

# Viscoelastic Shock Absorbers

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Special Catalog 2019



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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.

**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

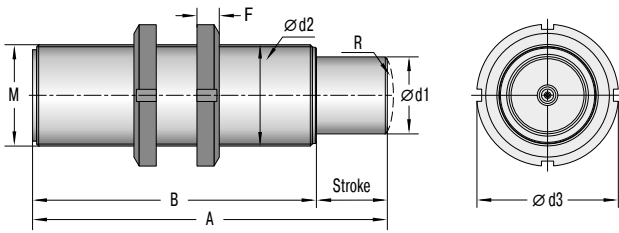
**Application field:** Industry, Material Handling, Rolling Mill, Defense, Waterways, Paper Industries

**On request:** special designs

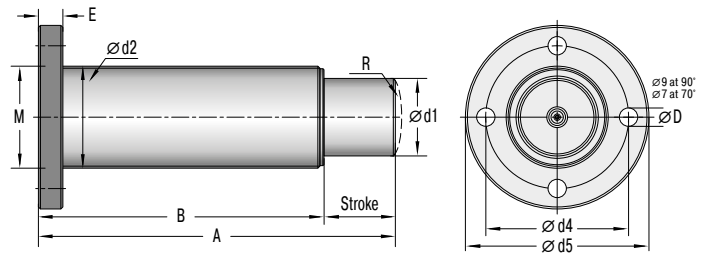
Simple Design – High reliability

# 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

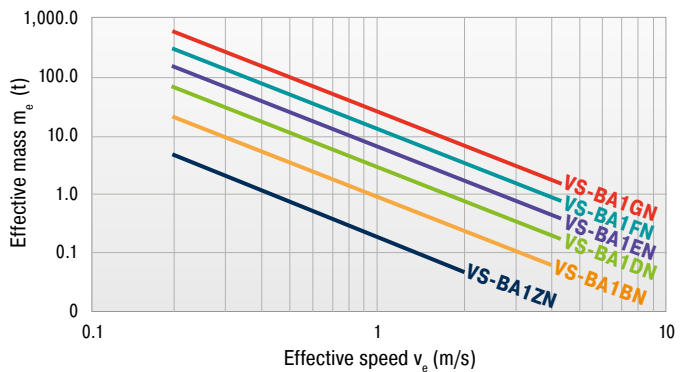
TYPES	Stroke mm	A mm	B mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	D mm	E mm	F mm	M mm	R mm
VS-BA1ZN	12	75	53	19	20	38	41	57	7	10	7	M25x1.5	/
VS-BA1BN	22	120	98	25	32	52	60	80	9	12	8	M35x1.5	/
VS-BA1DN	35	175	140	38	45	70	70	90	9	12	11	M50x1.5	/
VS-BA1EN	45	213	168	60	72	98	100	122	11	10	13	M75x2	130
VS-BA1FN	60	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		Dynamic force min. kN	Dynamic force max. kN	Static force max. kN
	$W_3$ kJ/cycle				
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

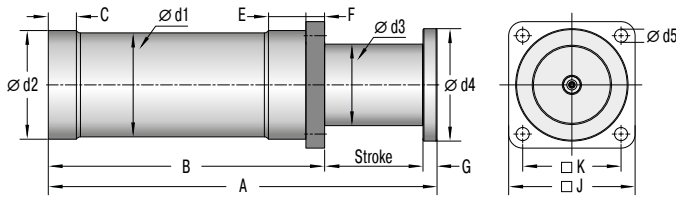
- Moving load: m (kg)
- Impact velocity range: v (m/s) max.
- Creep speed: vs (m/s)
- Motor power: P (kW)
- Stall torque factor: HM (normal, 2.5)  
(Alternatively: Propelling force F (N))
- Number of absorbers in parallel: n
- Flange Fastening: -Fa  
-Fc (incl. two locknuts)



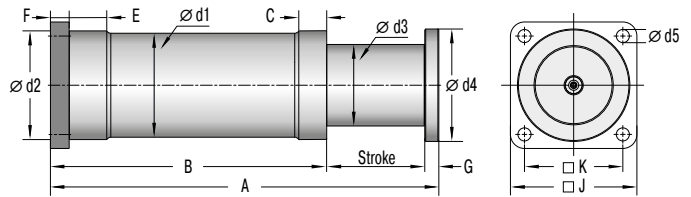
Issue 01, 2019 – Specifications subject to change

### 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

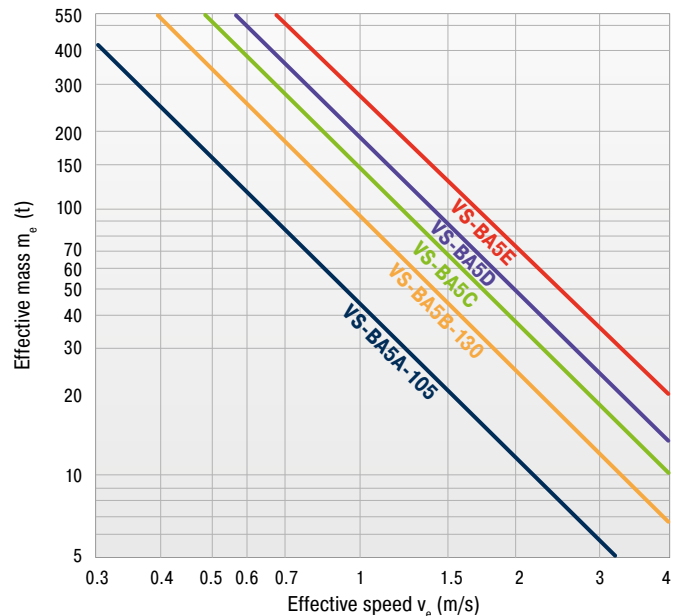
TYPES	Stroke mm	A mm	B mm	C mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	E mm	F mm	G mm	J mm	K mm
VS-BA5A-105	105	415	295	30	111	116	87	120	14	60	20	15	135	105
VS-BA5B-130	130	500	395	39	139	142	117	140	15	60	30	15	155	125
VS-BA5C	140	520	345	36	154	160	132	158	18	35	30	35	175	140
VS-BA5D	160	585	385	40	175	180	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

TYPES	Max. Energy Capacity		Dynamic force min. kN	Dynamic force max. kN	Static force max. kN
	$W_3$ kJ/cycle				
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

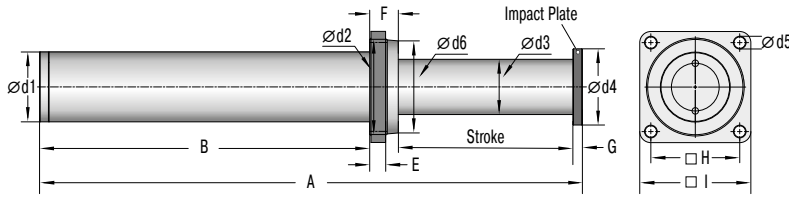
#### Complete details required when ordering

- 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 Fastening: -Fa  
-Fc

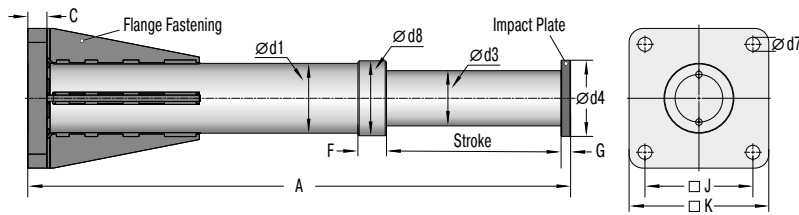


## VS-BXLR

### 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

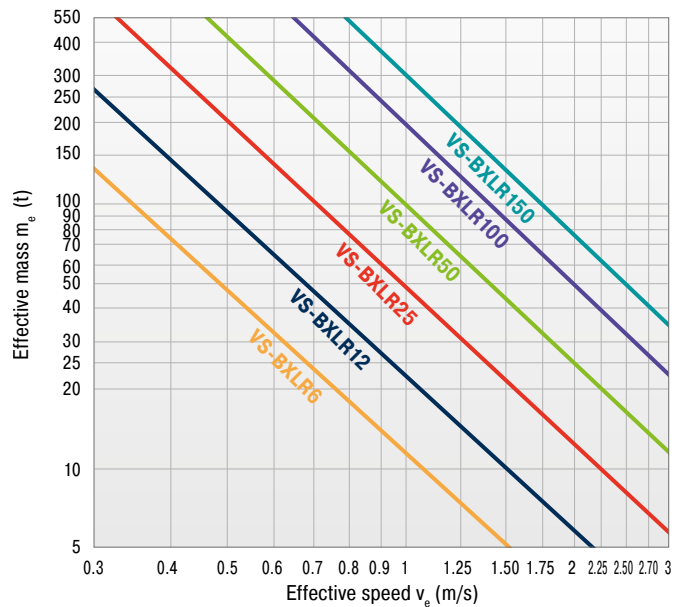
TYPES	Stroke mm	A mm	B mm	C mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	d6 mm	d7 mm	d8 mm	E mm	F mm	G mm	I mm	K mm	H mm	J mm
VS-BXLR6-150	150	410	231	-	50	90	38	50	9	-	-	-	19	19	10	90	-	70	-
VS-BXLR12-150	150	480	285	20	75	90	57	80	11	85	17	85	18	33	12	110	125	85	90
VS-BXLR25-200	200	620	370	20	90	110	72	100	14	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

#### Performance

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

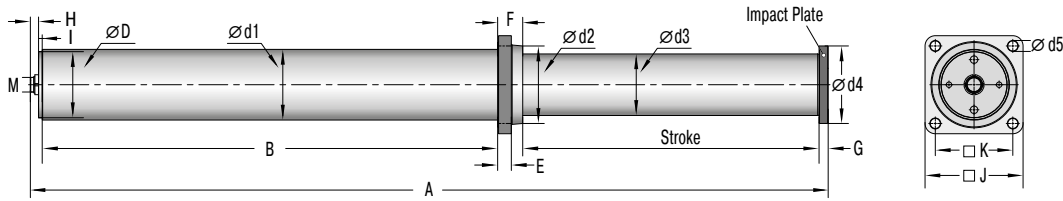
### Complete details required when ordering

- 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 Fastening: -Fa  
-Fc



## 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

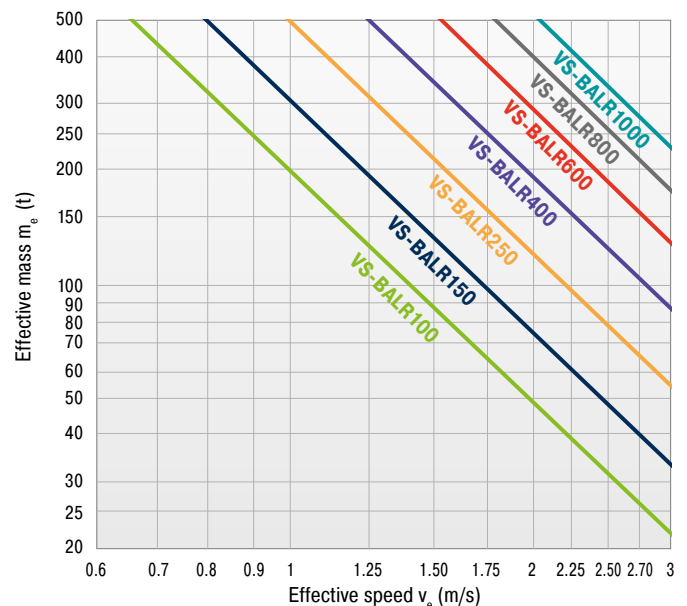
TYPES	Stroke mm	A mm	B mm	D mm	d1 mm	d2 mm	d3 mm	d4 mm	d5 mm	E mm	F mm	G mm	H mm	I mm	J mm	K mm	M mm
VS-BALR-100	400	1,120	636	119	130	145	109.3	140	18	25	45	15	16	8	175	140	M25x1.5
VS-BALR-150	500	1,350	751	130	140	170	120	150	22	25	55	20	16	8	215	170	M28x1.5
VS-BALR-250	650	1,750	999	145	155	170	135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

#### Performance

TYPES	Max. Energy Capacity		Dynamic force min. kN	Dynamic force max. kN	Static force max. kN
	$W_3$ kJ/cycle				
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

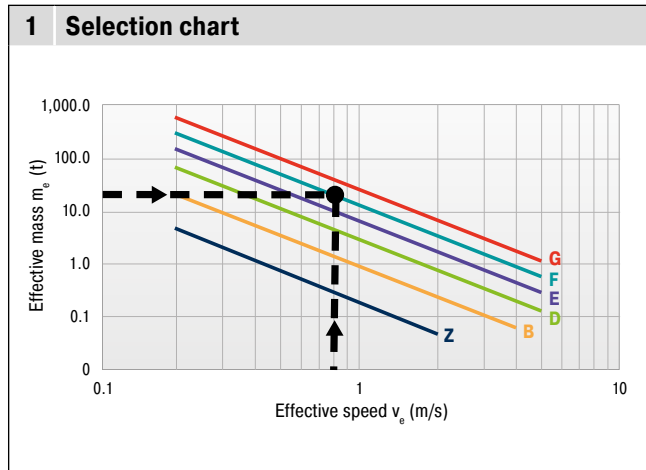
#### Complete details required when ordering

- 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 Fastening: -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.



**2 Effective energy calculation**

$$W_1 = \frac{1}{2} m v_2$$

**3 Allowable impact frequency**

$$W_4 = W_3 \cdot x$$

**4 Effective stroke calculation**

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

**5 Effective reaction force Q calculation**

$$Q = \left[ \left( \frac{Q_{max} - Q_0}{H} \right) x C_e + Q_0 \right] (0.1v + 0.8)$$

- 6 Application example**
- Given data:
- |                  |                       |
|------------------|-----------------------|
| Effective mass   | $m_e = 15 \text{ t}$  |
| Effective speed  | $v = 0.8 \text{ m/s}$ |
| Impact frequency | $x = 25 \text{ 1/h}$  |
- Selection chart gives VS-BA1FN  
The mechanical characteristics are:  
 $W_1 = 7 \text{ kJ}$   
 $H = 60 \text{ mm}$   
 $Q_{max} = 150 \text{ kN}$   
 $Q_0 = 90 \text{ kN}$
  - An energy of  $W_3 = 4.8 \text{ kNm}$  must be absorbed per stroke
  - Maximal frequency is  $< 20 \times 7 / 4.8$
  - The effective stroke  $s_e$  amounts to 49 mm  

$$60 \left( \sqrt{\frac{4.8}{7(0.03 \times 0.8 + 0.24)} + 1.36} - 1.17 \right)$$
  - $Q = [(150-90) \times (49/60) + 90] \times (0.1 \times 0.8 + 0.8) = 122 \text{ kN}$

**All performance characteristics can be modified.**

**Please advise us of your specific requirements.**

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## Viscoelastic Springs

Extremely compact – High energy storing

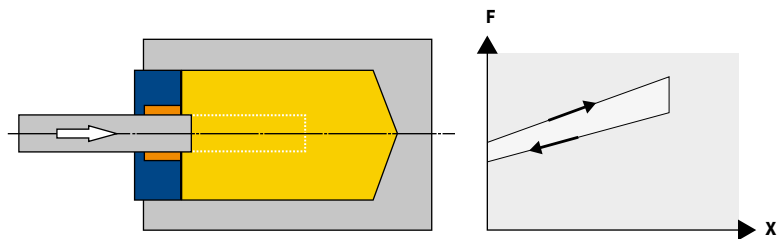
The self-adjusting Viscoelastic Springs are designed on the principals of hydrostatic compression to act as high energy storing device.

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



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