- Adjustable or self-adjusting
- With linear or progressive characteristic
- Stop elements: combination of cushioning and end-position sensing
- Specified types in accordance with ATEX directive for potentially explosive atmospheres
  ➔ www.festo.com/en/ex

Cushioning components

Features

Shock absorber

YSR – adjustable

With these hydraulic shock absorbers, impact energy is dissipated by displacing oil via a pressure-controlled valve. A built-in compression spring returns the piston rod to the initial position. Cushioning action can be infinitely adjusted by means of an adjusting ring. Adjustment can be performed during operation. The shock absorbers can be used as end stops, subject to the specified maximum impact force.

YSR-C – self-adjusting

In the case of this self-adjusting hydraulic shock absorber, energy acting upon the piston rod has the effect of displacing oil through a combination of a pressure operated pressure relief valve and a position dependent flow control valve. This ensures automatic adaptation to every possible cushioning requirement within the permissible energy limits. An integrated compression spring returns the piston rod to its initial position.

YSRW – self-adjusting, progressive

Unlike the YSR-...-C shock absorber, these shock absorbers have progressive characteristics. This facilitates a gradually rising cushioning force with a longer stroke. Vibration is thus significantly reduced at handling systems and enables the realisation of shorter cycle times.

Stop elements with shock absorber

YSRWJ – self-adjusting, progressive

These limit stops include three functions:

- Cushioning with self-adjusting, progressive hydraulic shock absorber (YSRW)
- Adjustable cushioning stroke
- End-position sensing with proximity sensors SME-/SMT-8
- Precision end-position adjustment

Type YSRWJ limit stops can be used for a wide variety of applications in the handling and assembly technology system.

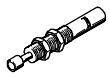
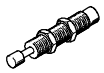
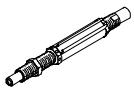
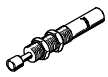
Hydraulic cushioning cylinders

YDR – adjustable

With the hydraulic cushioning cylinders, energy acting on the piston rod is dissipated by displacing oil through a flow control valve. A built-in compression spring returns the piston rod to the initial position. The braking speed can be infinitely adjusted by means of an adjusting ring. They are suitable for slow feed speeds in the range of 0.1 m/s.

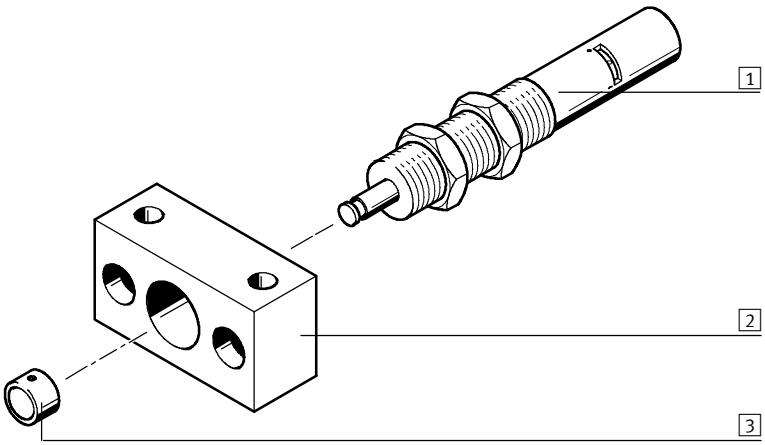
Cushioning components

Product range overview

Function	Design	Type	∅ [mm]	Stroke [mm]	Energy absorption per stroke [J]	Cushioning characteristic curve	Position sensing A	Free of copper, PTFE and silicone CT	➔ Page
Shock absorber	**Adjustable**								
		YSR	8, 12, 16, 20, 25, 32	8, 12, 20, 25, 40, 60	4 ... 380	Adjustable	–	–	1 / 9.1-0
	Self-adjustable								
		YSR-C	4, 5, 7, 8, 10, 12, 16, 20, 25, 32	4, 5, 8, 10, 12, 20, 25, 40, 60	0.6 ... 380	Rapidly increasing cushioning force curve	–	■	1 / 9.1-4
		YSRW	5, 7, 8, 10, 12, 16, 20	8, 10, 14, 17, 20, 26, 34	1.3 ... 70	Slowly increasing cushioning force curve	–	■	1 / 9.1-8
Stop element	**Self-adjustable**								
		YSRWJ	5, 7, 8	7.5, 9.5, 13.5	1 ... 3	Slowly increasing cushioning force curve	■	–	1 / 9.1-12
Hydraulic cushioning cylinders	**Adjustable**								
		YDR	16, 20, 25, 32	20, 25, 40, 60	32 ... 384	Linear, adjustable	–	–	1 / 9.2-0

Shock absorbers YSR

Peripherals overview and type codes



Accessories			
	Type	**Brief description**	**➔ Page**
1	Shock absorber YSR	Hydraulic shock absorber with adjustable cushioning characteristic	1 / 9.1-1
2	Mounting flange YSRF	Mounting option for shock absorber	1 / 9.3-0
3	Buffer YSRP	For the protection of piston rod	1 / 9.3-2
–	Oil gun YSR-OEP	For topping up oil	1 / 9.3-2
–	Special oil OFSB-1	Replacement oil	1 / 9.3-2

YSR	–	12	–	12	–	

Type	
YSR	Shock absorber

∅[mm]

Stroke [mm]

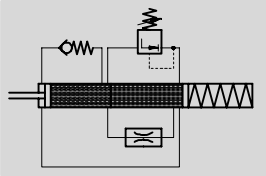
Buffer	
D	With buffer

Shock absorbers YSR

Data sheet

FESTO

Function



- Ø - Diameter
  8 ... 32 mm
- | - Stroke length
  8 ... 60 mm

General technical data							
Piston ∅		8	12	16	20	25	32
Stroke	[mm]	8	12	20	25	40	60
Mode of operation		Hydraulic shock absorbers with return spring					
Cushioning		Adjustable					
Type of mounting		Thread with locknut					
Impact velocity	[m/s]	0.1 ... 3					
Product weight	[g]	40	120	240	420	860	1,600
Ambient temperature	[°C]	–10 ... +80					

Reset times [s]							
Piston ∅		8	12	16	20	25	32
Short[1)]		≤ 0.4					
Long [2)]		≤ 1					

1) Piston rod retracted for short period ≤ 30 s
2) Piston rod retracted for longer period ≤ 6 h

Forces [N]							
Piston ∅		8	12	16	20	25	32
Max. stop force in end positions		400	900	1,600	2,500	4,000	6,400
Resetting force		3	25	20	25	30	35

Energies [J]							
Piston ∅		8	12	16	20	25	32
Max. energy absorption per stroke		4	10.8	32	62.5	160	380
Max. energy absorption per hour		24,000	77,000	130,000	180,000	293,000	483,000

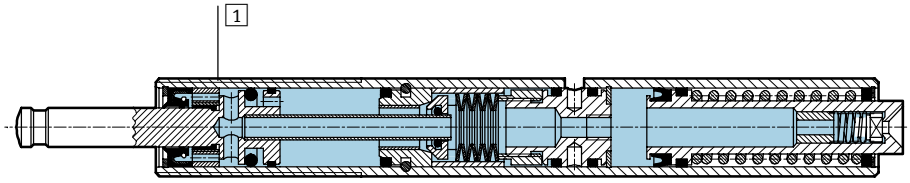
Shock absorbers YSR

Data sheet

FESTO

Materials

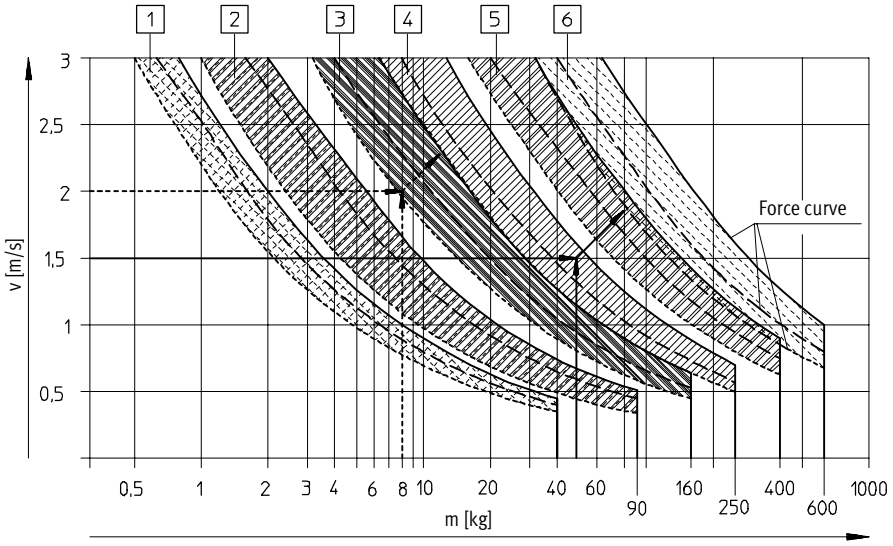
Sectional view



Shock absorber		
1	Housing	Galvanised steel
–	Seals	Nitrile rubber, polyurethane
	Material note	Free of copper and PTFE

Selection graph for shock absorbers with infinitely adjustable cushioning YSR

Impact velocity dependent on mass m



1 YSR-8-8-D
2 YSR-12-12
3 YSR-16-20
4 YSR-20-25
5 YSR-25-40
6 YSR-32-60

Three force curves are shown for each shock absorber. Interim values must be calculated by averaging. The arrows relate to the examples starting on page ➔ 1 / 9.3-6.

Shock absorber	Max. stop force in end position	Force A = ———	Force A = — — —	Force A = - - - -
YSR-8-8-D	400 N	0 N	100 N	200 N
YSR-12-12	900 N	0 N	200 N	500 N
YSR-16-20	1,600 N	0 N	500 N	800 N
YSR-20-25	2,500 N	0 N	800 N	1,200 N
YSR-25-40	4,000 N	0 N	1 200 N	2,000 N
YSR-32-60	6,400 N	0 N	2,000 N	3,000 N

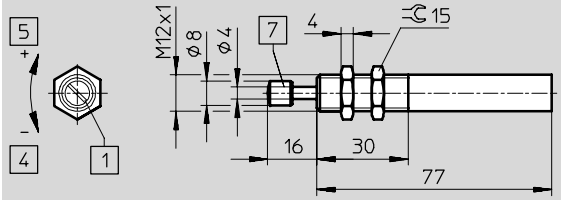
Shock absorbers YSR

Data sheet

Dimensions

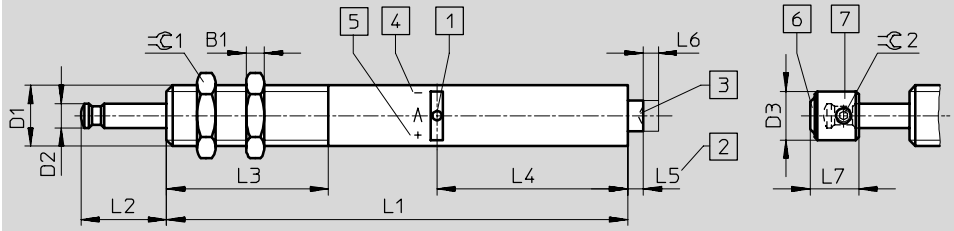
Download CAD data ➔ **www.festo.com/en/engineering**

YSR-8-8-D



1 Cushioning adjustment
4 – Less cushioning
5 + More cushioning
7 Buffer (included in scope of delivery)

YSR ...



1 Cushioning adjustment
2 Oil reservoir
3 Oil top-up facility
4 – Less cushioning
5 + More cushioning
6 Polyurethane insert
7 Buffer YSRP (to be ordered separately)

∅ [mm]	B1	D1	D2 ∅	D3 ∅	L1	L2	L3
8	–	–	–	–	–	–	–
12	5	M15x1	6	12	119	18	36
16	6	M20x1.25	8	16	151	28	53
20	8	M24x1.25	10	20	174	35	60
25	10	M30x1.5	12	25	227	52	80
32	12	M37x1.5	15	32	275	75	108

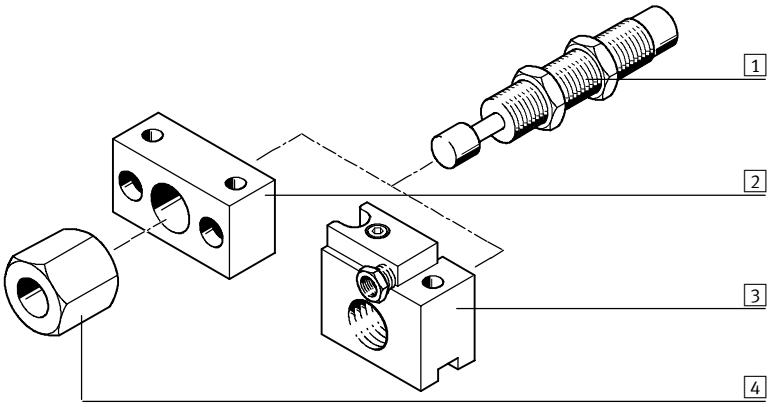
∅ [mm]	L4	L5 max.	L6	L7 ±0.4	⊂ 1	⊂ 2	Max. tightening torque ⊂ 1 [Nm]
8	–	–	–	–	–	–	5
12	52.5	5	3	10	19	2	20
16	62.5	5	5	13.5	24	2.5	35
20	72.5	6	6	17	30	3	60
25	89.8	9	10	20.5	36	4	80
32	106.3	13	15	26	46	4	100

Ordering data

∅ [mm]	Part No.	Type
8	**189 980**	**YSR-8-8-D**
12	**10 867**	**YSR-12-12**
16	**10 868**	**YSR-16-20**
20	**10 869**	**YSR-20-25**
25	**10 870**	**YSR-25-40**
32	**10 871**	**YSR-32-60**

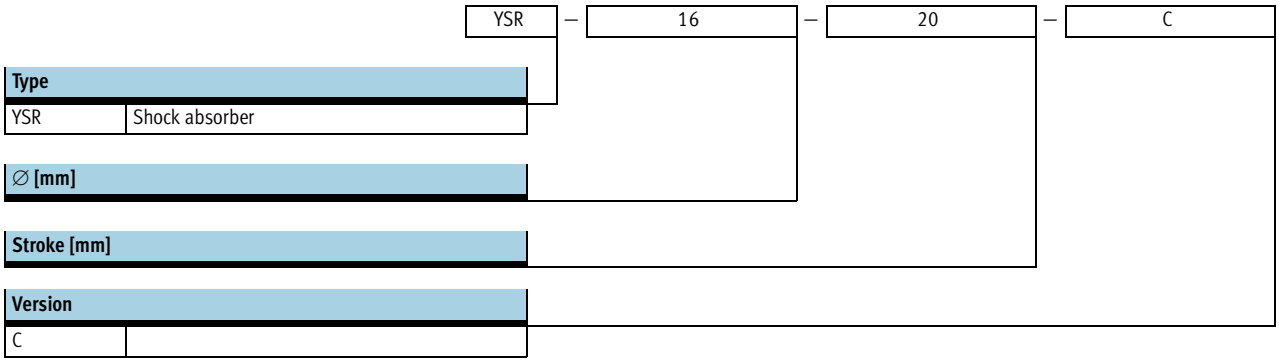
Shock absorber YSR-C

Peripherals overview and type codes



Accessories

	Type	Brief description	→ Page
1	Shock absorber YSR-C	Hydraulic shock absorber with rapidly increasing cushioning force curve	1 / 9.1-5
2	Mounting flange YSRF	Mounting option for shock absorber	1 / 9.3-0
3	Mounting flange YSRF-S	Mounting option for shock absorber with attached stop sleeve and position sensing	1 / 9.3-1
4	Stop limiters YSRA	Stroke limiter for shock absorber	1 / 9.3-2

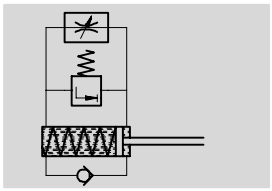


Shock absorber YSR-C

Data sheet

FESTO

Function



- Ø - Diameter
  4 ... 32 mm
- | - Stroke length
  4 ... 60 mm

General technical data											
Piston ∅		4	5	7	8	10	12	16	20	25	32
Stroke	[mm]	4	5	5	8	10	12	20	25	40	60
Mode of operation		Hydraulic shock absorbers with return spring									
Cushioning		Self-adjustable									
Type of mounting		Thread with locknut									
Impact velocity	[m/s]	0.05 ... 2		0.05 ... 3							
Product weight	[g]	5	9	18	30	50	70	140	240	600	1,250
Ambient temperature	[°C]	–10 ... +80									

Reset time [s]										
Piston ∅	4	5	7	8	10	12	16	20	25	32
Reset time[1)]	≤ 0.2								≤ 0.4	≤ 0.5

1) The specified technical data refers to ambient temperature. At higher temperatures in the 80 °C range, the max. mass and the cushioning work must be reduced by 50% approx. At –10 °C, the reset time may be up to 1 second.

Forces [N]										
Piston ∅	4	5	7	8	10	12	16	20	25	32
Min. insertion force[1)]	5	5.5	8.5	15	20	27	42	80	143	120
Max. stop force [2)] in end positions	100	200	300	500	700	1,000	2,000	3,000	4,000	6,000
Min. resetting force[3)]	0.7	0.7	1	3.1	4.5	6	6	14	14	21

1) This is the minimum force that must be applied so that the shock absorber is pushed exactly into the retracted end position. This value is reduced correspondingly in the event of an extended external end-position.
2) If the max. stop force is exceeded, a fixed stop (e.g. YSRA) 0.5 mm must be fitted before the end of stroke.
3) This is the maximum force which may act upon the piston rod, allowing for full extension of the shock absorber (e.g. protruding stem).

Energies [J]										
Piston ∅	4	5	7	8	10	12	16	20	25	32
Max. energy absorption per stroke	0.6	1	2	3	6	10	30	60	160	380
Max. energy absorption per hour	5,600	8,000	12,000	18,000	26,000	36,000	64,000	92,000	150,000	220,000

Mass range [kg]										
Piston ∅	4	5	7	8	10	12	16	20	25	32
Permissible mass range up to	1.2	1.5	5	15	25	45	90	120	200	400

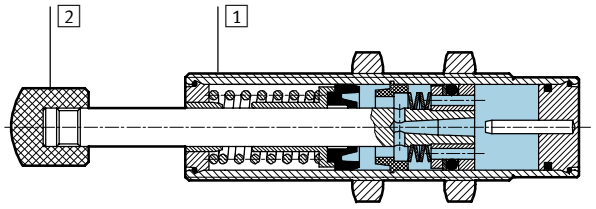
Shock absorber YSR-C

Data sheet

FESTO

Materials

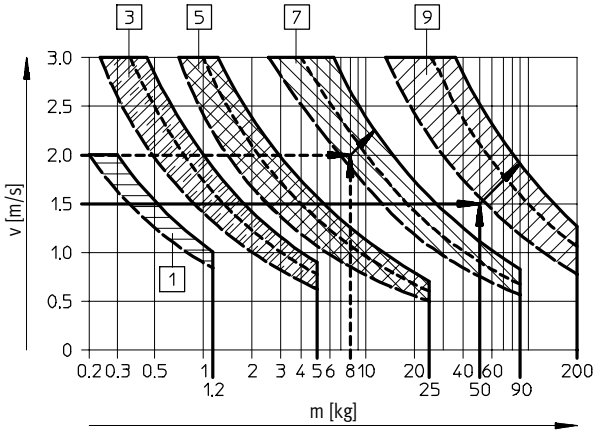
Sectional view

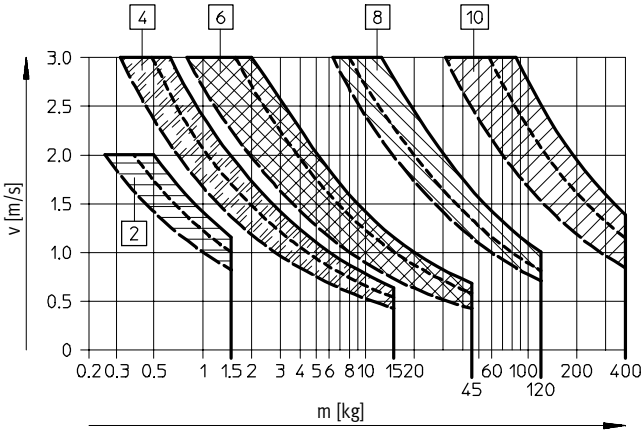


Piston ∅		4	5	7	8	10	12	16	20	25	32
1	Housing	Brass, nickel-plated				Galvanised steel					
2	Buffer	Polyacetate			Polyamide					Steel with polyurethane	
–	Seals	Nitrile rubber, polyurethane									
	Material note	Free of copper, PTFE and silicone								–	

Selection graph for self-adjusting shock absorbers YSR-C

Impact velocity dependent on mass m





Three force curves are shown for each shock absorber. Interim values must be calculated by averaging. The arrows relate to the examples starting on page ➔ 1 / 9.3-6.

1 YSR-4-4-C
2 YSR-5-5-C
2 YSR-7-5-C
3 YSR-8-8-C
4 YSR-10-10-C
5 YSR-12-12-C
6 YSR-16-20-C
7 YSR-20-25-C
8 YSR-25-40-C
10 YSR-32-60-C

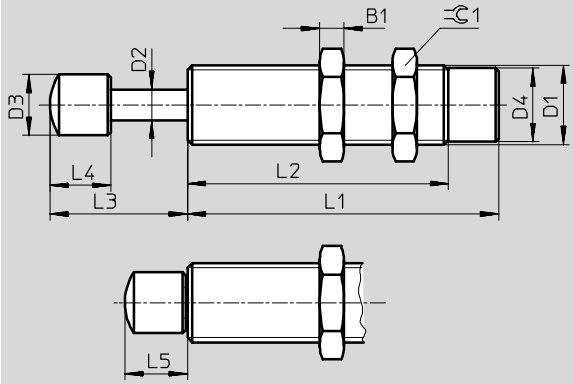
Shock absorber	Max. stop force in end position	Force A = ———	Force A = — — —	Force A = - - - -
YSR-4-4-C	100 N	0 N	–	50 N
YSR-5-5-C	200 N	0 N	50 N	100 N
YSR-7-5-C	300 N	0 N	100 N	200 N
YSR-8-8-C	500 N	0 N	100 N	200 N
YSR-10-10-C	700 N	0 N	150 N	300 N
YSR-12-12-C	1,000 N	0 N	200 N	500 N
YSR-16-20-C	2,000 N	0 N	500 N	800 N
YSR-20-25-C	3,000 N	0 N	800 N	1,200 N
YSR-25-40-C	4,000 N	0 N	1,200 N	2,500 N
YSR-32-60-C	6,000 N	0 N	2,000 N	4,000 N

Shock absorber YSR-C

Data sheet

FESTO

Dimensions Download CAD data ➔ **www.festo.com/en/engineering**



∅ [mm]	B1	D1	D2 ∅	D3 ∅	D4 ∅	L1 ±0.1
4	2,5	M6x0,5	2	3,8 ±0,1	5,3 ±0,05	28,5
5	3	M8x1	2.5	5 ±0.1	6.7 ±0.05	29
7	3.5	M10x1	3	6 ±0.1	8.6 ±0.05	34
8	4	M12x1	4	8 ±0.2	10.4 ±0.1	46
10	5	M14x1	5	10 ±0.2	12.4 ±0.1	55
12	5	M16x1	6	12 ±0.2	14.5 ±0.1	64
16	6	M22x1.5	8	16 ±0.2	20 ±0.1	86
20	8	M26x1.5	10	20 ±0.2	24 ±0.1	104
25	10	M30x1.5	12	25 ±0.2	28 ±0.1	152
32	12	M37x1.5	15	32 ±0.2	35 ±0.1	207

∅ [mm]	L2 ±0.3	L3	L4	L5	⊂1	Max. tightening torque ⊂1 [Nm]
4	18,5	8,3 +0,6/–0,3	4 ±0,1	4,3 +0,35/–0,25	8	1
5	19	10.8 +0.6/–0.3	5.5 ±0.1	5.8 +0.55/–0.25	10	2
7	23	12.3 +0.7/–0.35	7 ±0.2	7.3 +0.55/–0.25	13	3
8	33	16.3 +0.7/–0.35	8 ±0.2	8.3 +0.55/–0.25	15	5
10	42	20.5 +0.7/–0.35	10 ±0.2	10.5 +0.55/–0.25	17	8
12	51	24.5 +0.7/–0.35	12 ±0.2	12.5 +0.55/–0.25	19	20
16	69	36.5 +0.7/–0.35	16 ±0.2	16.5 +0.55/–0.25	27	35
20	87	45.5 +0.7/–0.35	20 ±0.2	20.5 +0.55/–0.25	32	60
25	125	61.5 +1.25/–0.75	20.5 ±0.4	21.5 +0.95/–0.55	36	80
32	179	87 +1.25/–0.75	26 ±0.4	27 +0.95/–0.55	46	100

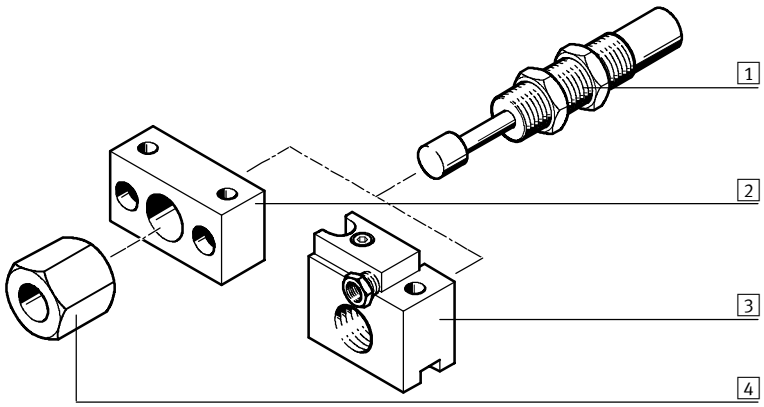
Ordering data

∅ [mm]	Part No.	Type
4	**540 060**	**YSR-4-4-C**[1]
5	**158 981**	**YSR-5-5-C**[1]
7	**160 272**	**YSR-7-5-C**[1]
8	**34 571**	**YSR-8-8-C**[1]
10	**191 199**	**YSR-10-10-C**[1]
12	**34 572**	**YSR-12-12-C**[1]
16	**34 573**	**YSR-16-20-C**[1]
20	**34 574**	**YSR-20-25-C**[1]
25	**160 273**	**YSR-25-40-C**
32	**160 274**	**YSR-32-60-C**

1) Free of copper, PTFE and silicone

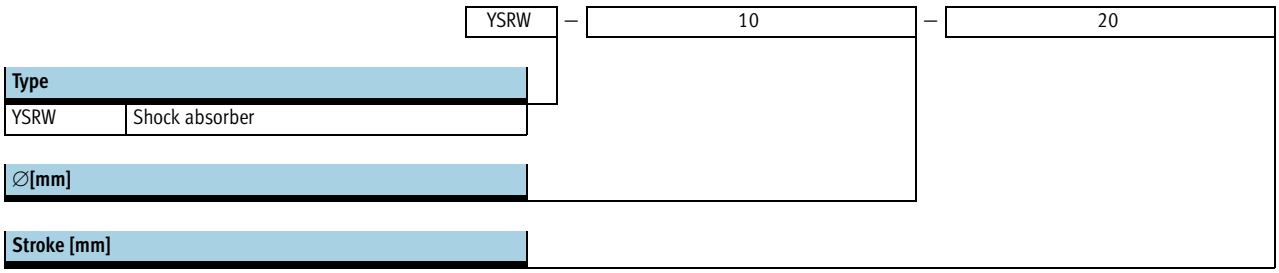
Shock absorber YSRW

Peripherals overview and type codes



Accessories

	Type	Brief description	➔ Page
1	Shock absorber YSRW	Hydraulic shock absorber with progressive cushioning characteristic	1 / 9.1-9
2	Mounting flange YSRF	Mounting option for shock absorber	1 / 9.3-0
3	Mounting flange YSRF-S	Mounting option for shock absorber with attached stop sleeve and position sensing	1 / 9.3-1
4	Stop limiters YSRA	Stroke limiter for shock absorber	1 / 9.3-2

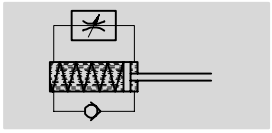


Shock absorber YSRW

Data sheet

FESTO

Function



- Ø - Diameter
  5 ... 16 mm
- I - Stroke length
  8 ... 26 mm

General technical data								
Piston ∅		5	7	8	10	12	16	20
Stroke	[mm]	8	10	14	17	20	26	34
Mode of operation		Hydraulic shock absorbers with return spring						
Cushioning		Self-adjustable						
Type of mounting		Thread with locknut						
Impact velocity	[m/s]	0.1 ... 2	0.1 ... 3					
Product weight	[g]	8	18	34	54	78	190	330
Ambient temperature	[°C]	–10 ... +80						

Reset time [s]								
Piston ∅		5	7	8	10	12	16	20
Reset time[1)]		≤ 0.2					≤ 0.3	

1) The specified technical data refers to ambient temperature. At higher temperatures in the 80 °C range, the max. mass and the cushioning work must be reduced by 50% approx. At –10 °C, the reset time may be up to 1 second.

Forces [N]							
Piston ∅	5	7	8	10	12	16	20
Min. insertion force[1)]	6.5	6.5	16	18	26	42	85
Max. stop force [2)] in end positions	200	300	500	700	1,000	2,000	3,000
Min. resetting force[3)]	1	1.7	3.5	3.8	5.2	6.6	10

1) This is the minimum force that must be applied so that the shock absorber is pushed exactly into the retracted end position. This value is reduced correspondingly in the event of an extended external end-position.
2) If the max. stop force is exceeded, a fixed stop (e.g. YSRA) 0.5 mm must be fitted before the end of stroke.
3) This is the maximum force which may act upon the piston rod, allowing for full extension of the shock absorber (e.g. protruding stem).

Energies [J]							
Piston ∅	5	7	8	10	12	16	20
Max. energy absorption per stroke	1.3	2.5	4	8	12	35	70
Max. energy absorption per hour	10,000	15,000	21,000	30,000	41,000	68,000	100,000

Mass range [kg]							
Piston ∅	5	7	8	10	12	16	20
Permissible mass range up to	2	5	10	20	30	50	80

Shock absorber YSRW

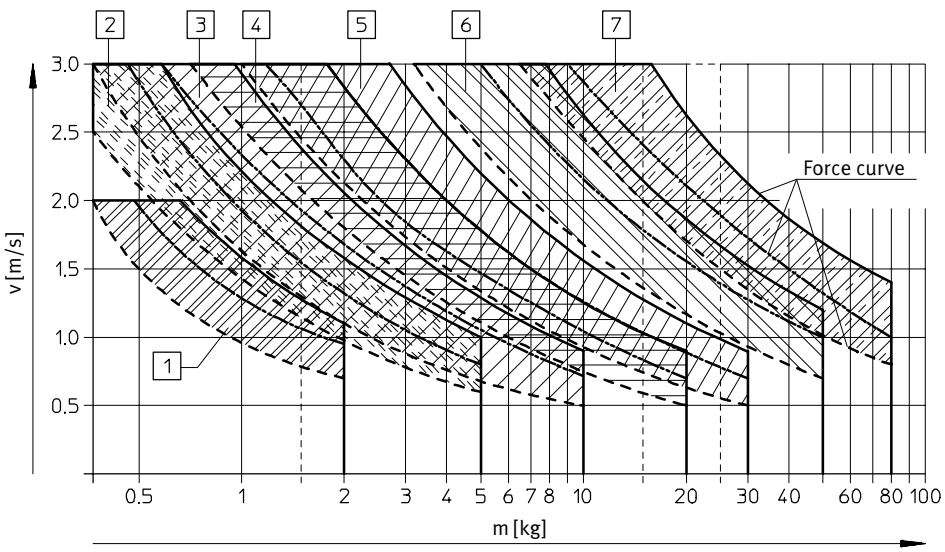
Data sheet

FESTO

Materials							
Piston ∅	5	7	8	10	12	16	20
Housing	Brass, nickel-plated			Galvanised steel			
Buffer	Polyamide						
Seals	Nitrile rubber						
Material note	Free of copper, PTFE and silicone						

Selection graph for self-adjusting shock absorbers with progressive characteristics YSRW

Impact velocity dependent on mass m



1 YSRW-5-8
2 YSRW-7-10
3 YSRW-8-14
4 YSRW-10-17
5 YSRW-12-20
6 YSRW-16-26
7 YSRW-20-34

Three force curves are shown for each shock absorber. Interim values must be calculated by averaging.

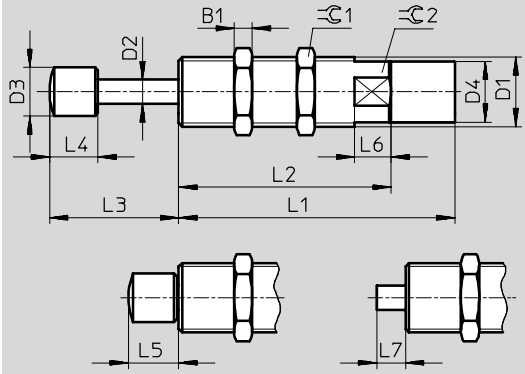
Shock absorber	Max. stop force in end position	Force A = ———	Force A = — — —	Force A = - - - -
YSRW-5-8	200 N	0 N	50 N	100 N
YSRW-7-10	300 N	0 N	75 N	150 N
YSRW-8-14	500 N	0 N	100 N	200 N
YSRW-10-17	700 N	0 N	150 N	300 N
YSRW-12-20	1,000 N	0 N	200 N	400 N
YSRW-16-26	2,000 N	0 N	500 N	800 N
YSRW-20-34	3,000 N	0 N	800 N	1,200 N

Shock absorber YSRW

Data sheet

FESTO

Dimensions Download CAD data ➔ **www.festo.com/en/engineering**



∅ [mm]	B1	D1	D2 ∅	D3 ∅	D4 ∅	L1 ±0.1	L2 ±0.3	L3
5	3	M8x1	2.5	5 ±0.1	6.7 ±0.05	33.5	22.5	13.8 +0.6/–0.25
7	3.5	M10x1	3	6 ±0.1	8.6 ±0.05	41	30	17.3 +0.7/–0.25
8	4	M12x1	4	8 ±0.2	10.4 ±0.1	53	40	22.3 +0.7/–0.25
10	5	M14x1	5	10 ±0.2	12.4 ±0.1	62	49	27.5 +0.7/–0.25
12	5	M16x1	6	12 ±0.2	14.5 ±0.1	72.5	59.5	32.5 +0.7/–0.25
16	6	M22x1.5	8	16 ±0.2	20 ±0.1	91	70	42.5 +0.7/–0.35
20	8	M26x1.5	10	20 ±0.2	24 ±0.1	112	91	54.5 +0.7/–0.35

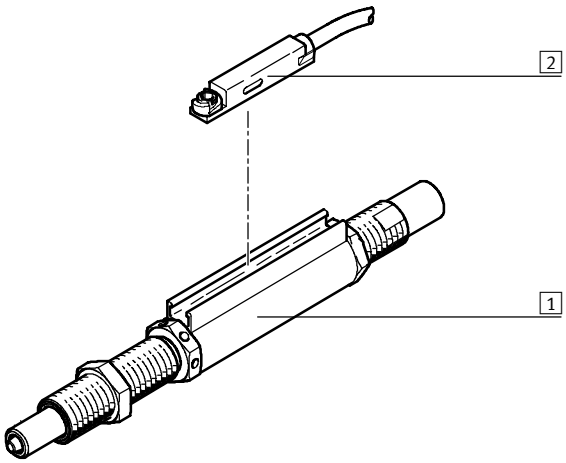
∅ [mm]	L4	L5	L6 +0.5	L7	⌀C1	⌀C2	Max. tightening torque ⌀C1 [Nm]
5	5.5 ±0.1	5.8 +0.35/–0.25	5	3.5 ±0.25	10	7	2
7	7 ±0.2	7.3 +0.35/–0.25	6	4.3 ±0.25	13	9	3
8	8 ±0.2	8.3 +0.4/–0.25	8	5.3 +0.3/–0.25	15	11	5
10	10 ±0.2	10.5 +0.4/–0.25	10	6.5 +0.3/–0.25	17	13	8
12	12 ±0.2	12.5 +0.4/–0.25	12	7.5 +0.3/–0.25	19	15	20
16	16 ±0.2	16.5 +0.4/–0.25	12	9.5 +0.3/–0.25	27	20	35
20	20 ±0.2	20.5 +0.4/–0.25	12	11.5 +0.3/–0.25	32	24	60

Ordering data

∅ [mm]	Part No.	Type
5	**191 192**	**YSRW-5-8**
7	**191 193**	**YSRW-7-10**
8	**191 194**	**YSRW-8-14**
10	**191 195**	**YSRW-10-17**
12	**191 196**	**YSRW-12-20**
16	**191 197**	**YSRW-16-26**
20	**191 198**	**YSRW-20-34**

Stop elements YSRWJ

Peripherals overview and type codes



Accessories

	Type	Brief description	➔ Page
1	Stop element YSRWJ	Hydraulic shock absorber with progressive cushioning characteristic The cushioning length is adjustable	1 / 9.1-13
2	Proximity switches SME-/SMT-8	Sensing option for end positions	1 / 9.3-3

YSRWJ – 7 – 10 – A

Type

YSRWJ	Shock absorber

∅ [mm]

Stroke [mm]

Position sensing

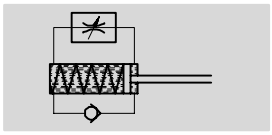
A	Position sensing

Stop elements YSRWJ

Data sheet

FESTO

Function



- Ø - Diameter
  5 ... 8 mm
- | - Stroke length
  7.5 ... 13.5 mm

General technical data				
Piston ∅		5	7	8
Stroke	[mm]	8	10	14
Mode of operation		A piston rod in front of the shock absorber transmits the force to the shock absorber. This serves as the end stop and actuates the proximity sensor via a magnet mounted on it.		
Cushioning		Self-adjustable		
Type of mounting		Thread with locknut		
Position sensing		Via proximity sensor		
Impact velocity	[m/s]	0.05 ... 2	0.05 ... 3	
Repetition accuracy	[mm]	0.02		
Product weight	[g]	45	75	110
Ambient temperature	[°C]	0 ... +60		

Reset time [s]			
Piston ∅	5	7	8
Reset time[1)]	≤ 0.2		

1) The specified technical data refers to ambient temperature. At higher temperatures in the 80 °C range, the max. mass and the cushioning work must be reduced by 50% approx. At –10 °C, the reset time may be up to 1 second.

Forces [N]			
Piston ∅	5	7	8
Min. insertion force[1)]	5	18	80
Max. stop force [2)] in end positions	200	300	500
Min. resetting force[3)]	1.5	2	3.5

1) This is the minimum force that must be applied so that the shock absorber is pushed exactly into the retracted end position.
2) Impact force may not exceed the maximum specified value.
3) This is maximum force that can be exerted on the piston rod so that the shock absorber advances fully.

Energies [J]			
Piston ∅	5	7	8
Max. energy absorption per stroke	1	2	3
Max. energy absorption per hour	10,000	15,000	21,000

Mass range [kg]			
Piston ∅	5	7	8
Permissible mass range up to	2	5	10

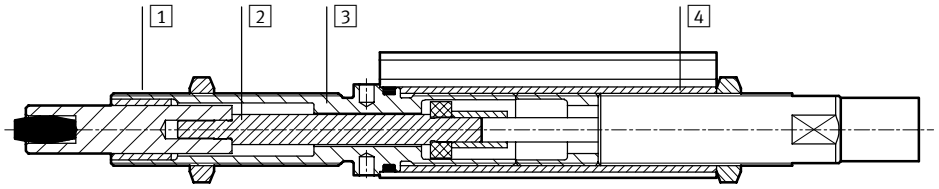
Stop elements YSRWJ

Data sheet

FESTO

Materials

Sectional view

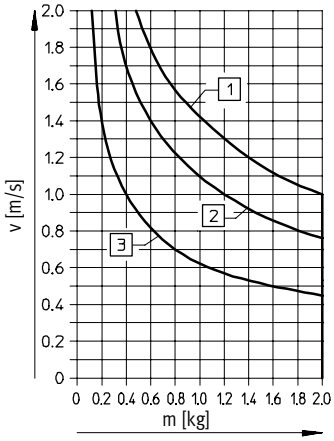


Piston ∅		5	7	8
1	Housing	Brass, nickel-plated		
2	Stop bolt	Steel, stainless and reinforced		
3	Distance sleeve	Aluminium		
4	Threaded barrel	Brass, nickel-plated		
	Material note	Free of copper, PTFE and silicone		

Selection graphs for limit stops with shock absorber YSRWJ

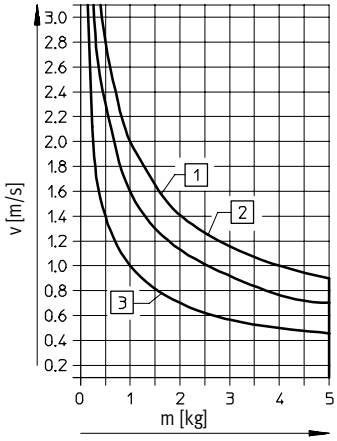
Impact velocity dependent on mass m

YSRWJ-5-8-A



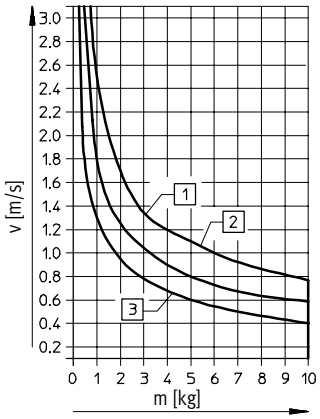
1 Without additional force
2 With additional force A = 50 N
3 With additional force A = 100 N

YSRWJ-7-10-A



1 Without additional force
2 With additional force A = 75 N
3 With additional force A = 150 N

YSRWJ-8-14-A

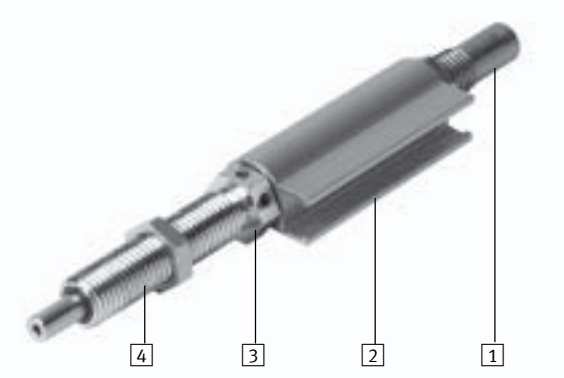


1 Without additional force
2 With additional force A = 100 N
3 With additional force A = 150 N

Stop elements YSRWJ

Data sheet

Mode of operation

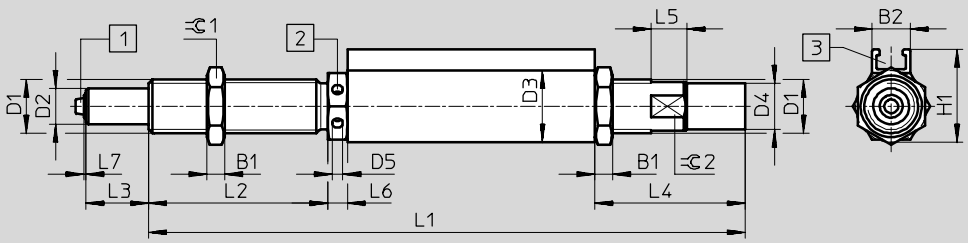


1 Soft cushioning characteristics – cushioning stroke is adjustable
2 End-position sensing via proximity sensor SME-/SMT-8 that can be integrated
3 Precision end-position adjustment
4 Precision end position thanks to internal, metallic inserts

Dimensions

Download CAD data ➔ **www.festo.com/en/engineering**

YSR-...-C



1 Rubber buffer, only with sizes: YSRWJ-7-10-A and YSRWJ-8-14-A
2 Precision end-position adjustment
3 Slot for proximity sensor SME-/SMT-8

∅ [mm]	B1	B2 +0.4	D1	D2	D3 +0.1	D4	D5 +0.1	H1 +0.3	L1 +0.3/-0.1
5	3	8.1	M8x1	4	12	6.7 ±0.05	2	16.5	97.4
7	3.5	8.5	M10x1	6	14	8.6 ±0.05	2.4	18.3	144.8
8	4	8.5	M12x1	8	16	10.4 ±0.1	2.4	20.75	133.3

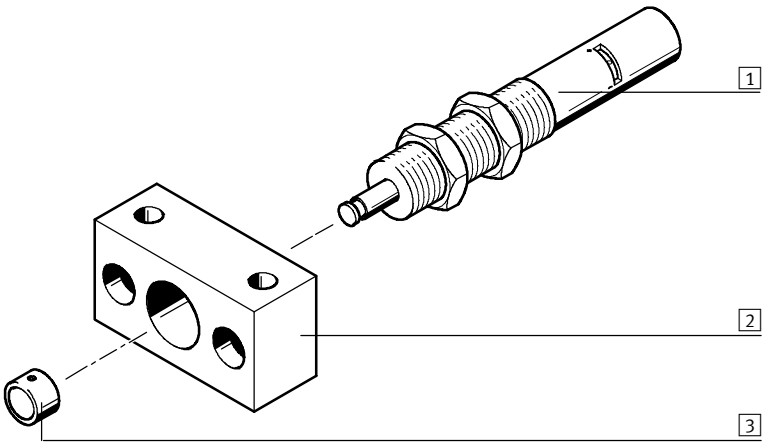
∅ [mm]	L2 +0.4	L3	L4 +0.45/-0.1	L5 +0.5	L6 +0.1/-0.55	L7 +0.3	⊂1	⊂2
5	32.5	8 +0.7/-0.55	21.6	5	4.4	0.5	10	7
7	40	10 +0.8/-0.55	21.1	6	4	0.5	13	9
8	40	14 +0.8/-0.55	33.6	8	4.4	0.5	15	11

Ordering data

∅ [mm]	Part No.	Type
5	**192 968**	**YSRWJ-5-8-A**
7	**192 967**	**YSRWJ-7-10-A**
8	**192 966**	**YSRWJ-8-14-A**

Hydraulic cushioning cylinder YDR

Peripherals overview and type codes



Accessories

	Type	Brief description	➔ Page
1	Hydraulic cushioning cylinders YDR	Hydraulic cushioning cylinder with reset spring for slow feed speeds	1 / 9.2-1
2	Mounting flange YSRF	Mounting option for shock absorber	1 / 9.3-0
3	Buffer YSRP	For the protection of piston rod	1 / 9.3-2
–	Oil gun YSR-OEP	For topping up oil	1 / 9.3-2
–	Special oil OFSB-1	Replacement oil	1 / 9.3-2

YDR	–	16	–	20

Type	
YDR	Hydraulic cushioning cylinder

∅[mm]

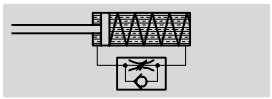
Stroke [mm]

Hydraulic cushioning cylinder YDR

Data sheet

FESTO

Function



- Ø - Diameter
  16 ... 32 mm
- | - Stroke length
  20 ... 60 mm

General technical data					
Piston ∅		16	20	25	32
Stroke	[mm]	20	25	40	60
Mode of operation		Hydraulic cushioning cylinder with return spring			
Cushioning		Adjustable			
Type of mounting		Thread with locknut			
Impact velocity, max.	[m/s]	0.3		0.4	
Min. feed speed	[mm/s]	0.2			
Max. feed speed	[mm/s]	100			
Product weight	[g]	280	460	900	1,600
Ambient temperature	[°C]	0 ... +80			

Reset times [s]				
Piston ∅	16	20	25	32
Short[1)]	≤ 0.4			
Long [2)]	≤ 1			

1) Piston rod retracted for short period ≤ 30 s
2) Piston rod retracted for longer period ≤ 6 h

Forces [N]				
Piston ∅	16	20	25	32
Min. feed force	60	70	90	120
Max. feed force[1)]	1,600	2,500	4,000	6,400
Resetting force	25	25	35	35

1) Corresponds to max. force in the end position

Energies [J]				
Piston ∅	16	20	25	32
Max. energy absorption per stroke	32	62.5	160	384
Max. energy absorption per hour	65,000	90,000	150,000	220,000
Max. residual energy	0.16	0.32	0.8	2

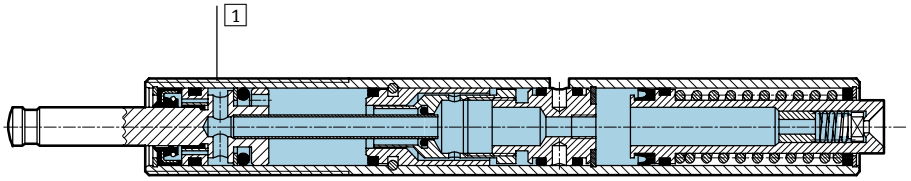
Hydraulic cushioning cylinder YDR

Data sheet

FESTO

Materials

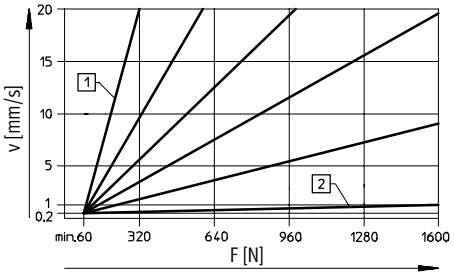
Sectional view



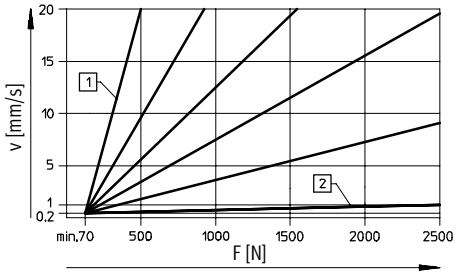
Hydraulic cushioning cylinder		
1	Housing	Galvanised steel
–	Seals	Nitrile rubber, polyurethane

Feed speed v dependent on feed force F (cushioning characteristic)

YDR-16-20

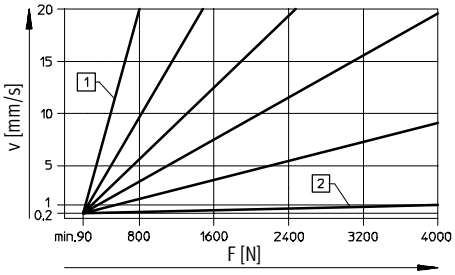


YDR-20-25

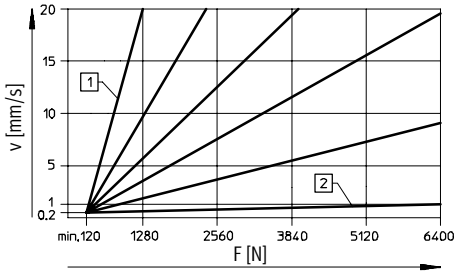


1 Speed adjustment open
2 Speed adjustment closed

YDR-25-40



YDR-32-60



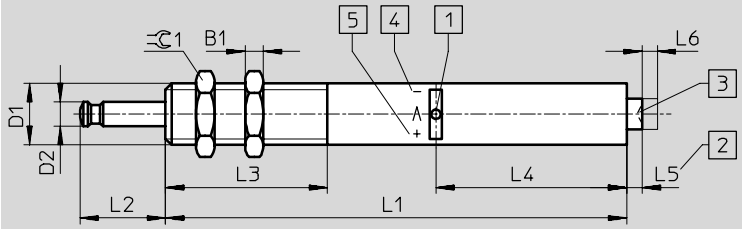
1 Speed adjustment open
2 Speed adjustment closed

Hydraulic cushioning cylinder YDR

Data sheet

FESTO

Dimensions Download CAD data ➔ **www.festo.com/en/engineering**



1 Speed control
2 Oil reservoir
3 Oil top-up (after 0.6 million load cycles)
4 – = slower speed
5 + = faster speed

∅ [mm]	B1	D1	D2	L1	L2	L3
16	6	M20x1.25	8	151	28	53
20	8	M24x1.25	10	174	35	60
25	10	M30x1.5	12	227	52	80
32	12	M37x1.5	15	275	75	108

∅ [mm]	L4	L5 max.	L6	⌭ 1	Max. tightening torque ⌭ 1 [Nm]
16	62.5	5	5	24	35
20	72.5	6	6	30	60
25	89.8	9	10	36	80
32	106.3	13	15	46	100

Ordering data

∅ [mm]	Part No.	Type
16	**14 900**	**YDR-16-20**
20	**14 901**	**YDR-20-25**
25	**14 902**	**YDR-25-40**
32	**14 903**	**YDR-32-60**

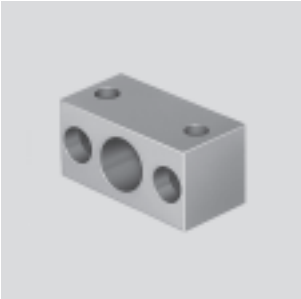
Accessories for cushioning components

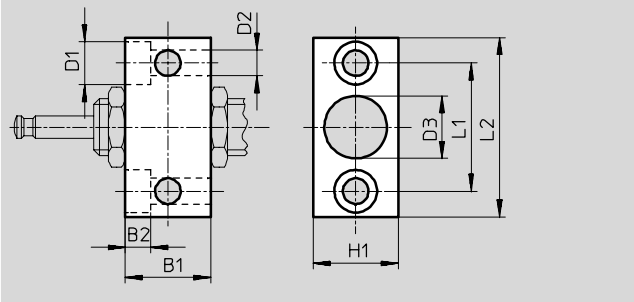
Data sheet

FESTO

Mounting flange
YSRF/YSRF-C

Material:
Steel





Possible combinations				
Cushioning components Mounting flange	YSR	YSR-C	YSRW	YDR
YSRF				
YSRF-8	–	■1)	■1)	–
YSRF-12	■	–	–	–
YSRF-16	■	–	–	■
YSRF-20	■	–	–	■
YSRF-25	■	■	–	■
YSRF-32	■	■	–	■
YSRF-C				
YSRF-8-C	■	■	■	–
YSRF-12-C	–	■	■	–
YSRF-16-C	–	■	■	–
YSRF-20-C	–	■	■	–

1) For shock absorber size ∅ 7

Dimensions and ordering data

YSRF

For ∅ [mm]	B1	B2	D1	D2	D3	H1	L1	L2	CRC1)	Weight [g]	Part No.	Type
8	16	5.5	10	5.5	10.2	16	25	38	2	50	**11 681**	**YSRF-8**
12	25	6.8	11	6.6	15.2	25	36	50	2	175	**11 682**	**YSRF-12**
16	30	9	15	9	20.2	30	45	63	2	300	**11 683**	**YSRF-16**
20	36	11	18	11	24.2	36	56	78	2	535	**11 684**	**YSRF-20**
25	45	13	20	13.5	30.2	45	63	86	2	895	**11 685**	**YSRF-25**
32	55	15	24	15.5	37.2	55	80	108	2	1,730	**11 686**	**YSRF-32**

1) Corrosion resistance class 2 according to Festo standard 940 070
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents.

YSRF-C

For ∅ [mm]	B1	B2	D1	D2	D3	H1	L1	L2	CRC1)	Weight [g]	Part No.	Type
8	20	5.5	10	5.5	12.2	20	28	41	2	90	**34 575**	**YSRF-8-C**
12	25	6.8	11	6.6	16.2	25	36	50	2	180	**34 576**	**YSRF-12-C**
16	32	9	15	9	22.2	32	45	63	2	330	**34 577**	**YSRF-16-C**
20	40	11	18	11	26.2	40	56	78	2	700	**34 578**	**YSRF-20-C**

1) Corrosion resistance class 2 according to Festo standard 940 070
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents.

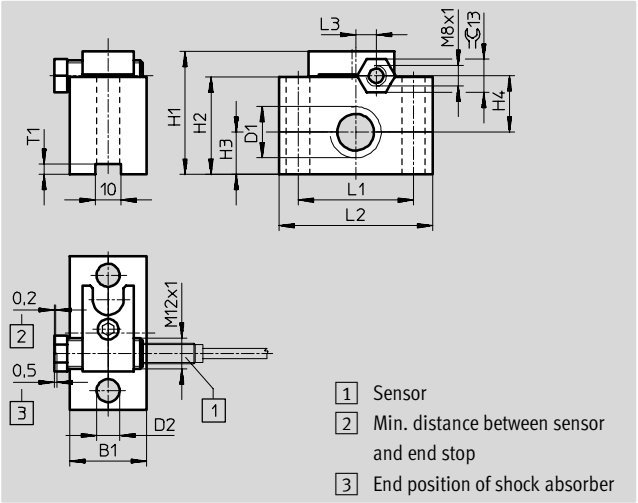
Accessories for cushioning components

Data sheet

FESTO

Mounting flange YSRF-S-C

Material:
Aluminium, steel
Free of copper, PTFE and silicone



Possible combinations				
Cushioning components Mounting flange	YSR	YSR-C	YSRW	YDR
YSRF-S-8-C	–	■	■	–
YSRF-S-12-C	–	■	■	–
YSRF-S-16-C	–	■	■	–
YSRF-S-20-C	–	■	■	–

Dimensions and ordering data														
For ∅ [mm]	B1	D1	D2 ∅	H1	H2	H3	H4	L1	L2	L3	T1	Weight [g]	Part No.	Type
8	20	M12x1	5.5	35	25	9.5	16	32	45	4	2	12	**34 579**	**YSRF-S-8-C**
12	25	M16x1	6.6	42	32	12.5	20	36	50	3	4	130	**34 580**	**YSRF-S-12-C**
16	30	M22x1.5	9	48	38	16.5	22	45	60	8	4	180	**34 581**	**YSRF-S-16-C**
20	30	M26x1.5	11	52	42	19	23.5	56	80	11.5	4	250	**34 582**	**YSRF-S-20-C**

Note

Inductive sensors for position sensing ➔ 1 / 9.3-3

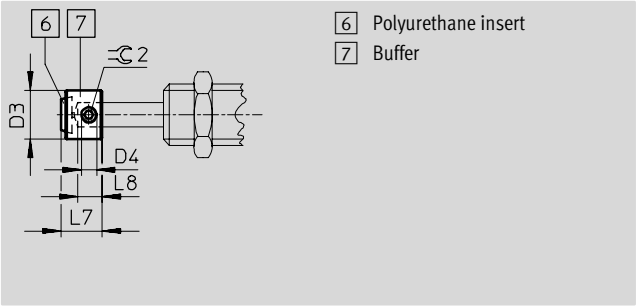
Accessories for cushioning components

Data sheet

FESTO

Buffer YSRP

Material:
Steel, polyurethane



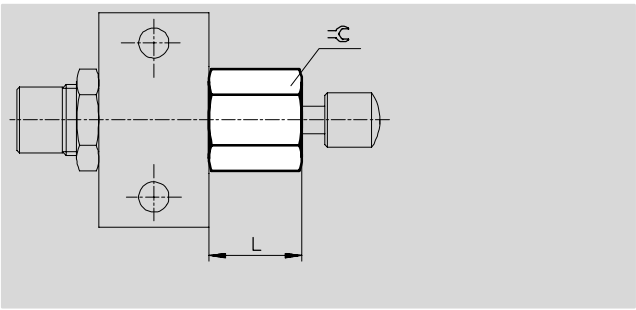
Dimensions and ordering data

For ∅ [mm]	D3	D4	L7	L8	⊂ 2	CRC[1]	Weight [g]	Part No.	Type
8	8	M2	6,7	4	0,9	2	4	**539 638**	**YSRP-8**
12	12	M4	10	6	2	2	7	**11 133**	**YSRP-12**
16	16	M5	13.5	8	2.5	2	15	**11 134**	**YSRP-16**
20	20	M6	17	10	3	2	27	**11 135**	**YSRP-20**
25	25	M8	20.5	12	4	2	52	**11 136**	**YSRP-25**
32	32	M8	26	15	4	2	110	**11 137**	**YSRP-32**

1) Corrosion resistance class 2 according to Festo standard 940 070
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents.

Stop limiter YSRA-C

Material:
Steel



Dimensions and ordering data

For ∅ [mm]	L	⊂	Weight [g]	Part No.	Type
7	14.5	13	12	**150 932**	**YSRA-7-C**
8	18	15	28	**150 933**	**YSRA-8-C**
12	24.5	19	48	**150 934**	**YSRA-12-C**

Oil gun YSR-OEP

Ordering data

Part No.	Type
11 698	**YSR-OEP**

Special oil OFSB-1

Ordering data

Part No.	Type
207 873	**OFSB-1**

Ordering data – Proximity switch for slot 8, magneto-resistive, for stop elements YSRWJ — Data sheets ➔ 1 / 10.2-13

	Mounting	Switch output	Electrical connection: Cables	M8 plug	M12 plug	Cable length [m]	Part No.	Type
NO contact								
	Inserted from above	PNP	3 wires	–	–	2.5	**525 898**	**SMT-8F-PS-24V-K2,5-OE**
		NPN					**525 909**	**SMT-8F-NS-24V-K2,5-OE**
		PNP	–	3-pin	–	0.3	**525 899**	**SMT-8F-PS-24V-K0,3-M8D**
		NPN					**525 910**	**SMT-8F-NS-24V-K0,3-M8D**
	Inserted from end	PNP	3 wires	–	–	2.5	**175 436**	**SMT-8-PS-K-LED-24-B**
			–	3-pin	–	0.3	**175 484**	**SMT-8-PS-S-LED-24-B**
NC contact								
	Inserted from above	PNP	3 wires	–	–	7.5	**525 911**	**SMT-8F-PO-24V-K7,5-OE**

Ordering data – Proximity switch for slot 8, magnetic reed, for stop elements YSRWJ — Data sheets ➔ 1 / 10.2-18

	Mounting	Electrical connection: Cables	M8 plug	Cable length [m]	Part No.	Type
NO contact						
	Inserted from above	3 wires	–	2.5	**525 895**	**SME-8F-DS-24V-K2,5-OE**
		–	3-pin	0.3	**525 896**	**SME-8F-DS-24V-K0,3-M8D**
	Inserted from end	3 wires	–	2.5	**150 855**	**SME-8-K-LED-24**
		–	3-pin	0.3	**150 857**	**SME-8-S-LED-24**
NC contact						
	Inserted from above	3 wires	–	7.5	**525 906**	**SME-8F-DO-24V-K7,5-OE**

Ordering data – Inductive sensors M8, for mounting flange YSRF-S-C — Data sheets ➔ Volume 4

	Electrical connection: Cable	M8 plug	Switch output	LED	Cable length [m]	Part No.	Type
NO contact							
	3 wires	–	PNP	■	2.5	**150 386**	**SIEN-M8B-PS-K-L**
	–	3-pin	PNP	■		**150 387**	**SIEN-M8B-PS-S-L**
NC contact							
	3 wires	–	PNP	■	2.5	**150 390**	**SIEN-M8B-PO-K-L**
	–	3-pin	PNP	■		**150 391**	**SIEN-M8B-PO-S-L**

Ordering data – Plug sockets — Data sheets ➔ 7 / 1.1-106

	Mounting	Switch output: PNP	NPN	Connection	Cable length [m]	Part No.	Type
Straight plug socket							
	M8 union nut	■	■	3-pin	2.5	**159 420**	**SIM-M8-3GD-2,5-PU**
					5	**159 421**	**SIM-M8-3GD-5-PU**
Angled plug socket							
	M8 union nut	■	■	3-pin	2.5	**159 422**	**SIM-M8-3WD-2,5-PU**
					5	**159 423**	**SIM-M8-3WD-5-PU**

Core Range

Calculation tool for cushioning components

Data sheet

FESTO

This selection aid helps you find the right shock absorber for every application.
When you are choosing a shock absorber, we recommend that you proceed as follows:

1. Determine the following values, effective at the time of impact:
   – Force (A)
   – Equivalent mass m_{equiv}
   – Impact velocity (v)
2. Select a shock absorber from the graphs on the following pages.
3. Check your selection on the basis of its maximum cushioning energy ($W_{max.}$)

Selection and ordering aid
Shock absorber
www.festo.com/en/engineering

When you are choosing a shock absorber for your application, ensure that the following values are not exceeded:

- Permissible energy load per stroke:
  $W_{min.}$ = 25%
  $W_{max.}$ = 100%
- Recommended energy load per stroke:
  $W_{opt.}$ = 50% ... 100 %
- Max. energy absorption per hour
- Max. residual energy
- Max. stop force in end position

The (angular) velocity required in the formulae is the velocity at the time of the impact on the shock absorber. This depends on the dynamic characteristics of the drive component and is thus difficult to determine.

It is better to determine the mean velocity ($v_m = s/t$ or $\omega_m = \varphi/t$).

In order to prevent damage to the drive concerned, calculations should in the interests of safety be based on the following values:
$v = 1.25 \ldots 2\ v_m$
$\omega = 1.25 \ldots 2\ \omega_m$
Guide values for linear motions:
Factor 2 with strokes ‹ 50 mm,
factor 1.5 with strokes › 50 mm and ‹ 100 mm,
factor 1.25 with strokes › 100 mm.

The fact that the (angular) velocity appears in the calculation as a squared value means that the expected error becomes considerably larger. The calculation can thus be regarded only as an approximation. The safety factor does, however, ensure that the selected shock absorber is not too small.

The following formulae are required for the calculation:

$$A = F + G$$

$$A = F + m \times g \times \sin\alpha$$

$$W_{total} = \frac{1}{2} \times m \times v^2 + A \times s < W_{max.}$$

$$W_h = W_{total} \times \text{Stroke} \div \text{Hours} < W_{hmax.}$$

The following applies additionally for rotary motions:

$$m_{equiv.} = \frac{J}{R^2}$$

$$v = \omega \times R$$

$$A = \frac{M}{R} + m \times g \times \sin\alpha \times \frac{a}{R}$$

The following abbreviations are used:

A = Additional force = F + G [N]
F = Cylinder force minus frictional force [N]
G = Force due to weight = m x g x sin α

Special cases:
α = 0°: Horizontal motion G = 0
α = 90°: Downward motion G = m x g
α = 90°: Upward motion: G = –m x g

v = Impact velocity [m/s]
$m_{equiv.}$ = Equivalent mass [kg]
g = Acceleration due to gravity 9.81 [m/s²]
s = Shock absorber stroke [m]
α = Impact angle [°]
W_{total} = Cushioning work/stroke [J]
W_h = Cushioning work/hour [J]

J = Mass moment of inertia [kg x m²]
R = Distance between mass pivot point and shock absorber [m]
ω = Angular velocity [rad/s]
M = Drive torque [Nm]
a = Distance between centre of gravity of mass and pivot point

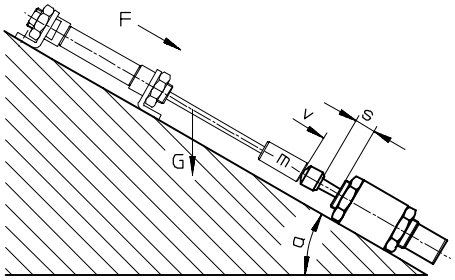
Calculation tool for cushioning components

Data sheet

FESTO

Sizing example for linear motion

This example illustrates the procedure for the selection of a shock absorber for the application shown in the adjacent drawing:



m = 50 kg
v = 1.5 m/s
α = 45°
F = 190 N

(∅ 20 mm with p = 6 bar, 1,800 strokes per hour)

A = F + m x g x sin α
= 190 N + 50 x 9.81 x sin α N
= 537 N

m_{equiv} = m = 50 kg

In the process of selecting shock absorbers on the basis of the graphs (see data sheets), the force (A) is governed by the first curve to the right of the point of intersection of the equivalent mass (m_{equiv}) and the impact velocity (v). The curves move to the left as the additional force increases.
Three force curves are given for each shock absorber. Interim values must be calculated by averaging. As the graphs show (continuous line), possible choices are the shock absorbers YSR-25-40 and YSR-25-40-C.
We must now determine whether the maximum permissible values for cushioning work ($W_{max.}$) and cushioning work per hour ($W_{hmax.}$) are not being exceeded. These maximum permissible values and the stroke length (s) can be found in the tables (below the graphs).

Experiment:

W_{total} = ½ x m x v^2 + A x s
= (1/2 x 50 x 1.5^2 +
537 x 0.04) Nm = 78 J

W_h = W_{total} x strokes/h
= 78 Nm x 1,800
= 140,000 J

For the above application, both shock absorbers are suitable.
Further selection criteria are adjustment facilities and size.

Result

	YSR-25-40	YSR-25-40-C
W_{total}	78 J	78 J
W_h	140,000 J	140,000 J
$W_{max.}$ [1)]	160 J > W_{total}	160 J > W_{total}
$W_{hmax.}$	290,000 > $W_{max.}$	150,000 > $W_{max.}$

1) The degree of utilisation is 49% in both cases.

Calculation tool for cushioning components

Data sheet

FESTO

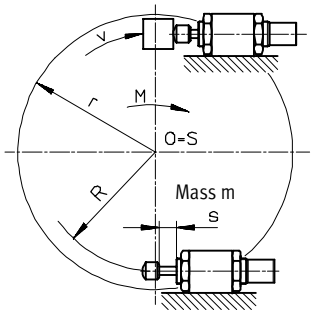
Sizing example for rotary motion

Example for rotary motion:

m_{equiv} = J/R^2 = 8 kg

v = ω x R

A = M/R = 40 N



J = 2 kg m^2

ω = 4 rad/s

R = 0.5 m

M = 20 Nm

900 strokes per hour

In the process of selecting shock absorbers on the basis of graphs (see data sheets), the force (A) is governed by the first curve to the right of the point of intersection of the equivalent mass (m_{equiv}) and the impact velocity (v). The curves move to the left as the additional force increases.
Three force curves are given for each shock absorber. Interim values must be calculated by averaging. As the graphs show (dotted line), possible choices are the shock absorbers YSR-16-20 and YSR-16-20-C.
We must now determine whether the maximum permissible values for cushioning work ($W_{max.}$) and cushioning work per hour ($W_{hmax.}$) are not being exceeded. These maximum permissible values and the stroke length (s) can be found in the tables (below the graphs).

Experiment:

W_{total} = ½ x m x v^2 + A x s
= (1/2 x 8 x 2^2 +
40 x 0.02) J = 17 J

W_h = W_{total} x strokes/h
= 17 J x 900
= 15,300 J

For the above application, both shock absorbers are suitable.
Further selection criteria are adjustment facilities and size.

Result

	YSR-16-20	YSR-16-20-C
W_{total}	17 J	17 J
W_h	15,300 J	15,300 J
$W_{max.}$	32 J > W_{total} [1]	30 J > W_{total} [2]
$W_{hmax.}$	130,000 > $W_{max.}$	64,000 > $W_{max.}$

1) The degree of utilisation is 53%.
2) The degree of utilisation is 57%.