



HYDAC

DW SERIES
HYDRAULIC
CYLINDERS FOR

OFFSHORE
DREDGING
INDUSTRY
CIVIL WORKS



HYCOM B.V.

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INTRODUCTION

Hycom is the leading specialist in complete hydraulic systems, including their control systems for the industry, offshore, dredging, civil works, mobile equipment & aviation.

The turn-key hydraulic systems engineered and manufactured by Hycom can be found throughout the world. Often hydraulic cylinders are part of the systems delivered by Hycom.

Distinctive characteristics of Hycom hydraulic cylinders are:

- Solid constructions
- Long life time by applying high-grade materials
- Accurate dimensions
- Wide range of piston rod protection
- Very wide range of applications

Hycom is a specialist in all aspects of hydraulic cylinders and has the capability to react quickly to your demands.



DW SERIES HYDRAULIC CYLINDERS

The Hycom DW series cylinders has been designed to meet hard working conditions. Their solid construction suits the cases of general mechanical engineering when heavy strains of the cylinders are required. Every time, a multitude of mounting combinations allows to erect cylinders according to the way suitable for the working conditions.

The maximum possible stroke depends on the bending strength of the piston rod, on the resulting pushing force and on the kind of mounting of the cylinder. This has to be determined according to the buckling graph.

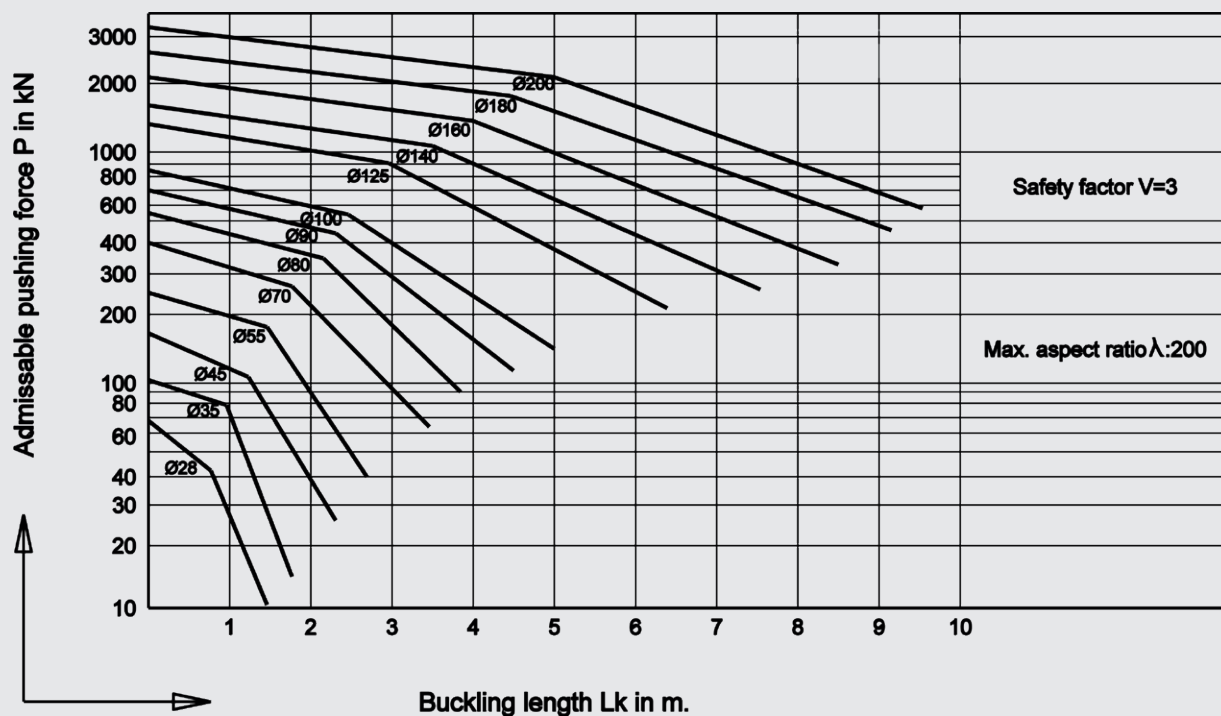
For the DW series cylinders we use seamless honed steel tubes. The heads and cylinder bottoms are made of steel. The piston rods are made of high quality material, there are four standard surface treatments available. On request they can be hardened additionally. The interchangeable piston guides and guide bushing are made of bronze.

Also the cylinder can be equipped with cushioning at one or both sides. The seals of the piston rod are re-adjustable. The cylinders are suitable for a standard pressure of 25 MPa (= 250 bar). The standard sealing material has been laid out for a maximum speed of 0,5 m/s.

PISTON ROD PROCESSING

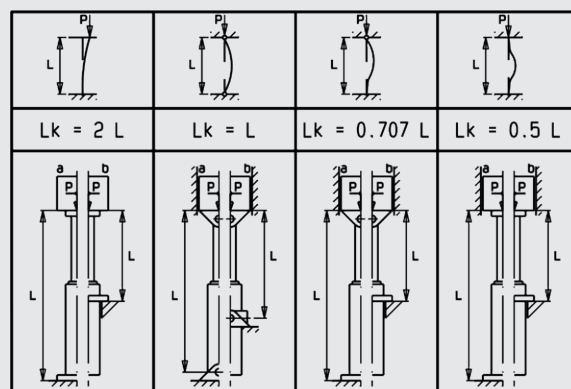
CODE-1	Carbon steel with galvanic single-layer coating (hard chromium)
1	* S355 + 0.050mm hard chromium
1.1	* other base material and/or layer thickness
CODE-2	Carbon steel with galvanic dual-layer coating (nickel-hard chromium)
2	* S355 + 0.060/0.040mm nickel/hard chromium
2.1	* other base material and/or layer thickness
CODE-3	Stainless steel with galvanic single-layer coating (Hard Chromium)
3	* AISI431 + 0.050mm hard chromium
3.1	* other base material and/or layer thickness
CODE-4	Carbon steel with plasma sprayed coating (ceramic/metal)
4	* S355 + 0.020/0.200mm inconel625/chromium titanate
4.1	* other base material
CODE-5	Staal with special surface treatment (tbd)
5	* S355 + (tbd)
5.1	* other base material and/or treathment
CODE-6	Carbon steel with HVOF-sprayed coating (metal)
6	* S355 + 0.020/0.150mm inconel625/chromium carbide-nickel/chromium
6.1	* other base material

Graph to determine the piston rod diameter on buckling



Side load of piston rods

Hydraulic cylinders preferably are to be installed in such a manner, that side loads cannot occur. In the event that side loading is unavoidable, the piston rod must be designed for bending loads, as well as for buckling loads.





* Dimensions in mm

* Subject to alteration

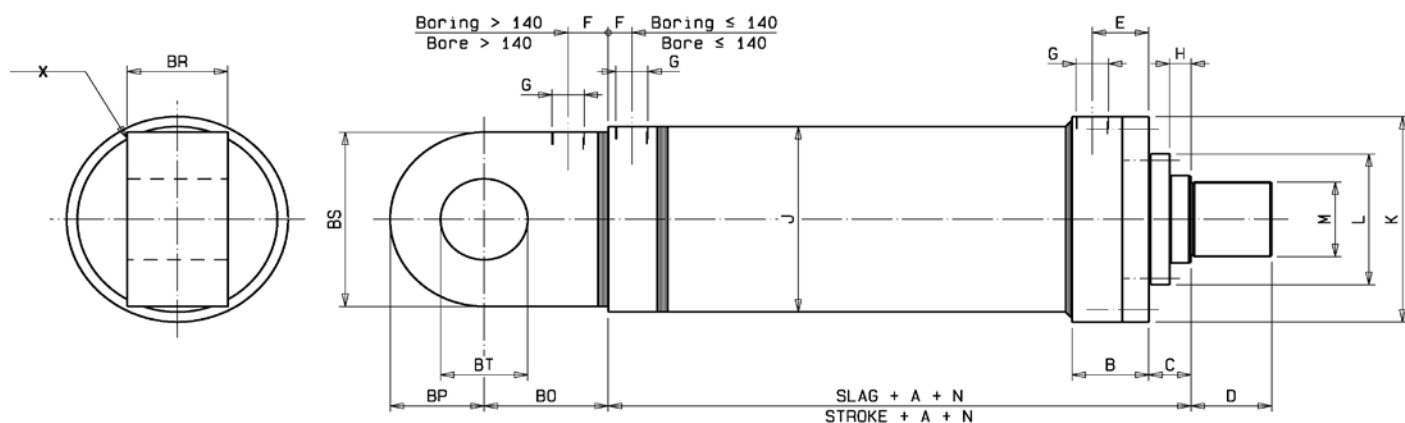
Type	D	d	A1	A2	φ	theoretical forces at 16 MPa		theoretical forces at 25 MPa	
	(mm)	(mm)	(cm ²)	(cm ²)		Push (kN)	Pull (kN)	Push (kN)	Pull (kN)
40/28	40	28	12,57	6,41	1,96	20,1	10,3	31,4	16,0
50/28	50	28	19,63	13,48	1,42	31,4	21,6	49,1	33,7
50/35		35		10,01	1,96		16,0		25,0
63/35	63	35	31,17	21,55	1,45	49,9	34,5	77,9	53,9
63/45		45		15,27	2,04		24,4		38,2
80/45	80	45	50,27	34,36	1,46	80,4	55,0	125,7	85,9
80/55		55		26,51	1,90		42,4		66,3
100/55	100	55	78,54	54,78	1,43	125,7	87,7	196,3	137,0
100/170		70		40,06	1,96		64,1		100,1
125/170	125	70	122,72	84,23	1,46	196,3	134,8	306,8	210,6
125/90		90		59,10	2,02		94,6		147,8
140/80	140	80	153,94	103,67	1,49	246,3	165,9	384,8	259,2
140/1100		100		75,40	2,04		120,6		188,5
160/90	160	90	201,06	137,44	1,46	321,7	219,9	502,7	343,6
160/125		125		78,34	2,57		125,3		195,9
180/90	180	90	254,47	190,85	1,33	407,2	305,4	636,2	477,1
180/125		125		131,75	1,93		210,8		329,4
200/100	200	100	314,16	235,62	1,33	502,7	377,0	785,4	589,0
200/140		140		160,22	1,96		256,4		400,6
220/125	220	125	380,13	257,41	1,47	608,2	411,9	950,3	643,5
220/160		160		179,07	2,12		286,5		447,7
250/140	250	140	490,87	336,94	1,46	785,4	539,1	1227,2	842,3
250/180		180		236,40	2,08		378,2		591,0
280/160	280	160	615,75	414,69	1,48	985,2	663,5	1539,4	1036,7
280/200		200		301,59	2,04		482,5		754,0
320/160	320	160	804,25	603,19	1,33	1286,8	965,1	2010,6	1508,0
320/220		220		424,12	1,90		678,6		1060,3
360/180	360	180	1017,88	763,41	1,33	1628,6	1221,5	2544,7	1908,5
360/250		250		527,00	1,93		843,2		1317,5
400/200	400	200	1256,64	942,48	1,33	2010,6	1508,0	3141,6	2356,2
400/280		280		640,88	1,96		1025,4		1602,2
400/320	460	320	1661,90	452,39	2,77	2659,0	723,8	4154,8	1131,0
460/250		250		1171,03	1,42		1873,6		2927,6
460/300	460	300	1661,90	955,04	1,74	2659,0	1528,1	4154,8	2387,6
460/320		320		857,65	1,94		1372,2		2144,1
520/250	520	250	2123,72	1632,84	1,30	3397,9	2612,5	5309,3	4082,1
520/300		300		1416,86	1,50		2267,0		3542,1
520/350	580	350	2642,08	1161,60	1,83	4227,3	1858,6	6605,2	2904,0
580/300		300		1935,22	1,37		3096,4		4838,1
580/350	580	350	2642,08	1679,97	1,57		2687,9	6605,2	4199,9
580/400		400		1385,44	1,91		2216,7		3463,6
650/320	650	320	3318,31	2514,06	1,32	5309,3	4022,5	8295,8	6285,1
650/400		400		2061,67	1,61		3298,7		5154,2
650/480	720	480	4071,50	1508,75	2,20	6514,4	2414,0	10178,8	3771,9
720/350		350		3109,39	1,31		4975,0		7773,5
720/420	720	420	4071,50	2686,06	1,52		4297,7	10178,8	6715,2
720/480		480		2261,95	1,80		3619,1		5654,9
800/400	800	400	5026,55	3769,91	1,33	8042,5	6031,9	12566,4	9424,8
800/480		480		3216,99	1,56		5147,2		8042,5
800/560	800	560		2563,54	1,96		4101,7		6408,8





Model code for cylinder DW

	Cylinder type	Bore	Rod Dia.	Type of mounting	Stroke	Rod processing	cushioning	pressure	Option for signaling
example	DW	140	/80 -	C/E -	250 -	2 -	P -	Y -	LO
	DW = Double acting DLP = Double acting with double piston rods	Bore 40/28 160/90 50/28 160/125 50/35 180/90 63/35 180/125 63/45 200/100 80/45 200/140 80/55 220/125 100/55 220/160 100/70 250/140 125/70 250/150 125/90 280/160 140/80 280/200 140/100		Cylinder mountings B = Bottom eye C = Bottem eye with ball joint bearing H = Trunnion mounting J = Front flange K = Bottom flange L = Foot Mounting Rod connections D = Screw on rod eye E = Screw on rod eye with ball joint bearing	Stroke in mm	1 = standard chromium plated 2 = Corrosion resistant chromium plated 3 = Stainless steel	P = No cushioning R = Adjustable bottom cushioning S = Adjustable rod cushioning	Y = Working pressure up to 25 Mpa	LO = Displacement transducer ES = End position sensor(s)

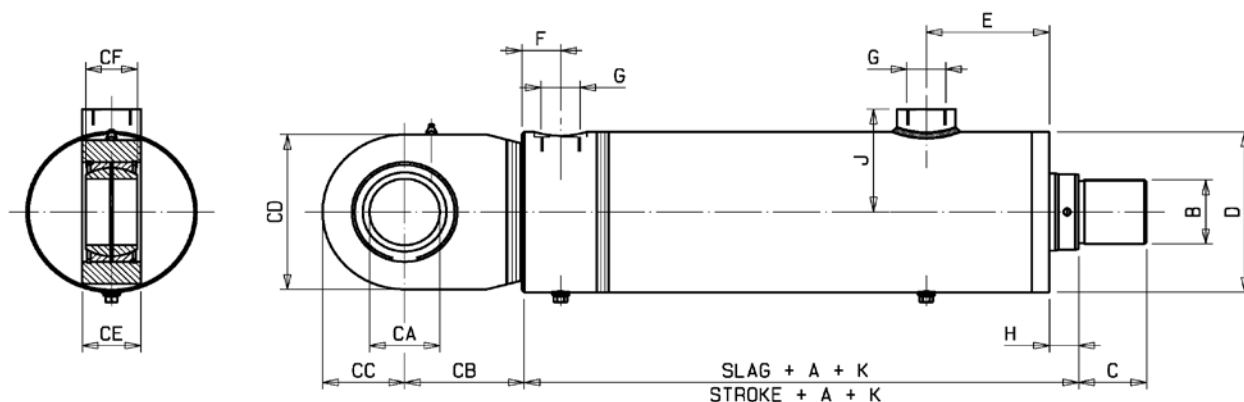


* Dimensions in mm
* Subject to alteration

Bore	40	50	63	80				100		125		140		160		180		200		220		250		280		
Pistonrod	28	28	35	35	45	45		55	55	70	70	90	80	100	90	125	90	125	100	140	125	160	140	180	160	200
Stroke	≤ 1200													≤ 1750												
A	180	190	205	220	220		230	220	235	240	255	255	265	305	330	320	345	340	355	375	395	390	410	440	460	
Stroke	1201 - 2000													1751-2500												
A	280	290	305	320	320		330	320	335	340	355	355	365	405	430	420	445	440	455	475	495	490	510	540	560	
Stroke	2001 - 3500													2501 - 4000 Longer strokes on request												
A	430	440	455	470	470		480	470	485	490	505	505	515	555	580	570	595	590	605	625	645	640	660	690	710	
B	71	75	68	89	65		90	73	78	83	96	88	98	95	119	95	119	100	115	115	120	114	130	123	140	
C	30	35	35	38	38				38	38	40	40		48	50	48	50	52	53	50	55	53	56	55	58	
D	15	20	28		35				45		55		60		70		85		90		110		120			
E	55	60	52	73	46		69	53	58	60	73	62	72	72	96	72	96	70	85	85	90	84	100	93	110	
F	15	16	23		23				29		35		40		40		40		40		50		50			
G	G3/8 "	G3/8 "	G1/2 "		G1/2 "				G3/4"		G3/4"		G3/4"		G1"		G1"		G1"		G1"		G 1 1/4"		G 1 1/4"	
H	15	20	20		20				20		20		20		25		25		25		25		25			
J	48	60	76		101				121		152		168		194		219		244		267		299		324	
K	85	90	105		130				142		184		200		220		240		275		295		325		355	
L	65	65	73	73	93	100		100	115	115	145	135	155	145	185	145	185	155	200	185	200	200	245	220	265	
M	M16x1,5	M22x1,5	M28x1,5		M35x1,5				M45x1,5		M58x1,5		M65x1,5		M62x3		M68x3		M76x3		M90x3		M100x3			
N±(max.)	2	2	2		2				2		3		3		3		3		4		4		4			
TypeB																										
BO	30	35	40		50				60		70		80		110		110		120		135		150		165	
BP	25	30	35		40				50		60		70		80		95		105		120		135		150	
BR	25	30	40		50				60		70		80		90		100		110		125		140		150	
BS	45	50	60		70				85		100		110		125		135		145		160		180		200	
BT(H8)	25	30	35		40				50		60		70		80		90		100		110		130		150	



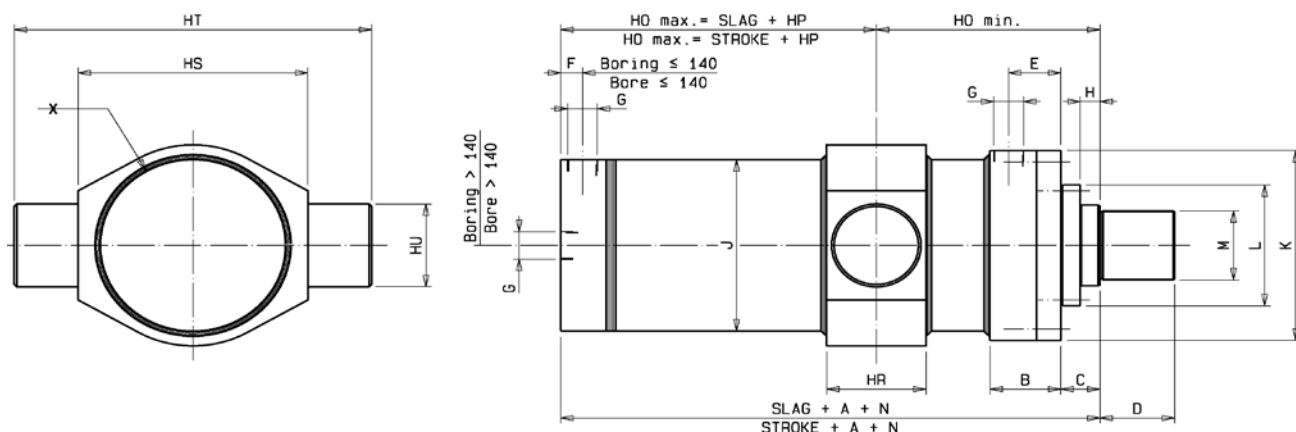
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* Dimensions in mm
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Bore	40		50		63		80		100		125		140		160		180		200		220		250		280																							
Pistonrod	28	28	35	35	45	45	55	55	70	70	90	80	100	90	125	90	125	100	140	125	160	140	180	160	200																							
Stroke	≤ 1200													≤ 1750																																		
A	180		190		205		220		220		230		235		240		255		255		265		305		330		320		345		340		355		375		395		390		410		440		460			
Stroke	1201 - 2000													1751-2500																																		
A	280		290		305		320		320		330		320		335		340		355		365		405		430		420		445		440		455		475		495		490		510		540		560			
Stroke	2001 - 3500													2501 - 4000 Longer strokes on request																																		
A	430		440		455		470		470		480		470		485		490		505		505		515		555		580		570		595		590		605		625		645		640		660		690		710	
B	71		75		68		89		65		90		73		78		83		96		88		98		95		119		95		119		100		115		115		120		114		130		123		140	
C	30		35		35		38		38		38		38		40		40		48		50		48		50		52		53		50		55		53		56		55		58							
D	15		20		28		35		45		55		60		70		85		90		100		120																									
E	55		60		52		73		46		69		53		58		60		73		62		72		72		96		72		96		70		85		85		90		84		100		93		110	
F	15		16		23		23		29		35		40		40		40		40		40		50		50																							
G	G3/8 "		G3/8 "		G1/2 "		G1/2 "		G3/4"		G3/4"		G3/4"		G1"		G1"		G1"		G1"		G 1 1/4"		G 1 1/4"																							
H	15		20		20		20		20		20		20		25		25		25		25		25																									
J	48		60		76		101		121		152		168		194		219		244		267		299		324																							
K	85		90		105		130		142		184		200		220		240		275		295		325		355																							
L	65		65		73		73		93		100		100		115		115		145		135		155		145		185		145		185		155		200		185		200		245		220		265			
M	M16x1,5		M22x1,5		M28x1,5		M35x1,5		M45x1,5		M58x1,5		M65x1,5		M62x3		M62x3		M68x3		M76x3		M90x3		M100x3																							
N±(max.)	2		2		2		2		2		3		3		3		3		4		4		4		4																							
TypeC																																																
CO	45		51		61		69		88		100		115		130		140		155		175		190		210																							
CP	28		33		42		50		62		70		82		110		120		140		155		165		190																							
CR	23		28		30		35		40		50		55		60		65		70		70		80		85																							
CS	55		65		83		100		123		140		164		170		190		220		240		270		305																							
CT(H8)	25		30		35		40		50		60		70		80		90		100		110		110		120																							
CU	20		22		25		28		35		44		49		55		60		70		70		70		85																							

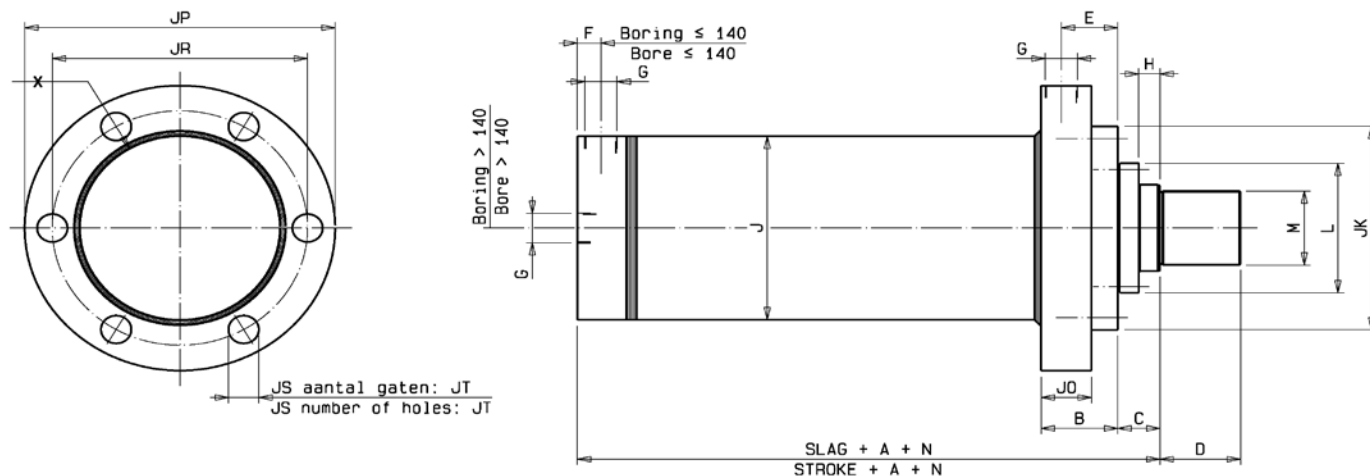




* Dimensions in mm
* Subject to alteration

Bore	40		50		63		80		100		125		140		160		180		200		220		250		280		
Pistonrod	28	28	35	35	45	45	55	55	70	70	90	80	100	90	125	90	125	100	140	125	160	140	180	160	200		
Stroke	≤ 1200													≤ 1750													
A	180		190		205	220	220	230	220	235	240	255	255	265	305	330	320	345	340	355	375	395	390	410	440	460	
Stroke	1201 - 2000													1751-2500													
A	280	290		305	320	320	330	320	335	340	355	355	365	405	430	420	445	440	455	475	495	490	510	540	560		
Stroke	2001 - 3500													2501 - 4000 Longer strokes on request													
A	430	440	455	470	470	480	470	485	490	505	505	515	555	580	570	595	590	605	625	645	640	660	690	710			
B	71	75	68	89	65	90	73	78	83	96	88	98	95	119	95	119	100	115	115	120	114	130	123	140			
C	30	35	35	38	38			38			38	40	40		48	50	48	50	52	53	50	55	53	56	55	58	
D	15	20	28			35			45			55		60		70		85		90		100		120			
E	55	60	52	73	46	69	53	58	60	73	62	72	72	96	72	96	70	85	85	90	84	100	93	110			
F	15	16	23			23			29			35		40		40		40		40		50		50			
G	G3/8 "	G3/8 "	G1/2 "			G1/2 "			G3/4"			G3/4"		G3/4"		G1"		G1"		G1"		G 1 1/4"		G 1 1/4"			
H	15	20	20			20			20			20		20		25		25		25		25		25			
J	48	60	76			101			121			152		168		194		219		244		267		299		324	
K	85	90	105			130			142			184		200		220		240		275		295		325		355	
L	65	65	73	73	93	100	100	115	115	145	135	155	145	185	145	185	155	200	185	200	200	245	220	265			
M	M16x1,5	M22x1,5	M28x1,5			M35x1,5			M45x1,5			M58x1,5		M65x1,5		M62x3		M62x3		M68x3		M76x3		M90x3		M100x3	
N±(max.)	2	2	2			2			2			3		3		3		3		4		4		4		4	
TypeH																											
HO	131	142	138	162	148	173	161	166	176	191	188	198	218	239	218	239	232	248	262	277	274	293	293	313			
HP	127	134	137	152	142	152	133	148	136	151	141	151	230	250	245	265	260	275	268	293	283	303	325	345			
HR	30	35	40			50			60			70		80		90		90		100		115		125		140	
HS	90	95	110			135			150			190		205		230		260		290		325		365		395	
HT	125	135	155			190			220			270		295		330		370		415		465		515		565	
HU(e8)	25	30	35			45			55			65		70		80		80		90		100		110		125	

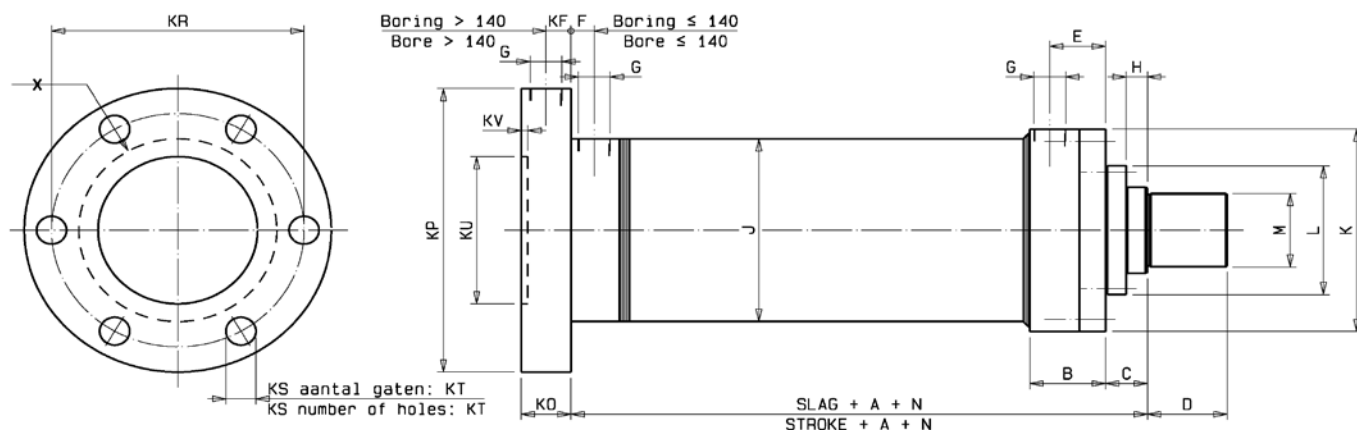




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Bore	40		50		63		80		100		125		140		160		180		200		220		250		280					
Pistonrod	28	28	35	35	45	45	55	55	70	70	90	80	100	90	125	90	125	100	140	125	160	140	180	160	200					
Stroke	≤ 1200													≤ 1750																
A	180		190		205	220	220	230	220	235	240	255	255	265	305	330	320	345	340	355	375	395	390	410	440	460				
Stroke	1201 - 2000													1751-2500																
A	280		290		305	320	320	330	320	335	340	355	355	365	405	430	420	445	440	455	475	495	490	510	540	560				
Stroke	2001 - 3500													2501 - 4000 Longer strokes on request																
A	430		440		455	470	470	480	470	485	490	505	505	515	555	580	570	595	590	605	625	645	640	660	690	710				
B	71		75		68	89	65	90	73	78	83	96	88	98	95	119	95	119	100	115	115	120	114	130	123	140				
C	30		35		35	38	38			38			40	40		48	50	48	50	52	53	50	55	53	56	55	58			
D	15		20		28			35			45			55		60		70		85		90		100		110		120		
E	55		60		52	73	46	69	53	58	60	73	62	72	72	96	72	96	70	85	85	90	84	100	93	110				
F	15		16		23			23			29			35		40		40		40		40		50		50				
G	G3/8 "		G3/8 "		G1/2 "			G1/2 "			G3/4"			G3/4"		G1"		G1"		G1"		G1"		G 1 1/4"		G 1 1/4"				
H	15		20		20			20			20			20		25		25		25		25		25		25				
J	48		60		76			101			121			152		168		194		219		244		267		299		324		
K	85		90		105			130			142			184		200		220		240		275		295		325		355		
L	65		65	73	73	93	93	100	100	115	115	145	135	155	145	185	145	185	155	200	185	200	200	245	220	265				
M	M16x1,5		M22x1,5		M28x1,5			M35x1,5			M45x1,5			M58x1,5		M65x1,5		M62x3		M62x3		M68x3		M76x3		M90x3		M100x3		
N±(max.)	2		2		2			2			2			3		3		3		3		4		4		4		4		
TypeJ																														
JK (e8)	85		90		105			130			142			184			200		220		240		275		295		325		355	
JO	51		55		43	64	43	65	48			55			58		65		65		67		70		75		80			
JP	120		125		155			180			200			245			260		320		340		375		405		435		495	
JR	100		105		130			155			170			215			230		270		290		325		350		380		425	
JS	9		9		11			13			13			17			17		22		22		22		26		26		32	
JT	4		6		8			8			8			11			11		11		11		11		15		15		15	

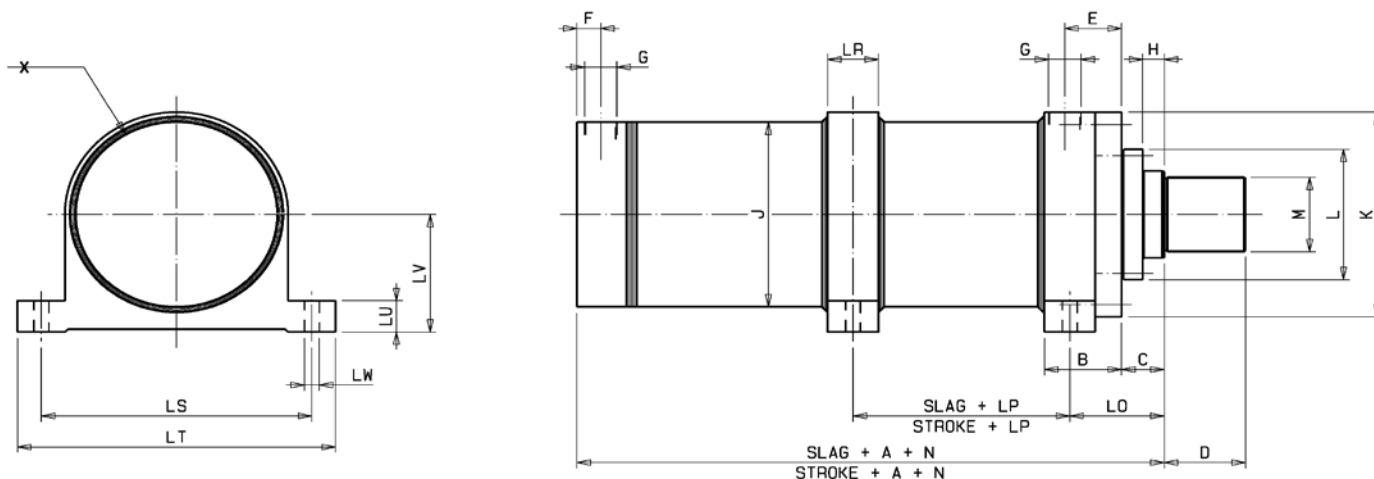




* Dimensions in mm
* Subject to alteration

Bore	40		50		63		80		100		125		140		160		180		200		220		250		280	
Pistonrod	28	28	35	35	45	45	55	55	70	70	90	80	100	90	125	90	125	100	140	125	160	140	180	160	200	
Stroke	≤ 1200													≤ 1750												
A	180	190		205	220	220	230	220	235	240	255	255	265	305	330	320	345	340	355	375	395	390	410	440	460	
Stroke	1201 - 2000													1751-2500												
A	280	290		305	320	320	330	320	335	340	355	355	365	405	430	420	445	440	455	475	495	490	510	540	560	
Stroke	2001 - 3500													2501 - 4000 Longer strokes on request												
A	430	440		455	470	470	480	470	485	490	505	505	515	555	580	570	595	590	605	625	645	640	660	690	710	
B	71	75		68	89	65	90	73	78	83	96	88	98	95	119	95	119	100	115	115	120	114	130	123	140	
C	30	35		35	38	38			38		40	40		48	50	48	50	52	53	50	55	53	56	55	58	
D	15	20		28		35			45			55		60		70		85		90		110		120		
E	55	60		52	73	46	69	53	58	60	73	62	72	72	96	72	96	70	85	85	90	84	100	93	110	
F	15	16		23		23			29		35		40		40		40		40		50		50			
G	G3/8 "	G3/8 "		G1/2 "		G1/2 "			G3/4"		G3/4"		G3/4"		G1"		G1"		G1"		G1"		G1/4"		G1/4"	
H	15	20		20		20			20		20		20		25		25		25		25		25			
J	48	60		76		101			121		152		168		194		219		244		267		299		324	
K	85	90		105		130			142		184		200		220		240		275		295		325		355	
L	65	65	73	73	93	93	100	100	115	115	145	135	155	145	185	145	185	155	200	185	200	200	245	220	265	
M	M16x1,5	M22x1,5		M28x1,5		M35x1,5			M45x1,5		M58x1,5		M65x1,5		M62x3		M62x3		M68x3		M76x3		M90x3		M100x3	
N±(max.)	2	2		2		2			2		3		3		3		3		4		4		4		4	
TypeK																										
KF															30		30		30		30		35		35	
KO	13	18		18		22			27		32		37		65		65		65		75		75		75	
KP	100	115		140		165			185		240		255		305		330		355		395		420		485	
KR	80	95		115		140			160		210		225		255		280		305		340		365		415	
KS	9	9		11		13			13		8		17		22		22		22		26		26		32	
KT	4	6		6		8			8		17		11		11		11		11		11		15		15	
KU(H8)	50	65		80		100			120		150		165		190		215		240		260		290		320	
KV	3	3		3		3			5		5		5		5		5		7		7		7		7	

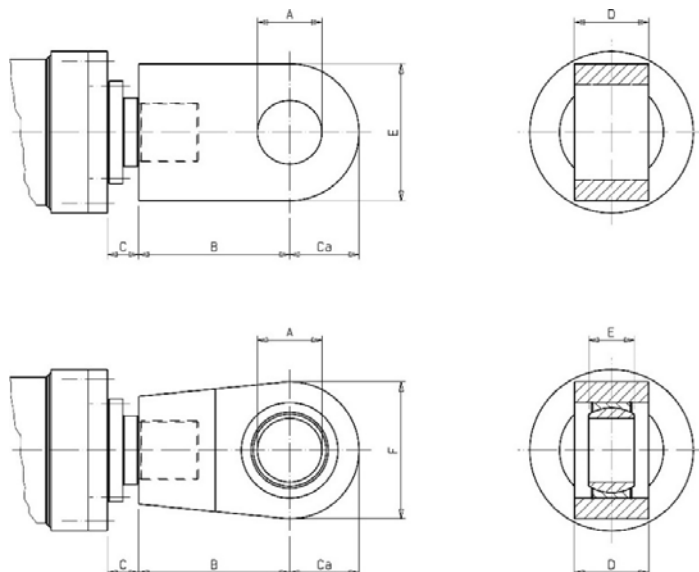




* Dimensions in mm
* Subject to alteration

Bore	40	50	63		80		100		125		140		160		180		200		220		250		280				
Pistonrod	28	28	35	35	45	45	55	55	70	70	90	80	100	90	125	90	125	100	140	125	160	140	180	160	200		
Stroke	≤ 1200													≤ 1750													
A	180	190		205	220	220	230	220	235	240	255	255	265	305	330	320	345	340	355	375	395	390	410	440	460		
Stroke	1201 - 2000													1751-2500													
A	280	290		305	320	320	330	320	335	340	355	355	365	405	430	420	445	440	455	475	495	490	510	540	560		
Stroke	2001 - 3500													2501 - 4000 Longer strokes on request													
A	430	440		455	470	470	480	470	485	490	505	505	515	555	580	570	595	590	605	625	645	640	660	690	710		
B	71	75		68	89	65	90	73	78	83	96	88	98	95	119	95	119	100	115	115	120	114	130	123	140		
C	30	35		35	38	38			38			40		48	50	48	50	52	53	50	55	53	56	55	58		
D	15	20		28		35		45			55		60		70		85		90		110		120				
E	55	60		52	73	46	69	53	58	60	73	62	72	72	96	72	96	70	85	85	90	84	100	93	110		
F	15	16		23		23		29			35		40		40		40		40		50		50				
G	G3/8 "	G3/8 "		G1/2 "		G1/2 "			G3/4"		G3/4"		G3/4"		G1"		G1"		G1"		G1"		G 1 1/4"		G 1 1/4"		
H	15	20		20		20			20			20		25		25		25		25		25		25			
J	48	60		76		101			121			152		168		194		219		244		267		299		324	
K	85	90		105		130			142			184		200		220		240		275		325		355			
L	65	65	73	73	93	93	100	100	115	115	145	135	155	145	185	145	185	155	200	185	200	200	245	220	265		
M	M16x1,5	M22x1,5		M28x1,5		M35x1,5			M45x1,5			M58x1,5		M65x1,5		M62x3		M62x3		M68x3		M76x3		M90x3		M100x3	
N±(max.)	2	2		2		2			2			3		3		3		3		4		4		4		4	
TypeL																											
LO	76	83		82	95	82	96	87	92	94	109	99	109	233	254	233	254	252	268	275	290	292	311	303	323		
LP	61	63		70	72	80	76	71	81	67		72		-93	-94	-78	-79	-107	-108	-105	-95	-127	-126	-88	-88		
LR	25	30		30		35			45			50		190		190		225		225		260		260			
LS	110	120		140		170			200			240		365		240		270		300		330		365		400	
LT	135	150		170		205			240			290		330		290		320		365		395		440		470	
LU	19	24		30		35			50			60		70		45		50		55		60		65		75	
LV	40	45		55		65			75			95		105		115		130		145		155		170		185	
LW	11	13		13		17			22			26		33		26		26		33		33		39		39	
LX																60		60		70		70		80		80	
LY																70		70		85		85		100		100	
LZ																8		8		8		8		8		8	
Min. Slag/Min. Stroke																315		315		375		395		440		450	





* Dimensions in mm
* Subject to alteration

Code	Type D						Type E					
Bore	A (H8)	B	Ca	D	E		A(M7)	B	C	D	E	F
40	25	40	25	25	45		25	50	30	20	23	56
50	30	50	30	30	50		30	60	34	22	28	64
65	35	60	35	40	60		35	70	42	25	30	78
80	40	70	40	50	70		40	85	50	28	35	94
100	50	85	50	60	85		50	105	63	35	40	116
125	60	110	60	70	100		60	130	70	44	50	130
140	70	120	70	80	110		70	150	82	49	55	154
160	80	145	80	90	125		80	210	110	55	60	170
180	90	155	95	100	135		90	240	120	60	65	190
200	100	170	105	110	145		100	265	140	70	70	220
220	110	185	120	125	160		110	290	155	70	70	240
250	110	210	135	125	180		110	315	165	70	80	270
280	120	240	150	140	200		120	355	190	85	85	305

