Automation Control Equipment

Viscoelastic Shock Absorbers

ACE: Your partner for industrial shock absorbers,
gas springs and vibration control

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VS-BA1, VS-BA5, VS-BXLR, VS-BALR

Simple Design – High reliability

Energy capacity 0.1 kJ/cycle bis 1,000 kJ/cycle
Stroke 12 mm to 1,300 mm

The self-adjusting Viscoelastic Shock Absorbers are designed on the principals of hydrostatic compression to combine the funtions of a shock absorber and a spring.

The advantages are a high damping coefficient, a low sensitivity to temperature changes and increased security by integrated static preload.

Viscoelastic shock absorbers are being used across a wide range of applications within heavy industry. Examples include, Material Handling, Rolling Mills, Defense, Waterways and Paper production.

Technical Data

Energy capacity: 0.1 kJ/cycle to 1,000 kJ/cycle

Stroke: 12 mm to 1,300 mm

Impact velocity range: 0.5 m/s bis 5 m/s. Other speeds on request.

Dynamic force: 6 kN bis1,100 kN

Static force: 6.5 kN bis 740 kN

Operating temperature range: -20 °C to +50 °C. Other temperatures on request.

Mounting: In any position

Positive stop: Integrated

Material: VS-BA1: Outer body and Piston Rod: zinc plated steel

VS-BA5, VS-BXLR, VS-BALR: Outer body and rod end button: zinc plated steel or painted grey; Piston Rod: zinc plated steel

Damping medium: Visco elastic fluid

Application field: Industry, Material Handling, Rolling Mill, Defense, Waterways, Paper Industries

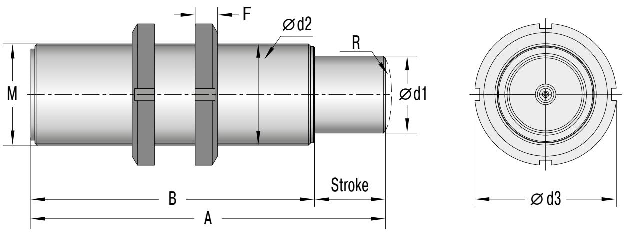
Note: The shock absorber can be pushed through its stroke. In creep speed conditions the shock absorber provides minimal resistance and there is no braking effect.

On request: special designs

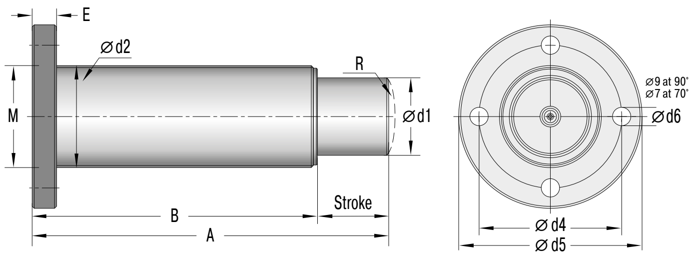
Issue 01.2019 – Specifications subject to change

VS-BA1

VS-BA1-Fc Front Flange



VS-BA1-Fa Rear Flange



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

Dimensions

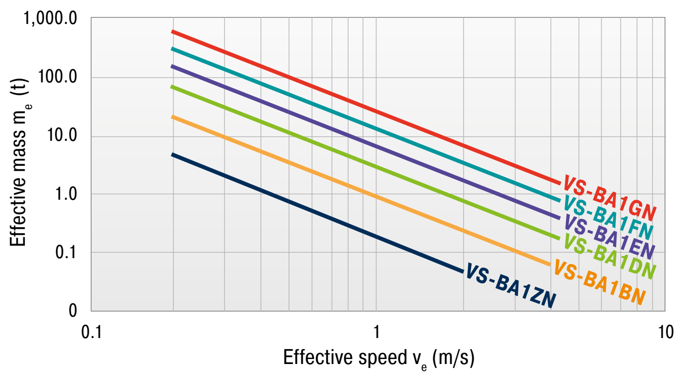
TYPES	Stroke mm	A mm	B mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	d6 mm	E mm	F mm	M mm	R mm
VS-BA1ZN	12	75	53	19	20	38	41	57	7	10	7	M25x1.5	/
VS-BA1BN	22	120	98	25	32	52	60	80	9	12	8	M35x1.5	/
VS-BA1DN	35	175	140	38	45	70	70	90	9	12	11	M50x1.5	/
VS-BA1EN	45	213	168	60	72	98	100	122	11	10	13	M75x2	130
VS-BA1FN	60	270	210	74.5	90	120	120	150	13	12	16	M90x2	150
VS-BA1GN	80	337	257	90	110	143	143	175	18	14	19	M110x2	350

Performance

TYPES	Max. Energy Capacity W_3 kJ/cycle	Dynamic force min. kN	Dynamic force max. kN	Static force max. kN
VS-BA1ZN	0.1	6	11	6.5
VS-BA1BN	0.43	14	27	19.5
VS-BA1DN	1.5	28	60	40
VS-BA1EN	3.4	45	100	65
VS-BA1FN	7	90	150	94
VS-BA1GN	14	100	230	173

Complete details required when ordering

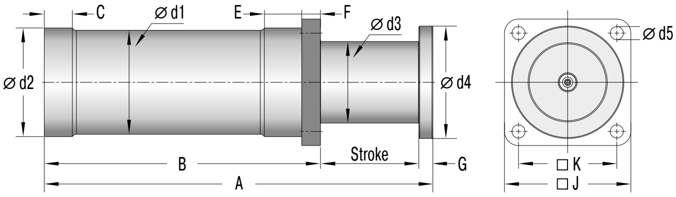
Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: HM (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n
Flange Mounting: -Fa
-Fc (incl. two locknuts)



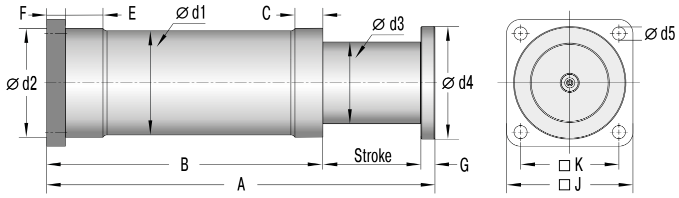
Issue 01.2019 – Specifications subject to change

VS-BA5

VS-BA5-Fc Front Flange



VS-BA5-Fa Rear Flange



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

Dimensions

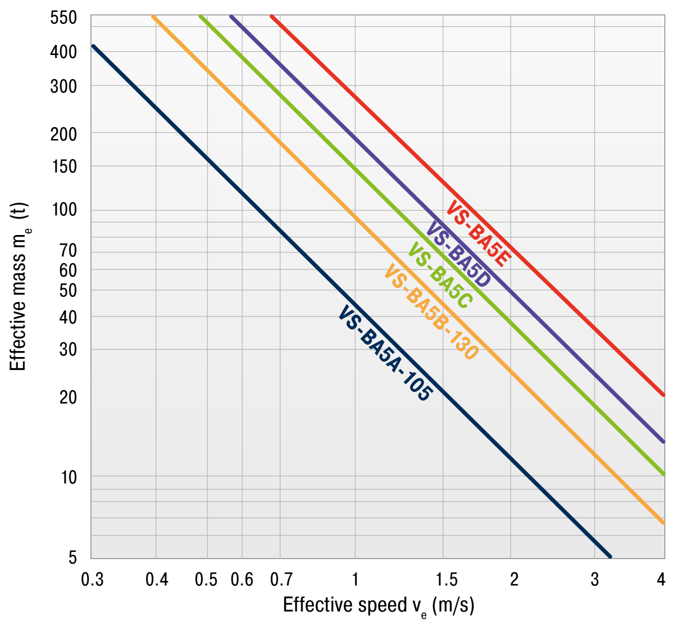
TYPES	Stroke mm	A mm	B mm	C mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	E mm	F mm	G mm	J mm	K mm
VS-BA5A-105	105	415	295	30	111	116	87	120	14	60	20	15	135	105
VS-BA5B-130	130	500	395	39	139	142	117	140	15	60	30	15	155	125
VS-BA5C	140	520	345	36	154	160	132	158	18	35	30	35	175	140
VS-BA5D	160	585	385	40	175	180	152	180	22	40	35	40	215	170
VS-BA5E	180	670	445	45	208	215	182	220	26	85	40	45	250	195

Performance

	Max. Energy Capacity			
TYPES	W_3 kJ/cycle	Dynamic force min. kN	Dynamic force max. kN	Static force max. kN
VS-BA5A-105	25	167	310	174
VS-BA5B-130	50	260	500	290
VS-BA5C	68	350	700	495
VS-BA5D	100	420	820	550
VS-BA5E	150	650	1,100	740

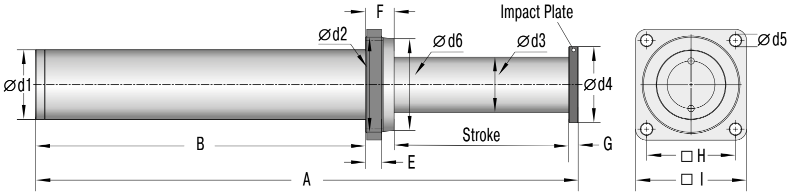
Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: HM (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n
Flange Mounting: -Fa
-Fc

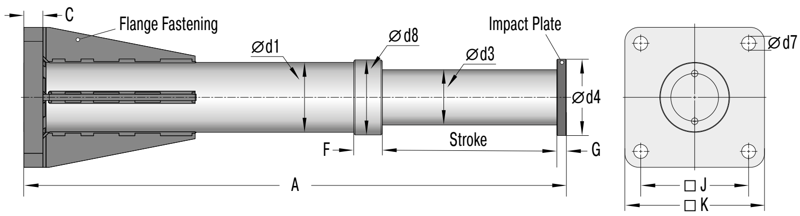


VS-BXLR

VS-BXLR-Fc Front Flange



VS-BXLR-Fa Rear Flange



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

Dimensions

TYPES	Stroke [1] mm	A mm	B mm	C mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	d6 mm	d7 mm	d8 mm	E mm	F mm	G mm	I mm	K mm	H mm	J mm
VS-BXLR6-150	150	410	231	-	50	90	38	50	9	-	-	-	19	19	10	90	-	70	-
VS-BXLR12-150	150	480	285	20	75	90	57	80	11	85	17	85	18	33	12	110	125	85	90
VS-BXLR25-200	200	620	370	20	90	110	72	100	14	100	19	95	20	38	12	135	160	105	120
VS-BXLR50-275	275	855	520	30	110	150	87	120	18	145	22	118	25	45	15	175	220	140	170
VS-BXLR50-400	400	980	520	30	110	150	87	120	18	145	22	118	25	45	15	175	220	140	170
VS-BXLR100-400	400	1370	910	35	110	150	87	120	18	145	22	118	25	45	15	175	260	140	210

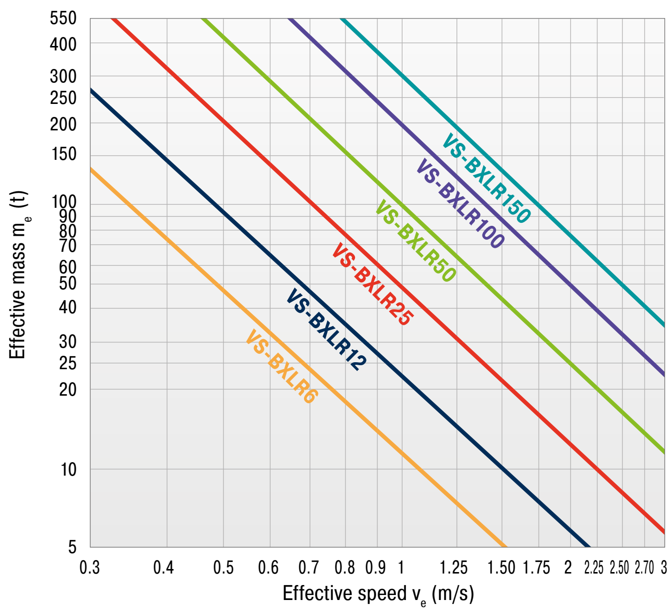
[1] From Stroke 400 Flange Mounting Fa only on request.

Performance

TYPES	Max. Energy Capacity W_3 kJ/cycle	Dynamic force min. kN	Dynamic force max. kN	Static force max. kN
VS-BXLR6-150	6	25	50	27.5
VS-BXLR12-150	12	66	100	54
VS-BXLR25-200	25	95	150	95
VS-BXLR50-275	50	118	230	165
VS-BXLR50-400	50	75	150	104
VS-BXLR100-400	100	175	320	224

Complete details required when ordering

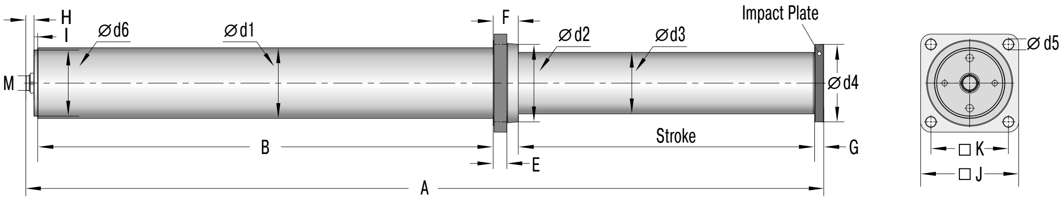
Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: HM (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n
Flange Mounting: -Fa
-Fc



Issue 01.2019 – Specifications subject to change

VS-BALR

VS-BALR-Fc Front Flange



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

Dimensions

TYPES	Stroke[1] mm	A mm	B mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	d6 mm	E mm	F mm	G mm	H mm	I mm	J mm	K mm	M mm
VS-BALR-100	400	1,120	636	130	145	109.3	140	18	119	25	45	15	16	8	175	140	M25x1.5
VS-BALR-150	500	1,350	751	140	170	120	150	22	130	25	55	20	16	8	215	170	M28x1.5
VS-BALR-250	650	1,750	999	155	170	135	170	22	145	30	55	20	18	8	215	170	M32x1.5
VS-BALR-400	850	2,185	1232	175	220	150	190	27	156	35	60	25	18	8	265	210	M35x1.5
VS-BALR-600	1,050	2,555	1392	200	220	175	215	27	185	35	60	25	18	10	265	210	M40x1.5
VS-BALR-800	1,200	2,935	1600	220	250	190	235	30	200	37	75	30	20	10	300	240	M42x1.5
VS-BALR-1000	1,300	3,225	1790	230	250	205	248	30	215	40	75	30	20	10	300	240	M48x1.5

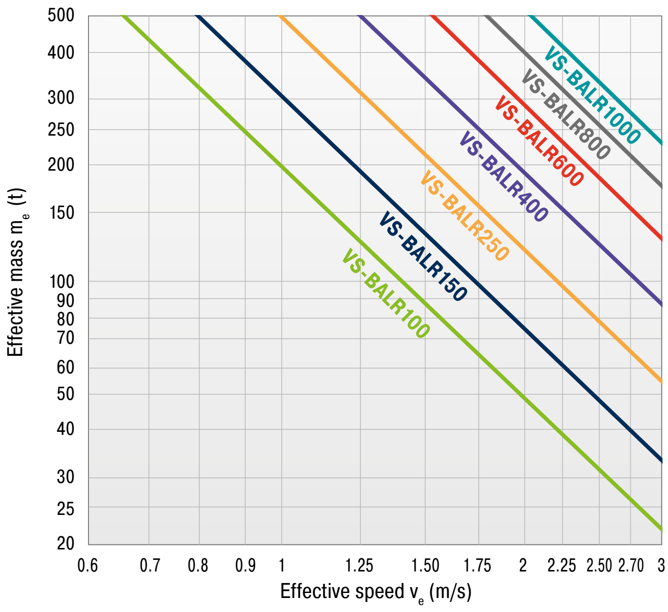
[1] From Stroke 1,050 Flange Mounting Fc only on request.

Performance

TYPES	Max. Energy Capacity W_3 kJ/cycle	Dynamic force min. kN	Dynamic force max. kN	Static force max. kN
VS-BALR-100	100	190	310	230
VS-BALR-150	150	200	390	300
VS-BALR-250	250	270	490	375
VS-BALR-400	400	340	600	425
VS-BALR-600	600	390	600	-
VS-BALR-800	800	430	860	620
VS-BALR-1000	1,000	500	1,000	725

Complete details required when ordering

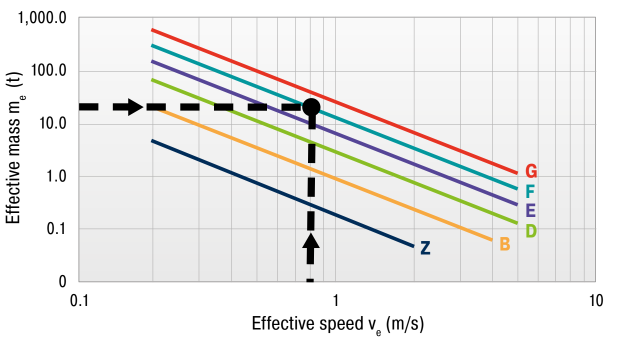
Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: HM (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n
Flange Mounting: -Fc



Calculation Bases for the Design of Viscoelastic Shock Absorbers

Calculation steps 4 to 6 apply only to damper type VS-BA1FN.
Please contact ACE for detailed calculations for other dampers.

1 Selection chart



2 Effective energy calculation

$$W_1 = ½ mv_2$$

3 Allowable impact frequency

$$W_4 = W_3 \cdot x$$

4 Effective stroke calculation

$$H_e = H \left(\sqrt{\frac{W_1}{W_n\,(0.03\,v + 0.24)}} + 1.36 - 1.17 \right)$$

5 Effective reaction force Q calculation

$$Q = \left[\left(\frac{Q\,max - Q0}{H} \right) xC_e + Qo \right] (0.1v + 0.8)$$

6 Application example

Given data:

Effective mass	me = 15 t
Effective speed	v = 0.8 m/s
Impact frequency	x = 25 1/h

1. Selection chart gives VS-BA1FN
   The mechanical characteristics are:
   W_1 = 7 kJ
   H = 60 mm
   Qmax = 150 kN
   Q0 = 90 kN

2. An energy of W_3 = 4.8 kNm must be absorbed per stroke

3. Maximal frequency is <20x7/4.8

4. The effective stroke s_e amounts to 49 mm

$$60 \left(\sqrt{\frac{4.8}{7(0.03x0.8 + 0.24)}} + 1.36 - 1.17 \right)$$

5. Q = [(150-90) x (49/60)+90] x (0.1x0.8+0.8)=122 kN

All performance characteristics can be modified.

Please advise us of your specific requirements.

T +49 (0)2173 - 9226-4100

Viscoelastic Springs

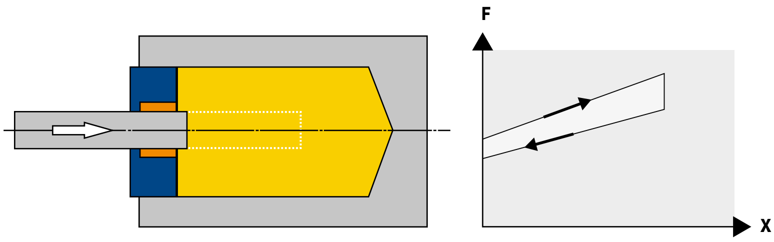
Extremely compact – High energy storing

The self-adjusting Viscoelastic Springs are designed on the principals of hydrostatic compression to act as high energy storing device.

The advantages are greater reliability, extremely compact design and an easy installation.

Viscoelastic Springs are being used for work rolls of the steel industry.

Additional information available upon request.



Technical Data

Operating temperature range: -20 °C to +50 °C. Other temperatures on request.

Mounting: In any position

Positive stop: Integrated

Material: Steel or stainless steel

Damping medium: Visco elastic fluid

Application field: Rolling mills, Hot strip mills, Cold strip mills, Skin pass mills, Tin mills, Temper mills, Plate mills, Slab/Bloom mills, Bar mills, Rod mills, Sluices, Ports

ACE Germany
The shortest way to the perfect shock absorber

ACE Stoßdämpfer GmbH

PO Box 1510
40740 Langenfeld

Albert-Einstein-Straße 15
40764 Langenfeld

Germany

T +49 (0)2173 - 9226-10
F +49 (0)2173 - 9226-19

info@ace-int.eu
www.ace-ace.com

Global but always near
International ACE Sales Locations

GREAT BRITAIN
ACE Fabreeka UK
Unit 404 Easter Park, Haydock Lane
Haydock, WA11 9TH, U.K.
T +44 (0)1942 - 727 440
F +44 (0)1942 - 717 273
www.ace-controls.co.uk

JAPAN
ACE Controls Japan L.L.C.
City Center Bldg. II 2fl
3-1-42, Chigasaki-minami, Tsuzuki-ku
Yokohama, 224-0037, Japan
T +81 (0)45 - 945-0123
F +81 (0)45 - 945-0122
www.acecontrols.co.jp

P.R. CHINA
ACE Controls
No. 8 Longxiang Road, Wujin National High-tech Industrial Zone,
Changzhou, Jiangsu Province, CN-213164, P. R. China
T +86 (0)519 - 8622-3520
F +86 (0)519 - 8622-3550
www.ace-ace.cn

USA
ACE Controls International Inc.
23425 Industrial Park Dr., Farmington Hills
Michigan 48335, USA
T +1 248 - 476-0213
F +1 248 - 476-2470
www.acecontrols.com