Jarret Series
BC1N, BC5, LR Series

Overview

The design of Jarret Series Industrial Shock Absorber utilizes the unique compression and shear characteristics of specially formulated silicone elastomers.

These characteristics allow the energy absorption and return spring functions to be combined into a single unit **without the need for an additional gas or mechanical spring stroke return mechanism**.

Applications
Shock protection for all types of industries including:
Defense, Automotive, Railroad, Materials Handling, Marine, Pulp/Paper, Metal Production and Processing.

Advantages:
- Simple design
- High reliability
- High damping coefficient
- Low sensitivity to temperature variances

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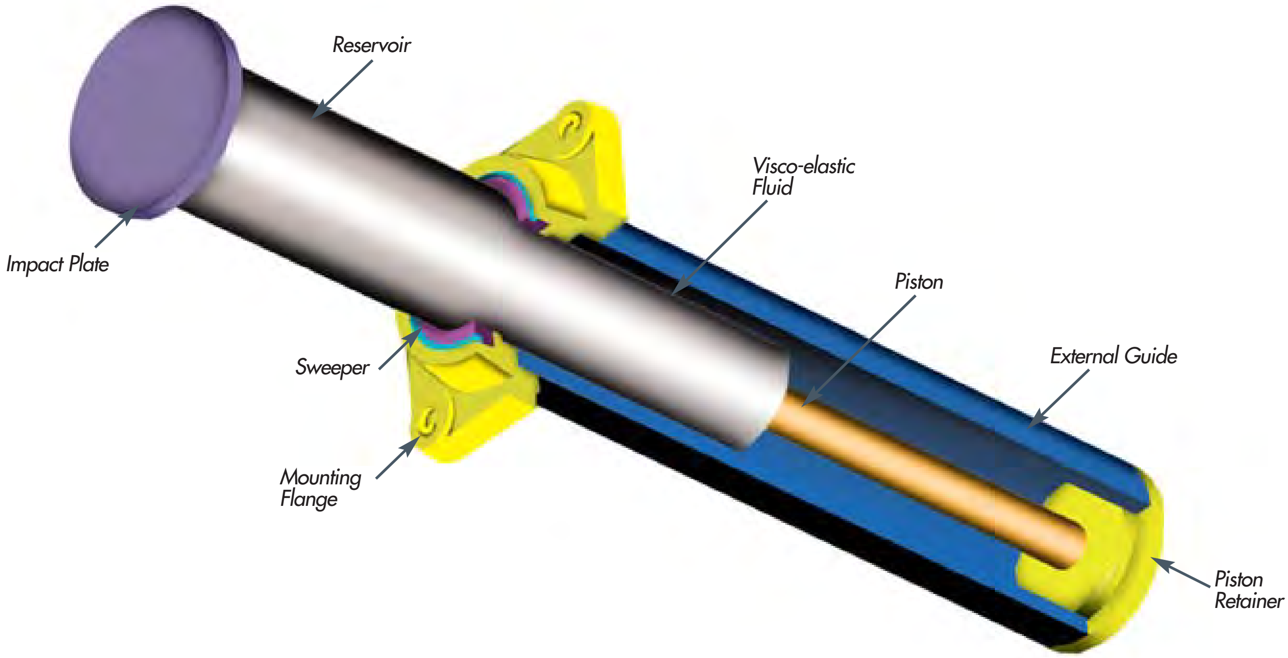
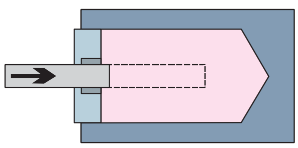
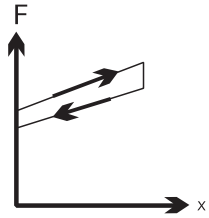
Visco-elastic Technology

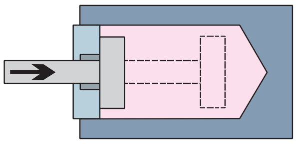


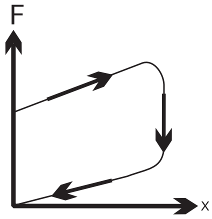
Visco-elastic technology makes use of the fundamental properties of specially formulated Jarret visco-elastic medium.





Compressibility:
Preloaded spring function
$\mathbf{F = F_0 + Kx}$





Viscosity:
Shock absorber function
$\mathbf{F = F_0 + Kx + CV^{\alpha}}$ **with** α **between 0,1 and 0,4**

The two functions can be used separately or in combination, in the same product:

Preloaded Spring:
Spring Function Only
- Hysteresis of between 5% and 10%
- Reduced weight and space requirement
- Force/stroke characteristic is independent of actuation speed

Shock Absorber Without Spring Return:
Shock Absorbing Function Only
- Dampening devices
- Blocking devices

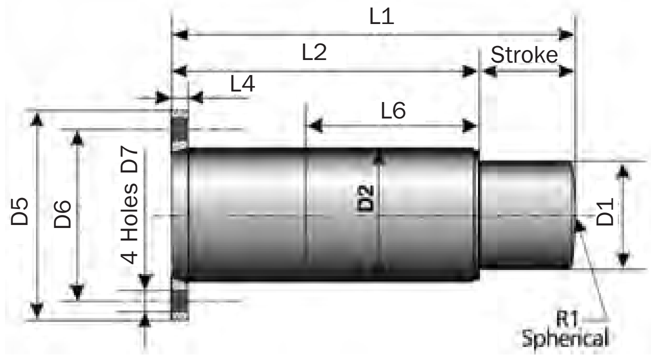
Preloaded Spring Shock Absorbers:
Combine Spring and Shock Absorber Functions
- Dissipate between 30% and 100% of energy
- Force/stroke characteristics remain relatively unchanged between -10°C and + 70°C

* Spring and shock absorber products are capable of functioning between -10°C and + 70°C. However, standard products are not intended for use over the full rated temperature range. Consult factory for special product considerations required to accommodate operation over a wide temperature range.

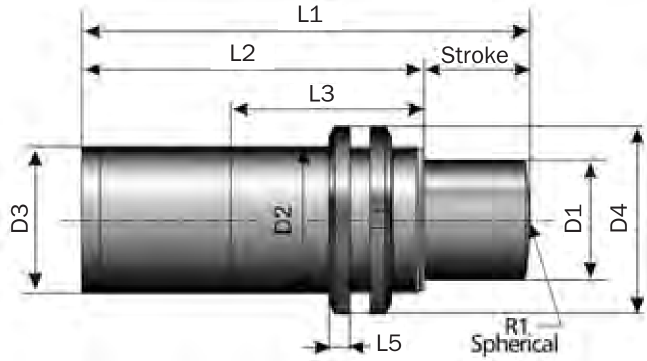
Jarret Shock Absorbers
BC1N Series

BC1ZN → BC1GN Series

Technical Data



Rear Flange Mounting - Fa



Threaded Body Mounting - Fc

Catalog No./ Model	Max Energy Capacity kJ	Stroke mm	Return Force Extension kN	Return Force Compression kN	Rdy_0 kN	Rdymax Max Shock Force kN
BC1ZN	0,1	12	0,94	5,4	6	11
BC1BN	0,43	22	2,5	14,0	14	27
BC1DN	1,5	35	5,2	28,8	28	60
BC1EN	3,4	45	7,8	43,0	45	100
BC1FN	7	60	13,6	76,6	90	150
BC1GN	14	80	19,0	130,0	130	230

Catalog No./ Model	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm	R1 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm	D6 mm	D7 mm	Mass Kg
BC1ZN	75	53	52	10	7	43	–	19	M25 x 1,5	20	38	57	41	7	0,3
BC1BN	120	98	96	12	8	86	–	25	M35 x 1,5	32	52	80	60	9	0,7
BC1BN-M	120	98	96	12	9	-	–	25	M40 x 1,5	32	58	–	–	–	0,8
BC1DN-70	175	140	138	12	11	128	–	38	M50 x 1,5	45	70	90	70	9	1,9
BC1DN-85	175	140	138	12	11	128	–	38	M50 x 1,5	45	70	106	85	11	2
BC1DN-M	175	140	138	12	11	–	–	38	M60 x 2	45	70	–	–	–	2
BC1EN	213	168	158	10	13	158	130	60	M75 x 2	72	98	122	100	11	5
BC1FN	270	210	130	12	16	130	150	74,5	M90 x 2	90	120	150	120	13	10,5
BC1GN	337	257	145	14	19	145	350	90	M110 x 2	110	145	175	143	18	17

Notes: 1. Spring and shock absorber products are capable of functioning between -10°C and + 70°C. However, standard products are not intended for use over the full rated temperature range.
2. Consult factory for special product considerations required to accommodate operation over a wide temperature range.

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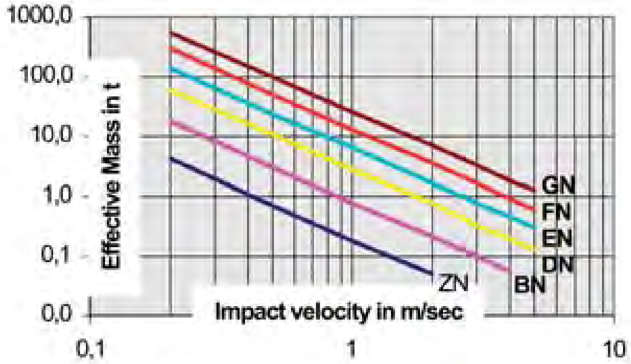
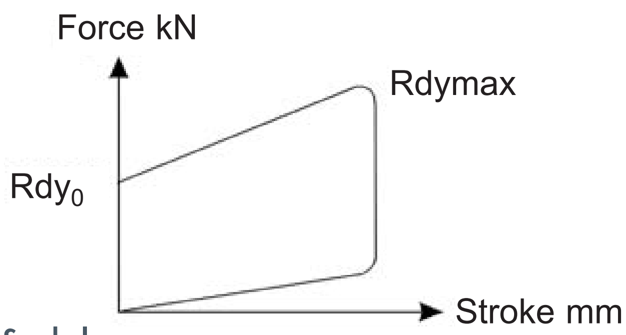
Application Worksheet

1 - Selection Chart



Based On

- ☐ Impact velocity (V) : 2 m/s
- ☐ Operating temperature : 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity (kJ)

C = Maximum Stroke (mm)

Rdy = Dynamic Reaction Force (kN)

2 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

3 - Allowable Impact Velocity

$$IF < 20 \times \frac{En}{E} \text{ Impacts/hour}$$

4 - Effective (Actual) Stroke Calculation

$$Ce = C\left(\sqrt{\frac{E}{En\,(0{,}03\,V + 0{,}24)} + 1{,}36} - 1{,}17\right)$$

5 - Calculation of Effective Reaction Force Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy_0}{C}\right) \times Ce + Rdy_0\right](0{,}1V + 0{,}8)$$

6 - Application Example

Given data: Effective mass = 15 t

Effective velocity = 0,8 m/s

Impact frequency: 25 impacts/hour

1. Energy dissipated per impact: $E = \frac{1}{2}(15)(0{,}8) = 4{,}8$ kJ

2. BC1FN Selected

3. Allowable impact frequency IF < 20x7/4,8 = 29
   25 < 29

4. Effective (Actual) Stroke:

$$Ce = 60\left(\sqrt{\frac{4{,}8}{7\,(0{,}03 \times 0{,}8 + 0{,}24)} + 1{,}36} - 1{,}17\right)$$

Ce = 49 mm

5. Effective Reaction Force:

$$Rdy_e = \left[\frac{(150 - 90)}{60} \times 49 + 90)\right](0{,}1 \times 0{,}8 + 0{,}8)$$

Rdy_e = 122 kN

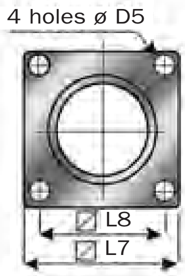
6. Compare standards to results:

	BC1FN		APPLICATION
E (kJ) =	7	>	4,8
C (mm) =	60	>	49
Rdymax (kN)	150	>	122

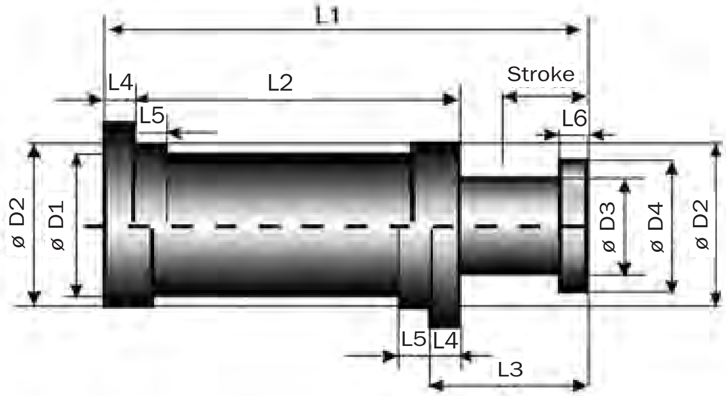
All performance characteristics can be modified. Please advise us of your specific requirements.

BC5A → BC5E Series

Technical Data



Rear Flange Mount - Fa



Front Flange Mount - Fc

Catalog No./ Model	Max Energy Capacity kJ	Stroke mm	Return Force Extension kN	Return Force Compression kN	Rdy_0 kN	Rdymax Max Shock Force kN
BC5A-105	25	105	18,5	140,7	167	310
BC5B-130	50	120	58,0	259,9	310	540
BC5C-140	75	140	49,0	328,4	400	700
BC5D-160	100	160	59,5	380,0	470	820
BC5E-180	150	180	117,0	546	640	1 100

Catalog No./ Mode	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm	L7 mm	L8 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm	Mass Kg
BC5A-105	415	275	140	20	30	15	135	105	116	116	87	120	14	25
BC5B-130	500	325	175	25	33	30	155	125	142	142	115	138	14	40
BC5C-140	520	315	205	30	36	35	175	140	160	160	132	158	18	45
BC5D-160	585	350	235	35	40	40	215	170	180	180	153	185	22	73
BC5E-180	670	405	265	40	45	45	250	195	215	215	182	220	26	117

Notes: 1. Impact Speed: BC5 Series shock absorbers are designed for impact velocities of up to 4 m/sec. Higher impact velocities require custom modification.
2. Spring and shock absorber products are capable of functioning between -10°C and + 70°C. However, standard products are not intended for use over the full rated temperature range.
3. Consult factory for special product considerations required to accommodate operation over a wide temperature range.

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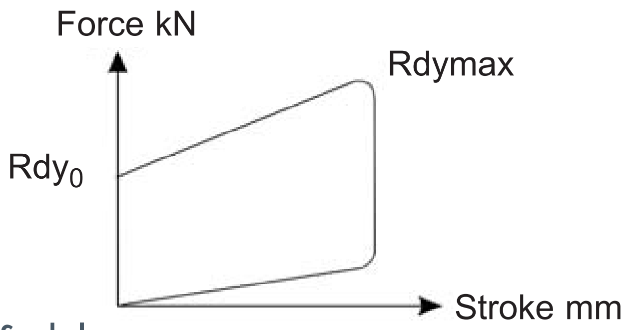
Application Worksheet

Based On

- ☐ Impact velocity (V) : 2 m/s
- ☐ Operating temperature : 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity (kJ)
C = Maximum Stroke (mm)
Rdy = Dynamic Reaction Force (kN)

1 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

2 - Allowable Impact Frequency (IF)

$$IF < 15 \times \frac{En}{E} \text{ Impacts/hour}$$

3 - Effective Stroke Calculation

$$Ce = C\left(\sqrt{\frac{E}{En\,(0{,}03\,V + 0{,}24)} + 1{,}36} - 1{,}17\right)$$

4 - Calculation of Effective Reaction Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy_0}{C}\right) \times Ce + Rdy_0\right](0{,}1V + 0{,}8)$$

5 - Application Example

Data: Two shock absorbers in series, Effective mass m =300 t, Impact speed v = 1,2 m/s (which is an impact of 0,6 m/s on each shock absorber), Impact frequency = 15 impacts/hour, Maximum allowable structural load 1000 kN

$$1:\ E = \frac{1}{2}\left(\frac{1}{2} mV^2\right)$$

$$E = \frac{1}{2}\left(\frac{1}{2}\ 300 \times 1{,}2^2\right) = 108 \text{ kJ}$$

2. Selection BC5E-180

3. Maximum allowable impact frequency is $15 \times \frac{150}{108}$ 21 impacts/hour. Therefore 15 impacts/hour is acceptable.

$$15 < 15 \times \frac{150}{108}$$

$$15 < 21$$

4. Effective (actual) stroke is 167 mm

$$Ce = 180 \times \left(\sqrt{\frac{108}{150\,(0{,}03 \times 0{,}6 + 0{,}24)} + 1{,}36} - 1{,}17\right) = 156 \text{ mm}$$

$$5.\ Rdye = \left[(1\,100 - 640) \times \frac{156}{180} + 640\right](0{,}1 \times 0{,}6 + 0{,}8)$$

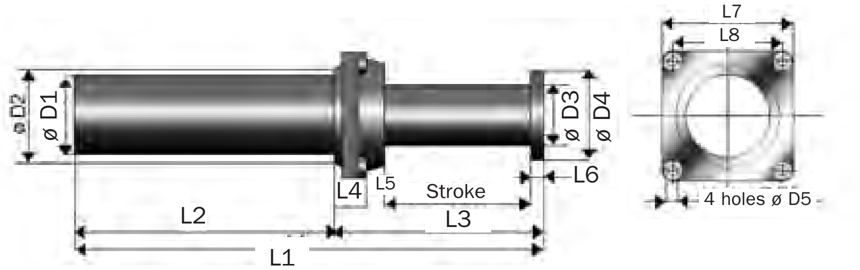
Rdye = 893 kN < 1000 kN

6. Compare standards to results:

	BC5E-180		APPLICATION
E (kJ) =	150	>	108
IF =	21	>	15
C (mm) =	180	>	156
Rdymax (kN)	1100	>	893

Note: maximum allowed structural load is 1 000 kN > 893 kN

All performance characteristics can be modified.
Please advise us of your specific requirements.



XLR Series - Front Flange Mount- Fc

Catalog No./ Model	Max Energy Capacity kJ	Stroke mm	Return Force Extension kN	Return Force Compression kN	Rdy_0 kN	Rdymax Max Shock Force kN
△ XLR6-150	6	150	2,9	20,5	25	50
△ XLR12-150	12	150	8,3	38,5	66	100
△ XLR12-200	12	200	5,6	30,0	42	78
△ XLR25-200	25	200	13,4	74,4	95	150
△ XLR25-270	25	270	11,1	51,4	66	112
△ XLR50-275	50	275	19,7	130,0	118	230
△ XLR50-400	50	400	12,9	83,8	75	150
△ XLR100-400	100	400	25,0	162,5	175	320
△ XLR100-600	100	600	11,6	132,4	85	230
△ XLR150-800	150	800	23,2	152,2	80	250

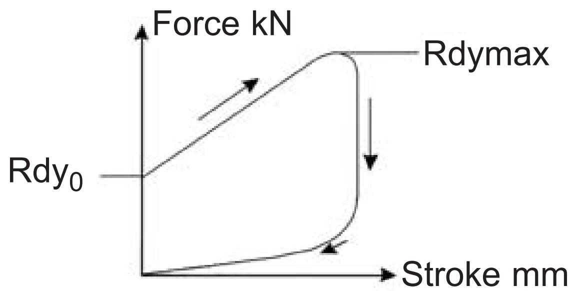
Notes: 1. Impact Speed: Types XLR and BCLR Series shock absorbers are designed for impact velocities of up to 2 m/sec. Higher impact velocities require custom modification.
2. △ = Non-standard lead time items, contact ITT Enidine.

Catalog No./ Model	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm	L7 mm	L8 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm	Mass Kg
△XLR6-150	410	231	179	19	0	10	90	70	50	90	38	50	9	4,2
△XLR12-150	480	285	195	18	15	12	110	85	75	90	57	80	11	11
△XLR12-200	530	285	245	18	15	12	110	85	75	90	57	80	11	11
△XLR25-200	620	370	250	20	18	12	135	105	90	110	72	100	14	20
△XLR25-270	690	370	320	20	18	12	135	105	90	110	72	100	14	25
△XLR50-275	855	520	335	25	20	15	175	140	110	150	87	120	18	40
△XLR50-400	980	520	460	25	20	15	175	140	110	150	87	120	18	40
△XLR100-400	1 370	910	460	25	20	15	175	140	110	150	87	120	18	65
△XLR100-600	1 570	910	660	25	20	15	175	140	110	150	87	120	18	65
△XLR150-800	2 640	1 780	860	25	20	15	175	140	110	150	87	120	18	115

Notes: 1. Rear Flange Mounting - Fa on Request.
2. Spring and shock absorber products are capable of functioning between -10°C and + 70°C. However, standard products are not intended for use over the full rated temperature range.
3. Consult factory for special product considerations required to accommodate operation over a wide temperature range.

Based On

- ☐ Impact velocity (V) : 2 m/s
- ☐ Operating temperature : 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc & Painting
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity (kJ)
C = Maximum Stroke (mm)
Rdy = Dynamic Reaction Force (kN)

1 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

2 - Allowable Impact Frequency (IF)

$$IF < 8 \times \frac{En}{E} \text{ Impacts/hour}$$

3 - Required Stroke Calculation

$$Ce = C\left(\sqrt{\frac{E}{En\,(0{,}027\,V + 0{,}22)} + 1{,}83} - 1{,}35\right)$$

4 - Calculation of Effective Reaction Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy_0}{C}\right) \times Ce + Rdy_0\right](0{,}1V + 0{,}8)$$

5 - Application Example **Data**:

Effective mass = 30 t
Effective impact speed = 2,2
Maximum allowable structural force = 350 kN
Impact frequency = 10/hr

1: Energy dissipated/impact is 72,6 kJ

$$E = \frac{1}{2} \times 15 \times (2{,}2)^2$$

$$E = 72{,}6 \text{ kJ}$$

2: XLR100-400 selected

3: Maximum allowable impact frequency
IF < 8 x 100 / 72,6 = 11
(10<11 impacts/hour is acceptable)

4: Effective (actual) stroke:

$$Ce = 400 \times \left(\sqrt{\frac{72{,}6}{100\,(0{,}027 \times 2{,}7 + 0{,}22)} + 1{,}83} - 1{,}35\right)$$

$$Ce = 290{,}3 \text{ mm}$$

5: $$Rdye = \left[\left(\frac{320 - 175}{400}\right) 290{,}3 + 175\right](0{,}1 \times 2{,}2 + 0{,}8)$$

$$Rdye = 285{,}8 \text{ kN}$$

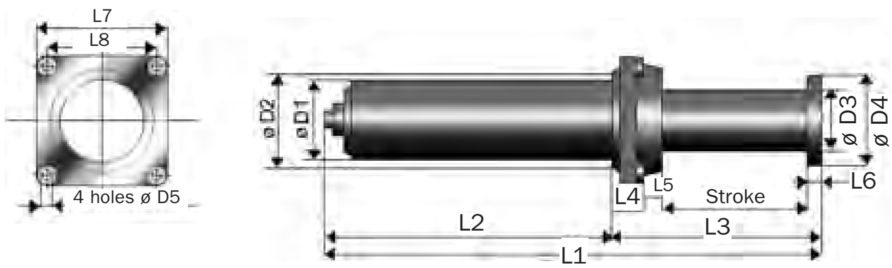
(which is less than maximum allowable reaction force of 350 kN)

6. Compare standards to results:

	XLR100-400		APPLICATION
E (kJ) =	100	>	72,6
IF =	11	>	10
C (mm) =	400	>	301,8
Rdymax (kN)	320	>	290,1

Note: maximum allowed structural load is 350 kN > 290,1 kN

All performance characteristics can be modified.
Please advise us of your specific requirements.



BCLR Series - Front Flange Mount- Fc

Catalog No./ Model	Max Energy Capacity kJ	Stroke mm	Return Force Extension kN	Return Force Compression kN	Rdy_0 kN	Rdymax Max Shock Force kN
ΔBCLR-100	100	400	30,0	161,9	190	310
ΔBCLR-150	150	500	41,5	201,4	200	380
ΔBCLR-220S	220	400	45,0	270,0	380	685
ΔBCLR-250	250	650	45,0	253,0	270	490
ΔBCLR-400	400	850	49,6	307,9	330	600
ΔBCLR-600	600	1 050	47,5	351,5	370	740
ΔBCLR-800	800	1 200	64,2	441,0	430	860
ΔBCLR-1000	1 000	1 300	85,0	534,0	500	1 000

Notes: 1. Impact Speed: Types XLR and BCLR Series shock absorbers are designed for impact velocities of up to 2 m/sec. Higher impact velocities require custom modification.
2. Δ = Non-standard lead time items, contact ITT Enidine.

Catalog No./ Model	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm	L7 mm	L8 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm	Mass Kg
ΔBCLR-100	1 120	660	460	25	20	15	175	140	130	150	110	140	18	63
ΔBCLR-150	1 350	775	575	30	25	20	215	170	140	185	120	150	22	90
ΔBCLR-220S	1 258	783	475	30	25	20	215	170	160	N/A	134	160	22	110
ΔBCLR-250	1 750	1 025	725	30	25	20	215	170	155	185	135	170	22	135
ΔBCLR-400	2 185	1 250	935	35	25	25	265	210	175	235	150	190	27	218
ΔBCLR-600	2 555	1 420	1 135	35	25	25	265	210	200	235	175	215	27	295
ΔBCLR-800	2 935	1 630	1 305	40	35	30	300	240	220	270	190	235	30	420
ΔBCLR-1000	3 225	1 820	1 405	40	35	30	300	240	230	270	205	248	30	470

Notes: 1. Rear Flange Mounting - Fa on Request.
2. Spring and shock absorber products are capable of functioning between -10°C and + 70°C. However, standard products are not intended for use over the full rated temperature range.
3. Consult factory for special product considerations required to accommodate operation over a wide temperature range.

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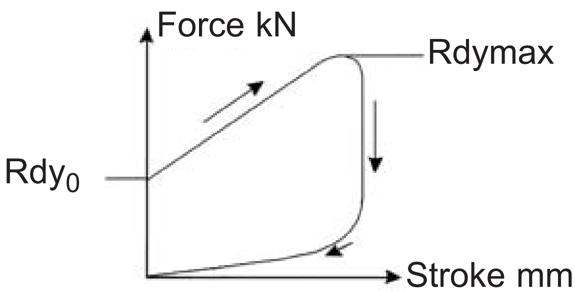
Jarret Shock Absorbers
BCLR Series

BCLR-100 → BCLR-1000 Series

Application Worksheet

Based On

- ☐ Impact velocity (V) : 2 m/s
- ☐ Operating temperature : 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc & Painting
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity (kJ)
C = Maximum Stroke (mm)
Rdy = Dynamic Reaction Force (kN)

1 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

2 - Allowable Impact Frequency (IF)

$$IF < 8 \times \frac{En}{E} \text{ Impacts/hour}$$

3 - Required Stroke Calculation

$$Ce = C\left(\sqrt{\frac{E}{En\,(0{,}027\,V + 0{,}22)} + 1{,}83} - 1{,}35\right)$$

4 - Calculation of Effective Reaction Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy_0}{C}\right) \times Ce + Rdy_0\right](0{,}1V + 0{,}8)$$

5 - Application Example:

Effective mass = 75 t
Effective impact speed = 2,7
Maximum allowable structural force: 650 kN
Impact frequency = 10/hr

1. Energy dissipated/impact is 274 kJ
2. BCLR-400 selected
3. Maximum allowable impact frequency
   IF < 8 x 400 / 274 = 12 (10 impacts/hour is acceptable)
   10 < 12
4. Effective (actual) stroke:

$$Ce = 850 \times \left(\sqrt{\frac{274}{400\,(0{,}027 \times 2{,}7 + 0{,}22)} + 1{,}83} - 1{,}35\right)$$

   Ce = 587mm

5. Rdye = 520 (0,1 x 2,7 + 0,8) = 556 kN

(which is less than maximum allowable reaction force of 650 kN)

6. Compare standards to results:

	BCLR-400		APPLICATION
E (kJ) =	400	>	274
IF =	12	>	10
C (mm) =	850	>	587
Rdymax (kN)	600	>	556

Note: maximum allowed structural load is 650 kN > 556 kN

All performance characteristics can be modified.
Please advise us of your specific requirements.