha = \tan^{-1} \left(\frac{.98}{2 \cdot 3.94} \right) \quad R_{s\min} = 1.05 \text{ (27mm)}$$

$$\alpha = (7.09)^\circ$$

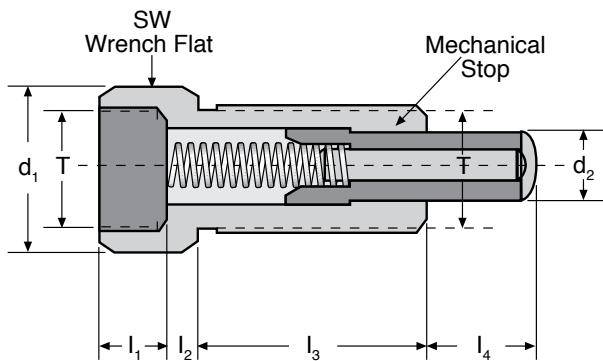
α = angle of impact

α_{\max} = maximum angle of impact

s = stroke

R_s = radius

$R_{s\min}$ = minimum radius



Miniature Series Side Load Adapters Dimensions in inches (millimeters)

MC, MVC Series Model	SC Series Model	MA Series Model	Side Load Adapter	T	d ₁	d ₂	l ₁	l ₂	l ₃	l ₄	SW	Maximum Side Load (oz)
MC 150M	N/A	MA 150M	250-0558	M14 x 1.5	0.70 (18)	0.35 (9)	0.31 (8)	0.15 (4)	0.78 (20)	0.49 (12.5)	0.62 (16)	25 <i>i</i>
MC 225M	N/A	N/A	250-0559	M20 x 1.5	0.94 (24)	0.47 (12)	0.39 (10)	0.15 (4)	0.78 (20)	0.49 (12.5)	0.86 (22)	25 <i>i</i>
MC 600M	N/A	N/A	250-0560	M25 x 1.5	1.18 (30)	0.62 (16)	0.39 (10)	0.23 (6)	1.50 (38)	0.98 (25)	1.06 (27)	25 <i>i</i>
N/A	SC 190M-880*	N/A	250-0080	M14 x 1.5	0.70 (18)	0.35 (9)	0.39 (10)	0.15 (4)	1.02 (26)	0.62 (16)	0.62 (16)	25 <i>i</i>
MVC 225M-880*	SC 300M-880*	MA 225M-880*	250-0081	M20 x 1.5	0.94 (24)	0.47 (12)	0.39 (10)	0.15 (4)	1.25 (32)	0.75 (19)	0.86 (22)	25 <i>i</i>
MVC 600M-880*	SC 650M-880*	MA 600M-880*	250-0082	M25 x 1.5	1.18 (30)	0.62 (16)	0.39 (10)	0.23 (6)	1.50 (38)	0.98 (25)	1.06 (27)	25 <i>i</i>

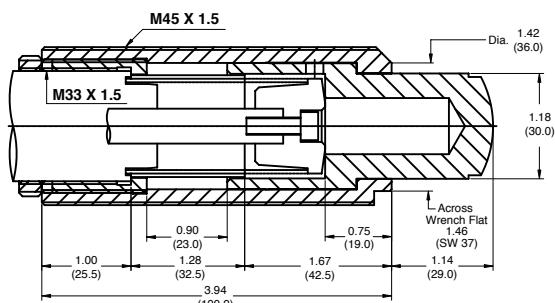
* The -880 = No button, standard rod

ACE Controls recommends that side load not exceed 5°. Maximum side load depends on application, shock absorber model, and stroke length. For additional information consult ACE's Applications Department.

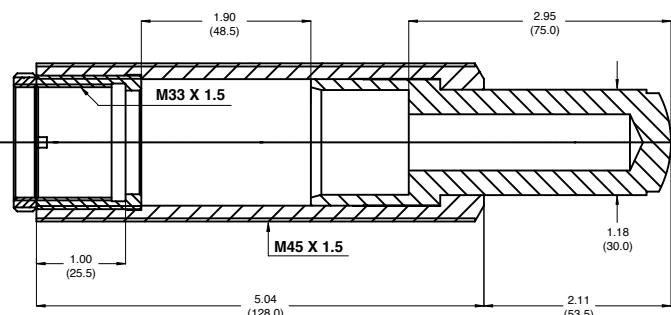
Note: The side load adapter for miniature models can only be installed on select metric shock absorbers without a rod end button.

Magnum Group Side Load Adapters for Side Load Impact Angles from 5° to 25°

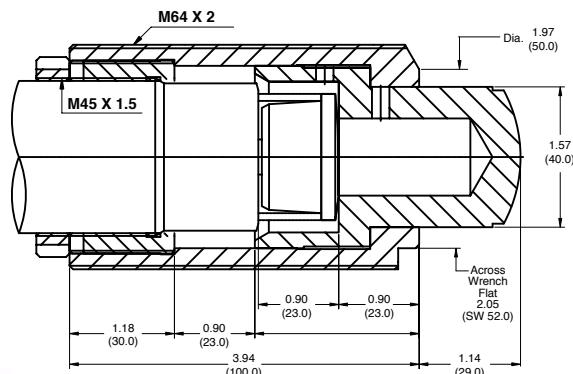
For MC, MA, ML 3325M - Part No. 250-0736



For MC, MA, ML 3350M - Part No. 250-0750



For MC, MA, ML 4525M - Part No. 250-0739



Additional Side Load Adapters Available for:

Model	Part Number	Model	Part Number
MC 10M-880	250-0141	MA 225-880	250-0561
MC 25M-880	250-0562	SC 75M-880	250-0145
MC 30M-880	250-0146		
MC 75-880	250-0762		
MC 75M-880	250-0760		
MC 150	250-0554		
MC 225	250-0561		
MC 600	250-0763		

Model	Part Number
MC, MA, ML 4550M	250-0761
ML 6425M	Contact ACE
MC, MA, ML 6450	Contact ACE

MAGNUM® Group...
Named One of Best Products of the
Year in Fluid Power by Design News.



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Materials: Steel with Weartec Plus finish. Piston rod high tensile steel, hardened and chrome plated. Rod end button hardened steel with black oxide finish. Zinc plated return spring. For optimum heat dissipation, **do not** paint shock absorber.

MAGNUM® Group MC 33 to MC 64

Self-Compensating

Self-Compensating

ACE Controls presents the ultimate in industrial shock absorber design...the **MAGNUM® Group**. These versatile performers offer you the capability to mount shock absorbers that contain the highest energy capacity ratings in the industry. **Up to 150% of the energy per cycle** of previous models in the same package size, means increased safety factors in a wider range of applications.

Up to 390% of the effective weight capacity of previous models, may allow a smaller, lower priced shock absorber to be mounted, to meet your application requirements.

All MAGNUM® Group shock absorbers are **fully threaded** for ease of installation. **Incorporation of high strength materials** along with an **integral stop collar** translates to extended shock absorber life and cost savings for you.

Applications include: automotive manufacturing and production equipment, large robotics, heavy conveyors, packaging and glass bottling equipment, rotary actuators, theme park rides, and lumber industry equipment.

Technical Data

Impact velocity range:

MC Models: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec)

Operating temperature: 10° to 150°F (-12° to 66°C)

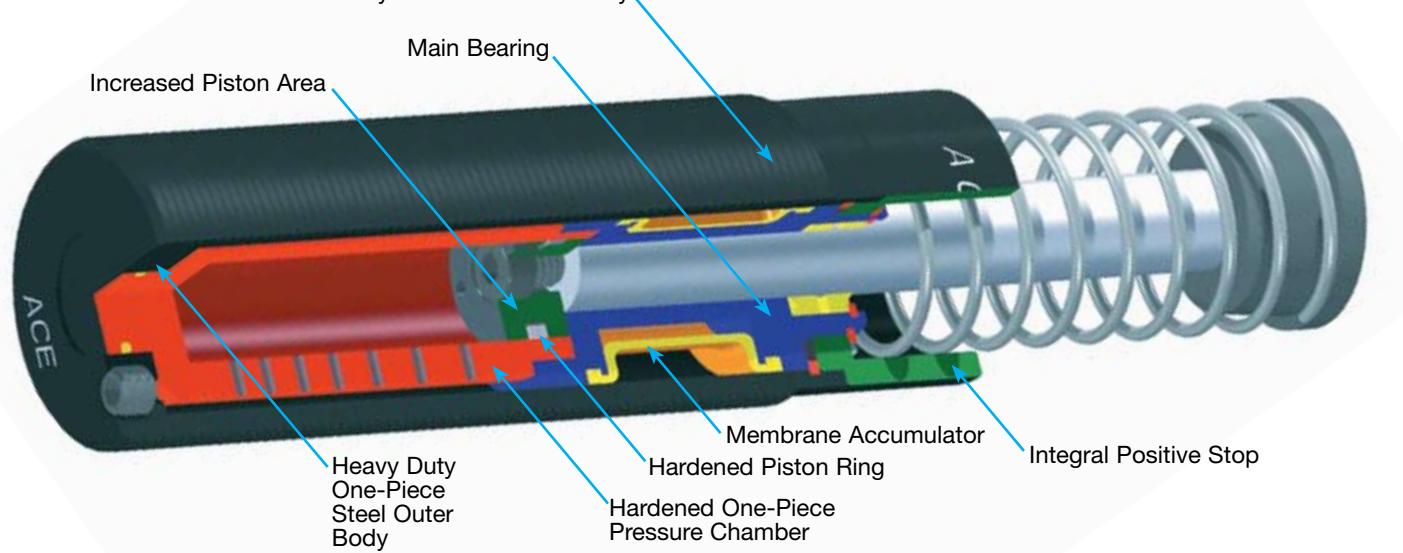
Operating temperature, high-temp option:

Up to 300°F (149°C) for MC models except 4575 and 64150. It is available for MCA air return models including the 4575 and 64150. Add -HT to end of model code when ordering.

Oil type:

Technical data applies to standard and metric threaded models.

Lock nut included with each shock absorber.



Adjustable

ACE MAGNUM® Group adjustable shock absorbers feature the latest seal technology, a **hardened piston ring**, **pressure chamber** and **outer body** for increased operating life. Additionally, these rugged units offer the unique feature of **front or rear adjustment** along with a fully threaded outer body for ease of installation.

MAGNUM® Group adjustable shock absorbers are **directly interchangeable** with previous ACE and competitor models.

Along with the self-compensating models, the adjustable range offers unprecedented increases in energy and effective weight capacity.

Applications are the same as self-compensating models.

**Technical Data****Impact velocity range:**

MA Models: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec)

ML Models: 0.06 to 1.5 ft/sec (0.02 to 0.46 m/sec)

Operating temperature: 10° to 150°F (-12° to 66°C)

Operating temperature, high-temp option:

Up to 300°F (149°C) for MA and ML models except 4575 and 64150. It is available for MAA and MLA air return models including the 4575 and 64150. Add -HT to end of model code when ordering.

Oil type: ATF

Materials: Steel with Weartec Plus finish. Piston rod high tensile steel, hardened and chrome plated. Rod end button hardened steel with black oxide finish. Zinc plated return spring. For optimum heat dissipation, do not paint shock absorber.

Adjustment: After installation of the MAGNUM® Group shock absorber, cycle the machine a number of times. Turn the front stop collar or the rear adjuster against the scale marked 0 to 9 until optimum deceleration is achieved (i.e. smooth deceleration throughout the stroke).

Hard impact at the start of stroke-turn adjuster toward 9
Hard set-down at end of stroke-turn adjuster toward 0.

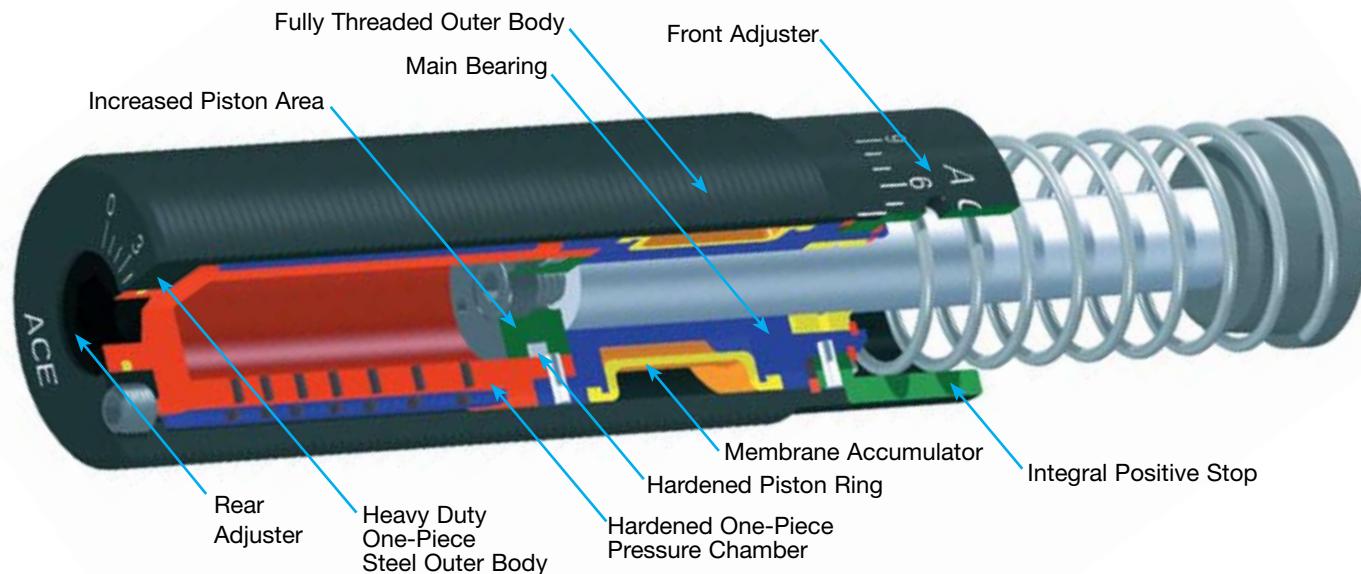
Technical data applies to standard and metric threaded models.

ACE Controls recommends that side load not exceed 5°.
Maximum side load depends on application. For additional information consult ACE's Applications Department.

Lock nut included with each shock absorber.

MAGNUM® Group MA and ML 33 to 64

Adjustable



Self-Compensating and Adjustable**36 Model Dimensions in inches (millimeters)**

Model	Stroke	A	B	D	G	H	I*	J	K	T	W	C1	C2	C3	C4		
MC, MA, ML 3625	0.91 (23.1)	5.44 (138.1)	2.19 (55.6)	0.375	0.99 (25.1)	1.00 (25.4)	1/8 NPT MALE	0.75 (19.1)	1.15 (29.2)	1-3/8-12 M36x1.5	1.75 (44.5)	N/A	N/A	N/A	N/A		
MC, MA, ML 3650	1.91 (48.5)	7.44 (189)	3.19 (81)														
Model	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	F1	F2	F3	F4	F5		
MC, MA, ML 3625	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
MC, MA, ML 3650																	
Model	F6	F7	F8	F9													
MC, MA, ML 3625	N/A	N/A	N/A	N/A													
MC, MA, ML 3650																	

Specifications MC Series, Self Compensating

Model	We	E ₃	Energy per Hour in lbs/hour (Nm/hour) E ₄					Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank)	External Accumulator (Re-circulating)			
MC 3325-1	20-80 (9-36)									
MC 3325-2	68-272 (31-123)			1,350 (153)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.00 (0.45)
MC 3325-3	230-920 (104-417)									
MC 3325-4	780-3,120 (354-1,415)									
MC 3350-1	40-160 (18-73)									
MC 3350-2	136-544 (62-247)			2,700 (305)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.2 (0.54)
MC 3350-3	460-1,840 (209-835)									
MC 3350-4	1,560-6,240 (708-2,830)									
MC 3625-1	20-80 (9-36)									
MC 3625-2	68-272 (31-123)			1,350 (153)	730,000 (81,700)	1,170,000 (131,000)	1,570,000 (176,000)	10.3-19.8 (46-88)	0.03	1.23 (0.56)
MC 3625-3	230-920 (104-417)									
MC 3625-4	780-3,120 (354-1,415)									
MC 3650-1	40-160 (18-73)									
MC 3650-2	136-544 (62-247)			2,700 (305)	830,000 (93,000)	1,270,000 (142,000)	1,670,000 (187,000)	9.9-30.3 (44-135)	0.06	1.51 (0.68)
MC 3650-3	460-1,840 (209-835)									
MC 3650-4	1,560-6,240 (708-2,830)									

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications MA Series, Adjustable

MA 3325	20-3,800	(9-1,724)	1,500 (169)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.00 (0.45)
MA 3350	28-5,400	(13-2,449)	3,000 (339)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.2 (0.54)
MA 3625	20-3,800	(9-1,724)	1,500 (169)	730,000 (81,700)	1,170,000 (131,000)	1,570,000 (176,000)	10.3-19.8 (46-88)	0.03	1.23 (0.56)
MA 3650	28-5,400	(13-2,449)	3,000 (339)	830,000 (93,000)	1,270,000 (142,000)	1,670,000 (187,000)	9.9-30.3 (44-135)	0.06	1.51 (0.68)

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications ML Series, Low Velocity Adjustable

ML 3325			1,500 (169)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.00 (0.45)
ML 3350			3,000 (339)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.2 (0.54)
ML 3625			1,500 (169)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.23 (0.56)
ML 3650			3,000 (339)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.51 (0.68)

Impact velocity range: 0.1 to 2.0 ft/sec (0.03 to 0.60 m/sec).

ACE Controls recommends that side load not exceed 5°. Maximum side load depends on application. For additional information consult ACE's Applications Department.

See page 59 for ordering information.



Self-Compensating and Adjustable**36 Model Dimensions in inches (millimeters)**

Model	Stroke	A	B	D	G	H	I*	J	K	T	W	C1	C2	C3	C4		
MC, MA, ML 3625	0.91 (23.1)	5.44 (138.1)	2.19 (55.6)	0.375	0.99 (25.1)	1.00 (25.4)	1/8 NPT MALE	0.75 (19.1)	1.15 (29.2)	1-3/8-12 M36x1.5	1.75 (44.5)	N/A	N/A	N/A	N/A		
MC, MA, ML 3650	1.91 (48.5)	7.44 (189)	3.19 (81)														
Model	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	F1	F2	F3	F4	F5		
MC, MA, ML 3625	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
MC, MA, ML 3650																	
Model	F6	F7	F8	F9													
MC, MA, ML 3625	N/A	N/A	N/A	N/A													
MC, MA, ML 3650																	

Specifications MC Series, Self Compensating

Model	We	E ₃	Energy per Hour in lbs/hour (Nm/hour) E ₄					Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank)	External Accumulator (Re-circulating)			
MC 3325-1	20-80 (9-36)									
MC 3325-2	68-272 (31-123)			1,350 (153)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.00 (0.45)
MC 3325-3	230-920 (104-417)									
MC 3325-4	780-3,120 (354-1,415)									
MC 3350-1	40-160 (18-73)									
MC 3350-2	136-544 (62-247)			2,700 (305)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.2 (0.54)
MC 3350-3	460-1,840 (209-835)									
MC 3350-4	1,560-6,240 (708-2,830)									
MC 3625-1	20-80 (9-36)									
MC 3625-2	68-272 (31-123)			1,350 (153)	730,000 (81,700)	1,170,000 (131,000)	1,570,000 (176,000)	10.3-19.8 (46-88)	0.03	1.23 (0.56)
MC 3625-3	230-920 (104-417)									
MC 3625-4	780-3,120 (354-1,415)									
MC 3650-1	40-160 (18-73)									
MC 3650-2	136-544 (62-247)			2,700 (305)	830,000 (93,000)	1,270,000 (142,000)	1,670,000 (187,000)	9.9-30.3 (44-135)	0.06	1.51 (0.68)
MC 3650-3	460-1,840 (209-835)									
MC 3650-4	1,560-6,240 (708-2,830)									

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications MA Series, Adjustable

MA 3325	20-3,800	(9-1,724)	1,500 (169)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.00 (0.45)
MA 3350	28-5,400	(13-2,449)	3,000 (339)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.2 (0.54)
MA 3625	20-3,800	(9-1,724)	1,500 (169)	730,000 (81,700)	1,170,000 (131,000)	1,570,000 (176,000)	10.3-19.8 (46-88)	0.03	1.23 (0.56)
MA 3650	28-5,400	(13-2,449)	3,000 (339)	830,000 (93,000)	1,270,000 (142,000)	1,670,000 (187,000)	9.9-30.3 (44-135)	0.06	1.51 (0.68)

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications ML Series, Low Velocity Adjustable

ML 3325			1,500 (169)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.00 (0.45)
ML 3350			3,000 (339)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.2 (0.54)
ML 3625			1,500 (169)	670,000 (75,000)	1,100,000 (124,000)	1,500,000 (169,000)	10.3-19.8 (46-88)	0.03	1.23 (0.56)
ML 3650			3,000 (339)	760,000 (85,000)	1,200,000 (135,000)	1,600,000 (180,000)	9.9-30.3 (44-135)	0.06	1.51 (0.68)

Impact velocity range: 0.1 to 2.0 ft/sec (0.03 to 0.60 m/sec).

ACE Controls recommends that side load not exceed 5°. Maximum side load depends on application. For additional information consult ACE's Applications Department.

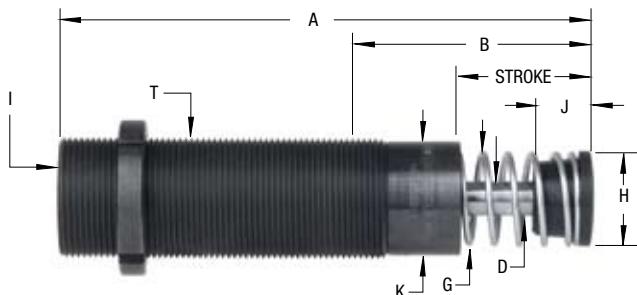
See page 59 for ordering information.



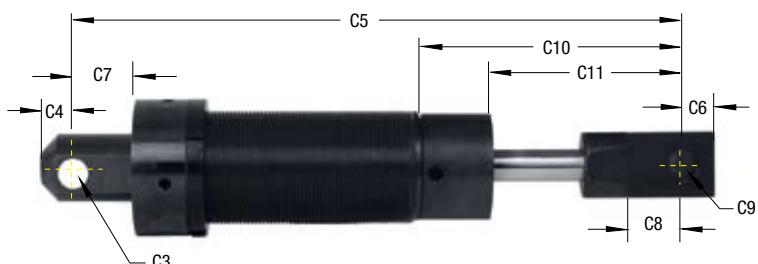
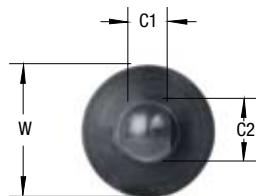
Primary Mount



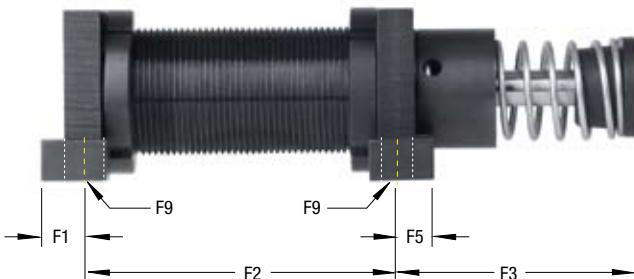
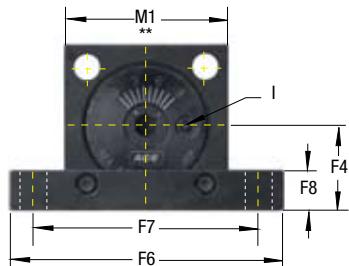
Adjuster (MA and ML only)



Clevis Mount



Side-Foot Mount



Dimensions 45 Model in inches (millimeters)

Model	Stroke	A	B	D	G	H	I*	J	K	T	W	C1	C2	C3	C4
MC, MA, ML 4525	0.91 (23.1)	5.69 (144.5)	1.97 (50)												
MC, MA, ML 4550	1.91 (48.5)	7.69 (195.3)	2.97 (75.4)	0.50 (12.7)	1.36 (34.5)	1.38 (34.9)	1/8 NPT	0.87 (22.1)	1.65 (41.9)	1-3/4-12 M45x1.5	2.25 (57.20)	0.75 (19.1)	1.00 (25.4)	.5005 (12.7)	0.50 (12.7)
MC, MA 4575	2.91 (73.9)	9.69 (246.1)	3.97 (100.8)												
Model	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	F1	F2	F3	F4	F5
MC, MA, ML 4525	7.85 (199.4)					2.57 (65.3)	1.51 (38.4)					3.35 (85.1)	1.94 (49.3)		
MC, MA, ML 4550	9.85 (250.2)	0.50 (12.7)	1.06 (26.9)	0.69 (17.5)	.3755 (9.6)	3.57 (90.7)	2.51 (63.8)	1.00 (25.4)	1.00 (25.4)	.505 (12.8)	0.50 (111.8)	4.38 (77.7)	3.06 (29.5)	1.16 (9.5)	0.37 (9.5)
MC, MA 4575	11.85 (301)					4.57 (116.1)	3.51 (89.2)					5.38 (136.6)	4.06 (103.1)		
Model	F6	F7	F8	F9											
MC, MA, ML 4525															
MC, MA, ML 4550	3.75 (95.3)	3.00 (76.2)	0.56 (14.2)	0.35 (8.9)											
MC, MA 4575															

*For models MAA and MAS 33 the 1/8-27 male fitting is shipped with the shock. MAA and MAS 45 and 64 have pipe plugs.

**See square flange M1 dimensions on page 56.

Self-Compensating and Adjustable**Specifications MC Series, Self-Compensating**

Model	We Effective Weight lbs (kg)	E ₃ Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour) E ₄				Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank)	External Accumulator (Re-circulating)				
MC 4525-1	50-200	(23-91)							
MC 4525-2	170-680	(77-300)	3,000 (339)	950,000 (107,000)	1,400,000 (158,000)	1,700,000 (192,000)	15.1-22.8 (67-101)	0.03	2.5 (1.13)
MC 4525-3	575-2,300	(261-1,043)							
MC 4525-4	1,950-7,800	(885-3,538)							
MC 4550-1	100-400	(45-181)							
MC 4550-2	340-1,360	(154-617)	6,000 (678)	1,000,000 (112,000)	1,700,000 (192,000)	2,200,000 (248,000)	15.1-32.2 (67-143)	0.08	3.0 (1.36)
MC 4550-3	1,150-4,600	(522-2,087)							
MC 4550-4	3,900-15,600	(1,769-7,076)							
MC 4575-1	150-600	(68-272)							
MC 4575-2	510-2,040	(231-925)	9,000 (1,017)	1,300,000 (146,000)	2,000,000 (225,000)	2,500,000 (282,000)	11.7-40.3 (52-179)	0.11	3.5 (1.59)
MC 4575-3	1,730-6,920	(785-3,139)							
MC 4575-4	5,850-23,400	(2,654-10,614)							

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications MA Series, Adjustable

MA 4525	95-22,000	(43-9,979)	3,450 (390)	950,000 (107,000)	1,400,000 (158,000)	1,700,000 (192,000)	15.1-22.8 (67-101)	0.03	2.5 (1.13)
MA 4550	150-32,000	(68-14,515)	6,900 (780)	1,000,000 (112,000)	1,700,000 (192,000)	2,200,000 (248,000)	15.1-32.2 (67-143)	0.08	3.0 (1.36)
MA 4575	155-33,000	(70-14,968)	10,350 (1,169)	1,300,000 (146,000)	2,000,000 (225,000)	2,500,000 (282,000)	11.7-40.3 (52-179)	0.11	3.5 (1.59)

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications ML Series, Low Velocity Adjustable

ML 4525			3,450 (390)	950,000 (107,000)	1,400,000 (158,000)	1,700,000 (192,000)	15.1-22.8 (67-98)	0.03	2.5 (1.13)
ML 4550			6,900 (780)	1,000,000 (112,000)	1,700,000 (192,000)	2,200,000 (248,000)	15.1-32.2 (67-143)	0.08	3.0 (1.36)

Impact velocity range: 0.06 to 1.5 ft/sec (0.02 to 0.46 m/sec).

Note: A side port can be adapted to MAGNUM® 45 MAA, MCA, MAS, MCS, MLA and MLS models and is a special adder item. A side port adapter ring is molded onto the outer tube and increases the overall diameter by 0.5 inches (12.7 mm) in the area of the ring. The side port centerline is located 1.04 inches (26.4 mm) from the front of the outer tube. Add (-P) to the model ordering code if a side port is desired, see page 59.

ACE Controls recommends that side load not exceed 5°. Maximum side load depends on application. For additional information consult ACE's Applications Department.

Lock nut included with each shock absorber. See page 57 for dimensions.

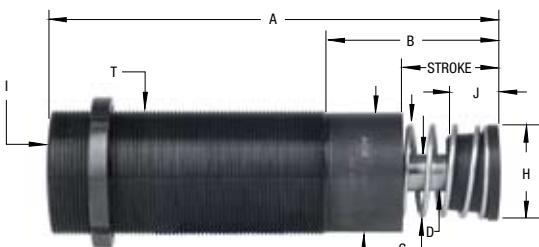
See page 59 for ordering information.

ACE Controls reserves the right to change models, dimensions or specifications without notice or obligation. Please refer to the online catalog for the latest information.

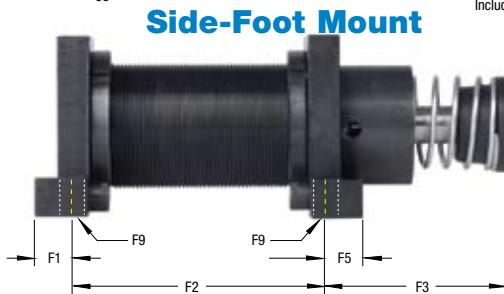
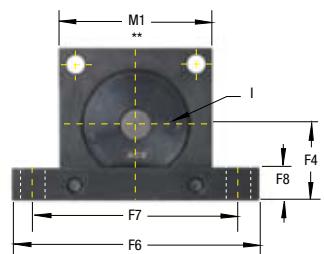
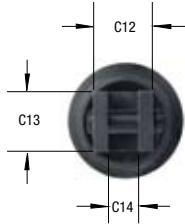
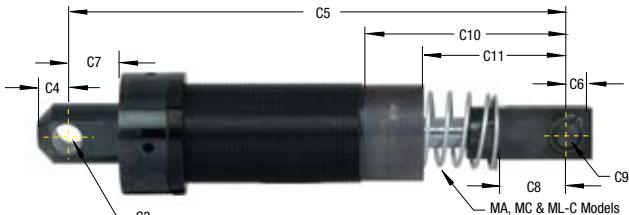
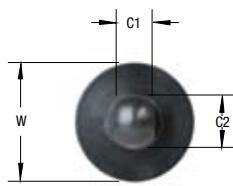
Primary Mount



Adjuster (MA and ML only)



Clevis Mount



Side-Foot Mount

64 Model Dimensions in inches (millimeters)

Model	Stroke	A	B	D	G	H	I*	J	K	T	W	C1	C2	C3	C4	
ML 6425	0.91 (23.1)	6.85 (174)	2.35 (59.7)													
MC, MA, ML 6450	1.91 (48.6)	8.85 (224.8)	3.35 (85.1)													
MC, MA 64100	3.91 (99.4)	12.85 (326.4)	5.35 (135.9)	0.75 (19.1)	1.86 (47.2)	1.90 (48.3)	1/4 NPT	1.06 (26.9)	2.37 (60.2)	2-1/2-12 M64x2	3.00 (76.20)	1.25 (31.8)	1.50 (38.1)	.7505 (19.1)	0.75 (19.1)	
MC, MA 64150	5.91 (150.1)	17.73 (450.4)	8.23 (209)		2.31 (58.7)	2.38 (60.3)		1.25 (31.8)								
MCA, MAA 64150	5.91 (150.1)	17.60 (447)	8.10 (205.7)		N/A	1.90 (48.3)		1.06 (26.9)		N/A	N/A	N/A	N/A	N/A	N/A	
Model		C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	F1	F2	F3	F4	
ML 6425		10.12 (257.1)					3.75 (95.2)	2.31 (58.7)				4.00 (101.6)	2.54 (64.5)			
MC, MA, ML 6450		12.12 (307.9)					4.75 (120.7)	3.31 (84.1)				5.00 (127.0)	3.54 (89.9)			
MC, MA 64100		16.12 (409.5)	0.63 (16.0)	1.29 (32.8)	1.40 (35.6)	.7535 (19.1)	6.75 (171.5)	5.31 (134.9)	1.50 (38.1)	1.25 (31.8)	.625 (15.9)	0.69 (17.5)	7.00 (177.8)	5.54 (140.7)	1.78 (45.2)	0.69 (17.5)
MC, MA 64150		20.87 (530.1)					9.50 (241.3)	8.06 (204.7)					9.00 (228.6)	8.42 (213.9)		
MCA, MAA 64150		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			8.29 (210.6)		
Model		F6	F7	F8	F9											
ML 6425																

MC, MA, ML 6450

MC, MA 64100 5.62 4.88 0.75 0.42
(142.8) (124.0) (19.1) (10.7)

MC, MA 64150

MCA, MAA 64150

Self-Compensating and Adjustable**Specifications MC Series, Self-Compensating**

Model	We Effective Weight lbs (kg)	E ₃ Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)			Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank)	External Accumulator (Re-circulating)			
MC 6450-1	300-1,200 (136-544)							
MC 6450-2	1,020-4,080 (463-1,851)	15,000	1,300,000 (146,000)	2,600,000 (293,000)	3,400,000 (384,000)	20.1-34.9 (89-155)	0.12	6.4 (2.90)
MC 6450-3	3,460-13,840 (1,569-6,278)	(1,695)						
MC 6450-4	11,700-46,800 (5,307-21,228)							
MC 64100-1	600-2,400 (272-1,089)							
MC 64100-2	2,040-8,160 (925-3,701)	30,000	1,700,000 (192,000)	3,400,000 (384,000)	4,400,000 (497,000)	23.5-61 (104-271)	0.34	8.15 (3.70)
MC 64100-3	6,920-27,680 (3,139-12,556)	(3,390)						
MC 64100-4	23,400-93,600 (10,614-42,457)							
MC 64150-1	900-3,600 (408-1,633)							
MC 64150-2	3,060-12,240 (1,388-5,552)	45,000	2,200,000 (248,000)	4,400,000 (497,000)	5,700,000 (644,000)	16.9-82.2 (75-366)	0.48	11.25 (5.10)
MC 64150-3	10,380-41,520 (4,708-18,833)	(5,084)						
MC 64150-4	35,100-140,400 (15,921-63,685)							

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications MA Series, Adjustable

MA 6450	480-110,000 (218-49,895)	18,000 (2,034)	1,300,000 (146,000)	2,600,000 (293,000)	3,400,000 (384,000)	20.1-34.9 (89-155)	0.12	6.4 (2.90)
MA 64100	600-115,000 (272-52,163)	36,000 (4,067)	1,700,000 (192,000)	3,400,000 (384,000)	4,400,000 (497,000)	23.5-61 (104-271)	0.34	8.15 (3.70)
MA 64150	730-175,000 (331-79,379)	54,000 (6,101)	2,200,000 (248,000)	4,400,000 (497,000)	5,700,000 (644,000)	16.9-82.2 (75-366)	0.48	11.25 (5.10)

Impact velocity range: 0.5 to 16.5 ft/sec (0.15 to 5 m/sec).

Specifications ML Series, Low Velocity Adjustable

ML 6425		9,000 (1,017)	1,100,000 (124,000)	2,200,000 (248,000)	2,900,000 (328,000)	26.7-34.9 (119-155)	0.06	5.5 (2.49)
ML 6450		18,000 (2,034)	1,300,000 (146,000)	2,600,000 (293,000)	3,400,000 (384,000)	20.1-34.9 (89-155)	0.12	6.4 (2.90)

Impact velocity range: 0.06 to 1.5 ft/sec (0.02 to 0.46 m/sec).

*For models MAA and MAS 33 the 1/8-27 male fitting is shipped with the shock. MAA and MAS 45 and 64 have pipe plugs.

**See square flange M1 dimensions on page 56.

Note: A side port can be adapted to MAGNUM® 64 MAA, MAS, MCA, MCS, MLA and MLS models and is special adder item. A side port adapter ring is molded onto the outer tube and increases the overall diameter by 0.5 inches (12.7 mm) in the area of the ring. The side port centerline is located 1.47 inches (37.3 mm) from the front of the outer tube. Add (-P) to the model ordering code if the side port is desired, see page 59.

Note: MA and MC 64150 models include an integral, non-removable stop block, not a stop collar. Adjustable models can be adjusted from the front or rear.

Note: MAA and MCA 64150 models include a stop collar, 0.75 inches (19 mm) longer than the standard 64 model stop collar.

ACE Controls recommends that side load not exceed 5°. Maximum side load depends on application. For additional information consult ACE's Applications Department.

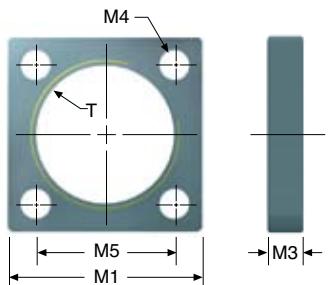
Lock nut included with each shock absorber. See page 57 for dimensions.

See page 59 for ordering information.

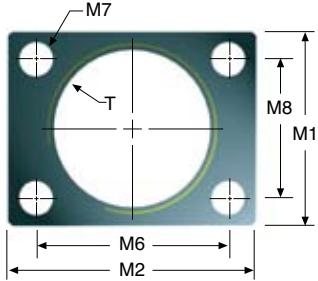
Square and Rectangular Flanges in inches (millimeters)

Used With	Square Flange	Rect Flange	T	M1	M2	M3	M4	M5	M6	M7	M8
MA 33 ML 33 MC 33		250-0016	1-1/4-12 UNF	1.50 (38.1)	2.00 (50.8)	0.38 (9.5)	.219 (5.6)	1.12 (28.4)	1.62 (41.2)	N/A	N/A
MA 33M ML 33M MC 33M	N/A	250-0293	M33x1.5	1.62 (41.1)	2.12 (53.8)	0.38 (9.5)	.278 (7.1)	1.10 (28.0)	1.65 (42.0)	N/A	N/A
MA 36 ML 36 MC 36		250-0633	1-3/8-12 UNF	1.75 (44.4)	2.00 (50.8)	0.38 (9.5)	.219 (5.6)	1.12 (28.4)	1.62 (41.2)	N/A	N/A
MA 36M ML 36M MC 36M	N/A			N/A							
MA 45 ML 45 MC 45	250-0023	250-0024	1-3/4-12 UN	2.25 (57.2)	3.00 (76.2)	0.50 (12.7)	0.36 (9.1)	1.62 (41.1)	2.38 (60.5)	0.34 (8.7)	1.57 (40.0)
MA 45M ML 45M MC 45M	250-0298	250-0299	M45x1.5	2.25 (57.2)	3.00 (76.2)	0.50 (12.7)	0.35 (8.8)	1.62 (41.1)	2.36 (60.0)	0.39 (10.0)	1.57 (40.0)
MA 64 ML 64 MC 64	250-0028	N/A	2-1/2-12 UN	3.50 (88.9)	N/A	0.62 (15.9)	0.41 (10.4)	2.75 (69.6)	N/A	N/A	N/A
MA 64M ML 64M MC 64M	250-0302	N/A	M64x2	3.50 (88.9)	N/A	0.62 (15.9)	0.41 (10.4)	2.75 (69.6)	N/A	N/A	N/A

Square Flange

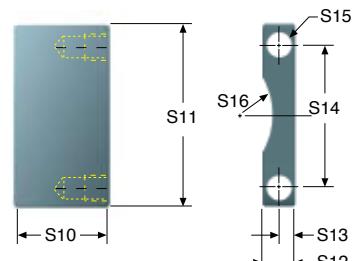
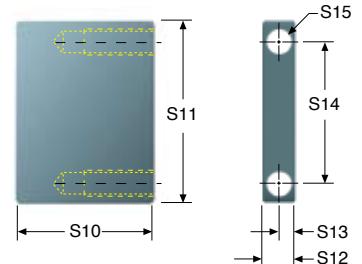


Rectangular Flange



Stop Bars in inches (millimeters)

Used With	Part #	S10	S11	S12	S13	S14	S15	S16
MA 33 ML 33 MC 33	250-0426	1.28 (32.5)	1.50 (38.1)	0.38 (9.7)	0.19 (4.8)	1.12 (28.4)	10-32 UNF	N/A
MA 33M ML 33M MC 33M	250-0427	1.28 (32.5)	1.50 (38.1)	0.38 (9.7)	0.19 (4.8)	1.10 (28.0)	M5x0.8	N/A
MA 36 ML 36 MC 36	250-0426	1.28 (32.5)	1.50 (38.1)	0.38 (9.7)	0.19 (4.8)	1.12 (28.4)	10-32 UNF	N/A
MA 36M ML 36M MC 36M	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MA 45 ML 45 MC 45	250-0428	1.03 (26.2)	2.25 (57.2)	0.63 (16.0)	0.31 (7.9)	1.62 (41.1)	5/16-24 UNF	N/A
MA 45M ML 45M MC 45M	250-0639	1.03 (26.2)	2.25 (57.2)	0.63 (16.0)	0.31 (7.9)	1.62 (41.1)	M8x1.25	N/A
MA 6450 MA 64100 ML 6425 ML 6450 MC 6450 MC 64100	250-0430	1.44 (36.5)	3.50 (88.9)	0.50 (12.7)	0.25 (6.4)	2.75 (69.8)	3/8-24 UNF	1.37 (34.8)
MA 6450M MA 64100M ML 6425M ML 6450M MC 6450M MC 64100M	250-0640	1.44 (36.5)	3.50 (88.9)	0.50 (12.7)	0.25 (6.4)	2.75 (69.8)	M10x1.5	1.37 (34.8)
MA 64150 MC 64150	250-0432	2.31 (57.7)	3.50 (88.9)	0.50 (12.7)	0.25 (6.4)	2.75 (69.8)	3/8-24 UNF	1.37 (34.8)
MA 64150M MC 64150M	250-0641	2.31 (57.7)	3.50 (88.9)	0.50 (12.7)	0.25 (6.4)	2.75 (69.8)	M10x1.5	1.37 (34.8)
MAA 64150 MCA 64150	250-0435	2.18 (55.4)	3.50 (88.9)	0.50 (12.7)	0.25 (6.4)	2.75 (69.8)	3/8-24 UNF	1.37 (34.8)
MAA 64150M MCA 64150M	250-0649	2.18 (55.4)	3.50 (88.9)	0.50 (12.7)	0.25 (6.4)	2.75 (69.8)	M10x1.5	1.37 (34.8)

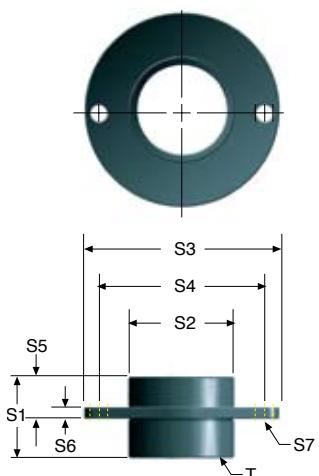


Hard metric stop bars available upon request.

Stop bars come in pairs, two bars per package.

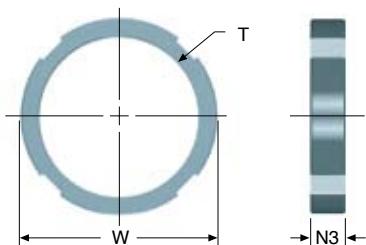
Flanged Stop Collars in inches (millimeters)

Used With	Part #	T	S1	S2	S3	S4	S5	S6	S7
MA 33 ML 33 MC 33	250-0070	1-1/4-12 UNF	2.00 (50.8)	1.50 (38.1)	2.50 (63.5)	2.00 (50.8)	0.88 (22.4)	0.25 (6.4)	0.35 (9.00)
MA 33M ML 33M MC 33M	250-0071	M33x1.5	2.00 (50.8)	1.50 (38.1)	2.50 (63.5)	2.00 (50.8)	0.88 (22.4)	0.25 (6.4)	0.35 (9.00)
MA 36 ML 36 MC 36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MA 36M ML 36M MC 36M									
MA 45 ML 45 MC 45	250-0072	1-3/4-12 UN	1.85 (47.0)	2.25 (57.2)	3.25 (82.6)	2.75 (69.9)	0.88 (22.4)	0.25 (6.4)	0.35 (9.00)
MA 45M ML 45M MC 45M	250-0073	M45x1.5	1.85 (47.0)	2.25 (57.2)	3.25 (82.6)	2.75 (69.9)	0.88 (22.4)	0.25 (6.4)	0.35 (9.00)
MA 6450 MA 64100 ML 6425 ML 6450 MC 6450 MC 64100	250-0074	2-1/2-12 UN	2.25 (57.2)	3.00 (76.2)	4.25 (108.0)	3.50 (88.9)	1.00 (25.4)	0.38 (9.7)	0.35 (9.00)
MA 6450M MA 64100M ML 6425M ML 6450M MC 6450M MC 64100M	250-0075	M64x2	2.25 (57.2)	3.00 (76.2)	4.25 (108.0)	3.50 (88.9)	1.00 (25.4)	0.38 (9.7)	0.35 (9.00)
MA 64150 MC 64150	250-0076	2-1/2-12 UN	3.13 (79.4)	3.00 (76.2)	4.25 (108.0)	3.50 (88.9)	1.00 (25.4)	0.38 (9.7)	0.35 (9.00)
MA 64150M MC 64150M	250-0077	M64x2	3.13 (79.4)	3.00 (76.2)	4.25 (108.0)	3.50 (88.9)	1.00 (25.4)	0.38 (9.7)	0.35 (9.00)



Lock Nuts in inches (millimeters)

Used With	Part #	T	W	N3
MA 33 ML 33 MC 33	250-0038	1-1/4-12 UN	1.50 (38.1)	0.25 (6.4)
MA 33M ML 33M MC 33M	250-0292	M33x1.5	1.56 (39.6)	0.25 (6.4)
MA 36 ML 36 MC 36	250-0631	1-3/8-12 UNF	1.75 (44.5)	0.25 (6.4)
MA 36M ML 36M MC 36M	250-0537	M36x1.5	1.75 (44.5)	0.25 (6.4)
MA 45 ML 45 MC 45	250-0041	1-3/4-12 UN	2.25 (57.2)	0.37 (9.4)
MA 45M ML 45M MC 45M	250-0297	M45x1.5	2.25 (57.2)	0.37 (9.4)
MA 64 ML 64 MC 64	250-0042	2-1/2-12 UN	3.00 (76.2)	0.37 (9.4)
MA 64M ML 64M MC 64M	250-0301	M64x2	3.00 (76.2)	0.37 (9.4)



One lock nut included with each shock absorber where appropriate.



Side-Foot Mount Assembly

Used With	Part #	Used With	Part #
MA 33	250-0015	MA 6450	
ML 33		MA 64100	
MC 33		ML 6425	250-0030
MA 33M	250-0294	ML 6450	
ML 33M		MC 6450	
MC 33M		MC 64100	
MA 36		MA 6450M	
ML 36	N/A	MA 64100M	
MC 36		ML 6425M	250-0304
MA 36M		ML 6450M	
ML 36M	N/A	MC 6450M	
MC 36M		MC 64100M	
MA 45		MA 64150	
ML 45	250-0025	MC 64150	250-0030
MC 45		MA 64150M	
MA 45M		MC 64150M	250-0304
ML 45M	250-0300		
MC 45M			

See pages 50, 52 and 54 for MAGNUM® Group side-foot mount drawings and dimensions.

Clevis Mount Assembly

Used With	Part #	Used With	Part #
MA 33		ML 6425	250-0625
ML 33		ML 6425M	250-0626
MC 33		MA 6450	
MAS 33	250-0225	ML 6450	250-0625
MLS 33		MC 6450	
MCS 33		MCS 6450	
MA 33M		MA 6450M	
ML 33M		ML 6450M	250-0626
MC 33M		MC 6450M	
MAS 33M	250-0323	MCS 6450M	
MLS 33M		MA 64100	
MCS 33M		MC 64100	250-0625
MAN 33		MCS 64100	
MLN 33		MA 64100M	
MCN 33		MC 64100M	250-0626
MAA 33		MCS 64100M	
MLA 33	250-0018	MAN 64150	
MCA 33		MCN 64150	250-0625
MAN 33M		MAA 64150	
MLN 33M		MCA 64150	
MCN 33M	250-0322	MAN 64150M	
MAA 33M		MCN 64150M	250-0626
MLA 33M		MAA 64150M	
MCA 33M		MCA 64150M	
MA 45		MA 64150	
ML 45	250-0324	MCA 64150	250-0627
MC 45		MAS 64150	
MCS 45		MCS 64150	
MA 45M		MA 64150M	
ML 45M	250-0325	MCA 64150M	250-0628
MC 45M		MAS 64150M	
MCS 45M		MCS 64150M	

See pages 50, 52 and 54 for MAGNUM® Group clevis mount drawings and dimensions.

MAA, MAS, MCA, MCS, MLA and MLS models require a side port (-P).

MC Series, Self-Compensating

MC 3325 - 1 C

Return Method and Accumulator Style

MC = Self-Contained Spring Return,
Internal Accumulator
MCA = Air Return, External Accumulator
MCS = Spring Return, External Accumulator
MCN = (Clevis), Internal Accumulator

Model Number

3325	4525	6450
3350	4550	64100
3625	4575	64150
3650		

Mounting Thread

- Standard
- M Metric

Effective Weight

- 1 Light Range
- 2 Medium Range
- 3 Heavy Range
- 4 Heavier Range

Mounting Options

- Standard Mount
- Flanged Stop Collar
- Rectangular Flange
- Square Flange
- C Clevis Mount*
- S Side-Foot Mount*
- P Side Port
- Z Within Air Cylinder

*Not available on MC 3625 and 3650 models.

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MA Series, Adjustable

MA 3325 - C

Return Method and Accumulator Style

MA = Self-Contained Spring Return,
Internal Accumulator
MAA = Air Return, External Accumulator
MAS = Spring Return, External Accumulator
MAN = (Clevis), Internal Accumulator

Model Number

3325	4525	6450
3350	4550	64100
3625	4575	64150
3650		

Mounting Thread

- Standard
- M Metric

Mounting Options

- Standard Mount
- Flanged Stop Collar
- Rectangular Flange
- Square Flange
- C Clevis Mount*
- S Side-Foot Mount*
- P Side Port
- Z Within Air Cylinder

*Not available on MA 3625 and 3650 models.

ML Series, Low Velocity Adjustable

ML 3325 - C

Return Method and Accumulator Style

ML = Self-Contained Spring Return,
Internal Accumulator
MLA = Air Return, External Accumulator
MLS = Spring Return, External Accumulator
MLN = (Clevis), Internal Accumulator

Model Number

3325	4525	6450
3350	4550	6450
3625		
3650		

Mounting Thread

- Standard
- M Metric

Mounting Options

- Standard Mount
- Flanged Stop Collar
- Rectangular Flange
- Square Flange
- C Clevis Mount*
- S Side-Foot Mount*
- P Side Port
- Z Within Air Cylinder

*Not available on ML 3625 and 3650 models.

Poly pad available on 33 models only...part no. 250-0011.

Flanges and flanged stop collars are packaged separately from shock absorbers.

Z-mounted MC, MA & ML MAGNUM® models do not include a stop collar.

1-1/2" Bore Series

Adjustable



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ACE 1-1/2" bore series shock absorbers are designed for the toughest environments. These durable adjustable models provide outstanding deceleration over a wide range of effective weight conditions. Large energy capacities stop heavy loads set into motion by high propelling forces, without damage.

Applications include: Automotive manufacturing and production equipment, large robotics, heavy conveyors, foundries and steel industry equipment.

Technical Data

Impact velocity range: 0.5 to 15 ft/sec (0.15 to 4.5 m/sec)

Operating temperature: 10° to 150° F (-12° to 66° C)

Mechanical stop: Must be provided .09 inch (2.3 mm) before end of stroke.

Oil type: American 46

Materials: Steel body with black oxide finish. Piston rod high tensile steel, hardened and chrome plated. Return spring zinc plated.

Adjustment: After installation of the ACE shock absorber, cycle the machine a number of times. Turn the adjustment ring against the scale marked 0 to 9, until optimum deceleration is achieved (i.e. smooth deceleration throughout the stroke).

Hard impact at the start of stroke-turn adjuster toward 9.

Hard set-down at the end of stroke-turn adjuster toward 0.

Poly pad: Optional

Specifications

Model	Effective Weight lbs (kg)	Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)		Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			E ₃	E ₄			
1-1/2 x 2	430 - 70,000 (195 - 31,750)	21,000 (2,373)	3,200,000 (361,550)	4,000,000 (451,900)	34.9 - 47.6 (155 - 210)	.10	16.4 (7.44)
1-1/2 x 3-1/2	480 - 80,000 (218 - 36,280)	36,750 (4,152)	5,600,000 (632,700)	7,000,000 (790,890)	25.4 - 47.6 (113 - 210)	.25	19.4 (8.80)
1-1/2 x 5	500 - 90,000 (227 - 40,800)	52,500 (5,932)	8,000,000 (903,870)	10,000,000 (1,129,840)	20.7 - 52.5 (92 - 230)	.40	22.7 (10.30)
1-1/2 x 6-1/2	680 - 100,000 (308 - 45,350)	68,250 (7,711)	10,400,000 (1,175,000)	13,000,000 (1,468,800)	20.7 - 97.4 (92 - 430)	.40	25.0 (11.34)

Ordering Information

A 1-1/2 x 6-1/2 - F

Return Method and Accumulator Style	Bore Size	Stroke Length	Mounting Style
A = Spring Return, Internal Accumulator	1-1/2	2	-F Front Flange
AA = Air Return, External Accumulator		3-1/2	-R Rear Flange
SA = Spring Return, External Accumulator		5	-RF Front Rectangular Flange
NA = Self (Clevis) Return, Internal Accumulator		6-1/2	-RR Rear Rectangular Flange
			-S Side Foot Mount
			-C Clevis Mount

Note: All body mounting hardware welded in place.

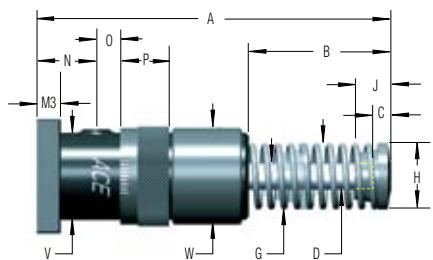


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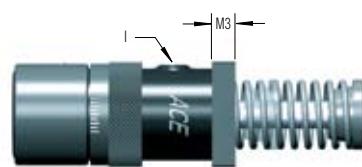
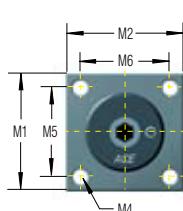
1-1/2" Bore Series

Adjustable

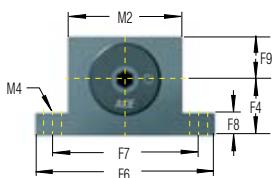
Rear Flange



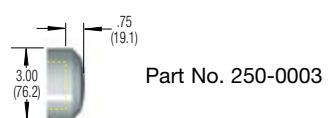
Front Flange



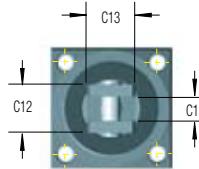
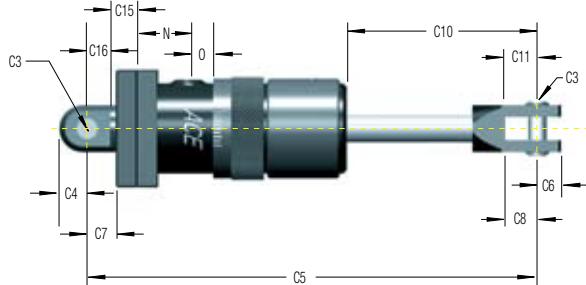
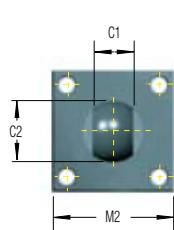
Side-Foot Mount



Poly Pad



Clevis Mount



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1-1/2" Bore Series Dimensions in inches (millimeters)

Size	Stroke	A	B	C	D	G	H	I	J	N	O	P	V	W	C1	C2	C3	C4	C5	C6	C7
1-1/2 x 2	2.00 (50.8)	9.69 (246.1)	4.13 (104.8)							1.38 (35.0)	0.78 (19.8)							12.94 (328.6)			
1-1/2 x 3-1/2	3.50 (88.9)	12.69 (322.3)	5.63 (142.9)	0.81	1.00	2.69	2.75	1/2	1.38	2.00 (50.8)	0.78 (19.8)	1.25	3.00	4.00	1.25	1.50	0.75	0.75 (405.6)	0.63	1.25	
1-1/2 x 5	5.00 (127.0)	15.69 (398.5)	7.13 (181.0)	(20.6)	(25.4)	(68.3)	(69.9)	NPT	(35.1)	2.00 (50.8)	1.03 (26.2)	(31.8)	(76.2)	(101.6)	(31.8)	(38.1)	(19.1)	18.97 (481.8)	(16.0)	(31.8)	
1-1/2 x 6-1/2	6.50 (165.1)	19.44 (493.7)	9.38 (238.1)							2.00 (50.8)	1.78 (45.2)							22.72 (577.1)			

Size	C8	C10	C11	C12	C13	C14	C15	C16	F1	F2	F3	F4	F5	F6	F7	F8	F9	M1	M2	M3	M4	M5	M6
1-1/2 x 2	5.41 (137.3)									**5.18 (131.6)	**4.31 (109.5)												
1-1/2 x 3-1/2	6.91 (175.4)	1.41 (35.7)	1.40 (35.6)	1.50 (38.1)	1.25 (31.8)	5/8 (23.9)	0.94 (27.0)	1.06 (15.9)	0.63 (169.9)	6.69 (147.6)	5.81 (147.6)												
1-1/2 x 5		8.41 (213.5)								8.19 (208.0)	7.31 (185.7)												
1-1/2 x 6-1/2	10.66 (270.7)									9.69 (246.1)	9.56 (242.8)							5.00 (127.0)			4.00 (101.6)		

*Rectangular flange dimension

**Note: 1-1/2 x 2 shock absorbers available with side-foot mount in AA and SA models only.

Heavy Industrial Shock Absorbers **CA 2 to CA 4**



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Self-Compensating

ACE's durable CA 2, CA 3 and 4" Bore Series of self-compensating shock absorbers are designed for extremely heavy duty applications and provide smooth deceleration under changing conditions. High energy capacities combined with wide effective weight ranges qualify these units to perform in the most demanding environments.

The new **CA 2 offers up to 170% of the energy per cycle capacity** of former models. The rugged new **CA 3 offers up to 125% of the energy capacity** of former models. You can select the correct model for your application by utilizing the ACESIZE sizing program or the capacity charts. Replacing existing shock absorbers with the new CA Series is easy. Simply provide us the type and adjustment setting of your existing units and we will do the rest. These dependable units are available self-contained or for use with an external air/oil tank.

Applications include: foundry, steel, marine, lumber and other heavy equipment industries.

Technical Data

Impact velocity range: 1 to 16.5 ft/sec (0.30 to 5 m/sec)

Operating temperature: 10° to 150° F (-12° to 66° C)

Mechanical stop:

2", 3" bore: Must be provided .09 inch (2.3 mm) before end of stroke.

4" bore: Must be provided 0.09 inch (2.3 mm) before end of stroke.

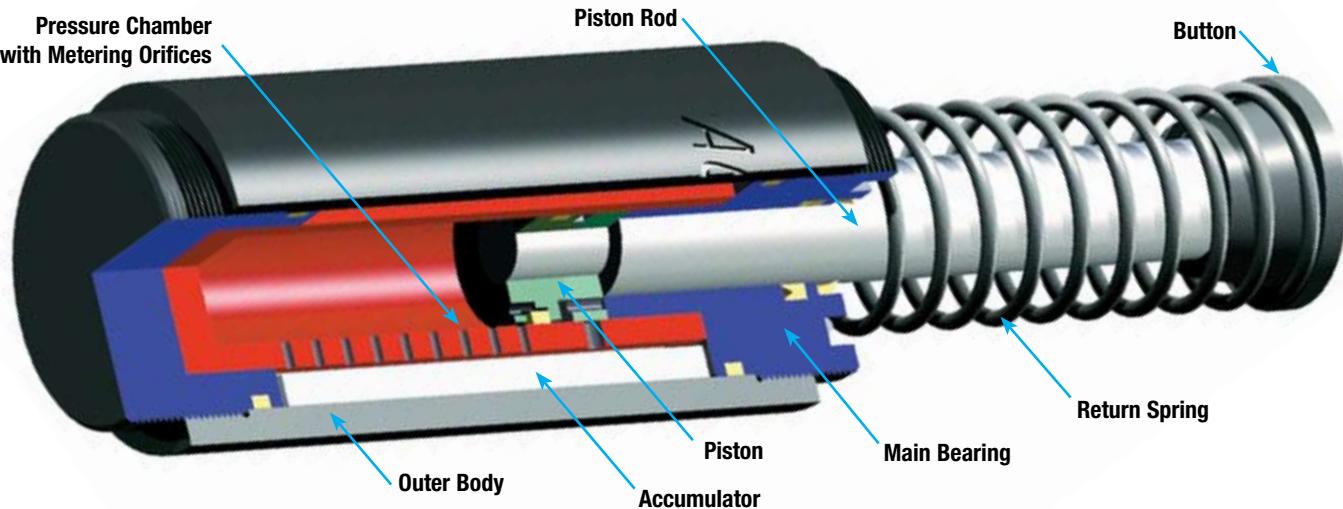
Oil type: ATF

Materials: Steel body with black oxide finish. Piston rod high tensile steel, hardened and chrome plated. Return spring zinc plated.

Heavy Industrial Shock Absorbers **CA 2 to CA 4**

Self-Compensating

Illustration depicts CA 2 and CA 3 design only.



Adjustable

ACE's rugged A2 and A3 Series adjustable shock absorbers are capable of decelerating heavy duty loads. These reliable units replace the former 2" and 3" large bore adjustable shock absorbers.

Energy capacity ratings are 228% of former models. In addition, effective weight ranges have increased dramatically, resulting in the capability of handling a wider range of applications and increases in velocity. The units are easily adjusted by means of a 5/16 inch (8 mm) hex socket adjuster located at the bottom of the outer body. These dependable shock absorbers are maintenance free and are available self-contained or for use with an external air/oil tank.

Features include a considerably reduced outer diameter, internal accumulator and threaded mounting brackets, easily adaptable to the front or rear of the outer body.

Applications include: foundry, steel, marine, lumber, and other heavy equipment industries.

**Technical Data**

Impact velocity range: 0.33 to 16.5 ft/sec (0.1 to 5 m/sec)

Operating temperature: 10° to 150° F (-12° to 66° C)

Mechanical stop: Must be provided .09 inch (2.3 mm) before end of stroke.

Oil type: ATF

Materials: Steel body with black oxide finish. Piston rod high tensile steel, hardened and chrome plated. Return spring zinc plated. To avoid reducing heat dissipation, do not paint.

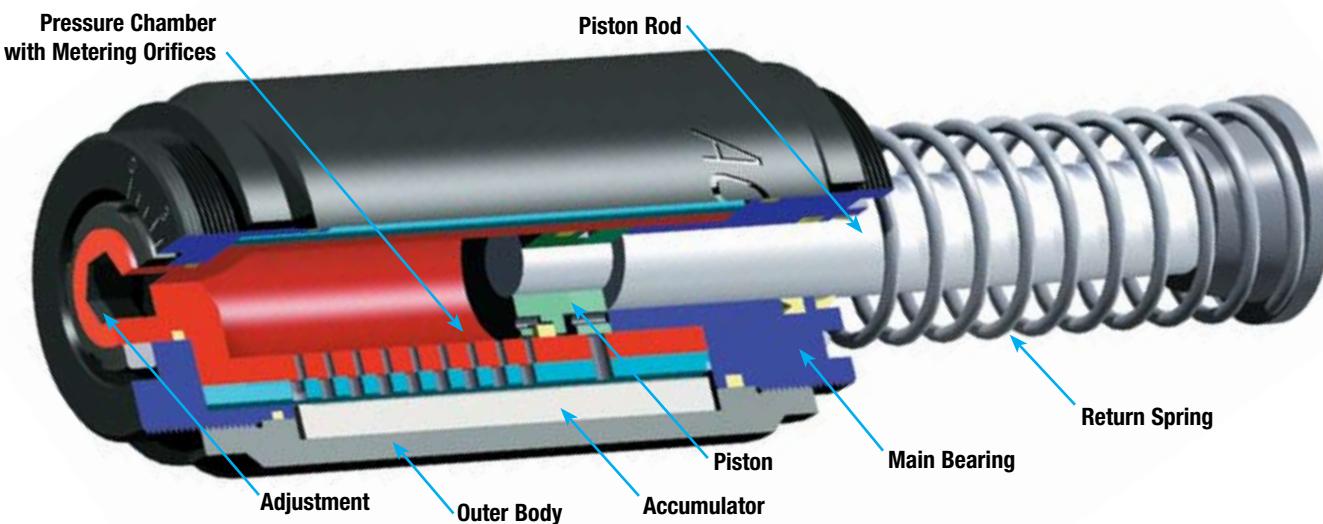
Adjustment: After installation of the ACE shock absorber, cycle the machine a number of times. Turn the hex socket adjuster against the scale marked 0 to 9, until optimum deceleration is achieved (i.e. smooth deceleration throughout the stroke).

Hard impact at the start of stroke-turn adjuster toward 9.

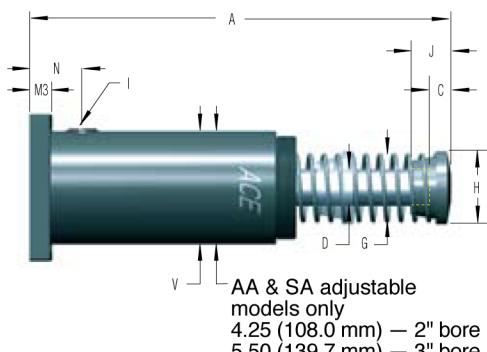
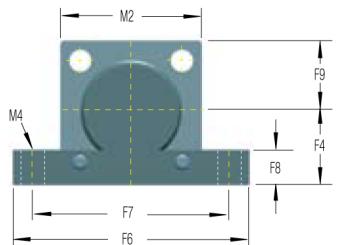
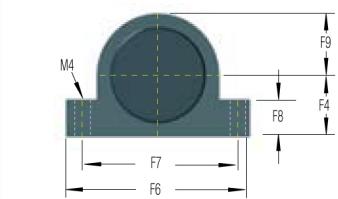
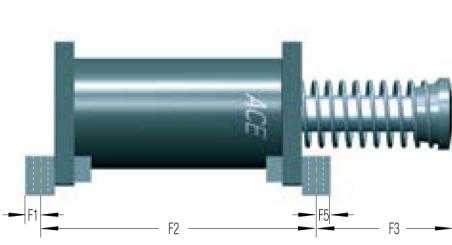
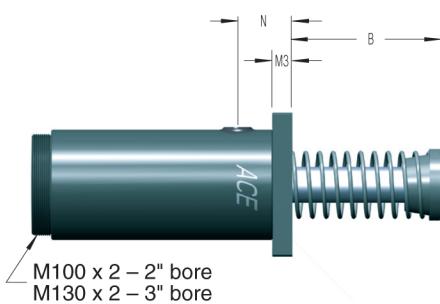
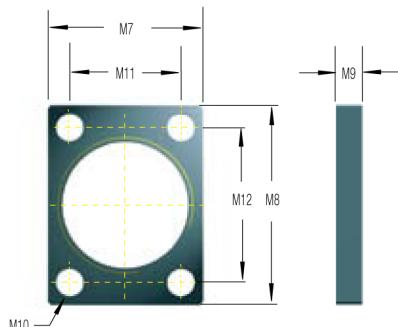
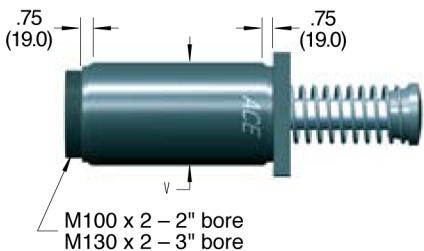
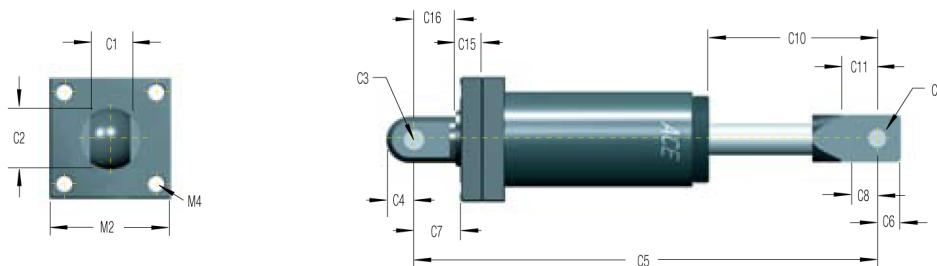
Hard set-down at the end of stroke-turn adjuster toward 0.

Heavy Industrial Shock Absorbers A 2 and A 3

Adjustable



(CA) Self-Compensating and (A) Adjustable

Rear Flange**2" Bore Foot Mount****3" Bore Foot Mount****Front Flange****Rectangular Flange
For 3" Bore Only****(A) Adjustable
2" & 3" Bore Models****Clevis Mount**

ACE Controls reserves the right to change models, dimensions or specifications without notice or obligation. Please refer to the online catalog for the latest information.

CA and A 2", 3" Bore Series

Heavy Duty Models

(CA) Self-Compensating and (A) Adjustable

Self-Compensating and Adjustable Models Dimensions in inches (millimeters)

Size	Stroke	A	B	C	D	G	H	I	J	N	V	C1	C2	C3	C4	C5	C6	C7	C8	C10	C11
CA 2x2	2.00	12.37	4.31	0.82		3.06	2.73		1.38										17.00	6.05	2.50
A 2x2	(50.8)	(312.7)	(109.5)	(20.8)		(77.7)	(69.3)		(35.1)										(431.8)	(153.7)	(63.5)
CA 2x4	4.00	16.37	6.31	0.82		3.06	2.73		1.38		CA								21.00	8.05	2.50
A 2x4	(101.6)	(414.0)	(160.3)	(20.8)		(77.7)	(69.3)		(35.1)		4.25								(533.4)	(204.4)	(63.5)
CA 2x6	6.00	20.37	8.31	0.82	1.38	3.63	2.73	3/4	1.38	3.50	(108.0)	1.50	2.25	1.005	1.00	25.00	1.00	2.00	1.50	10.05	2.50
A 2x6	(152.4)	(515.9)	(211.1)	(20.8)	(35.1)	(92.2)	(69.3)	NPT	(35.1)	(88.9)		(38.1)	(57.2)	(25.5)	(25.4)	(635)	(25.4)	(50.8)	(38.1)	(255.2)	(63.5)
CA 2x8	8.00	25.37	11.31	1.82		4.00	3.63		2.38		A*								29.00	12.05	2.50
A 2x8	(203.2)	(642.9)	(287.3)	(46.2)		(101.6)	(92.2)		(60.5)		4.63								(736.6)	(306.1)	(63.5)
CA 2x10	10.00	29.37	13.31	1.82		4.50	4.25		2.38		(118.0)								33.00	14.05	2.50
A 2x10	(254)	(744.5)	(338.1)	(46.2)		(114.3)	(108.0)		(60.5)										(838.2)	(356.9)	(63.5)
CA 3x5	5.00	19.31	8.25			4.75					CA								23.05	9.05	
A 3x5	(127)	(490.5)	(209.6)			(120.7)					5.50								(585.5)	(229.9)	
CA 3x8	8.00	25.31	11.25	2.00	1.75	4.75	4.38	3/4	2.38	3.13	(139.7)	1.50	2.25	1.01	1.00	29.05	1.00	2.00	1.50	12.05	1.12
A 3x8	(203.2)	(642.9)	(285.8)	(50.8)	(44.5)	(120.7)	(111.3)	NPT	(60.5)	(79.5)	A*	(38.1)	(57.2)	(25.5)	(25.4)	(737.9)	(25.4)	(38.1)	(306.1)	(28.4)	
CA 3x12	12.00	30.09	17.03			4.84					6.00								38.83	17.83	
A 3x12	(304.8)	(891.3)	(432.6)			(122.9)					(152.4)								(986.3)	(452.9)	
Size	Stroke	C12	C13	C14	C15	C16	F1	F2	F3	F4	F5	F6	F7	F8	F9	M1	M2	M3	M4	M5	M6
CA 2x2	2.00									9.28	3.44										
A 2x2	(50.8)									(235.7)	(87.4)										
CA 2x4	4.00									11.28	5.44										
A 2x4	(101.6)									(286.5)	(138.2)										
CA 2x6	6.00	3.5	2.00	1.50	1.25	1.75	0.63	13.28	7.44	3.13	0.63	8.00	6.50	1.50	2.75	5.50	5.50	0.75	0.66	4.38	4.38
A 2x6	(152.4)	(88.9)	(50.8)	(38.1)	(31.8)	(44.5)	(16.0)	(337.3)	(189.0)	(79.5)	(16.0)	(203.2)	(165.1)	(38.1)	(69.9)	(139.7)	(139.7)	(19.1)	(16.8)	(111.3)	(111.3)
CA 2x8	8.00									15.28	10.44										
A 2x8	(203.2)									(388.1)	(265.2)										
CA 2x10	10.00									17.28	12.44										
A 2x10	(254)									(438.9)	(316.0)										
CA 3x5	5.00									**10.00	8.50										
A 3x5	(127)									(254.0)	(215.9)										
CA 3x8	8.00	3.5	2.00	1.50	1.25	1.75	1.00	**13.00	11.81	3.15	1.00	10.00	8.50	1.73	3.15	6.00	6.50	1.00	0.66	4.88	5.38
A 3x8	(203.2)	(88.9)	(50.8)	(38.1)	(31.8)	(44.5)	(25.4)	(330.2)	(299.9)	(80.0)	(25.4)	(254.0)	(215.9)	(43.9)	(80.0)	(152.4)	(165.1)	(25.4)	(16.8)	(124.0)	(136.7)
CA 3x12	12.00									**17.00	17.28										
A 3x12	(304.8)									(431.8)	(438.9)										
Size		M7	M8	M9	M10	M11	M12														
CA 3	Rectangular	6.50	8.00	1.00	0.78	4.50	6.50														
A 3	Flange				(165.1)	(203.2)	(25.4)														

* See rear flange illustration on page 64 for AA and SA model dimensions.

** Rear hole is slotted.

Plus or minus 0.09 inches (2.28)

Size	A	J	H	AA 2x8 and AA 2x10 Dimensions in inches (millimeters)
AA 2x8	24.37	1.38	2.73	
	(619.0)	(35.1)	(69.3)	
AA 2x10	28.37	1.38	2.73	
	(720.6)	(35.1)	(69.3)	

Specifications Self-Compensating Models

Model	We Effective Weight lbs (kg)	E ₃ Energy per Cycle in lbs/Nm (Nm)	Energy per Hour in lbs/hour (Nm/hour)				E ₄ Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank) (Re-circulating)	A/O Tank Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)	
CA 2 x 2-1	1,600-4,800	(726-2,177)										
CA 2 x 2-2	4,000-12,000	(1,814-5,443)	32,000	9,600,000	12,000,000	15,600,00	(1,084,650)	(1,355,820)	(1,762,564)	48-63 (214-280)	0.25	28.2 (12.79)
CA 2 x 2-3	10,000-30,000	(4,536-13,608)	(3,616)									
CA 2 x 2-4	25,000-75,000	(11,340-34,019)										
CA 2 x 4-1	3,200-9,600	(1,452-4,354)										
CA 2 x 4-2	8,000-24,000	(3,629-10,886)	64,000	12,000,000	15,000,000	19,500,00	(1,355,820)	(1,694,770)	(2,203,200)	34-63 (151-280)	0.50	32.6 (14.79)
CA 2 x 4-3	20,000-60,000	(9,072-27,216)	(7,231)									
CA 2 x 4-4	50,000-150,000	(22,680-68,039)										
CA 2 x 6-1	4,800-14,400	(2,117-6,532)										
CA 2 x 6-2	12,000-36,000	(5,443-16,329)	96,000	14,400,000	18,000,000	23,500,000	(1,626,980)	(2,033,730)	(2,655,140)	34-90 (151-400)	0.60	37.2 (16.87)
CA 2 x 6-3	30,000-90,000	(13,608-40,823)	(10,847)									
CA 2 x 6-4	75,000-225,000	(34,019-102,058)										



Specifications Continued Self-Compensating Models

Model	We Effective Weight lbs (kg)	E ₃ Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)			Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank)	A/O Tank (Re-circulating)			
CA 2 x 8-1	6,400-19,200 (2,903-8,709)							
CA 2 x 8-2	16,000-48,000 (7,257-21,772)	128,000 (14,462)	16,800,000 (1,898,150)	21,000,000 (2,372,680)	27,000,00 (3,050,590)	51-144 (227-641)	0.70	42.6 (19.32)
CA 2 x 8-3	40,000-120,000 (18,144-54,431)							
CA 2 x 8-4	100,000-300,000 (45,359-136,708)							
CA 2 x 10-1	8,000-24,000 (3,629-10,886)							
CA 2 x 10-2	20,000-60,000 (9,072-27,216)	160,000 (18,078)	19,200,000 (2,169,310)	24,000,000 (2,711,640)	31,000,00 (3,502,530)	35-101 (156-449)	0.80	50.2 (22.77)
CA 2 x 10-3	50,000-150,000 (22,680-68,039)							
CA 2 x 10-4	125,000-375,000 (56,700-170,097)							
CA 3 x 5-1	6,400-19,200 (2,903-8,709)							
CA 3 x 5-2	16,000-48,000 (7,257-21,772)	125,000 (14,123)	20,000,000 (2,259,700)	25,000,000 (2,824,620)	32,500,000 (3,672,010)	59-156 (262-694)	0.60	63.8 (28.94)
CA 3 x 5-3	40,000-120,000 (18,144-54,431)							
CA 3 x 5-4	100,000-300,000 (45,359-136,078)							
CA 3 x 8-1	10,240-30,720 (4,645-13,934)							
CA 3 x 8-2	25,600-76,800 (11,612-34,836)	200,000 (22,597)	32,000,000 (3,615,520)	40,000,000 (4,519,390)	52,000,000 (5,875,210)	62-162 (275-721)	0.80	73.6 (33.38)
CA 3 x 8-3	64,000-192,000 (29,030-87,090)							
CA 3 x 8-4	160,000-480,000 (72,575-217,724)							
CA 3 x 12-1	15,360-46,080 (6,967-20,902)							
CA 3 x 12-2	38,400-115,200 (17,418-52,254)	300,000 (33,896)	48,000,000 (5,423,270)	60,000,000 (6,779,090)	78,000,000 (8,812,820)	60-160 (267-712)	1.20	89.4 (40.55)
CA 3 x 12-3	96,000-288,000 (43,545-130,635)							
CA 3 x 12-4	240,000-720,000 (108,862-326,587)							

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Specifications Adjustable Models

Model	We Effective Weight lbs (kg)	E ₃ Energy per Cycle in lbs (Nm)	Energy per Hour in lbs/hour (Nm/hour)			Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank)	A/O Tank (Re-circulating)			
A 2 x 2	560-170,000 (254-77,111)	32,000 (3,616)	9,600,000 (1,084,650)	12,000,000 (1,355,820)	15,600,00 (1,762,564)	48-63 (214-280)	0.25	31.5 (14.29)
A 2 x 4	560-180,000 (254-81,646)	80,000 (9,039)	12,000,000 (1,355,820)	15,000,000 (1,694,770)	19,500,00 (2,203,200)	34-63 (151-280)	0.50	36.9 (16.74)
A 2 x 6	570-190,000 (259-86,183)	120,000 (13,558)	14,400,000 (1,626,980)	18,000,000 (2,033,730)	23,500,000 (2,655,140)	34-90 (151-400)	0.60	42.6 (19.32)
A 2 x 8	580-200,000 (263-90,719)	170,000 (19,207)	16,800,000 (1,898,150)	21,000,000 (2,372,680)	27,000,000 (3,050,590)	51-144 (227-641)	0.70	49.1 (22.27)
A 2 x 10	720-250,000 (327-113,399)	210,000 (23,727)	19,200,000 (2,169,310)	24,000,000 (2,711,640)	31,000,000 (3,502,530)	35-101 (156-449)	0.80	57.8 (26.22)
A 3 x 5	1,050-340,000 (476-154,223)	140,000 (15,818)	20,000,000 (2,259,700)	25,000,000 (2,824,620)	32,500,000 (3,672,010)	59-156 (262-694)	0.60	72.1 (32.70)
A 3 x 8	1,200-400,000 (544-181,439)	250,000 (28,246)	32,000,000 (3,615,520)	40,000,000 (4,519,390)	52,000,000 (5,875,210)	62-162 (275-721)	0.80	84.9 (38.51)
A 3 x 12	1,350-450,000 (612-204,119)	390,000 (44,064)	48,000,000 (5,423,270)	60,000,000 (6,779,090)	78,000,000 (8,812,820)	60-160 (267-712)	1.20	105.0 (47.63)

CA and A 2", 3" Bore Series

Heavy Duty Models

(CA) Self-Compensating and (A) Adjustable

Ordering Information Self-Compensating Models

CA 2 x 8 R - 3

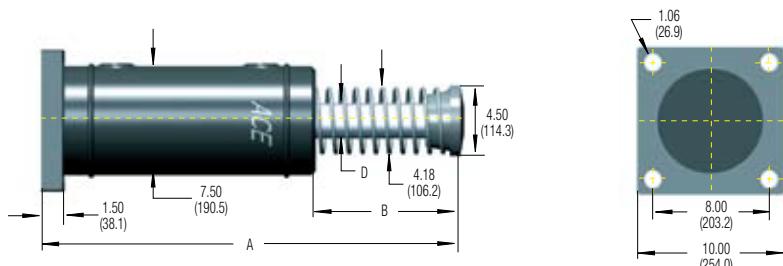
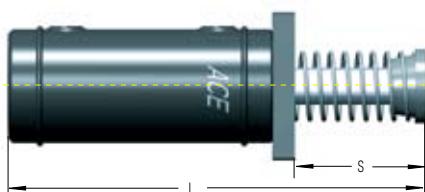
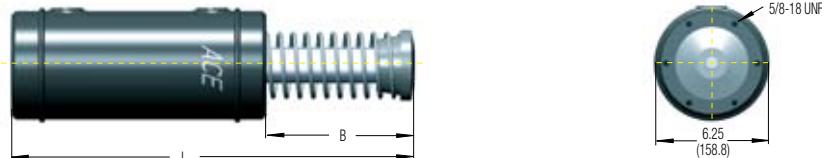
Return Method and Accumulator Style	Bore Size	2" Bore Stroke Length	Mounting Style	Effective Weight
CA = Spring Return, Internal Accumulator	2	2	-F Front Flange	-1 Light
CAA = Air Return, External Accumulator	3	4	-R Rear Flange	-2 Medium Light
CSA = Spring Return, External Accumulator		6	-RF* Rectangular Front Flange	-3 Medium Heavy
CNA = (Clevis), Internal Accumulator			-RR* Rectangular Rear Flange	-4 Heavy
		5	-S Side Foot Mount	
		8	-C Clevis Mount	
		12		
			*For 3" Bore Only	

Ordering Information Adjustable Models

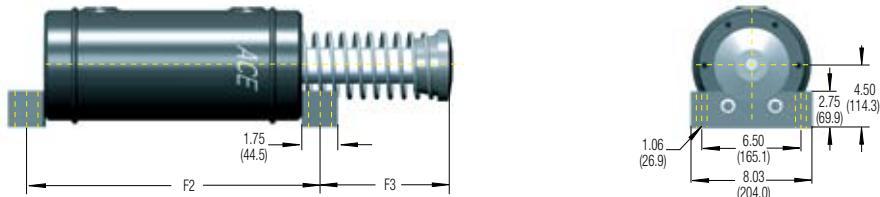
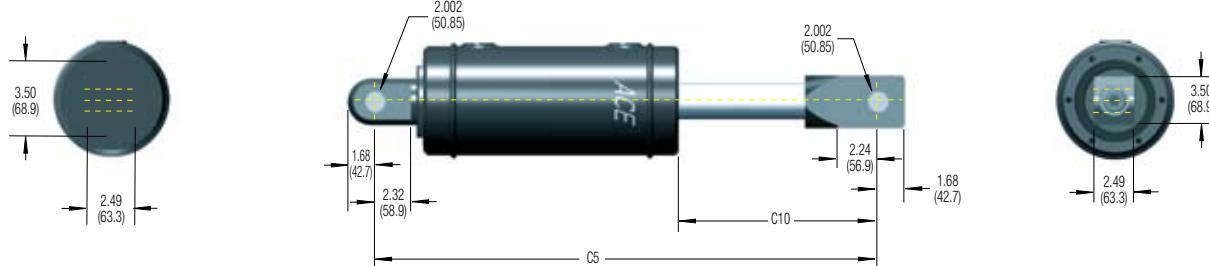
A 2 x 8 - R

Return Method and Accumulator Style	Bore Size	2" Bore Stroke Length	Mounting Style	
A = Spring Return, Internal Accumulator	2	2	-F Front Flange	
AA = Air Return, External Accumulator	3	4	-R Rear Flange	
SA = Spring Return, External Accumulator		6	-RF* Rectangular Front Flange	
NA = (Clevis), Internal Accumulator			-RR* Rectangular Rear Flange	
		5	-S Side Foot Mount	
		8	-C Clevis Mount	
		12		
			*For 3" Bore Only	

Note: A no button option is available on
the 3" Bore only as a special.

*Self-Compensating***Rear Flange****Front Flange****Standard Mount**

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Side-Foot Mount**Clevis Mount****Technical Data****Impact velocity range:** 1 to 16.5 ft/sec (0.30 to 5 m/sec)**Operating temperature:** 10° to 150° F (-12° to 66° C)**Mechanical stop:** Must be provided 0.09 inch (2.3 mm) before end of stroke.**Oil type:** ATF

CA 4" Bore Series

Heavy Duty Models

Self-Compensating

Size	Stroke	Dimensions in inches (millimeters)									
		A	B	D	H	L	S	C5	C10	F2	F3
CA 4 x 6	6.00 (152.4)	28.21 (716.5)	10.96 (278.4)	2.12 (53.8)	4.50 (114.3)	26.71 (678.4)	9.46 (240.3)	33.03 (839.0)	12.90 (327.7)	17.50 (447.5)	10.90 (256.3)
CSA 4 x 6											
CAA 4 x 6	6.00 (152.4)	26.21 (665.7)	8.96 (227.6)	2.12 (53.8)	4.50 (114.3)	24.71 (678.4)	7.46 (188.0)	31.03 (788.2)	10.90 (276.9)	17.50 (447.5)	8.09 (205.5)
CNA 4 x 6		N/A	N/A			N/A	N/A			N/A	N/A
CA 4 x 8	8.00 (203.2)	32.31 (818.1)	12.96 (329.2)	2.12 (53.8)	4.50 (114.3)	30.71 (780.0)	11.46 (291.1)	37.03 (940.6)	14.90 (378.5)	19.50 (495.3)	12.09 (307.1)
CSA 4 x 8											
CAA 4 x 8	8.00 (203.2)	30.21 (767.3)	10.96 (278.4)	2.12 (53.8)	4.50 (114.3)	28.71 (729.2)	9.46 (240.3)	35.03 (889.8)	12.90 (327.7)	19.50 (495.3)	10.09 (256.3)
CNA 4 x 8		N/A	N/A			N/A	N/A			N/A	N/A
CA 4 x 16	16.00 (406.4)	51.21 (1,300.7)	23.96 (608.6)	2.50 (63.5)	5.00 (127.0)	49.71 (1,262.6)	22.46 (570.5)	56.03 (1,423.2)	25.90 (657.9)	27.50 (698.5)	23.09 (586.5)
CSA 4 x 16											
CAA 4 x 16	16.00 (406.4)	46.21 (1,173.7)	18.96 (481.6)	2.50 (63.5)	5.00 (127.0)	44.71 (1,135.6)	17.46 (443.5)	51.03 (1,296.2)	20.90 (530.9)	27.50 (698.5)	18.09 (459.5)
CNA 4 x 16		N/A	N/A			N/A	N/A			N/A	N/A

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Specifications

Model	We Effective Weight lbs (kg)	E ₃	Energy per Hour in lbs/hour (Nm/hour)		Internal Accumulator (Self-Contained)	External Accumulator (A/O Tank)	Return Force lbs (N)	Return Time sec	Shipping Weight lbs (kg)
			E ₄						
4 x 6-3	8,000-19,000 (3,600-8,600)		420,000		27,000,000 (3,000,000)	45,000,000 (5,100,000)	108-222 (480-1,000)	Consult Factory	132 (60)
4 x 6-5	19,000-41,000 (8,600-18,600)								
4 x 6-7	41,000-94,000 (18,600-42,700)								
4 x 8-3	11,000-25,000 (5,000-11,400)		560,000		30,000,000 (3,400,000)	50,000,000 (5,600,000)	71-222 (310-1,000)	Consult Factory	150 (68)
4 x 8-5	25,000-55,000 (11,400-25,000)								
4 x 8-7	55,000-125,000 (25,000-57,000)								
4 x 16-3	22,000-50,000 (10,000-23,000)		1,120,000		50,000,000 (5,600,000)	85,000,000 (9,600,000)	Consult Factory	Consult Factory	321 (146)
4 x 16-5	50,000-110,000 (23,000-50,000)								
4 x 16-7	110,000-250,000 (50,000-114,000)								

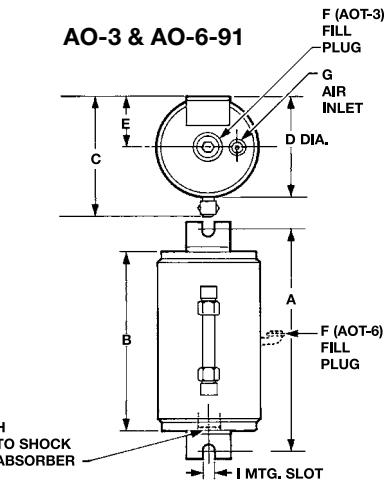
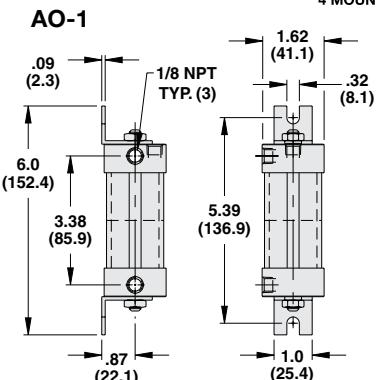
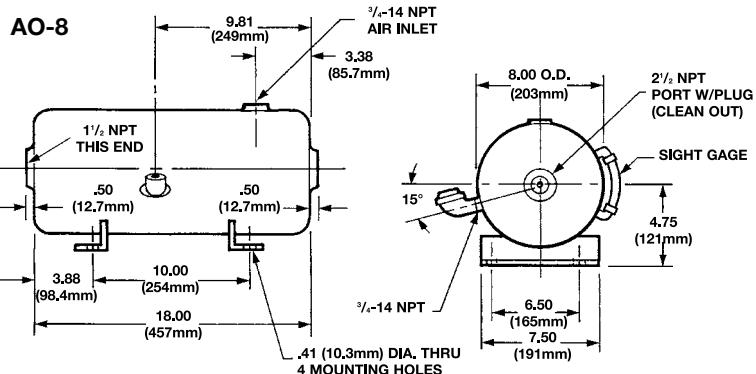
Ordering Information

CA 4 x 8 R - 5

Return Method and Accumulator Style	Bore Size	Stroke Length	Mounting Style	Effective Weight
CA = Spring Return, Internal Accumulator	4	6	-F Front Flange	-3 Light
CAA = Air Return, External Accumulator		8	-R Rear Flange	-5 Medium
CSA = Spring Return, External Accumulator		16	-RP Rear Standard	-7 Heavy
CNA = Self (Clevis) Return, Internal Accumulator			-FP Front Standard	
			-FRP Front and Rear Standard	
			-S Side Foot Mount	
			-C Clevis Mount	



Air/Oil Tanks



Capacity (Maximum)

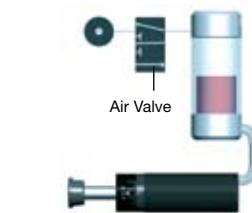
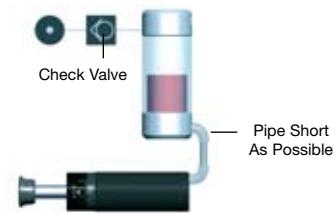
Model	Oil Temp °F (°C)	Max Pressure psi (bar)	Tank Capacity cu/in (cu/cm)	Fill Level oz. (L)	Recommended for Shock Absorber Size
AO-1	175 (79)	100 (7)	2.4 (39.32)	.6 (0.02)	MCA, MCS 33, 36, 45 MAA, MAS 33, 36, 45 MLA, MLS 33, 36, 45
AO-3	175 (79)	100 (7)	35 (573)	12.5 (0.37)	1-1/2 x 2 1-1/2 x 3-1/2 MCA, MCS *33, *36, *45, 64 MAA, MAS *33, *36, *45, 64 MLA, MLS *33, *36, *45, 64
AO-6-91	200 (93)	100 (7)	245 (4,015)	88 (2.60)	1-1/2 x 5 - 3 x 12 MCA, MCS *64 MAA, MAS *64 MLA, MLS *64
AO-8	200 (93)	100 (7)	740 (12,126)	205 (6.06)	4 x 6 - 4 x 16

*With re-circulating circuit, example 3 below.

Dimensions in inches (millimeters)

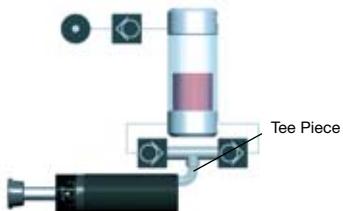
MODEL	A	B	C	D	E	F	G	H	I
AO-3	7.69 (195)	6.25 (159)	4.25 (108)	3.50 (88.9)	1.75 (44.5)	1/8-14 NPT	1/4-18 NPT	1/2-14 NPT	.41 (10.3)
AO-6	13.16 (334)	9.50 (241)	6.31 (160)	5.56 (141)	2.78 (70.6)	3/8-14 NPT	3/4-14 NPT	3/4-14 NPT	.66 (16.7)

Mounting and Circuits

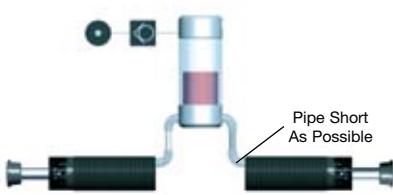


- The piston rod is immediately returned to its extended position after completing its stroke.

- Return stroke may be sequenced by pneumatic valve at any desired time. No return force until valve energized.

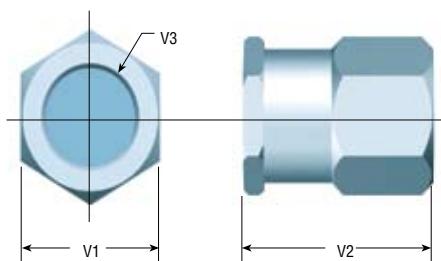


- A re-circulating cooling circuit allows warm oil to return to the tank while cool oil refills the shock absorber. A re-circulating cooling circuit substantially increases the shock absorber's hourly energy capacity.



- When connecting more than one shock absorber to an Air-Oil Tank, use caution in selecting the proper reservoir capacity. For two shock absorbers, the next largest Air-Oil Tank size is usually adequate.

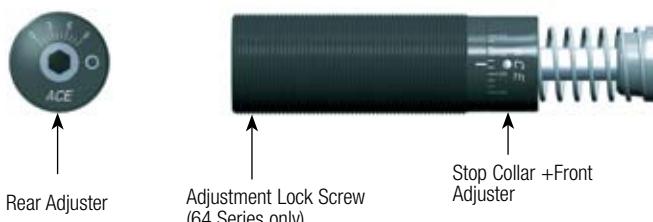
Check Valves



ACE check valves, for use with Air-Oil Tanks, are made of lightweight anodized aluminum. Dimensions below are in inches (millimeters).

Size	V1	V2	V3
CV-1/8	.75 (19.1)	.94 (23.8)	1/8-27 NPT
CV-1/4	1.125 (28.6)	1.31 (33.3)	1/4-18 NPT
CV-3/8	1.125 (28.6)	1.31 (33.3)	3/8-18 NPT
CV-1/2	1.625 (41.3)	1.56 (39.7)	1/2-14 NPT
CV-3/4	1.875 (47.6)	2.31 (58.7)	3/4-14 NPT

Mounting Hints and Operation Details



Mechanical Stop

The Magnum Series units have a built in Stop Collar (mechanical stop) which also serves as the front adjuster. If using a shock absorber without a Stop Collar it is important to install a mechanical stop 0.02 to 0.04 inches (0.5 to 1 mm) before the end of the stroke.

General Information

For optimum heat dissipation do not paint the shock absorber. For applications in environments with acids, dusts or powders, abrasives, steam or water, a reasonable effort should be made to protect the shock absorber. Consider adding the air bleed collar to select models (MC 150M, MC 225M and MC 600M). See miniature shock absorber accessories, pages 42, 43 and 44 and Installation Examples, pages 14 and 15. The shock absorber should be securely mounted onto a flat and smooth surface of adequate strength.

Self-Compensating Models

The MC Magnum Group of shock absorbers are self-compensating. Providing the effective weight on the application remains within the range given in the capacity charts then no adjustment is necessary for changes in weight, speed or propelling force. These units are available with four standard operating ranges (We min. – We max.) and are identified by the suffix number after the model which goes from -1 (very soft) up to -4 (very hard).

The optimum deceleration is achieved when there is no abrupt change in the load velocity at the beginning or the end of the shock absorber stroke. If there is a hard impact at the start of stroke use the next softer version (i.e. lower suffix number). If there is a hard setdown at the end of stroke use the next harder version, or mount two units in parallel. Alternatively change to a larger bore size unit. Contact ACE for further advice.

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Adjustable Models

The adjustment has a graduated scale from 0 to 9. The adjuster in the body has a side mounted locking screw which should be loosened (1/2 turn max.) with a hex. key before commencing adjustment. The Magnum Series units can be adjusted by the hex. socket at the rear of the body – or by rotating the front stop collar. Both adjusters are internally connected and will show the same adjustment value on the scales as they are turned. After installation cycle the equipment a few times and turn the adjustment until optimum deceleration is achieved (i.e. no abrupt change in the load velocity observed at the beginning or at the end of shock absorber stroke). The shock absorber is set at 5 when delivered. If there is a hard impact at start of stroke adjust the unit softer i.e. towards 9 on the scale. If there is a hard setdown at end of stroke adjust the unit harder i.e. towards 0. After adjustment relock the lock screw.

Adjustment approaching "0" means:

- Impact velocity is too low: consider changing to Model type ML or;
- Shock absorber selected is too small: use next larger size or mount 2 units in parallel.

Mounting Options

Basic Model



Flange Mounting



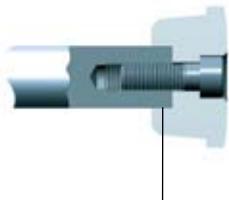
Side Foot Mounting



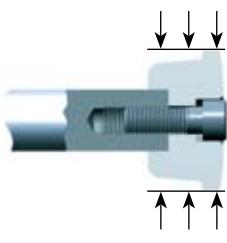
Clevis Mounting



Press fit (screw secured with loctite).

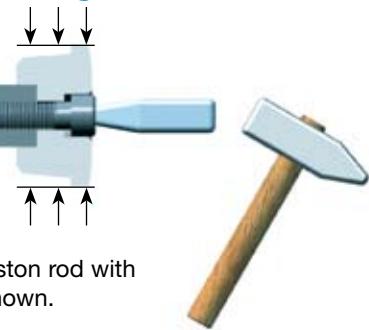


Clamp button in vice and loosen screw 3 or 4 turns.



Drive out piston rod with punch as shown.

Removing Rod End Button



Repairs

It is possible to overhaul Ace shock absorbers in sizes larger than the MC 600. We would recommend that damaged or worn shock absorbers are returned to ACE for repair. You will find that this is more economical than the comparative cost of repairing yourself. Spare parts and seal kits etc. are available, if required.



ACE Controls Inc. · 800-521-3320 · (248) 476-0213 · Fax (248) 476-2470 · www.acecontrols.com · email: shocks@acecontrols.com



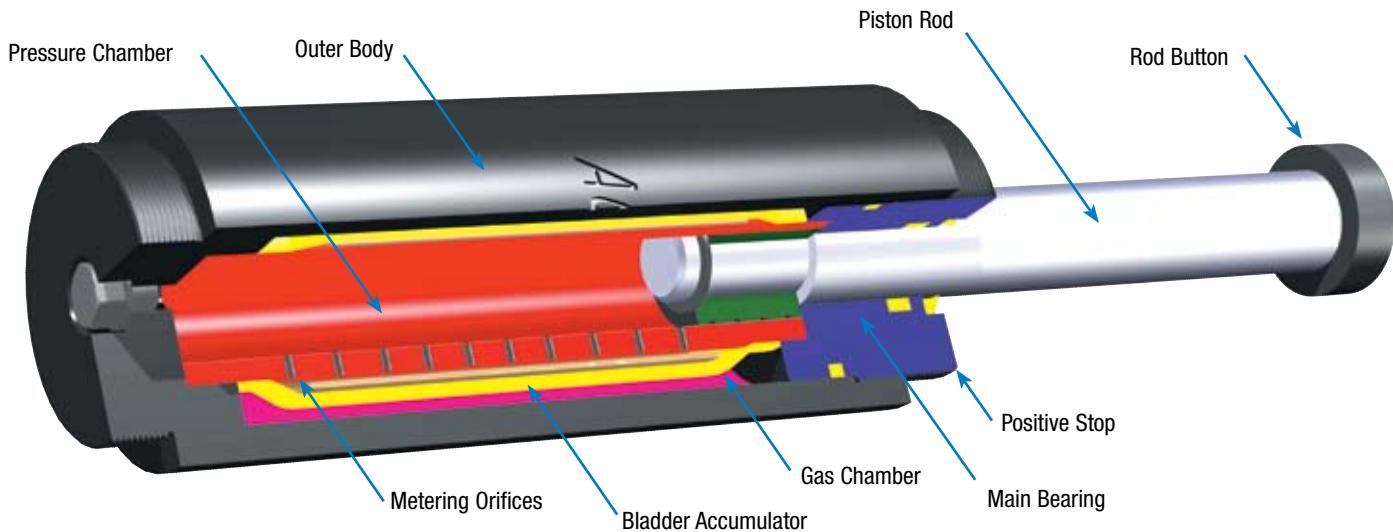
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ACE Stacker Crane Shock Absorbers (SCS Series) are designed primarily for **emergency applications** to improve the performance and safe operation of equipment such as **automated storage and retrieval systems**. During normal operation, the shock absorbers are required to provide only minimal resistance, but are designed to function under full load conditions when necessary. In an emergency condition, when the velocity of the system carriage or trolley is greater than normal, the SCS shock absorber responds to protect the installation by providing controlled deceleration.

In the normal ready condition the piston rod is fully extended. When the impacting load strikes the absorber, the hydraulic oil behind the piston is forced out through a series of metering orifices. The number of metering orifices in action reduces proportionally through the stroke and the load velocity is thereby smoothly reduced to zero. The internal pressure and thus the reaction force remains constant throughout the entire stroke length. The displaced oil is stored in the bladder accumulator. The integrated gas chamber, containing low pressure nitrogen, provides the return force to reset the rod to its extended position and functions as an accumulator for the hydraulic oil displaced during operation.

Applications include: automated storage and retrieval systems, automotive manufacturing and production equipment, theme park rides, and small overhead cranes.

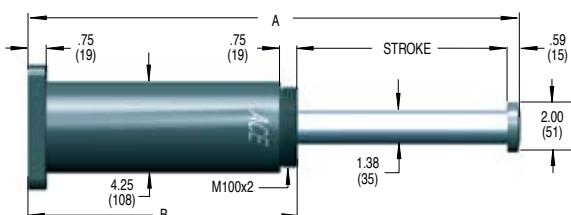
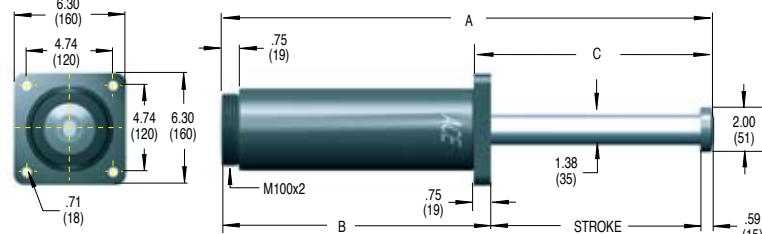
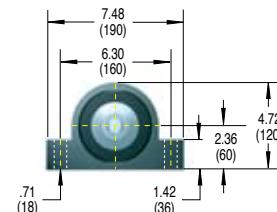
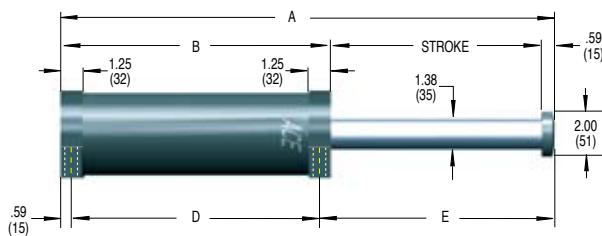
SCS-38 to 63



Ordering Information

SCS-38-200-F- -X

SCS Series	Bore Diameter (mm)	Stroke Length (mm)	Flange Location	Application Number	Specials
Stacker Crane Shock Absorbers	38	50	F Front Flange		Environmental Finish
	50	100	R Rear Flange		Custom Flanges
	63	150	S Side Mount		Fluid
		200			
		250			
		300			
		800			
		1000			
		1200			

Rear Flange**Front Flange****Side Mount****Dimensions in inches (millimeters)**

Model	Stroke	A	B	C	D	E	Energy per Cycle in lbs (kNm)	Effective Weight		Shipping Weight lbs (kg)	
								E ₃	We	Range lbs (kg)	F&R lbs (kg)
SCS-38-50	1.97 (50)	10.63 (270)	8.07 (205)	3.31 (84)	6.89 (175)	3.15 (80)	32,000 (3.6)	750-19,600 (340-8,900)		27.3 (12.4)	29.1 (13.2)
SCS-38-100	3.94 (100)	14.57 (370)	10.04 (255)	5.28 (134)	8.77 (225)	5.21 (132)	64,000 (7.2)	1,500-39,200 (680-17,800)		32.0 (14.5)	33.8 (15.4)
SCS-38-150	5.91 (150)	18.50 (470)	12.01 (305)	7.24 (184)	10.83 (275)	7.08 (180)	96,000 (10.8)	2,250-58,900 (1,020-26,700)		35.9 (16.3)	37.8 (17.1)
SCS-38-200	7.87 (200)	22.44 (570)	13.98 (355)	9.21 (234)	12.80 (325)	9.05 (230)	127,000 (14.4)	3,000-78,500 (1,360-35,600)		39.9 (18.1)	41.7 (18.9)
SCS-38-250	9.84 (250)	26.38 (670)	15.94 (405)	11.18 (284)	14.77 (375)	11.02 (280)	159,000 (18.0)	3,750-97,900 (1,700-44,400)		43.8 (19.9)	45.6 (20.7)
SCS-38-300	11.81 (300)	30.91 (785)	18.50 (470)	13.15 (334)	17.33 (440)	12.99 (330)	191,000 (21.6)	4,500-117,500 (2,040-53,300)		48.9 (22.2)	50.7 (23.0)
SCS-38-350	13.78 (350)	34.84 (885)	20.47 (520)	15.12 (384)	19.29 (490)	14.96 (380)	223,000 (25.2)	5,250-137,100 (2,380-62,200)		52.8 (23.9)	54.6 (24.8)
SCS-38-400	15.75 (400)	39.37 (1,000)	23.03 (585)	17.09 (434)	21.85 (555)	16.93 (430)	255,000 (28.8)	6,000-156,700 (2,720-711,000)		57.9 (26.2)	59.7 (27.1)
SCS-38-500	19.69 (500)	47.83 (1,215)	27.56 (700)	21.02 (534)	26.38 (670)	20.56 (530)	319,000 (36.0)	7,500-196,000 (3,400-88,900)		66.9 (30.3)	68.7 (31.2)
SCS-38-600	23.62 (600)	56.30 (1,430)	32.09 (815)	24.96 (634)	30.91 (785)	24.80 (630)	382,000 (43.2)	8,990-235,200 (4,080-106,700)		75.9 (34.4)	77.7 (35.3)
SCS-38-700	27.56 (700)	64.76 (1,645)	36.61 (930)	28.90 (734)	35.43 (900)	28.74 (730)	446,000 (50.4)	10,490-274,300 (4,760-124,400)		84.9 (38.5)	86.7 (39.3)
SCS-38-800	31.50 (800)	73.23 (1,860)	41.14 (1,045)	32.83 (834)	39.97 (1,015)	32.67 (830)	510,000 (57.6)	11,990-313,500 (5,440-142,200)		93.9 (42.6)	95.7 (43.4)

Technical Data**Maximum force:** 18,000 lbs (80 kN)**Impact velocity range:** 3-15 ft/sec (0.9 to 4.6 m/s)**Minimum return force:** 45 lbs. (0.2 kN)**Operating temperature:** 10° to 150°F (-12°C to 66°C)
(Consult factory for optional ranges).**Mechanical stop:** Integral mechanical stop is built into the front of all units.

Custom environmental protection options of paint, plating, rod bellows, etc. are available. Consult factory for your specific needs.

Note: Buttons are standard on all stacker crane shock absorbers.

Oil type: ATF

All stacker crane shock absorbers have special orifice designs and must be sized per application.