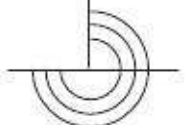


A

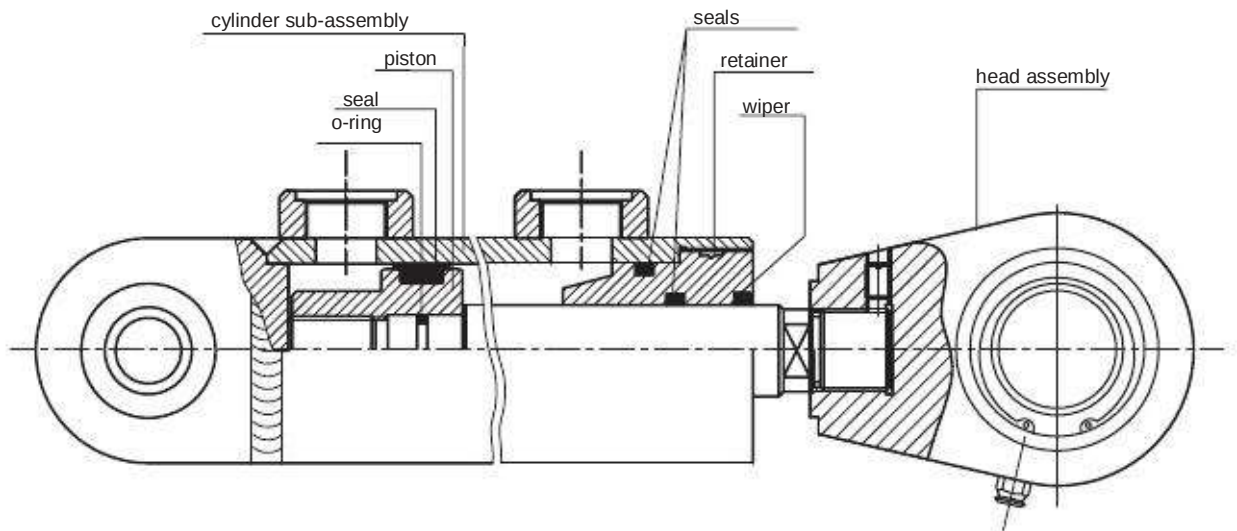


Doubled-acting cylinders

A

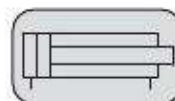
DESCRIPTION

- Welded construction.
- Cylinders are made of steel tubes.
- Piston rods are made of hardened steels, while sliding surface are hard-chromium plated.
- High-grade sealing material contributes to long service life and high reliability of hydraulic cylinders under all service duties.
- Any hydraulic cylinder from this series can be fitted with bolt eyes or swivel bearings. Nominal sizes and mounting drawings are shown separately.



TECHNICAL DATA

Symbol



GENERAL

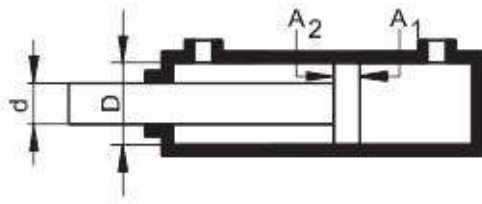
Line connection	threaded ports DIN 3852
Mounting position	optional
Loading direction	along the cylinder axis
Ambient temperature [°C]	to +50
Mass [kg]	in separate table

HYDRAULIC

Pressure [bar]	nominal	160
	max	200
Force, stroke	in separate table and diagrams	
Piston speed [m/s]		
	max 0,2	
Working fluid	mineral oil	
	viscosity [mm ² /s]	10 to 400
	temperature [°C]	-20 to +80

Doubled-acting cylinders

FORCES [kN]



Nominal size	ØD [mm]	Ød (mm)	A1 [cm ²]	A2 [cm ²]	Forces [kN] at 50 bar		Forces [kN] at 100 bar		Forces [kN] at 160 bar	
					push	pull	push	pull	push	pull
25/12	25	12	4,9	3,77	2,45	1,9	4,9	3,8	7,48	6,0
25/14		14		3,46		1,7		3,5		5,5
25/18		18		2,36		1,2		2,4		3,8
32/14		14		6,51		3,3		6,5		10,4
32/18	32	18	8,04	5,50	4,02	2,8	8,04	5,5	12,92	8,8
32/22		22		4,24		2,1		4,2		6,8
40/18		18		10,02		5,0		10,0		16,0
40/20		20		9,42		4,7		9,4		15,1
40/22	40	22	12,56	8,76	6,28	4,4	12,56	8,8	21,00	14,0
40/25		25		7,66		3,8		7,7		12,3
40/28		28		6,41		2,5		6,4		10,3
50/22		22		15,83		7,9		15,8		25,3
50/25	50	25	19,63	14,73	9,81	7,4	19,63	14,7	31,40	23,5
50/28		28		13,48		6,7		13,5		21,6
50/32		32		11,59		5,8		11,6		18,5
50/36		36		9,46		4,7		9,5		15,1
63/28	63	28	31,17	25,02	15,58	12,5	31,17	25,0	49,87	40,0
63/32		32		23,13		11,6		23,1		37,0
63/36		36		21,00		10,5		21,0		33,6
63/40		40		18,61		9,3		18,6		29,7
63/45	70	45	38,48	15,27	19,24	7,6	38,48	15,3	61,57	24,4
70/32		32		30,44		15,2		30,4		48,7
70/40		40		25,92		12,9		25,9		41,5
70/45		45		22,58		11,2		22,6		36,1
70/50	80	50	50,26	18,85	25,13	9,4	50,26	18,8	80,42	30,2
80/36		36		40,09		20,0		40,0		64,1
80/40		40		37,70		18,8		37,7		60,3
80/45		45		34,36		17,2		34,4		54,9
80/50	90	50	63,61	30,63	31,80	15,3	63,61	30,6	101,78	49,0
80/56		56		25,63		12,8		25,6		41,0
90/40		40		51,05		25,5		51,0		81,7
90/50		50		43,98		22,0		44,0		70,4
90/63	100	63	78,53	32,44	39,26	16,2	78,53	32,4	125,65	52,0
100/45		45		62,63		31,3		22,6		100,2
100/50		50		58,90		29,5		58,9		94,2
100/56		56		53,89		26,9		54,0		86,2
100/63	125	63	122,71	47,36	61,35	23,6	122,71	47,4	196,34	75,7
100/70		70		40,05		20,0		40,0		64,0
125/56		56		98,08		49,0		98,1		156,9
125/63		63		91,54		45,7		91,5		146,4
125/70	140	70	153,93	84,23	76,96	42,1	153,93	84,2	246,29	134,7
125/80		80		72,45		36,2		72,4		115,9
125/90		90		59,10		29,5		59,1		94,5
140/63		63		122,76		61,4		122,8		196,4
140/70	160	70	201,06	115,45	100,53	57,7	201,06	115,4	321,70	184,7
140/80		80		103,67		51,8		103,7		165,8
140/90		90		90,32		45,1		90,3		144,5
140/100		100		75,40		37,7		75,4		120,6
160/70	180	70	297,60	163,12	198,80	81,5	297,60	163,1	636,16	260,9
160/80		80		151,34		75,6		151,3		242,1
160/90		90		137,99		68,9		138,0		220,8
160/100		100		123,07		61,5		123,1		196,9
160/110	200	110	314,15	116,57	150,07	58,2	314,15	116,6	502,64	186,5
200/90		90		250,64		125,3		250,6		401,0
200/110		110		219,12		109,5		219,1		350,6
200/125		125		191,44		95,7		191,4		306,3
200/140	225	140	397,60	160,22	198,80	80,14	397,60	160,2	636,16	256,3
225/125		125		274,89		137,4		275,0		439,8
225/160		160		196,54		98,2		196,5		314,4
250/140		140		336,94		168,6		337,0		539,3
250/180	250	180	490,87	235,91	245,43	117,9	490,87	235,9	785,39	377,4

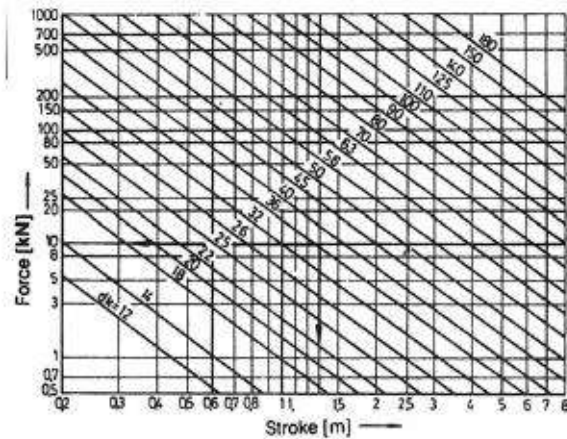
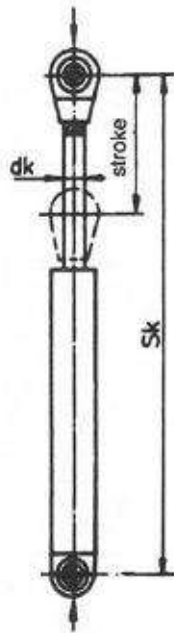
Doubled-acting cylinders

STROKE-FORCE DIAGRAMS

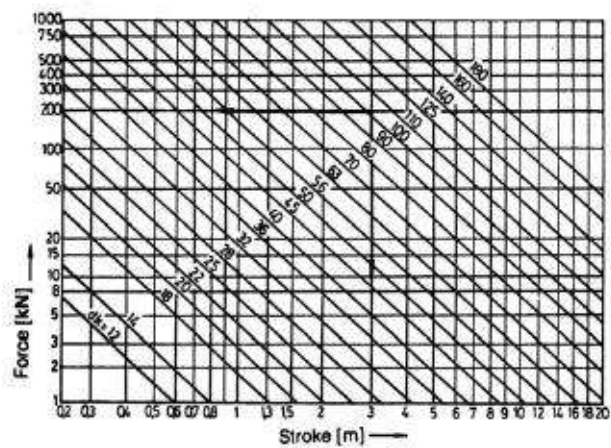
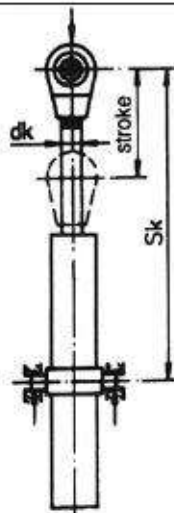
(according to Oyler's formula for buckling, safety class 2,5)

A

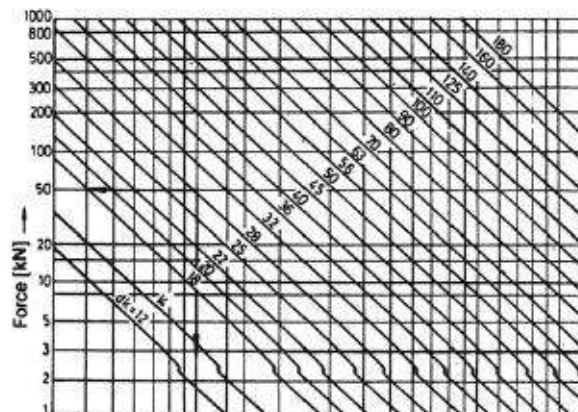
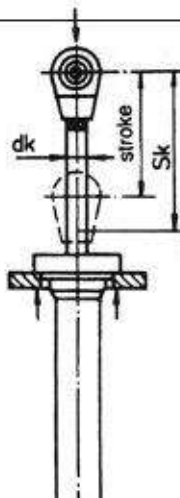
Type A,B



Type C



Type D,F



Doubled-acting cylinders

MASS [kg] - theoretical values

Nom, size	Type A,B		TypeC		Type D, F		Type A, B
	stroke = 0	* stroke > 0	stroke = 0	* stroke > 0	stroke = 0	* stroke > 0	
25/12	0,76	0,76 + 0,502 · stroke	0,87	0,87 + 0,502 · stroke	1,05	1,05 + 0,502 · stroke	0,180
25/14		0,76 + 0,534 · stroke		0,87 + 0,534 · stroke		1,05 + 0,534 · stroke	
25/18		0,76 + 0,613 · stroke		0,87 + 0,613 · stroke		1,05 + 0,613 · stroke	
32/14		1,08 + 0,476 · stroke		1,35 + 0,476 · stroke		1,66 + 0,476 · stroke	
32/18	1,08	1,08 + 0,555 · stroke	1,35	1,35 + 0,555 · stroke	1,66	1,66 + 0,555 · stroke	0,290
32/22		1,08 + 0,653 · stroke		1,35 + 0,653 · stroke		1,66 + 0,653 · stroke	
40/18		1,85 + 0,817 · stroke		2,20 + 0,817 · stroke		2,77 + 0,817 · stroke	
40/20		1,85 + 0,863 · stroke		2,20 + 0,863 · stroke		2,77 + 0,863 · stroke	
40/22	1,85	1,85 + 0,915 · stroke	2,20	2,20 + 0,915 · stroke	2,77	2,77 + 0,915 · stroke	0,500
40/25		1,85 + 1,002 · stroke		2,20 + 1,002 · stroke		2,77 + 1,002 · stroke	
40/28		1,85 + 1,100 · stroke		2,20 + 1,100 · stroke		2,77 + 1,100 · stroke	
50/22		3,05 + 0,998 · stroke		3,61 + 0,998 · stroke		4,26 + 0,998 · stroke	
50/25	3,05	3,05 + 1,085 · stroke	3,61	3,61 + 1,085 · stroke	4,26	4,26 + 1,085 · stroke	0,500
50/28		3,05 + 1,183 · stroke		3,61 + 1,183 · stroke		4,26 + 1,183 · stroke	
50/32		3,05 + 1,331 · stroke		3,61 + 1,331 · stroke		4,26 + 1,331 · stroke	
50/36		3,05 + 1,500 · stroke		3,61 + 1,500 · stroke		4,26 + 1,500 · stroke	
63/28	5,28	5,28 + 1,597 · stroke	5,62	5,62 + 1,597 · stroke	7,25	7,25 + 1,597 · stroke	1,170
63/32		5,28 + 1,745 · stroke		5,62 + 1,745 · stroke		7,25 + 1,745 · stroke	
63/36		5,28 + 1,913 · stroke		5,62 + 1,913 · stroke		7,25 + 1,913 · stroke	
63/40		5,28 + 2,100 · stroke		5,62 + 2,100 · stroke		7,25 + 2,100 · stroke	
63/45	6,76	5,28 + 2,362 · stroke	6,26	5,62 + 2,362 · stroke	8,76	7,25 + 2,362 · stroke	1,180
70/32		6,76 + 1,806 · stroke		6,26 + 1,806 · stroke		8,76 + 1,806 · stroke	
70/40		6,76 + 2,161 · stroke		6,26 + 2,161 · stroke		8,76 + 2,161 · stroke	
70/45		6,76 + 2,423 · stroke		6,26 + 2,423 · stroke		8,76 + 2,423 · stroke	
70/50	10,10	6,76 + 2,716 · stroke	10,43	6,26 + 2,716 · stroke	12,80	8,76 + 2,716 · stroke	3,000
80/36		10,10 + 2,417 · stroke		10,43 + 2,417 · stroke		12,80 + 2,417 · stroke	
80/40		10,10 + 2,604 · stroke		10,43 + 2,604 · stroke		12,80 + 2,604 · stroke	
80/45		10,10 + 2,866 · stroke		10,43 + 2,866 · stroke		12,80 + 2,866 · stroke	
80/50	13,62	10,10 + 3,159 · stroke	12,39	10,43 + 3,159 · stroke	16,79	12,80 + 3,159 · stroke	5,000
80/56		10,10 + 3,551 · stroke		10,43 + 3,551 · stroke		12,80 + 3,551 · stroke	
90/40		13,62 + 3,183 · stroke		12,39 + 3,183 · stroke		35,88 + 3,183 · stroke	
90/50		13,62 + 3,738 · stroke		12,39 + 3,738 · stroke		35,88 + 3,738 · stroke	
90/63	17,74	13,62 + 4,644 · stroke	16,00	12,39 + 4,644 · stroke	22,45	16,79 + 4,644 · stroke	5,000
100/45		17,74 + 4,259 · stroke		16,00 + 4,259 · stroke		22,45 + 4,259 · stroke	
100/50		17,74 + 4,552 · stroke		16,00 + 4,552 · stroke		22,45 + 4,552 · stroke	
100/56		17,74 + 4,944 · stroke		16,00 + 4,944 · stroke		22,45 + 4,944 · stroke	
100/63	29,73	17,74 + 5,458 · stroke	27,42	16,00 + 5,458 · stroke	35,88	22,45 + 5,458 · stroke	7,500
100/70		17,74 + 6,032 · stroke		16,00 + 6,032 · stroke		22,45 + 6,032 · stroke	
125/56		29,73 + 5,441 · stroke		27,42 + 5,441 · stroke		63,88 + 5,441 · stroke	
125/63		29,73 + 5,955 · stroke		27,42 + 5,955 · stroke		63,88 + 5,955 · stroke	
125/70	40,65	29,73 + 6,529 · stroke	38,16	27,42 + 6,529 · stroke	63,88	35,88 + 6,529 · stroke	7,500
125/80		29,73 + 7,454 · stroke		27,42 + 7,454 · stroke		35,88 + 7,454 · stroke	
125/90		29,73 + 8,502 · stroke		27,42 + 8,502 · stroke		35,88 + 8,502 · stroke	
140/63		40,65 + 7,148 · stroke		38,16 + 7,148 · stroke		63,88 + 7,148 · stroke	
140/70	55,97	40,65 + 7,722 · stroke	50,50	38,16 + 7,722 · stroke	63,88	63,88 + 7,722 · stroke	1 4,000
140/80		40,65 + 8,647 · stroke		38,16 + 8,647 · stroke		63,88 + 8,647 · stroke	
140/90		40,65 + 9,695 · stroke		38,16 + 9,695 · stroke		63,88 + 9,695 · stroke	
140/100		40,65 + 10,866 · stroke		38,16 + 10,866 · stroke		63,88 + 10,866 · stroke	
160/70	100,43	55,97 + 8,338 · stroke	89,73	50,50 + 8,338 · stroke	114,13	63,88 + 8,338 · stroke	29,300
160/80		55,97 + 9,263 · stroke		50,50 + 9,263 · stroke		63,88 + 9,263 · stroke	
160/90		55,97 + 10,311 · stroke		50,50 + 10,311 · stroke		63,88 + 10,311 · stroke	
160/100		55,97 + 11,482 · stroke		50,50 + 11,482 · stroke		63,88 + 11,482 · stroke	
160/110	155,30	55,97 + 12,777 · stroke	137,12	50,50 + 12,777 · stroke	174,75	63,88 + 12,777 · stroke	35,800
200/90		100,43 + 12,947 · stroke		89,73 + 12,947 · stroke		114,13 + 12,947 · stroke	
200/110		100,43 + 15,413 · stroke		89,73 + 15,413 · stroke		114,13 + 15,413 · stroke	
200/125		100,43 + 17,586 · stroke		89,73 + 17,586 · stroke		114,13 + 17,586 · stroke	
200/140	211,80	100,43 + 20,037 · stroke	191,20	89,73 + 20,037 · stroke	237,00	114,13 + 20,037 · stroke	56,000
225/125		155,30 + 22,373 · stroke		137,12 + 22,373 · stroke		174,75 + 22,373 · stroke	
225/160		155,30 + 28,523 · stroke		137,12 + 28,523 · stroke		174,75 + 28,523 · stroke	
250/140		211,80 + 28,301 · stroke		191,20 + 28,301 · stroke		237,00 + 28,301 · stroke	
250/180		211,80 + 36,193 · stroke		191,20 + 36,193 · stroke		237,00 + 36,193 · stroke	

Doubled-acting cylinders

A

DESIGNATION

CYLINDERS

I1 * — D/d/H

Mounting mode:

- A — cylinder with bolt eye
- B — cylinder with swivel bearing
- C — cylinder with central trunnion
- D — cylinder with cylinder head flange
- F — cylinder with end flange

Nominal size:

ØD - piston diameter
Ød - piston rod diameter

Stroke:

(according to diagram)

Ordering example:

Double-acting hydraulic cylinder with swivel bearing, cylinder diameter D = 100 [mm], piston rod diameter d = 56 [mm] and stroke H = 500 [mm], bears the following designation:
I1B-100/56/500.

CYLINDER HEADS

G—**

Mounting mode:

- A = with bolt eye
- B = with swivel bearing

Nominal diameter:

of bolt eye or swivel bearing (according to table)

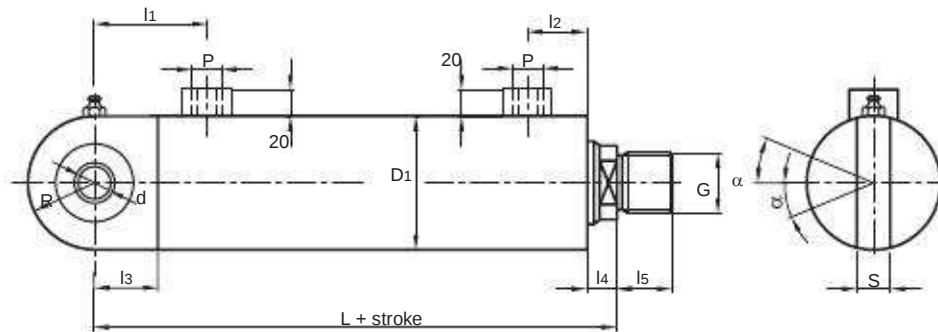
Ordering example:

For Design „A" cylinder: C-100/56 the head A50 or B50 can be ordered.

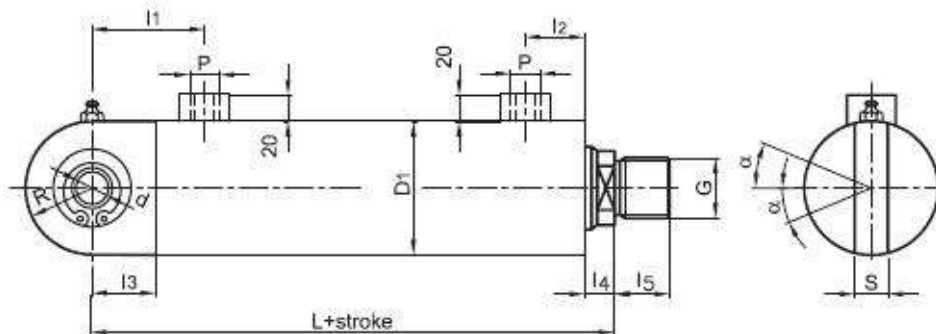
Doubled-acting cylinders

CYLINDERS MOUNTING DRAWINGS

Design A

[illegible]

Design B



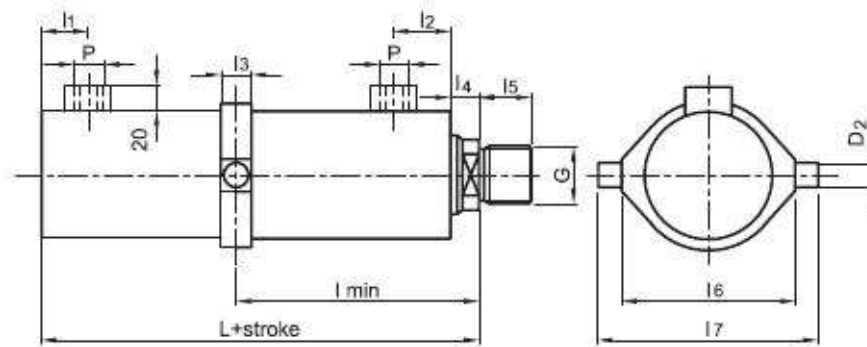
Nominal size	L	P	D ₁	d ₁	l ₁	l ₂	l ₃	l ₄	l ₅	R	S	G
B-25/12;14;18	107	M16x1,5	3612	37,5	28,5	17 9	1218	13				M10x1
B-32/14;18;22	121	M16x1,5	4017	45	32,5	22 9	1420	16				M12x1
B-40/18;20;22;25;28;	130	M16x1,5	5120	50	37,25	9 16	25,5	19				M16x1,5
B-50/22;25;28;32;36	155	M22x1,5	60,3	255	94	130 11	2030	23				M20x1,5
B-63/28;32;36;40;45	166	M22x1,5	7630	61,46	32 11	2238	28					M22x1,5
B-70/32;40;45;50	175	M22x1,5	82,5	356	74	938 11	2841	30				M28x1,5
B-80/36;40;45;50;56	198	M27x2	9540	77	54	45 11 35	47,5	35				M35x1,5
B-90/40;50;63	213	M27x2	108 50	90,5	54	55 11 35	54	40				M35x1,5
B-100/45;50;56;63;70	220	M27x2	122 50	89,5	59	55 13 42	61	40				M42x1,5
B-125/56;63;70;80	254	M27x2	146 60	103,5	72	65 13 52	70	50				M52x1,5
B-140/63;70;80;90;100	273	M33x2	165 70	121,5	70	75 13 58	82,5	55				M58x1,5
6-160/70;80;90;100	291	M33x2	185 80	129,5	80	80 19 65	92,5	60				M65x1,5
B-200/90;110;125;140	354	M48x2	230 90	151	90	18 85	115	65				M85x2
B-225/125;160	404	M48x2	267 100	175	114	105 23 110	133,5	70				M110x2
6-250/140;180	441	M48x2	298 110	190	134	115 25 120	149	80				M120x2

Note: For α angle see cylinder head mounting drawing

Doubled-acting cylinders

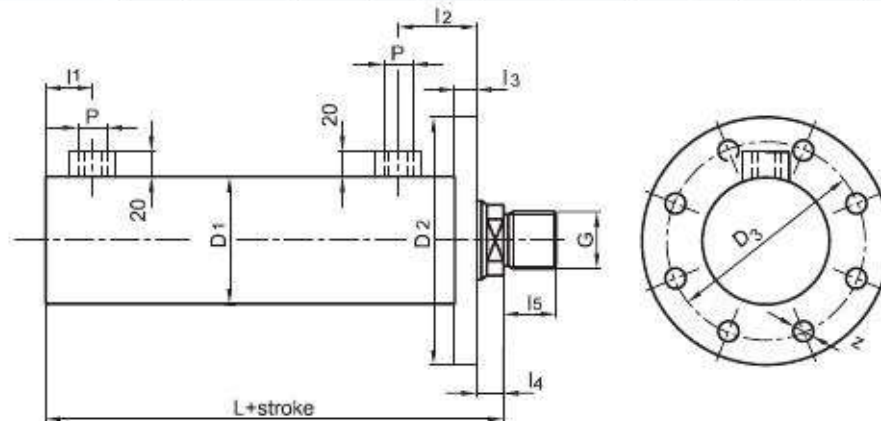
A

Design C



Nominal size	L	P	D ₁	D ₂	I	l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	l ₇	G
C-25/12;14;18	90	M16x1,5 36 12 70 22,5 28,5 20							9 12		56	80	M10x1
C-32/14;18;22	99	M16x1,5 40 17 8025 32,5 25							9 14		68	102	M12x1
C-40/18;20;22;25;28;	105	M16x1,5 51 25 88273732							9 16		76	126	M16x1,5
C-50/22;25;28;32;36	125	M22x1,5 60,3 30 104 314140							11 20		89	149	M20x1,5
C-63/28;32;36;40;45	134	M22x1,5 76 35 109 314640							11 22		102	172	M22x1,5
C-70/32;40;45;50	137	M22x1,5 82,5 35 112 314940							11 28		102	174	M28x1,5
C-80/36;40;45;50;56	153	M27x295 45 125 345450							11 35		127	215	M35x1,5
C-90/40;50	158	M27x2 108 45 125 385450							11 35		127	215	M35x1,5
C-100/45;50;56;63;70	165	M27x2 122 45 132 375950							13 42		140	228	M42x1,5
C-125/56;63;70;89	189	M27x2146 45 145 4172 50.							13 52		178	266	M52x1,5
C-140/63;70;80;90;100	198	M33x2 165 50 160 497070							13 58		200	300	M58x1,5
C-60/70;80;90;100;110	211	M33x2 185 50 173 528075							13 65		216	318	M65x1,5
C-200/90;110;125;140	254	M48x2 230 75 208 549490							18 85		247	399	M85x2
C-225/125;160	299	M48x2 267 90 235 73114 95							23 110		285	465	M110x2
C-250/140;180	326	M48x2 298 90 260 78 134 100							25 120		330	510	M 120x2

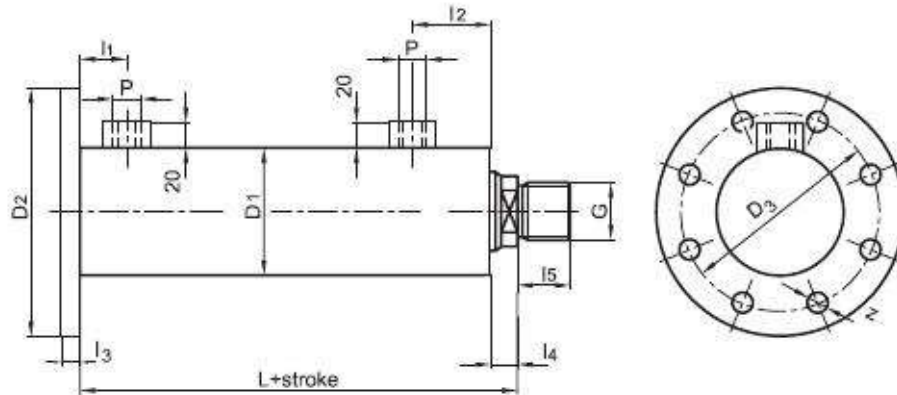
Design D



Nominal size	L	P	D ₁	D ₂	D ₃	Z	l ₁	l ₂	l ₃	l ₄	l ₅	G
D-25/12;14;18	90	M16x1,5 368875 6,6 22,5 28,5							8	9 12		M10x1
D-32/14;18;22	99	M16x1,5 40 110 92925 325							10	9 14		M12x1
D-40/18;20;22;25;28;	105	M16x1,5 51 125 106 92737							12	9 16		M16x1,5
D-50/22;25;28;32;36	125	M22x1,5 60,3 150 126 11 3141							12	11 20		M20x1,5
D-63/28;32;36;40;45	134	M22x1,5 76 170 145 14 3146							15	11 22		M22x1,5
D-70/32;40;45;50	137	M22x1,5 82,5 180 152 14 3149							16	11 28		M28x1,5
D-80/36;40;45;50;56	153	M27x295 200 165 18 3454							18	11 35		M35x1,5
D-90/40;50;63	158	M27x2108 215 180 183854							20	11 35		M35x1,5
D-100/45;50;56;63;70	165	M27x2122 240 200 22 3759							22	13 42		M42x1,5
D-125/56;63;70;80	189	M27x2146 275 235 22 4172							25	13 52		M52x1,5
D-140/63;70;80;90;100	198	M33x2165 295 255 22 4970							28	19 58		M58x1,5
D-160/70;80;90;100;110	211	M33x2185 325 280 22 5275							30	13 65		M65x1,5
D-200/90;110;125;140	254	M48x2230 390 340 26 5490							35	18 85		M85x2
D-225/125;160	299	M48x2267 435 385 26 7395							38	23 110		M110x2
D-250/140;180	326	M48x2298 480 420 33 78 100							42	25 120		M120x2

Doubled-acting cylinders

Design F



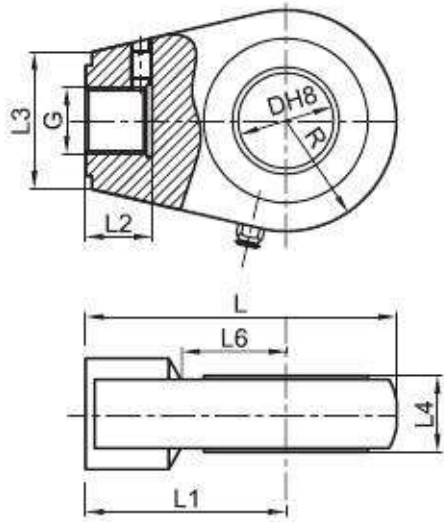
Nominal size	L	P	D1	D2	D3	Z	l1	l2	l3	l4	l5	G
F-25/12;14;18	101	M16x1,5	36	88	75	6,6	33,5	28,5	8	9	12	M10x1
F-32/14;18;22	112	M16x1,5	40	110	95	9	38	325	10	9	14	M12x1
F-40/18;20;22;25;28;	119	M16x1,5	51	125	106	9	41	37	12	9	16	M16x1,5
F-50/22;25;28;32;36	139	M22x1,5	60,3	150	126	11	45	41	12	11	20	M20x1,5
F-63/25;32;36;40;45	152	M22x1,5	76	170	145	14	49	46	15	11	22	M22x1,5
F-70/32;40;45;50	155	M22x1,5	82,5	180	152	14	49	49	16	11	28	M28x1,5
F-80/36;40;45;50;56	173	M27x2	95	200	165	18	54	54	18	11	35	M35x1,5
F-90/40;50;63	179	M27x2	108	215	180	18	59	54	20	11	35	M35x1,5
F-100/45;50;56;63;7Q	188	M27x2	122	240	200	22	60	59	22	13	42	M42x1,5
F-125/56;63;70;80	214	M27x2	146	275	325	22	66	72	25	13	52	M52x1,5
F-140/63;70;80;90;100	225	M33x2	165	295	255	22	76	70	28	13	58	M58x1,5
F-60/70;80;90;100;110	239	M33x2	185	325	280	22	80	75	30	13	65	M65x1,5
F-200/90;110;125;140	287	M48x2	230	390	340	26	87	90	35	18	85	M85x2
F-225/125;160	335	M48x2	267	435	385	26	109	95	38	23	110	M110x1,5
F-250/140;180	366	M48x2	298	480	420	33	118	100	42	25	120	M 120x2

Doubled-acting cylinders

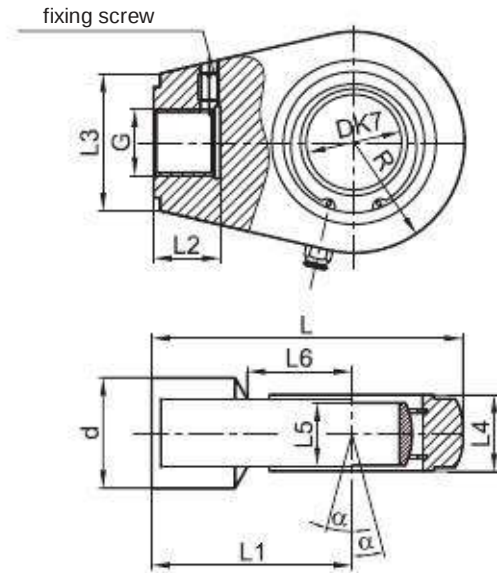
HEADS MOUNTING DRAWINGS

A

Design "A"



Design "B"



Nominal diameter D		Ordering designation		Size and design of cylinder A, B, C, D and F		G	R	L	L1	L2	L3	L4	L5	L6	d	α
12	GA-12	GB-12		25	M10x1		18	51	33	12	24	13	10	18	20	11°
17	GA-17	GB-17		32	M12x1,5		21	58	37	14	26	16	14	19	22	10°
20	GA-20	GB-20		40	M16x1,5		28	80	50	16	36	19		30	28	9°
25	GA-25	GB-25		50	M20x1,5		28	80	50	20	36	23	20	30	28	8°
30	GA-30	GB-30		63	M22x1,5		32	94	60	22	40	28	22	34	32	7°
35	GA-35	GB-35		70	M28x1,5		39	112	70	28	50	30	25	38	40	7°
40	GA-40	GB-40		80	M35x1,5		47	135	85	35	60	35	28	42	51	7°
50	GA-50	GB-50		90	M35x1,5		58	168	105	35	72	40	35	55	58	7°
50	GA-60	GB-60		100	M42x1,5		58	168	105	42	72	40	35	55	58	7°
60	GA-70	GB-70		125	M52x1,5		65	200	130	52	90	50	44	62	78	7°
70	GA-80	GB-80		140	M58x1,5		65	200	130	58	90	55	49	62	78	6°
80	GA-90	GB-90		160	M65x1,5		88	245	150	65	105	60	55	75	90	6°
90	GA-100	GB-100		200	M85x1,5		103	323	210	85	156	65	60	90	130	6°
100	GA-110	GB-110		225	M10x1,5		115	360	235	110	166	70	70	105	140	7°
110				250	M120x2		132	407	265	120	195	80	70	115	150	7°

For tolerance of diameter D see part E (swivel bearings)