SCS33 to SCS64

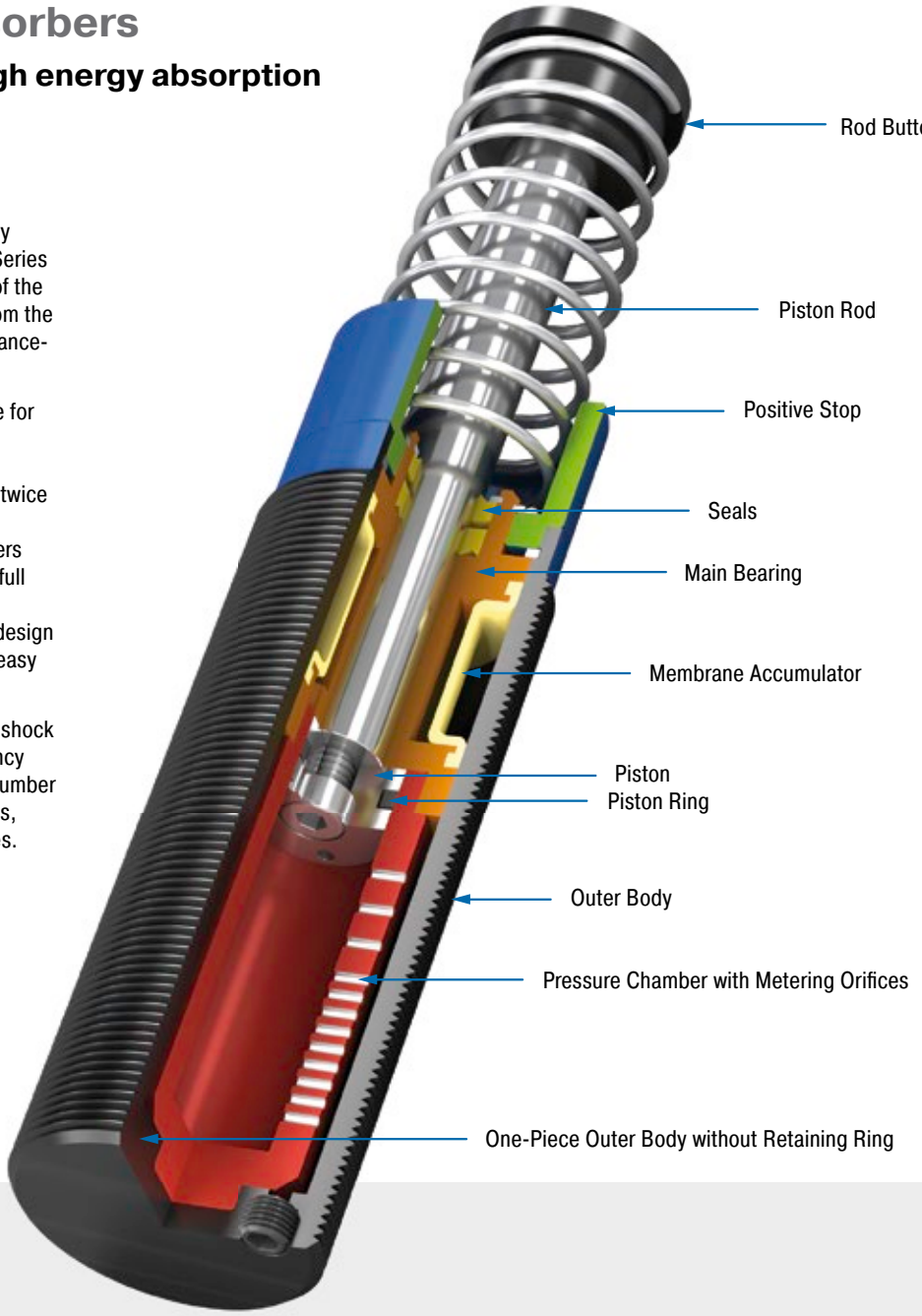
Safety Shock Absorbers

Industry design with high energy absorption

Effective emergency stop: The ACE safety shock absorbers from the SCS33 to 64 Series are based on the innovative technology of the successful industrial shock absorbers from the MAGNUM-Series. They are also maintenance-free and ready-to-install.

Due to the optimised characteristic curve for the respective application, the energy absorption of these hydraulic machine elements can be increased to more than twice the level of the MAGNUM model of ACE industrial shock absorber per stroke. Users benefit from a service life of up to 1,000 full load emergency cycles with a very good price-performance ratio. Their compact design in sizes M33x1.5 to M64x2 makes them easy to integrate into current applications.

These slimline, high-performance safety shock absorbers are only designed for emergency stop situations. They can be used for a number of tasks in gantries and conveyor systems, processing centres or assembly machines.



Technical Data

Energy capacity: 310 Nm/Cycle to 18,000 Nm/Cycle

Impact velocity range: 0.02 m/s to 5 m/s. Other speeds on request.

Operating temperature range: -12 °C to +66 °C. Other temperatures on request.

Mounting: In any position

Positive stop: Integrated

Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel; Accessories: Steel corrosion-resistant coating

Damping medium: Automatic Transmission Fluid (ATF)

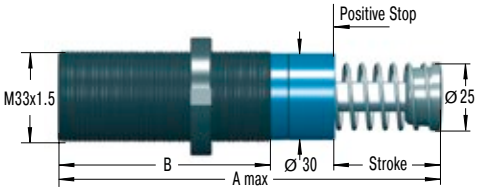
Application field: Finishing and processing centres, Conveyor systems, Portal systems, Test stations

Note: The shock absorber can be pushed through its stroke. In creep speed conditions the shock absorber provides minimal resistance and there is no braking effect.

On request: Special oils, special flanges etc.

Issue 08.2016 – Specifications subject to change

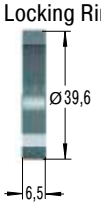
SCS33EU



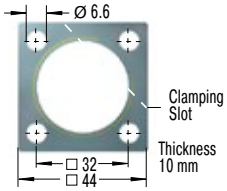
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Accessories

NM33
Locking Ring

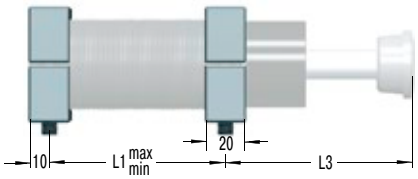


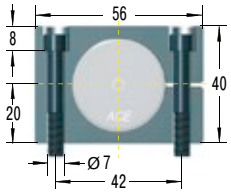
QF33
Square Flange



Torque max.: 11 Nm
Clamping torque: > 90 Nm
Install with 4 machine screws

S33
Side Foot Mounting Kit





S33 = 2 flanges + 4 screws M6x40, DIN 912
Torque max.: 11 Nm
Clamping torque: 90 Nm
Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SCS33-50EU-1xxxx**

Safety Shock Absorber
Thread Size M33
Max. Stroke without Positive Stop 50 mm
EU Compliant
Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

Performance and Dimensions

	Max. Energy Capacity											
TYPES	W_3 Self-compensating Nm/cycle	W_3 Optimised Nm/cycle	Return force min. N	Return force max. N	Stroke mm	A max. mm	B mm	L1 min. mm	L1 max. mm	L3 mm	[1] Side Load Angle max. °	Weight kg
SCS33-25EU	310	500	45	90	23.2	138	83	25	60	68	3	0.45
SCS33-50EU	620	950	45	135	48.6	189	108	32	86	93	2	0.54

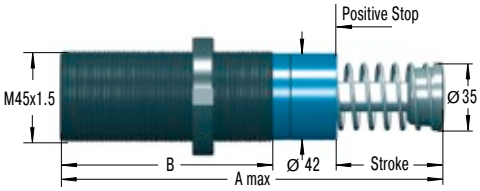
[1] The values are reduced by 20 % at max. side load angle.

Issue 08.2016 – Specifications subject to change

Safety Shock Absorbers SCS45EU

Self-Compensating or Optimized Characteristic

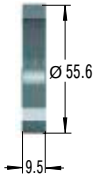
SCS45EU



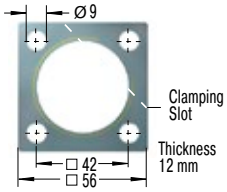
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Accessories

NM45
Locking Ring

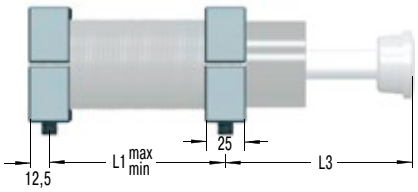


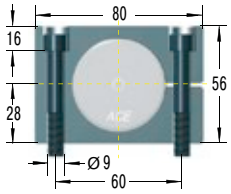
QF45
Square Flange



Torque max.: 27 Nm
Clamping torque: > 200 Nm
Install with 4 machine screws

S45
Side Foot Mounting Kit





S45 = 2 flanges + 4 screws M8x50, DIN 912
Torque max.: 27 Nm
Clamping torque: 350 Nm
Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SCS45-50EU-1xxxx**

Safety Shock Absorber
Thread Size M45
Max. Stroke without Positive Stop 50 mm
EU Compliant
Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

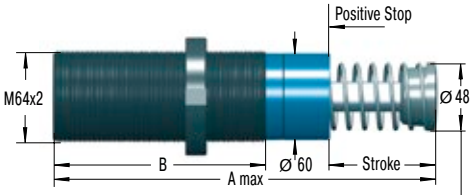
Performance and Dimensions

TYPES	Max. Energy Capacity W_3 Self-compensating Nm/cycle	Max. Energy Capacity W_3 Optimised Nm/cycle	Return force min. N	Return force max. N	Stroke mm	A max. mm	B mm	L1 min. mm	L1 max. mm	L3 mm	[1] Side Load Angle max. °	Weight kg
SCS45-25EU	680	1,200	70	100	23.1	145	95	32	66	66	3	1.13
SCS45-50EU	1,360	2,350	70	145	48.5	195	120	40	92	91	2	1.36
SCS45-75EU	2,040	3,500	50	180	73.9	246	145	50	118	116	1	1.59

[1] The values are reduced by 20 % at max. side load angle.

Issue 08.2016 – Specifications subject to change

SCS64EU

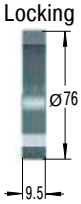


Note: 150 mm stroke model does not include stop collar and positive stop is provided by the rod button (Ø 60 mm)

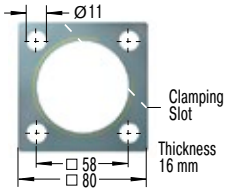
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Accessories

NM64
Locking Ring

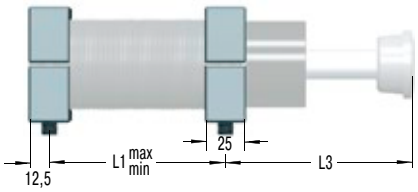


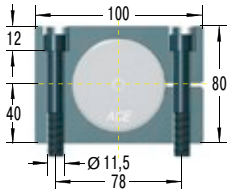
QF64
Square Flange



Torque max.: 50 Nm
Clamping torque: > 210 Nm
Install with 4 machine screws

S64
Side Foot Mounting Kit





S64 = 2 flanges + 4 screws M10x80, DIN 912
Torque max.: 50 Nm
Clamping torque: 350 Nm
Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SCS64-50EU-1xxxx**

Safety Shock Absorber
Thread Size M64
Max. Stroke without Positive Stop 50 mm
EU Compliant
Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

Performance and Dimensions

TYPES	Max. Energy Capacity W_3 Self-compensating Nm/cycle	Max. Energy Capacity W_3 Optimised Nm/cycle	Return force min. N	Return force max. N	Stroke mm	A max. mm	B mm	L1 min. mm	L1 max. mm	L3 mm	[1] Side Load Angle max. °	Weight kg
SCS64-50EU	3,400	6,000	90	155	48.6	225	140	50	112	100	3	2.9
SCS64-100EU	6,800	12,000	105	270	99.4	326	191	64	162	152	2	4.2
SCS64-150EU	10,200	18,000	75	365	150.0	450	241	80	212	226	1	5.1

[1] The values are reduced by 20 % at max. side load angle.

Issue 08.2016 – Specifications subject to change

Permitted Use

ACE safety shock absorbers are machine elements to brake moving masses in a defined end position in emergency stop situations for axial forces. The safety shock absorbers are not designed for regular operational usage.

Calculation of safety shock absorbers

The calculation of safety shock absorbers should generally be performed or checked by ACE.

Deceleration Properties

The orifice sizing and drill pattern in the pressure chamber are individually designed for each safety shock absorber. The respective absorption characteristic is optimised corresponding to the maximum mass that occurs in the emergency stop and the impact speed. Correspondingly, each safety shock absorber is given an individual identification number.

Model Code

For types SCS33 to 64, the individual five-digit identification numbers can be taken from the last digits of the shock absorber model code shown on the label. Example: SCS33-50EU-1XXXX. For type series SDH38 to SDH63 and SDP63 to SDP160, the identification number is a five digit number. Example: SDH38-400EU-F-XXXXX. In addition to the model code, the label also shows the authorised maximum impact velocity and maximum authorised impact mass for the unit.

Mounting

To mount the shock absorber, we recommend the use of original ACE mounting accessories shown in catalogue.

The mounting of each shock absorber must be exactly positioned so that the reaction force (Q) can be adequately transmitted into the mounting structure.

ACE recommends installation via the front flange -F mounting style that ensures the maximum protection against buckling. The damper must be mounted so that the moving loads are decelerated with the least possible side loading to the piston rod. The maximum permissable side load angles are detailed in our current catalogue.

The entire stroke length must be used for deceleration because only using part of the stroke can lead to overstressing and damage to the unit.

Mounting style **front flange**

Safety Shock Absorber SDH

Safety Shock Absorber SDP

Environmental Requirements

The permissible **temperature range** for each shock absorber type can be found in our current catalogue.
Caution: Usage outside the specified temperature range can lead to premature breakdown and damage of of the shock absorbers which can then result in severe system damage or machine failures.

Trouble free operation outdoors or in damp environments is only warranted if the dampers are coated with a specific corrosion protection finish.

Initial Start-Up Checks

First impacts on the shock absorber should only be tried after correctly mounting and with reduced impact speeds and – if possible – with reduced load. Differences between calculated and actual operating data can then be detected early on, and damage to your system can be avoided. If the shock absorbers were selected on calculated data that does not correspond to the maximum possible loading (i.e. selection based on drive power being switched off or at reduced impact speed) then these restricted impact conditions must not be exceeded during initial testing or subsequent use of the system. Otherwise you risk damaging the shock absorbers and/or your machine by overstressing materials. After the initial trial check that the piston rod fully extends again and that there are no signs of oil leakage. Also check that the mounting hardware is still securely tightened. You need to satisfy your- self that no damage has occurred to the piston rod, the body, or the mounting hardware.

Fixed Mechanical Stop

Safety shock absorbers do not need an external stop as a stroke limiter. The stroke of the safety absorber is limited by the stop of the impact head on the shock absorber. For types SCS33 to SCS64, the fixed stop point is achieved with the integrated stop collar.

What Needs to be Checked after a Full Load Impact?

Safety shock absorbers that were originally checked only at reduced speed or load need to be checked again after a full load impact (i.e. emergency use) has occurred. Check that the piston rod fully extends to its full out position, that there are no signs of oil leakage and that the mounting hardware is still securely fixed. You need to satisfy yourself that no damage has occurred to the piston rod, the body, or the mount- ing hardware. If no damage has occurred, the safety shock absorber can be put back into normal operation (see **initial start-up**).

Maintenance

Safety shock absorbers are sealed systems and do not need special maintenance. Safety shock absorbers that are not used regularly (i.e. that are intended for emergency stop systems) should be checked within the normal time frame for safety checks, but **at least once a year**. At this time special attention must be paid to checking that the piston rod resets to its fully extended position, that there is no oil leakage and that the mounting brackets are still secure and undamaged. The piston rod must not show any signs of damage. Safety shock absorbers that are **in use regularly** should be checked **every three months**.

Repair Notice

If any damage to the shock absorber is detected or if there are any doubts as to the proper functioning of the unit please send the unit for service to ACE. Alternatively contact your local ACE office for further advice.

Detailed information on the above listed points can be taken from the corresponding operating and assembly instructions.

Issue 08.2016 – Specifications subject to change

Calculation Bases for the Design of Safety Shock Absorbers

More formulae on page 10 to 13

ACE shock absorbers provide linear deceleration and are therefore superior to other kinds of damping element. It is easy to calculate around 90 % of applications knowing only the following four parameters:

1. Mass to be decelerated (weight)	**m**	**[kg]**
2. Impact velocity at shock absorber	**v_D**	**[m/s]**
3. Propelling force	**F**	**[N]**
4. Number of absorbers in parallel	**n**	

Key to symbols used

W_1	Kinetic energy per cycle	Nm	^2v_D	Impact velocity at shock absorber	m/s
W_2	Propelling force energy per cycle	Nm	F	Propelling force	N
W_3	Total energy per cycle ($W_1 + W_2$)	Nm	c	Cycles per hour	1/hr
$^1W_4$	Total energy per hour ($W_3 \cdot x$)	Nm/hr	s	Shock absorber stroke	m
me	Effective weight	kg	Q	Reaction force	N
m	Mass to be decelerated	kg	t	Deceleration time	s
n	Number of shock absorbers (in parallel)		a	Deceleration	m/s^2
^2v	Velocity at impact	m/s			

[1] All mentioned values of W4 in the capacity charts are only valid for room temperature. There are reduced values at higher temperature ranges.

[2] v or v_D is the final impact velocity of the mass. With accelerating motion the final impact velocity can be 1.5 to 2 times higher than the average. Please take this into account when calculating kinetic energy.

In all the following examples the choice of shock absorbers made from the capacity chart is based upon the values of (W_3), (W_4), (me) and the desired shock absorber stroke (s).

Note: When using several shock absorbers in parallel, the values (W_3), (W_4) and (me) are divided according to the number of units used.

Application	Formulae	Example
19 Wagon against 2 shock absorbers	$W_1 = m \cdot v^2 \cdot 0.25$ $W_2 = F \cdot s$ $W_3 = W_1 + W_2$ $v_D = v \cdot 0.5$	m = 5000 kg v = 2 m/s F = 3500 N s = 0.10 m (chosen)
20 Wagon against wagon	$W_1 = \frac{m_1 \cdot m_2}{(m_1+m_2)} \cdot (v_1+v_2)^2 \cdot 0.5$ $W_2 = F \cdot s$ $W_3 = W_1 + W_2$ $v_D = v_1 + v_2$	m = 7000 kg v_1 = 1.2 m/s m_2 = 10000 kg v_2 = 0.5 m/s F = 5000 N s = 0.10 m (chosen)
21 Wagon against wagon 2 shock absorbers	$W_1 = \frac{m_1 \cdot m_2}{(m_1+m_2)} \cdot (v_1+v_2)^2 \cdot 0.25$ $W_2 = F \cdot s$ $W_3 = W_1 + W_2$ $v_D = \frac{v_1 + v_2}{2}$	m = 7000 kg v_1 = 1.2 m/s m_2 = 10000 kg v_2 = 0.5 m/s F = 5000 N s = 0.10 m (chosen)

Example			
19	$W_1 = 5000 \cdot 2^2 \cdot 0.25$	= 5000	Nm
	$W_2 = 3500 \cdot 0.10$	= 350	Nm
	$W_3 = 5000 + 350$	= 5350	Nm
	$v_D = 2 \cdot 0.5$	= 1	m/s
	Chosen from capacity chart: Model SDH38-100EU self-compensating		
20	$W_1 = \frac{7000 \cdot 10000}{(7000+10000)} \cdot 1.7^2 \cdot 0.5$	= 5950	Nm
	$W_2 = 5000 \cdot 0.10$	= 500	Nm
	$W_3 = 5950 + 500$	= 6450	Nm
	$v_D = 1.2 + 0.5$	= 1.7	m/s
	Chosen from capacity chart: Model SDH50-100EU self-compensating		
21	$W_1 = \frac{7000 \cdot 10000}{(7000+10000)} \cdot 1.7^2 \cdot 0.25$	= 2975	Nm
	$W_2 = 5000 \cdot 0.10$	= 500	Nm
	$W_3 = 2975 + 510$	= 3475	Nm
	$v_D = (1.2 + 0.5) : 2$	= 0.85	m/s
	Chosen from capacity chart: Model SDH38-100EU self-compensating		

Issue 08.2016 – Specifications subject to change