

ZBD 1001 **Differential Cylinder**

Brochure 09.20/DS13210



Differential Cylinder ZBD 1001

Description:

This series is the logical and consistent supplement to the series already standardized to ISO 6022 (250 bar) and ISO 6020/1 (160 bar). The consistent application of these standards means that standardized mounting parts can be used on all cylinder series to DIN 24333, ISO 6022, ISO 6020/1 and DIN 24336.

To do justice to the wide range of applications of a 100 bar cylinder, 10 mounting types have been standardized.

The Storz hydraulic cylinders of the ZBD 1001 series have installation dimensions to DIN 24336 and are therefore fully interchangeable with other makes within this standard.

The same installation dimensions apply to cylinders with and without end position cushioning.

Please order mounting parts separately.

Technical data:

Nominal pressure:	100 bar (10 MPa)
Static test pressure:	150 bar (15 MPa)
Piston Ø:	25 – 100 mm (others on request)
Area ratio:	1,25
Temperature range:	-20 °C ... +80 °C (by hydraulic fluid)
Viscosity range:	(10 ... 600) 10 ⁻⁶ m ² /s
Stroke speed range:	0 – 0,5 m/s
Hydraulic fluid:	Mineral oil according to DIN 51524, HFD fluids



Technical data:

Piston Ø (mm)	Rod Ø MM (mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	Force at 100 bar ¹⁾		Cushioning length	G ₁ [kg]							G ₂ [kg/mm]	
							Mounting type							per 1 mm Stroke	
				Push [kN]	Pull [kN]		A	B	CA CB	CAA	CC CD	DA DB	EA		Form B
25	12 18	4,9	3,8	4,9	3,8	10,0	1,8	2,0	2,2	2,3	2,1	1,8	2,6	0,005	0,005
32	14 22	8,0	6,5	8,0	6,5	10,0	2,2	2,5	2,7	2,7	2,5	2,2	3,3	0,006	0,007
40	18 28	12,6	10,0	12,6	10,0	12,0	3,9	4,5	4,7	4,8	4,5	3,9	5,9	0,008	0,011
50	22 36	19,6	15,8	19,6	15,8	12,0	5,3	6,2	6,5	6,6	6,1	5,4	8,5	0,011	0,014
63	28 45	31,2	25,0	31,2	25,0	16,0	9,0	10,5	11,4	11,6	10,7	9,3	13,9	0,018	0,022
80	36 56	50,2	40,1	50,2	40,1	18,0	13,5	15,9	16,3	16,6	15,8	14,3	19,8	0,032	0,032
100	45 70	78,5	62,6	78,5	62,6	22,0	22,2	26,0	26,9	27,2	26,0	23,7	36,0	0,041	0,041

1) Theoretical static cylinder force (without considering efficiency and permissible loads of the mounting parts)

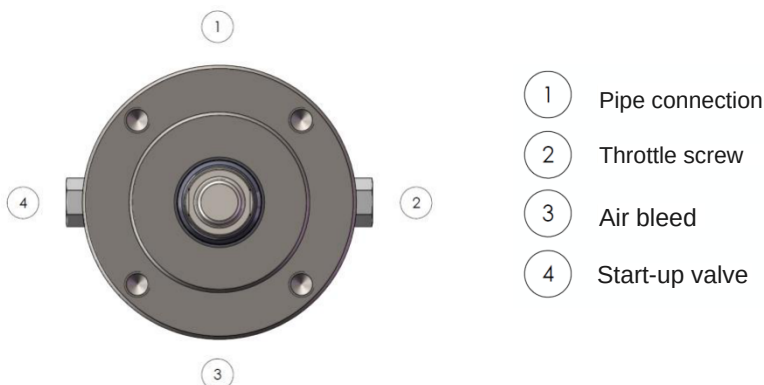
2) Stroke speed

The weight is calculated as follows: $G = G_1 + G_2 \times \text{Stroke}$

Recommended mean flow velocity of the hydraulic fluid in the connection cross-sections

	Suction lines	Return lines	Pressure lines up to 25 bar	25 - 63 bar	63 - 160 bar	160 - 250 bar	> 250 bar
Flow speed (guide values)	≤ 1,5 m/s	≤ 3 m/s	≤ 3 m/s	3 - 5 m/s	4 - 6 m/s	5 - 8 m/s	≤ 10 m/s

Positions of the connections:

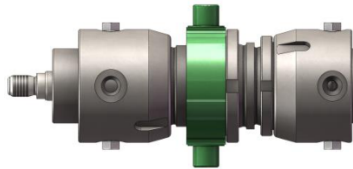


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Mounting types:



A Basic design (p. 5)



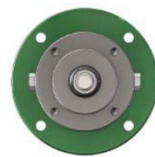
B Trunnion (p. 6)



CA Round flange at cylinder head (p. 7)



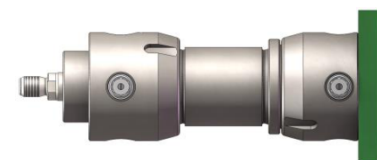
CAA Round flange at cylinder head with rear centering (p. 8)



CB Round flange at cylinder cap (p. 9)



CC Rectangular flange at cylinder head (p. 10)



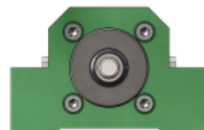
CD Rectangular flange at cylinder cap (p. 11)



DA Swivel eye at cylinder cap (p. 12)



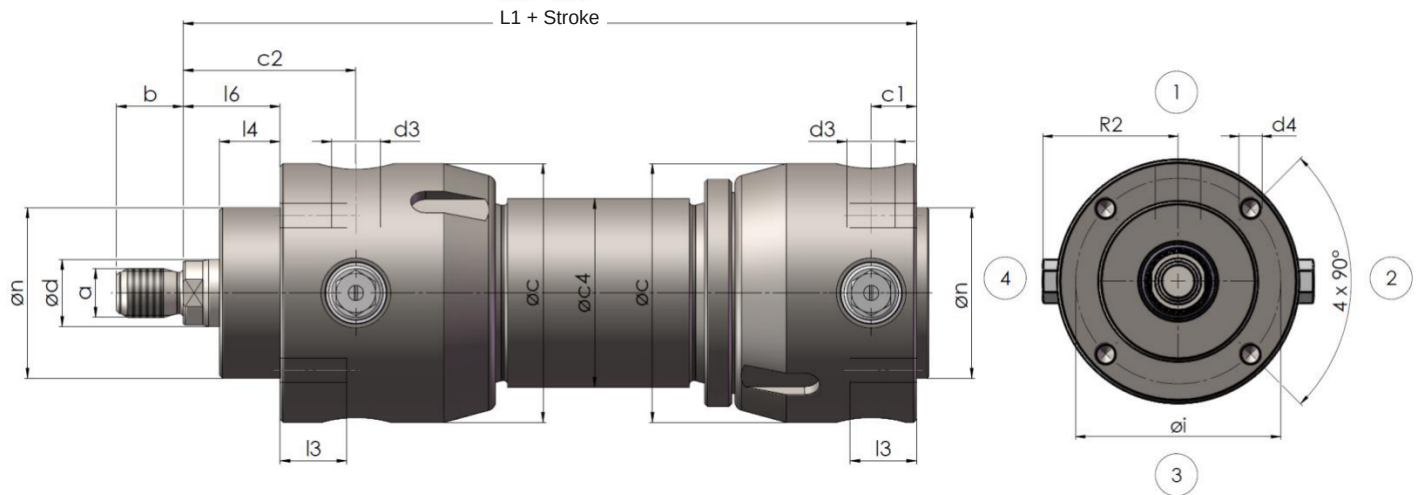
DB Spherical eye at cylinder cap (p. 13)



EA Foot mounting (p. 14)

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Mounting type A – basic design

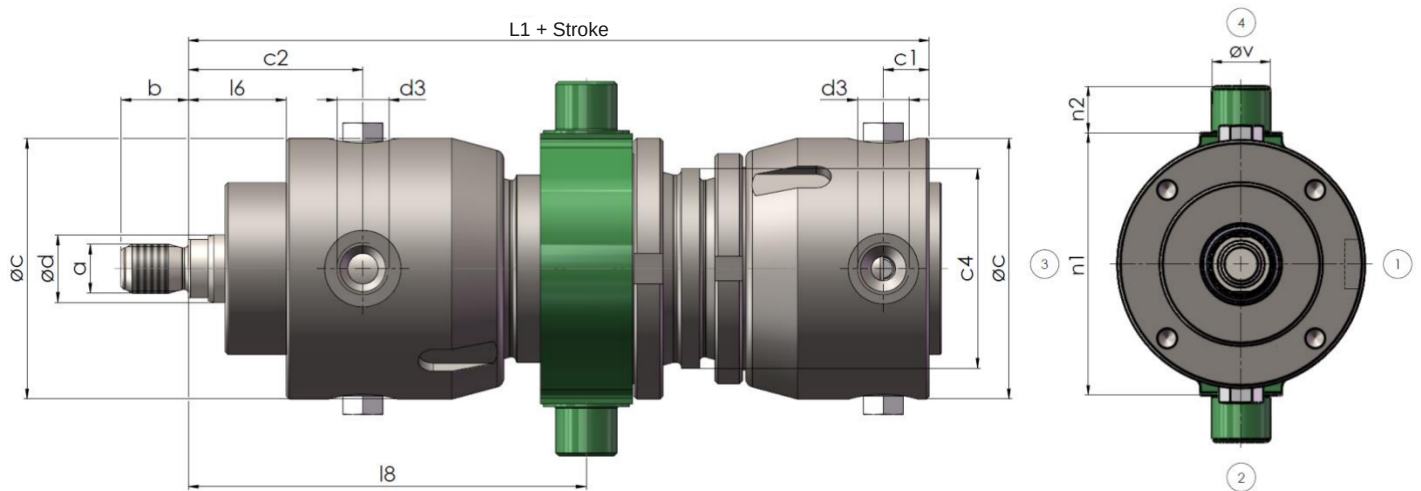


Piston Ø (mm)	Rod Ø d (mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L1 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	ø c	c1	c2	ø c4	d4	ø i j13	l4	l6	l13	ø n f8	R2 max.	Minimum stroke ¹⁾
25	12 18	4,9	3,8	114	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	M5	42	13	23	12	30	37	22
32	14 22	8,0	6,5	124	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	M6	48	15	25	14	35	39	32
40	18 28	12,6	10,0	132	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	M6	58	17	27	14	45	47	47
50	22 36	19,6	15,8	142	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	M8	72	20	33	16	56	51	58
63	28 45	31,2	25,0	165	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	M10	83	24	37	20	63	58	79
80	36 56	50,2	40,1	175	G1/2 M22x1,5	M27x2	36	120	19	71	95	M10	102	24	37	20	82	67	91
100	45 70	78,5	62,6	200	G3/4 M27x2	M33x2	45	145	22	86	115	M12	122	30	46	24	100	73	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush

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Mounting type B – trunnion

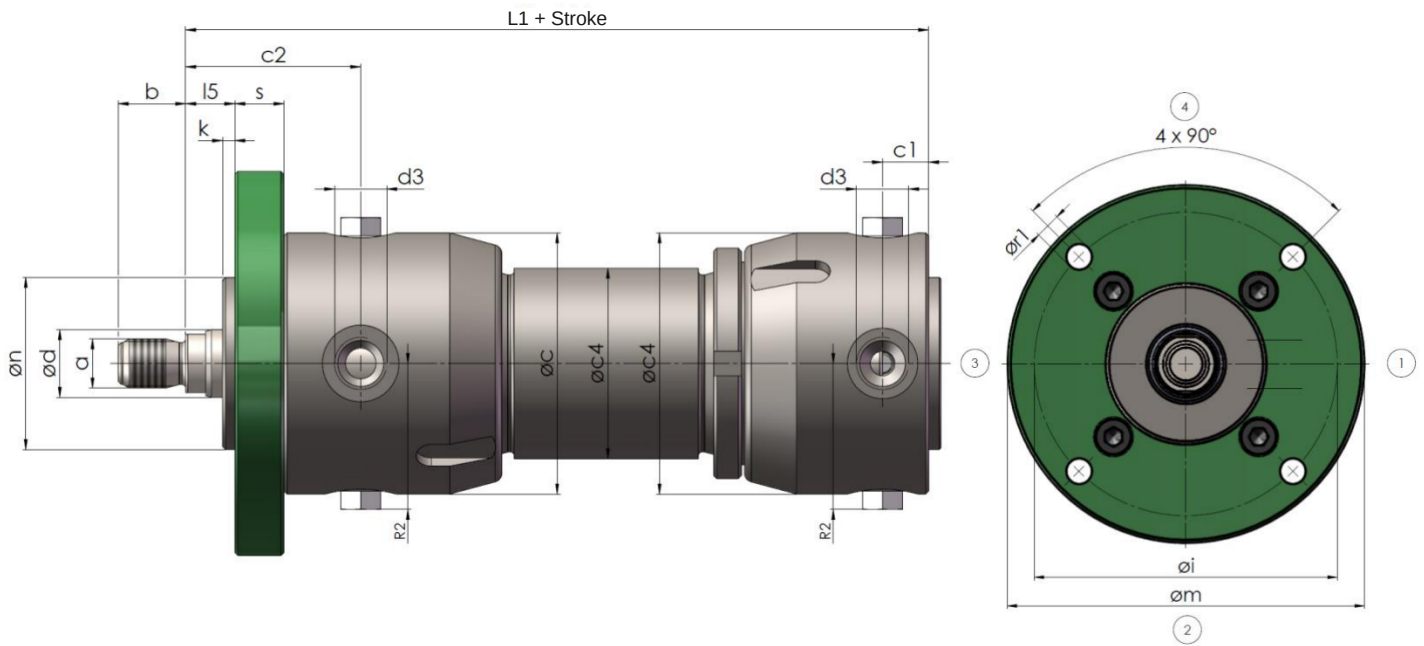


Piston Ø (mm)	Rod Ø d (mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L1 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	Ø c	c1	c2	Ø c4	l6	l8 min.	l8 max. = Stroke +	n1 h13	n2 js16	R2 max	Ø v f8	Minimum stroke ¹⁾
25	12 18	4,9	3,8	114	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	23	92	40	60	8	37	10	52
32	14 22	8,0	6,5	124	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	25	105	46	65	10	39	12	60
40	18 28	12,6	10,0	132	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	27	110	44	80	12	47	16	66
50	22 36	19,6	15,8	142	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	33	122	42	90	16	51	20	80
63	28 45	31,2	25,0	165	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	37	150	47	110	20	58	25	105
80	36 56	50,2	40,1	175	G1/2 M22x1,5	M27x2	36	120	19	71	95	37	155	45	125	25	67	32	110
100	45 70	78,5	62,6	200	G3/4 M27x2	M33x2	45	145	22	86	115	46	182	55	150	32	73	40	130

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush

Differential Cylinder ZBD 1001

Mounting type CA – round flange at cylinder head

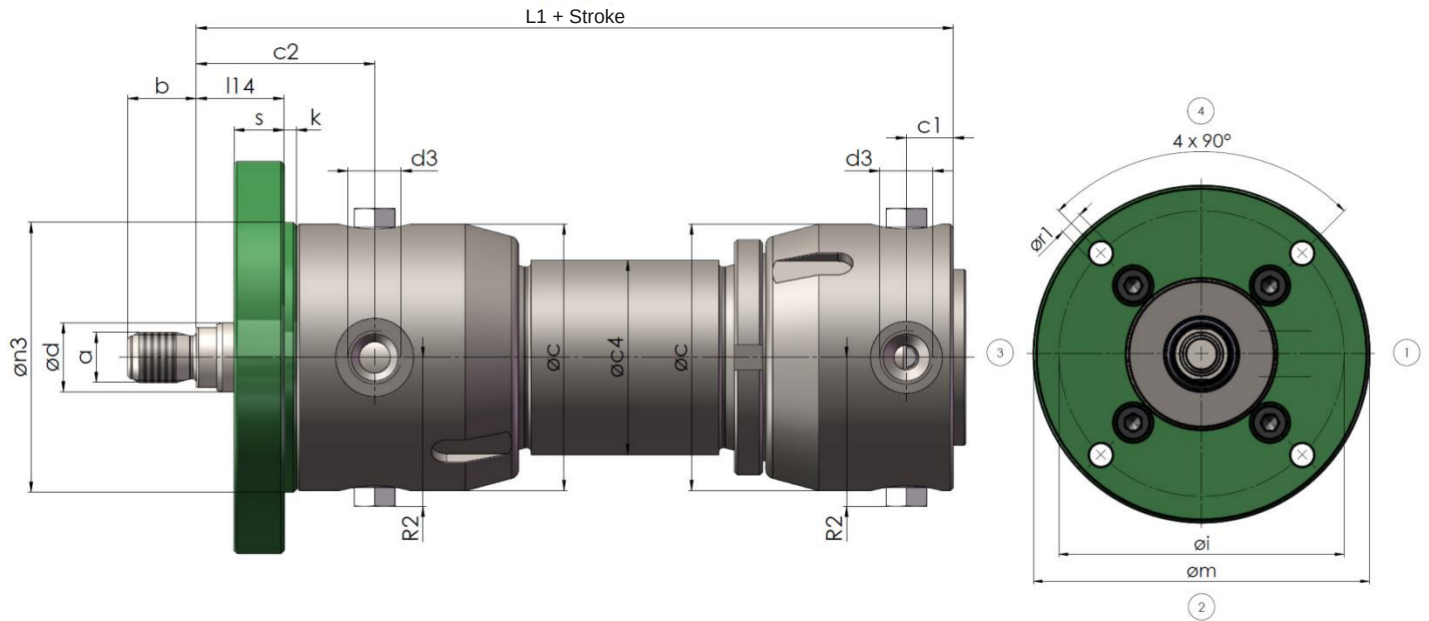


Piston Ø (mm)	Rod Ø d(mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L1 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	Ø c	c1	c2	Ø c4	k	Ø i js13	l5	Ø m-1	Ø n f8	Ø r1 H13	R2 max	s	Minimum stroke ¹⁾
25	12 18	4,9	3,8	114	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	3	72	13	85	30	5,5	37	10	22
32	14 22	8,0	6,5	124	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	3	78	13	92	35	6,6	39	12	32
40	18 28	12,6	10,0	132	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	3	96	13	110	45	6,6	47	14	47
50	22 36	19,6	15,8	142	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	4	106	17	125	56	9	51	16	58
63	28 45	31,2	25,0	165	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	4	132	17	155	63	11	58	20	79
80	36 56	50,2	40,1	175	G1/2 M22x1,5	M27x2	36	120	19	71	95	4	150	17	175	82	14	67	20	91
100	45 70	78,5	62,6	200	G3/4 M27x2	M33x2	45	145	22	86	115	5	175	21	205	100	18	73	25	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush

Differential Cylinder ZBD 1001

Mounting type CAA – round flange at cylinder head with rear centering

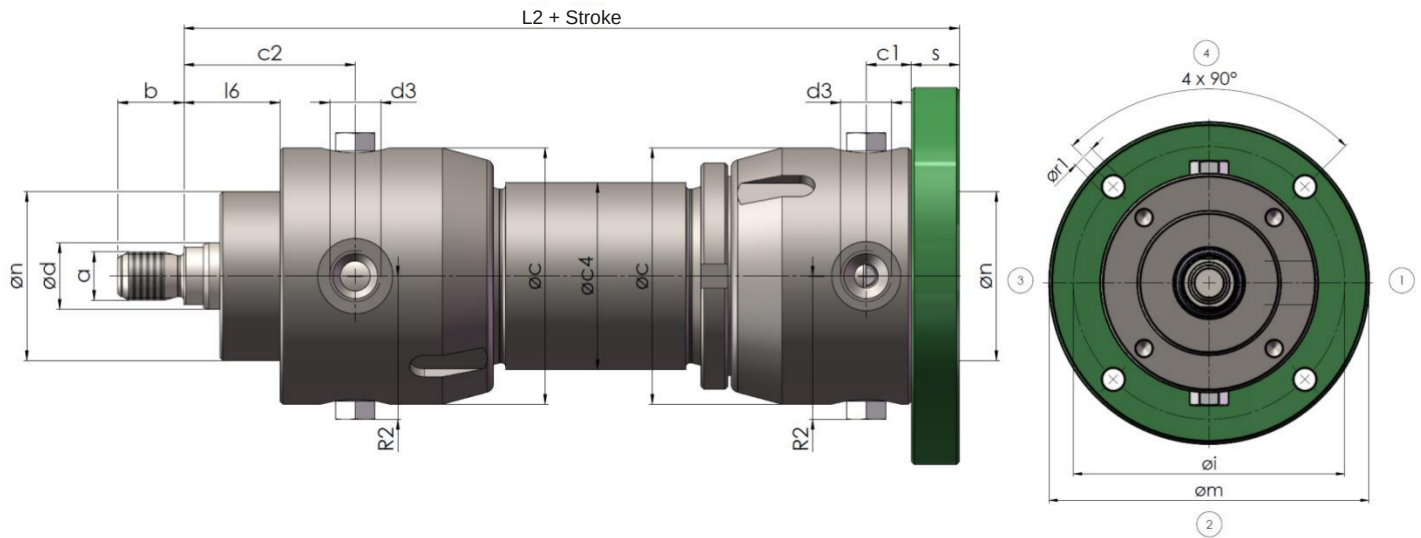


Piston Ø (mm)	Rod Ø d(mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L1 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	Ø c	c1	c2	Ø c4	k	Ø i js13	l14	Ø m-1	Ø n3 f8	Ø r1 H13	R2 max	s	Minimum stroke ¹⁾
25	12 18	4,9	3,8	114	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	3	72	20	85	60	6	37	10	22
32	14 22	8,0	6,5	124	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	3	78	22	92	64	6,6	39	12	32
40	18 28	12,6	10,0	132	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	3	96	24	110	78	6,6	47	14	47
50	22 36	19,6	15,8	142	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	4	106	29	125	86	9	51	16	58
63	28 45	31,2	25,0	165	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	4	132	33	155	106	11	58	20	79
80	36 56	50,2	40,1	175	G1/2 M22x1,5	M27x2	36	120	19	71	95	4	150	33	175	125	14	67	20	91
100	45 70	78,5	62,6	200	G3/4 M27x2	M33x2	45	145	22	86	115	5	175	41	205	146	18	73	25	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush

Differential Cylinder ZBD 1001

Mounting type CB – round flange at cylinder cap

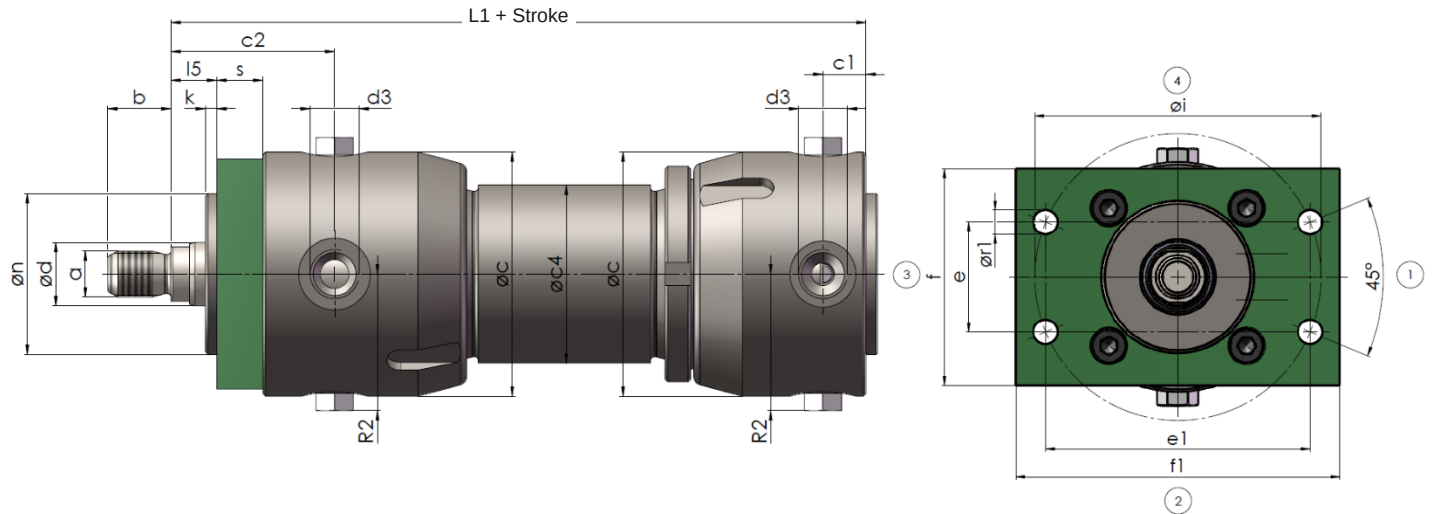


Piston Ø (mm)	Rod Ø d (mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L2 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	ø c	c1	c2	ø c4	k	ø i js13	l6	ø m-1	ø n f8/H8	ø r1 H13	R2 max	s	Minimum stroke ¹⁾
25	12 18	4,9	3,8	124	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	3	72	23	85	60	5,5	37	10	22
32	14 22	8,0	6,5	136	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	3	78	25	92	64	6,6	39	12	32
40	18 28	12,6	10,0	146	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	3	96	27	110	78	6,6	47	14	47
50	22 36	19,6	15,8	158	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	4	106	33	125	86	9	51	16	58
63	28 45	31,2	25,0	185	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	4	132	37	155	106	11	58	20	79
80	36 56	50,2	40,1	195	G1/2 M22x1,5	M27x2	36	120	19	71	95	4	150	37	175	125	14	67	20	91
100	45 70	78,5	62,6	225	G3/4 M27x2	M33x2	45	145	22	86	115	5	175	46	205	146	18	73	25	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush.

Differential Cylinder ZBD 1001

Mounting type CC – rectangular flange at cylinder head

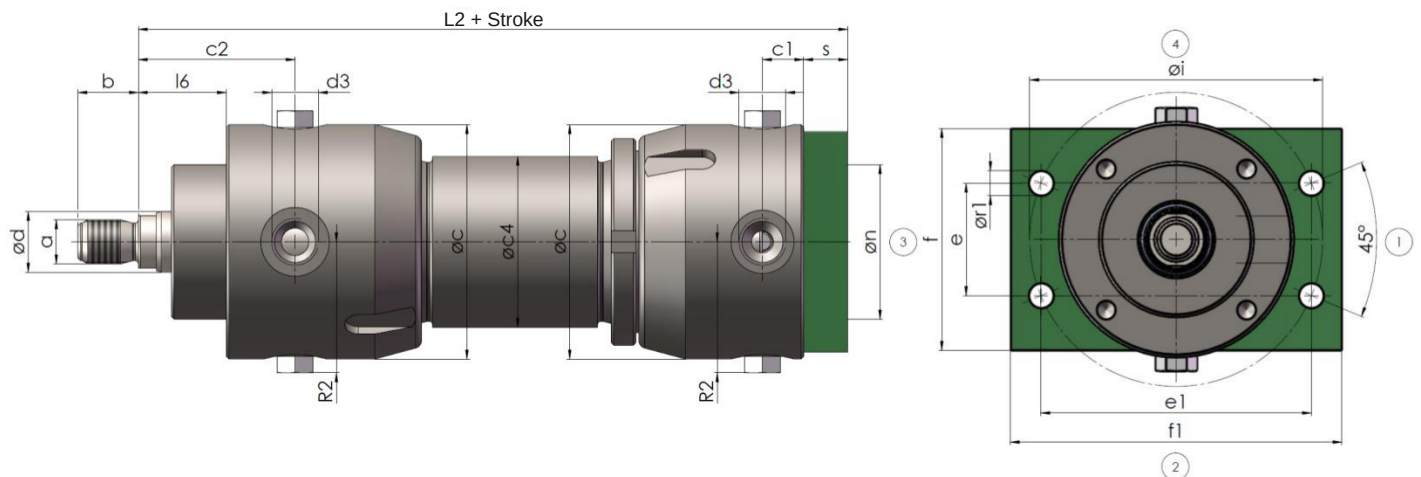


Piston Ø (mm)	Rod Ø d (mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L1 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	Ø c	c1	c2	Ø c4	s	Ø i js13	l5	k	Ø n f8	Ø r1 H13	R2 max	e js13	e1 js13	f	f1	Minimum stroke ¹⁾
25	12 18	4,9	3,8	114	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	10	72	13	3	30	5,5	37	27,5	66,5	55	80	22
32	14 22	8,0	6,5	124	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	12	78	13	3	35	6,6	39	29,8	72,1	60	85	32
40	18 28	12,6	10,0	132	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	14	96	13	3	45	6,6	47	36,7	88,7	70	105	47
50	22 36	19,6	15,8	142	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	16	106	17	4	56	9	51	40,6	98	80	120	58
63	28 45	31,2	25,0	165	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	20	132	17	4	63	11	58	50,5	121,9	100	145	79
80	36 56	50,2	40,1	175	G1/2 M22x1,5	M27x2	36	120	19	71	95	20	150	17	4	82	14	67	57,4	138,6	125	165	91
100	45 70	78,5	62,6	200	G3/4 M27x2	M33x2	45	145	22	86	115	25	175	21	5	100	18	73	67	161,7	150	190	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush.

Differential Cylinder ZBD 1001

Mounting type CD – rectangular flange at cylinder cap

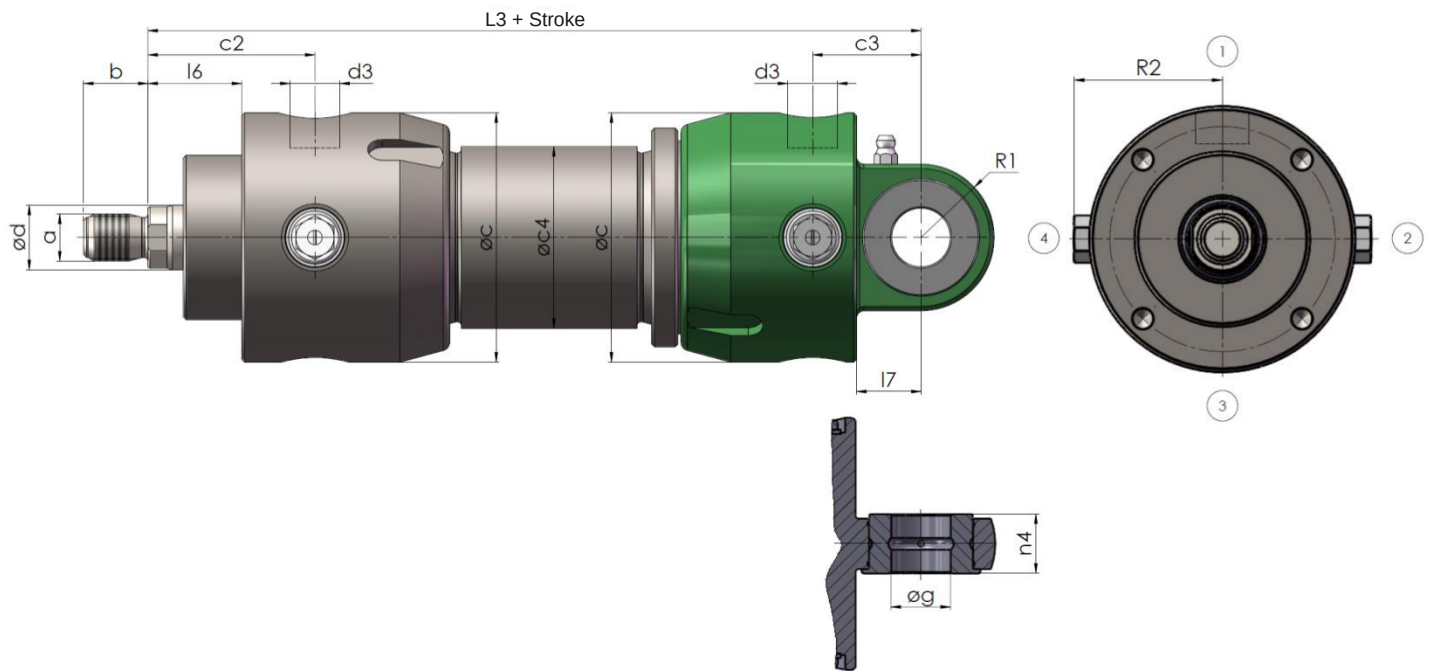


Piston Ø (mm)	Rod Ø d(mm)	Piston area A ₁ (cm ²)	Annular area A2 (cm ²)	L2 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	Ø c	c1	c2	Ø c4	s	Ø i js13	l6	Ø n H8	Ø r1 H13	R2 max	e js13	e1 js13	f	f1	Minimum stroke ¹⁾
25	12 18	4,9	3,8	124	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	10	72	23	30	5,5	37	28	66,5	55	80	22
32	14 22	8,0	6,5	136	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	12	78	25	35	6,6	39	30	72,1	60	85	32
40	18 28	12,6	10,0	146	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	14	96	27	45	6,6	47	37	88,7	70	105	47
50	22 36	19,6	15,8	158	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	16	106	33	56	9	51	41	98	80	120	58
63	28 45	31,2	25,0	185	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	20	132	37	63	11	58	51	121,9	100	145	79
80	36 56	50,2	40,1	195	G1/2 M22x1,5	M27x2	36	120	19	71	95	20	150	37	82	14	67	57	138,6	125	165	91
100	45 70	78,5	62,6	225	G3/4 M27x2	M33x2	45	145	22	86	115	25	175	46	100	18	73	67	161,7	150	190	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush.

Differential Cylinder ZBD 1001

Mounting type DA – swivel eye at cylinder cap



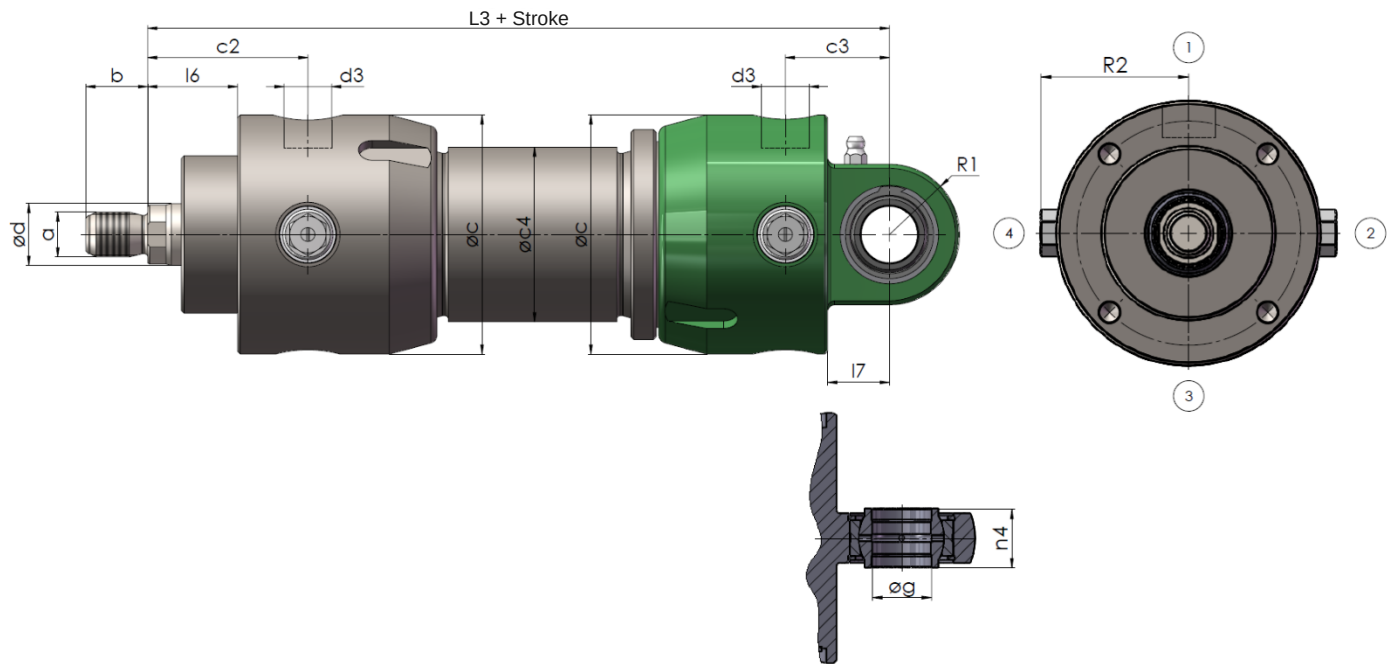
Piston Ø (mm)	Rod Ø d (mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L3 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	Ø c	c2	c3	Ø c4	l6	l7	n4 h12	Ø gH9	R1 max	R2 max	Minimum stroke ¹⁾
25 ²⁾	12 18	4,9	3,8	128	G1/4 M14x1,5	M10x1,25	14	55	44	26	33	23	14	10	10	14	37	22
32 ²⁾	14 22	8,0	6,5	140	G1/4 M14x1,5	M12x1,25	16	60	52	28	40	25	16	12	12	16	39	32
40	18 28	12,6	10,0	150	G3/8 M18x1,5	M14x1,5	18	75	54	33	50	27	18	16	16	20	47	47
50	22 36	19,6	15,8	164	G3/8 M18x1,5	M16x1,5	22	85	58	37	60	33	22	20	20	25	51	58
63	28 45	31,2	25,0	194	G1/2 M22x1,5	M20x1,5	28	100	70	48	75	37	29	25	25	32	58	79
80	36 56	50,2	40,1	208	G1/2 M22x1,5	M27x2	36	120	71	52	95	37	33	32	32	40	67	91
100	45 70	78,5	62,6	240	G3/4 M27x2	M33x2	45	145	86	62	115	46	40	40	40	50	73	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush.

²⁾ without grease nipple

Differential Cylinder ZBD 1001

Mounting type DB – spherical eye at cylinder cap



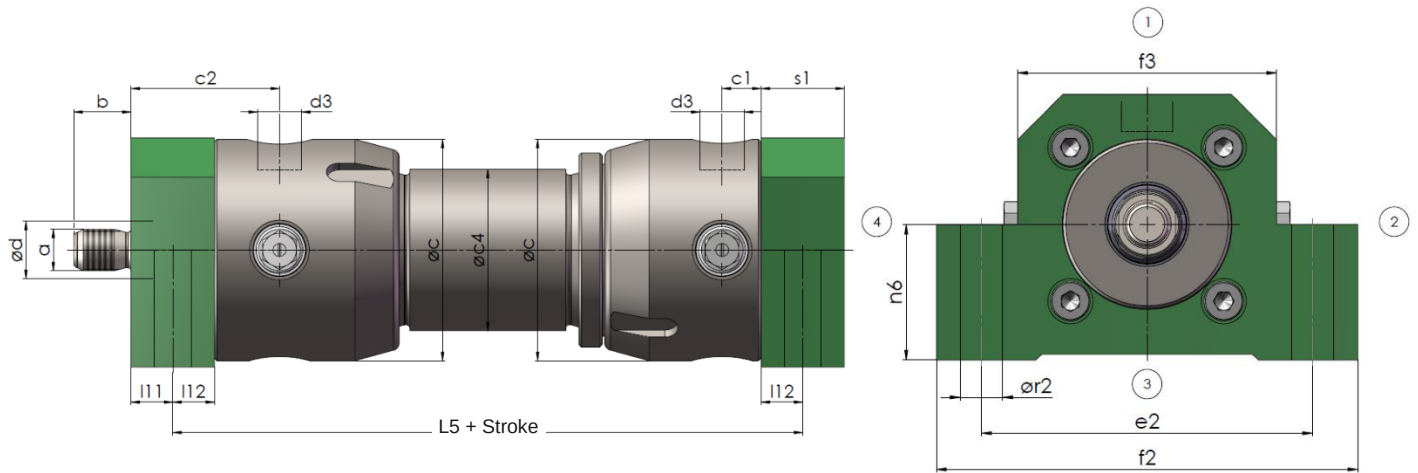
Piston $\varnothing$ (mm)	Rod $\varnothing d$ (mm)	Piston area A_1 (cm ²)	Annular area A_2 (cm ²)	L3 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	$\varnothing c$	c2	c3	$\varnothing c_4$	l6	l7	n4 h12	$\varnothing g$ H7	R1 max	R2 max	Minimum stroke ¹⁾
25 ²⁾	12 18	4,9	3,8	128	G1/4 M14x1,5	M10x1,25	14	55	44	26	33	23	14	9	10	14	37	22
32 ²⁾	14 22	8,0	6,5	140	G1/4 M14x1,5	M12x1,25	16	60	52	28	40	25	16	12	12	16	39	32
40	18 28	12,6	10,0	150	G3/8 M18x1,5	M14x1,5	18	75	54	33	50	27	18	16	16	20	47	47
50	22 36	19,6	15,8	164	G3/8 M18x1,5	M16x1,5	22	85	58	37	60	33	22	20	20	25	51	58
63	28 45	31,2	25,0	194	G1/2 M22x1,5	M20x1,5	28	100	70	48	75	37	29	25	25	32	58	79
80	36 56	50,2	40,1	208	G1/2 M22x1,5	M27x2	36	120	71	52	95	37	33	32	32	40	67	91
100	45 70	78,5	62,6	240	G3/4 M27x2	M33x2	45	145	86	62	115	46	40	40	40	50	73	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush.

²⁾ without grease nipple

Differential Cylinder ZBD 1001

Mounting type EA – cylinder with foot mounting



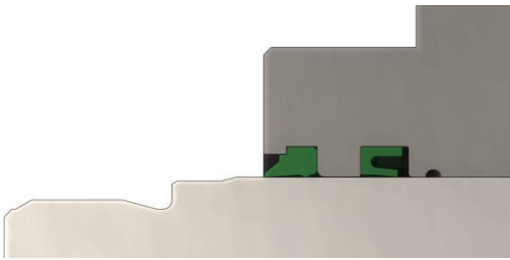
Piston Ø (mm)	Rod Ø d (mm)	Piston area A ₁ (cm ²)	Annular area A ₂ (cm ²)	L5 + Stroke	Pipe connection d3 Whitworth pipe thread/ Metric thread	Rod thread a	b js15	Ø c	c1	c2	Ø c4	s1	I11	I12	f2	f3	e2 js13	n6	Ø r2 H13	Minimum stroke ¹⁾
25	12 18	4,9	3,8	111	G1/4 M14x1,5	M10x1,25	14	55	12	44	33	20	13	10	80	52	68	30	6,6	22
32	14 22	8,0	6,5	119	G1/4 M14x1,5	M12x1,25	16	60	12	52	40	20	15	10	100	59	80	32	9	32
40	18 28	12,6	10,0	130	G3/8 M18x1,5	M14x1,5	18	75	15	54	50	25	14,5	12,5	120	74	95	40	11	47
50	22 36	19,6	15,8	141	G3/8 M18x1,5	M16x1,5	22	85	15	58	60	32	17	16	140	86	110	45	14	58
63	28 45	31,2	25,0	160	G1/2 M22x1,5	M20x1,5	28	100	19	70	75	32	21	16	170	101	140	55	16	79
80	36 56	50,2	40,1	173	G1/2 M22x1,5	M27x2	36	120	19	71	95	35	19,5	17,5	180	121	150	63	18	91
100	45 70	78,5	62,6	194	G3/4 M27x2	M33x2	45	145	22	86	115	40	26	20	232	150	195	75	22	121

¹⁾ Minimum stroke due to production. Shorter stroke lengths possible by using a spacer bush.

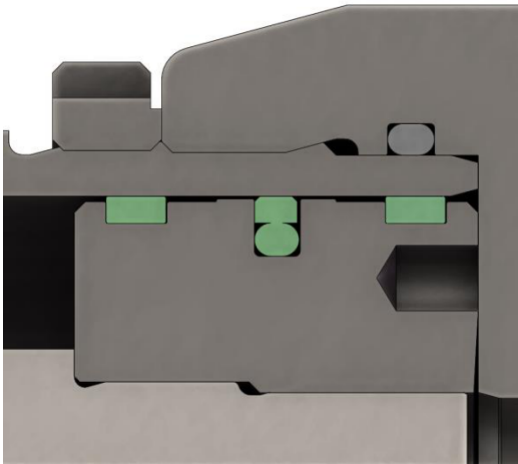
Differential Cylinder ZBD 1001

Seal variants – schematic representation

Rod seal

Code letter	Schematic representation	Features
P (standard version)		U-cup seal made of Perbunan (NBR) Temperature range: -40 °C to +100 °C Hydraulic fluid: mineral oil Universal industrial use High wear resistance
PV (Viton)		U-cup seal made of fluoroelastomer (FPM) Temperature range: -20 °C to +130 °C For higher operating temperatures and for HFD fluids

Piston seal

Code letter	Schematic representation	Features
G (standard version)		Teflon seal with NBR O-ring Temperature range: -10 °C to +80 °C Hydraulic fluid: mineral oil Stick-slip-free stroke motion, low wear, fast response
GV (Viton)		Teflon seal with FPM O-ring Temperature range: -20 °C to +130 °C Hydraulic fluid: mineral oil For higher operating temperatures and for HFD fluids

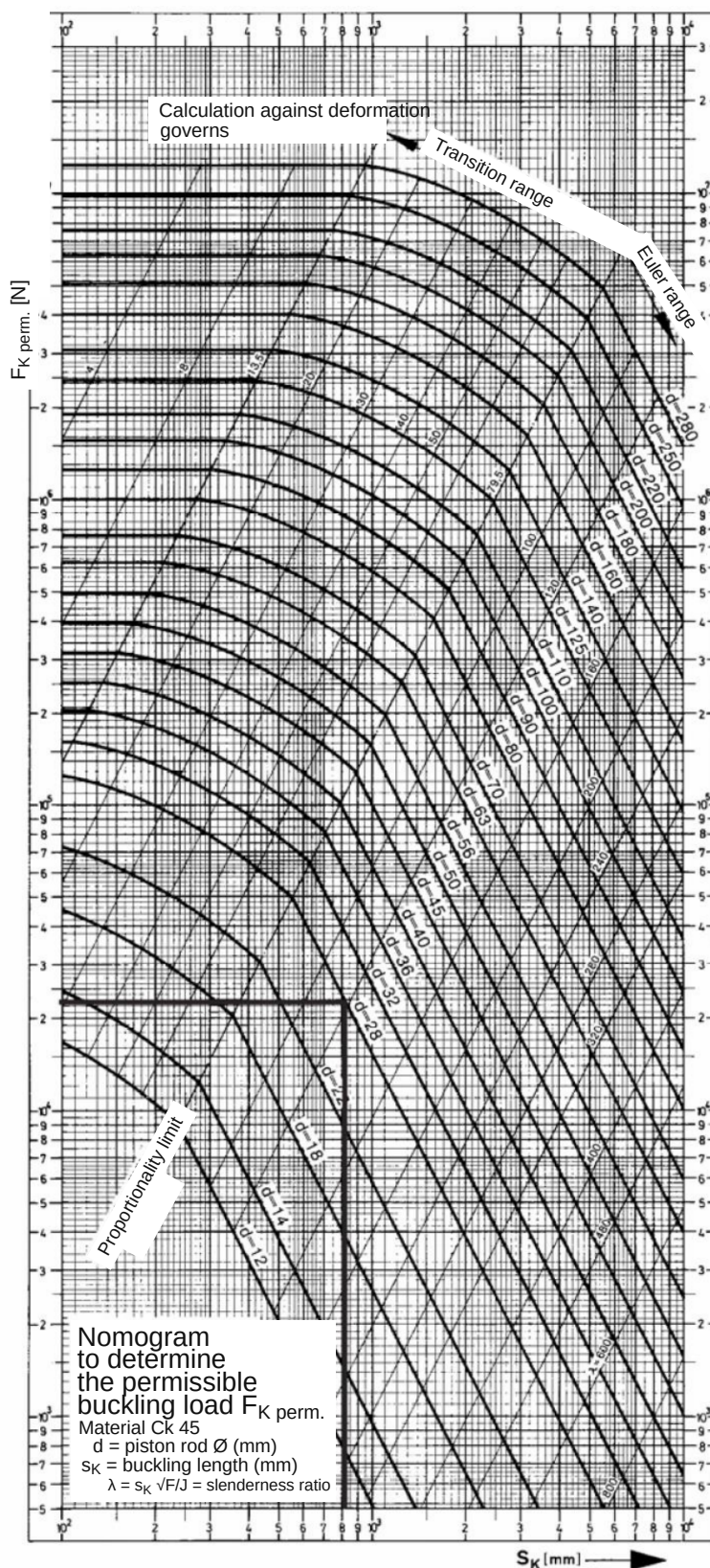
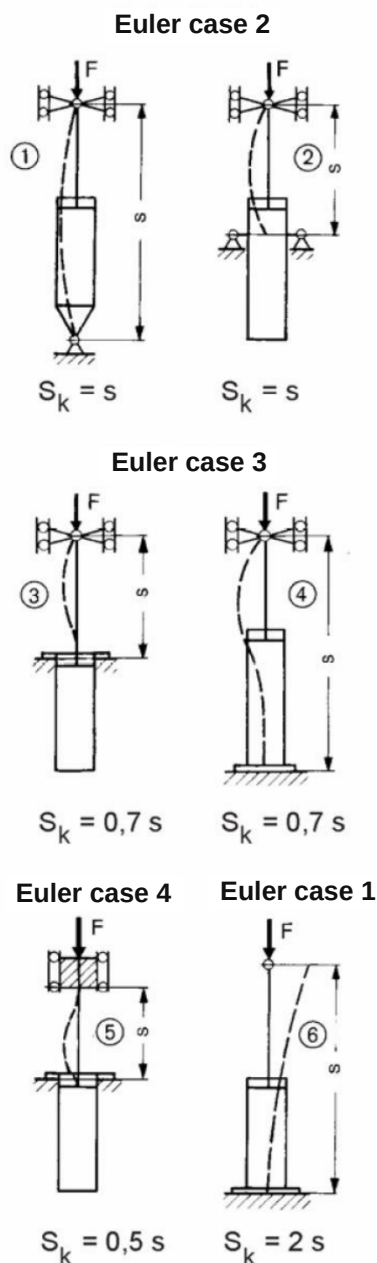
Determination of the permissible Buckling load F_K perm.

1. Buckling length s_K from mounting condition (① ⑥) and mounting length s .
2. Using s_K , rod diameter d and nomogram to determine the permissible buckling load (safety factor in the elastic range is $s = 4$).

Example (see nomogram)
 Mounting condition ③
 $d = 28 \text{ mm}$ $s = 1200 \text{ mm}$ (from dimensional drawing of the cylinder)
 $s_K = 0.7 s$ (see mounting condition ③)
 $= 840 \text{ mm}$
 From nomogram results $F_{K \text{ perm.}} = 22000 \text{ N}$

Determination of buckling length s_K for the various mounting conditions.

Explanation: The buckling length s_K is the length of that imaginary, rod hinged at both ends which, with the same cross-sectional dimensions, has the same ideal buckling load as the rod under investigation.



Buckling load diagram applies only to vertical cylinder installation and centrally applied force (without bending moments or lateral forces)!

Model code:

ZBD 1001 - [] / [] - [] - [] - [] [] [] [] [] [] []

Double-acting hydraulic cylinders

Nominal pressure 100 bar (10 MPa)
optionally with or without end position cushioning

Piston diameter in mm

Piston rod diameter in mm

Mounting type

- A Basic design
- B Trunnion
- CA Round flange, head end
- CAA Round flange, head end – rear centering
- CB Round flange, cap end
- CC Rectangular flange, head end
- CD Rectangular flange, cap end
- DA Swivel eye
- DB Spherical eye
- EA Foot mounting

Cylinder stroke in mm

Seal variant

- PG Standard version, U-cup seal / Teflon slide ring
- PVGV Viton version, U-cup seal / Teflon slide ring

End position cushioning

- 0 without
- 1 both sides
- 2 head end only
- 3 cap end only

Piston rod surface

- B Standard version, hard chrome-plated
- C induction-hardened and hard chrome-plated

Piston rod end

- 1 external thread

Piston rod material

- C Standard version, structural/tempered steel
- N Stainless steel (only with surface B)

Version of pipe connection

- G Standard version, Whitworth pipe thread
- M Metric ISO thread

Version code

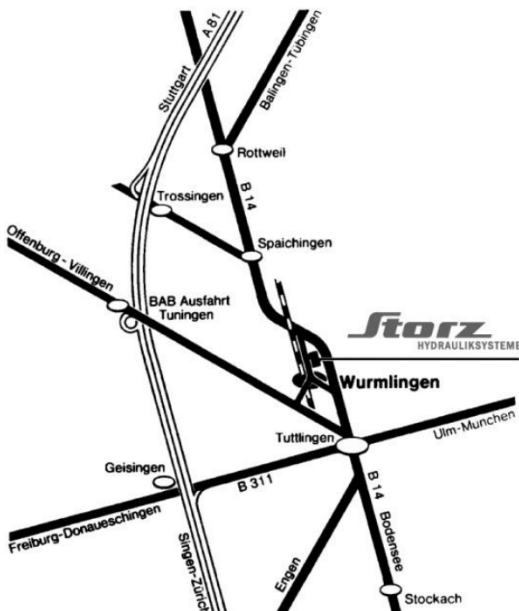
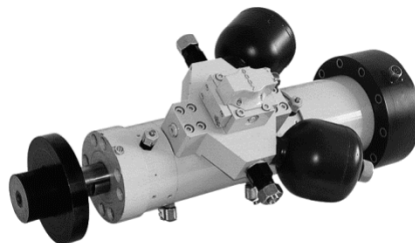
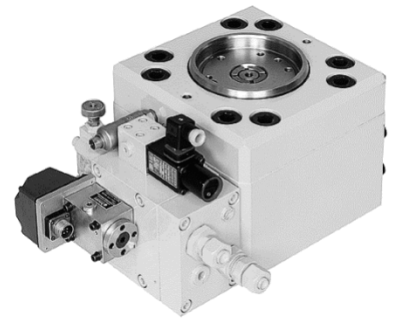
(specified by the manufacturer)

Example: Double-acting hydraulic cylinder, 100 bar nominal pressure, with the following data:
piston Ø 80 mm, piston rod Ø 36 mm, round flange at cylinder head, stroke 200 mm, rod seal: lip ring of NBR,
piston seal: rubber-energized Teflon seal, without end position cushioning, hard chrome-plated piston rod of tempered steel with
external thread, pipe connection with Whitworth pipe thread

ZBD 1001-80/36-CA-200-PG0B1CG.



Hydraulic cylinders to DIN/ISO
Hydraulic standard cylinders
Hydraulic telescopic cylinders
Hydraulic cylinders with position measuring systems
Hydraulic coiler cylinders
Test-machine cylinders
Special cylinders for all fields of application
Standardized mounting parts
Hydraulic power units and components
Plant engineering



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