Springs

Springs for dies, fixtures, moulds, machines, mechanisms. For various industrial uses.

FIBRO Compression Springs – a comprehensive range, rooted in the resolute quality consci-ousness on which our reputation was built. Applied equally to the selection and inspecti-on of raw materials as well as to every step in manufacture.

Springs – a simple product by comparison. But a demanding one also if new standards are to be set by its reliability and performance.

A product whose failure in service always is very expensive, even disastrous in some cases.

A product therefore where it pays . . . to pay for the difference. Whose faults or qualities remain hidden at first. They prove themselves in the long run –!

FIBRO high performance springs – in four duty ranges. Made from selected grades of chrome-vanadium spring steel.
Cold-formed from special rolled wire sections. Capable of sustaining service loadings of exceptional serverity.
Identical fitting dimensions for all springs of common nominal size, facilitating development work. Packing a maximum of spring action into a minimum of design space

Up and down in endless repetition: FIBRO Com-pression Springs. From the tough stable of tool- and diemaking, where no quarters are given.

A spring range of almost 400 sizes. Each spring strictly to specification. Ends flattened and ground parallel. Surfaces ball shot peened for even greater spring resilience.

FIBRO Springs – for fit-and-forget performance. For confined spaces. For virtually no space at all. For aircraft · tractors · harvesters · dies jigs · fixtures · for machines from A to Z.

For all uses where the going is hard. A choice without regrets.

A special spring range for demanding applications in the manufacture of tools, machinery and jigs & fixtures.

Our spring systems are constantly being developed to cover the most varied requirements.
The spring type is selected to match specific customer requirements.

Special helical springs

Manufactured to DIN ISO 10243, the springs are available in four grades for high cyclic and constant loads.
The specially rolled wire profile is manufactured from high quality heat treated alloy steel.

FIBROFLEX® Springs

These rubber-elastic spring elements in Sho-rehardness ratings 80, 90, 95, are made from polyurethane elastomers. Benefits include high spring forces and good resilient damping behaviour.

FIBROELAST® Springs

As a superior alternative to rubber springs we offer polyurethane elastomer springs in Shore A hardness rating of 70.

Disc Springs

The required spring characteristics result from various laminations with multiple settings and combinations.

FIBRO Gas springs

close a gap where ever the accent is on accomo-dation of the utmot force component within a minimum of space – or where exceedingly large travel is demanded: FIBRO Gas springs take care of both demands, even in combination.

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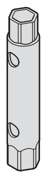

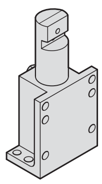

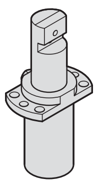

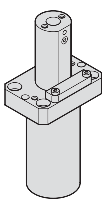

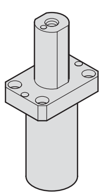

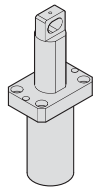

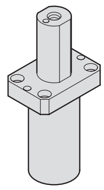

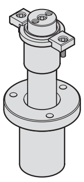

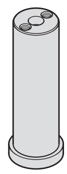

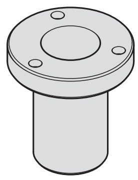

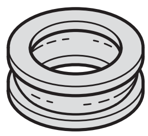

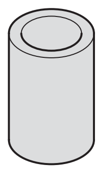

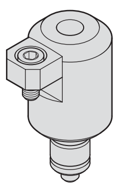

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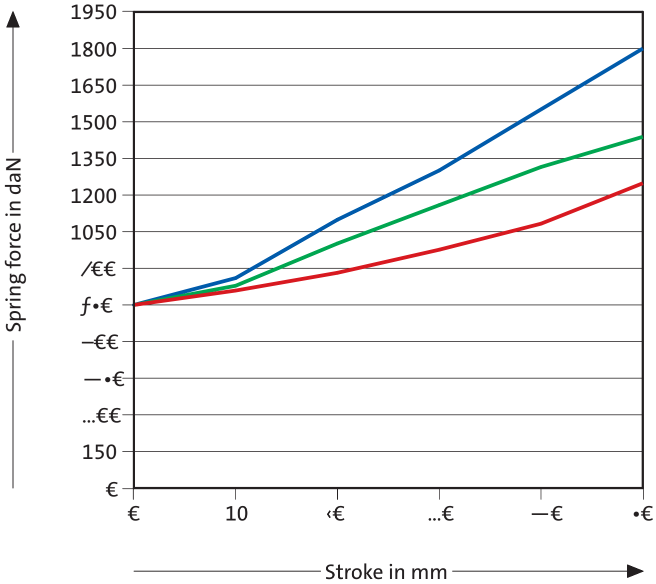
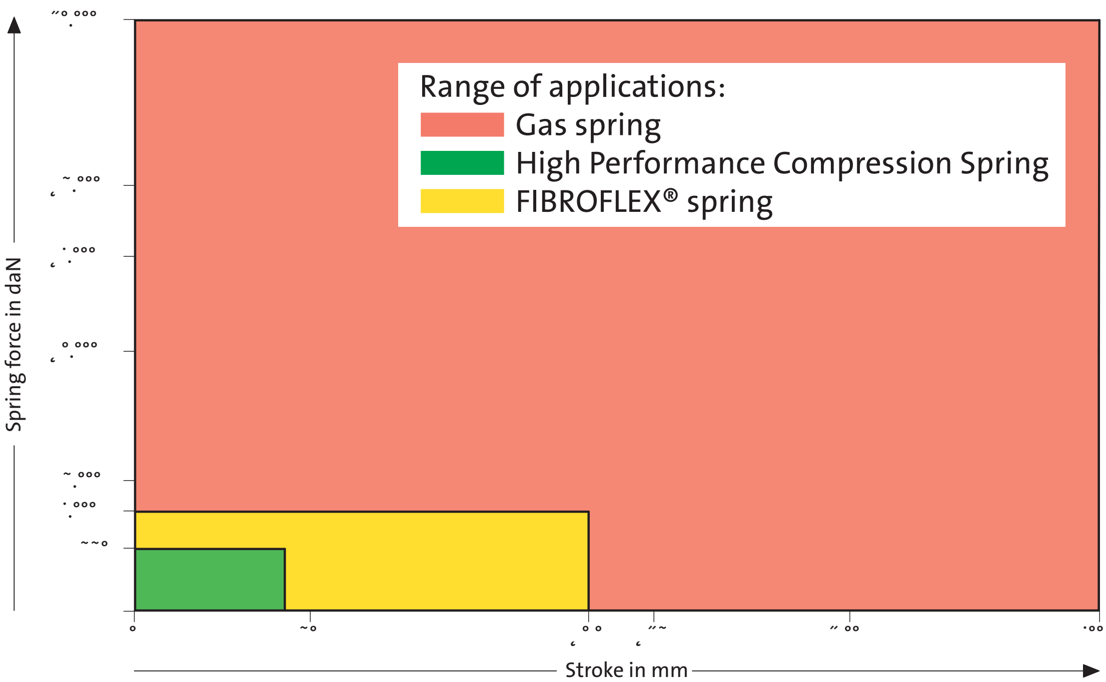
General overview of
Gas springs - High Performance Compression Spring - FIBROFLEX® springs



Force increase diagram:
Initial spring force 750 daN
– Gas spring
– High Performance Compression Spring
– FIBROFLEX® spring



Compression Springs DIN ISO 10243

Service Data for Limited-/ Extended Spring Life

The achievable service life of helical compression springs depends to a large extent on the composition of the spring wire, the operating conditions, and on design parameters.

In all applications with oscillating spring displacement, careful selection of both preload values and compressive displacement are prerequisites for extended spring life, as confirmed by the permissible stress values in the loading data tables and the stress/spring life diagram.

Shear stress maxima and spring oscillation stress differentials are a direct function of the quality of the spring wire.
FIBRO High Performance Compression Springs are made exclusively from special alloyed chrome-steel. The superlative characteristics of this material are further enhanced by heat treatment under optimal conditions, followed by a ball shot peening process.

For extended spring life under oscillating load changes, the maximal shear stress $\tau_{zul.}$ is 800 N/mm², of which some 400 N/mm² = (τ_h) may be taken up by the stress differential between spring oscillations.

Higher stress levels are permissible only under the proviso of limited life expectancy, or in cases of static and quasi-static load conditions.

Springs subjected to dynamic load conditions also suffer impairment to their life expectancy through influences such as extreme operating temperatures, transversal stress components, shock loads, and resonant vibration frequencies. In all these instances, a lowering of the stress levels assists towards better spring life.

Working temperature

The spring material has a working temperature of up to 250 °C. This rating is an approximation since the actual approved working temperature will also depend on factors such as load. It is worth noting that above 100 °C the modulus of elasticity decreases and with a reduction in tension setting starts to occur.

Extended Spring Life: Spring Displacement Values

The largest permissible displacement is indicated by S_6 – offering about 62% of the “total” displacement of the wire-to-wire compacted spring (= S_n). This displacement will induce a shear stress of $\tau_{zul.}$ of 800 N/mm². The associated stress differentialduring oscillations shoult not exceed 400 N/mm² (= τ_h).

Calculation of Spring Forces

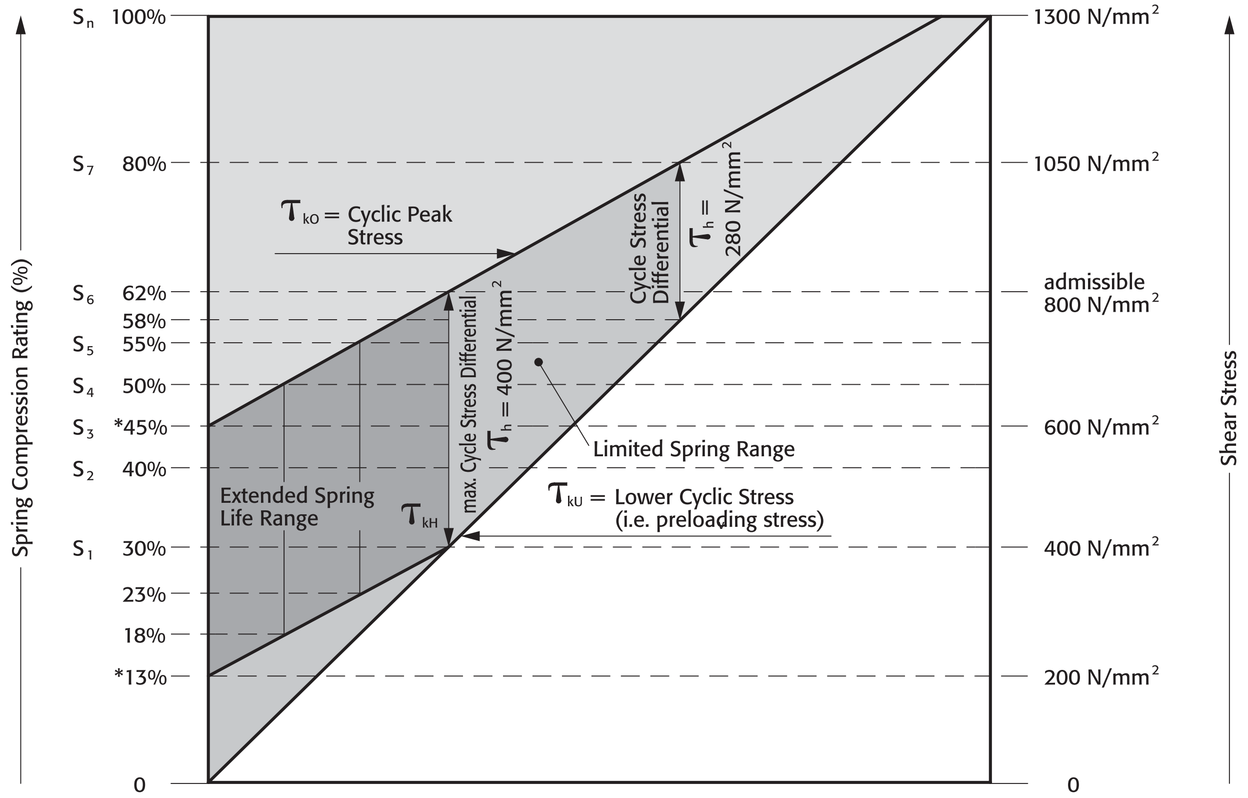
Simple multiplication of the spring coefficient R with the applicable displacement S (mm) yields the spring force value (N).

Spring Force versus Spring Displacement

The relevant tables show the force values for selected displacements od 30, 40, 45, 55, 62, 80 and 100% compression, designated by S_1...S_7. Intermediate force values can be extra-polated from the Stress/Spring Life Diagram.

Cyclic stress maxima/minima as applicable to extended/limited life of FIBRO High-Performance Compression Springs

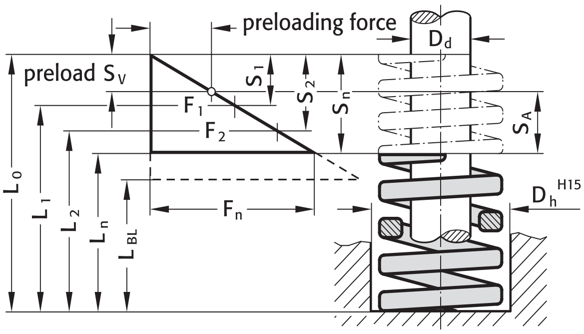
241.



* For application within Extended Spring Life:
up to a compression rating of 45%, a preloading compression of 13% applies .
e. g.: up to a compression rating of 55% a preloading compression of 23% is required.

D_h = diameter of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm), as related to spring
L_{BL} = length of compacted spring (i.e. wire-to-wire)

$F_1 ... F_n$ = forces (N) as related to lenght of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommended preload compression, as related to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compression, as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm))



Working strokes $S_{A1} ... S_{A7}$ = compress. ($S_1 ... S_7$) – minus preloading compression ($S_{v1} ... S_{v7}$)

Notice: 80% compression must not be exceeded!

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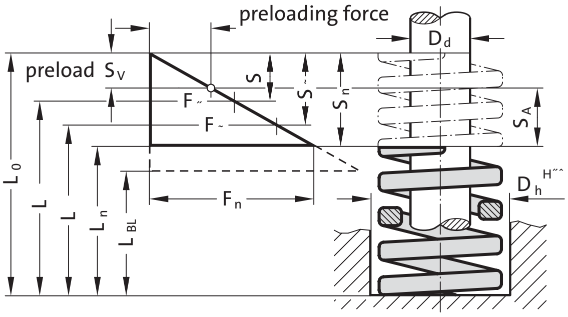
High performance compression spring, XSF, Colour "Violet"

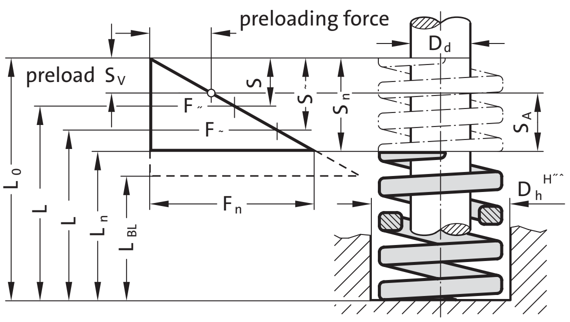


D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_{\sim}...L_n$	=	length of loaded spring (mm) as related to spring forces $F_{\sim}...F_n$
L_{BL}	=	length of compacted spring (i.e. wire-to-wire)
$F_{\sim}...F_n$	=	forces (N) as related to length of spring $L_{\sim}...L_n$
$S_{V\sim}...S_{V7}$	=	recommend. preload. compression, as relat. to compress. $S_{\sim}...S_7$
$S_{\sim}...S_n$	=	compr. as related to spring forces $F_{\sim}...F_n$
R	=	spring rate (N/mm)
$S_{A\sim}...S_{A7}$	=	working stroke (mm)

241.13. High performance compression spring, XSF, Colour "Violet"

					45%				62%				80%				100%	
Order No	D_h	D_d	L_0	R	S_1	S_{V1}	S_{A1}	F_1	S_2	S_{V2}	S_{A2}	F_2	S_3	S_{V3}	S_{A3}	F_3	S_n	F_n
241.13.20.025	20	10	25	32.1	6.3	1.8	4.5	202	8.7	4.2	4.5	279	11.2	8.1	3.1	360	14	449
241.13.20.032	20	10	32	24.7	8.1	2.3	5.8	200	11.2	5.4	5.8	276	14.4	10.4	4	356	18	445
241.13.20.038	20	10	38	20.7	9.9	2.9	7	205	13.6	6.6	7	282	17.6	12.8	4.8	364	22	455
241.13.20.044	20	10	44	17.8	11.7	3.4	8.3	208	16.1	7.8	8.3	287	20.8	15.1	5.7	370	26	463
241.13.20.051	20	10	51	15.3	13.5	3.9	9.6	207	18.6	9	9.6	285	24	17.4	6.6	367	30	459
241.13.20.064	20	10	64	12.1	17.1	4.9	12.2	207	23.6	11.4	12.2	285	30.4	22	8.4	368	38	460
241.13.20.076	20	10	76	10.2	20.2	5.9	14.4	207	27.9	13.5	14.4	285	36	26.1	9.9	367	45	459
241.13.20.089	20	10	89	8.6	23.9	6.9	17	205	32.9	15.9	17	283	42.4	30.7	11.7	365	53	456
241.13.20.102	20	10	102	7.5	27.9	8.1	19.8	209	38.4	18.6	19.8	288	49.6	36	13.6	372	62	465
241.13.20.115	20	10	115	6.7	31.5	9.1	22.4	211	43.4	21	22.4	291	56	40.6	15.4	375	70	469
241.13.20.127	20	10	127	6.1	34.6	10	24.6	211	47.7	23.1	24.6	291	61.6	44.7	16.9	376	77	470
241.13.20.139	20	10	139	5.5	38.2	11	27.2	210	52.7	25.5	27.2	290	68	49.3	18.7	374	85	468
241.13.20.152	20	10	152	5.1	41.9	12.1	29.8	213	57.7	27.9	29.8	294	74.4	53.9	20.5	379	93	474
241.13.20.305	20	10	305	2.5	84.6	24.4	60.2	212	116.6	56.4	60.2	291	150.4	109	41.4	376	188	470
241.13.25.025	25	12.5	25	52.7	6.3	1.8	4.5	332	8.7	4.2	4.5	457	11.2	8.1	3.1	590	14	738
241.13.25.032	25	12.5	32	40	8.1	2.3	5.8	324	11.2	5.4	5.8	446	14.4	10.4	4	576	18	720
241.13.25.038	25	12.5	38	33.3	9.9	2.9	7	330	13.6	6.6	7	454	17.6	12.8	4.8	586	22	733
241.13.25.044	25	12.5	44	28.6	11.2	3.2	8	322	15.5	7.5	8	443	20	14.5	5.5	572	25	715
241.13.25.051	25	12.5	51	24.7	13.5	3.9	9.6	333	18.6	9	9.6	459	24	17.4	6.6	593	30	741
241.13.25.064	25	12.5	64	19.4	17.1	4.9	12.2	332	23.6	11.4	12.2	457	30.4	22	8.4	590	38	737
241.13.25.076	25	12.5	76	16.3	20.2	5.9	14.4	330	27.9	13.5	14.4	455	36	26.1	9.9	587	45	734
241.13.25.089	25	12.5	89	15.9	23.9	6.9	17	379	32.9	15.9	17	522	42.4	30.7	11.7	674	53	843
241.13.25.102	25	12.5	102	12.1	27.4	7.9	19.5	332	37.8	18.3	19.5	458	48.8	35.4	13.4	590	61	738
241.13.25.115	25	12.5	115	10.8	31.5	9.1	22.4	340	43.4	21	22.4	469	56	40.6	15.4	605	70	756
241.13.25.127	25	12.5	127	9.8	34.6	10	24.6	340	47.7	23.1	24.6	468	61.6	44.7	16.9	604	77	755
241.13.25.139	25	12.5	139	8.9	38.2	11	27.2	340	52.7	25.5	27.2	469	68	49.3	18.7	605	85	756
241.13.25.152	25	12.5	152	8.1	41.9	12.1	29.8	339	57.7	27.9	29.8	467	74.4	53.9	20.5	603	93	753
241.13.25.178	25	12.5	178	6.9	49.1	14.2	34.9	338	67.6	32.7	34.9	466	87.2	63.2	24	602	109	752
241.13.25.203	25	12.5	203	6.1	55.8	16.1	39.7	340	76.9	37.2	39.7	469	99.2	71.9	27.3	605	124	756
241.13.25.305	25	12.5	305	4	84.6	24.4	60.2	338	116.6	56.4	60.2	466	150.4	109	41.4	602	188	752
241.13.32.038	32	16	38	43.8	9.9	2.9	7	434	13.6	6.6	7	597	17.6	12.8	4.8	771	22	964
241.13.32.044	32	16	44	37.5	11.7	3.4	8.3	439	16.1	7.8	8.3	604	20.8	15.1	5.7	780	26	975
241.13.32.051	32	16	51	32.3	13.9	4	9.9	451	19.2	9.3	9.9	621	24.8	18	6.8	801	31	1001
241.13.32.064	32	16	64	25.4	17.6	5.1	12.5	446	24.2	11.7	12.5	614	31.2	22.6	8.6	792	39	991
241.13.32.076	32	16	76	21.3	21.1	6.1	15	450	29.1	14.1	15	621	37.6	27.3	10.3	801	47	1001
241.13.32.089	32	16	89	18.1	25.2	7.3	17.9	456	34.7	16.8	17.9	628	44.8	32.5	12.3	811	56	1014
241.13.32.102	32	16	102	15.8	28.8	8.3	20.5	455	39.7	19.2	20.5	627	51.2	37.1	14.1	809	64	1011
241.13.32.115	32	16	115	13.9	32.9	9.5	23.4	457	45.3	21.9	23.4	629	58.4	42.3	16.1	812	73	1015
241.13.32.127	32	16	127	12.6	36.5	10.5	25.9	459	50.2	24.3	25.9	633	64.8	47	17.8	816	81	1021
241.13.32.139	32	16	139	11.4	40	11.6	28.5	457	55.2	26.7	28.5	629	71.2	51.6	19.6	812	89	1015
241.13.32.152	32	16	152	10.5	43.6	12.6	31	458	60.1	29.1	31	631	77.6	56.3	21.3	815	97	1018
241.13.32.178	32	16	178	8.9	51.3	14.8	36.5	457	70.7	34.2	36.5	629	91.2	66.1	25.1	812	114	1015
241.13.32.203	32	16	203	7.8	59	17	41.9	460	81.2	39.3	41.9	634	104.8	76	28.8	817	131	1022
241.13.32.254	32	16	254	6.2	73.3	21.2	52.2	455	101.1	48.9	52.2	627	130.4	94.5	35.9	808	163	1011
241.13.32.305	32	16	305	5.2	88.7	25.6	63	461	122.1	59.1	63	635	157.6	114.3	43.3	820	197	1024

High performance compression spring, XSF, Colour "Violet"



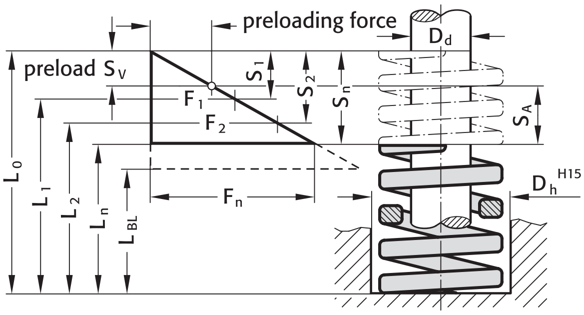
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
L…L_n = length of loaded spring (mm) as related to spring forces F…F_n
L_{BL} = length of compacted spring (i.e. wire-to-wire)
F…F_n = forces (N) as related to length of spring L…L_n
S_V…S_{V7} = recommend. preload. compression, as relat. to compress. S…S_7
S…S_n = compr. as related to spring forces F…F_n
R = spring rate (N/mm)
S_A…S_{A7} = working stroke (mm)

241.13. High performance compression spring, XSF, Colour "Violet"

					45%				62%				80%				100%	
Order No	D_h	D_d	L_0	R	S_1	S_{V1}	S_{A1}	F_1	S_2	S_{V2}	S_{A2}	F_2	S_3	S_{V3}	S_{A3}	F_3	S_n	F_n
241.13.40.051	40	20	51	50.8	11.7	3.4	8.3	594	16.1	7.8	8.3	819	20.8	15.1	5.7	1057	26	1321
241.13.40.064	40	20	64	39.7	15.3	4.4	10.9	607	21.1	10.2	10.9	837	27.2	19.7	7.5	1080	34	1350
241.13.40.076	40	20	76	33.1	18	5.2	12.8	596	24.8	12	12.8	821	32	23.2	8.8	1059	40	1324
241.13.40.089	40	20	89	28.1	21.6	6.2	15.4	607	29.8	14.4	15.4	836	38.4	27.8	10.6	1079	48	1349
241.13.40.102	40	20	102	24.5	24.8	7.2	17.6	606	34.1	16.5	17.6	835	44	31.9	12.1	1078	55	1348
241.13.40.115	40	20	115	21.6	28.4	8.2	20.2	612	39.1	18.9	20.2	844	50.4	36.5	13.9	1089	63	1361
241.13.40.127	40	20	127	19.5	31.5	9.1	22.4	614	43.4	21	22.4	846	56	40.6	15.4	1092	70	1365
241.13.40.139	40	20	139	17.8	34.2	9.9	24.3	609	47.1	22.8	24.3	839	60.8	44.1	16.7	1082	76	1353
241.13.40.152	40	20	152	16.3	37.8	10.9	26.9	616	52.1	25.2	26.9	849	67.2	48.7	18.5	1095	84	1369
241.13.40.178	40	20	178	13.8	44.5	12.9	31.7	615	61.4	29.7	31.7	847	79.2	57.4	21.8	1093	99	1366
241.13.40.203	40	20	203	12.1	50.8	14.7	36.2	615	70.1	33.9	36.2	848	90.4	65.5	24.9	1094	113	1367
241.13.40.254	40	20	254	9.7	63.9	18.5	45.4	620	88	42.6	45.4	854	113.6	82.4	31.2	1102	142	1377
241.13.40.305	40	20	305	8	77	22.2	54.7	616	106	51.3	54.7	848	136.8	99.2	37.6	1094	171	1368
241.13.50.064	50	25	64	80.2	16.6	4.8	11.8	1335	22.9	11.1	11.8	1840	29.6	21.5	8.1	2374	37	2967
241.13.50.076	50	25	76	66.9	20.2	5.9	14.4	1355	27.9	13.5	14.4	1867	36	26.1	9.9	2408	45	3011
241.13.50.089	50	25	89	56.6	23.9	6.9	17	1350	32.9	15.9	17	1860	42.4	30.7	11.7	2400	53	3000
241.13.50.102	50	25	102	40.3	27.9	8.1	19.8	1124	38.4	18.6	19.8	1549	49.6	36	13.6	1999	62	2499
241.13.50.115	50	25	115	43.5	31.5	9.1	22.4	1370	43.4	21	22.4	1888	56	40.6	15.4	2436	70	3045
241.13.50.127	50	25	127	39.3	35.1	10.1	25	1379	48.4	23.4	25	1901	62.4	45.2	17.2	2452	78	3065
241.13.50.139	50	25	139	35.8	38.2	11	27.2	1369	52.7	25.5	27.2	1887	68	49.3	18.7	2434	85	3043
241.13.50.152	50	25	152	32.8	42.3	12.2	30.1	1387	58.3	28.2	30.1	1912	75.2	54.5	20.7	2467	94	3083
241.13.50.178	50	25	178	27.8	49.5	14.3	35.2	1376	68.2	33	35.2	1896	88	63.8	24.2	2446	110	3058
241.13.50.203	50	25	203	24.2	56.7	16.4	40.3	1372	78.1	37.8	40.3	1891	100.8	73.1	27.7	2439	126	3049
241.13.50.254	50	25	254	19.2	71.5	20.7	50.9	1374	98.6	47.7	50.9	1893	127.2	92.2	35	2442	159	3053
241.13.50.305	50	25	305	16	86.4	25	61.4	1382	119	57.6	61.4	1905	153.6	111.4	42.2	2458	192	3072

FIBRO

High Performance Compression Springs
DIN ISO 10243



D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm)

241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green”

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.10.025	10,0	5,0	25	10,0	3,9	1,7	2,2	39	5,2	1,7	3,5	52	5,9	1,7	4,2	59	6,5	2,3	4,2	65
241.14.10.032	10,0	5,0	32	8,5	4,8	2,1	2,7	41	6,4	2,1	4,3	54	7,2	2,1	5,1	61	8,0	2,9	5,1	68
241.14.10.038	10,0	5,0	38	6,8	6,0	2,6	3,4	41	8,0	2,6	5,4	54	9,0	2,6	6,4	61	10,0	3,6	6,4	68
241.14.10.044	10,0	5,0	44	6,0	6,9	3,0	3,9	41	9,2	3,0	6,2	55	10,4	3,0	7,4	62	11,5	4,1	7,4	69
241.14.10.051	10,0	5,0	51	5,0	8,1	3,5	4,6	41	10,8	3,5	7,3	54	12,2	3,5	8,7	61	13,5	4,9	8,6	68
241.14.10.064	10,0	5,0	64	4,3	10,2	4,4	5,8	44	13,6	4,4	9,2	58	15,3	4,4	10,9	66	17,0	6,1	10,9	73
241.14.10.076	10,0	5,0	76	3,2	12,0	5,2	6,8	38	16,0	5,2	10,8	51	18,0	5,2	12,8	58	20,0	7,2	12,8	64
241.14.10.305	10,0	5,0	305	1,1	48,9	21,2	27,7	54	65,2	21,2	44,0	72	73,4	21,2	52,2	81	81,5	29,3	52,2	90

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.10.025	10,0	5,0	25	10,0	7,2	3,0	4,2	72	8,1	3,9	4,2	81	10,4	7,5	2,9	104	13,0	12,0	130,0
241.14.10.032	10,0	5,0	32	8,5	8,8	3,7	5,1	75	9,9	4,8	5,1	84	12,8	9,3	3,5	109	16,0	16,0	136,0
241.14.10.038	10,0	5,0	38	6,8	11,0	4,6	6,4	75	12,4	6,0	6,4	84	16,0	11,6	4,4	109	20,0	18,0	136,0
241.14.10.044	10,0	5,0	44	6,0	12,7	5,3	7,4	76	14,3	6,9	7,4	86	18,4	13,3	5,1	110	23,0	21,0	138,0
241.14.10.051	10,0	5,0	51	5,0	14,9	6,2	8,7	75	16,7	8,1	8,6	84	21,6	15,7	5,9	108	27,0	24,0	135,0
241.14.10.064	10,0	5,0	64	4,3	18,7	7,8	10,9	80	21,1	10,2	10,9	91	27,2	19,7	7,5	117	34,0	30,0	146,2
241.14.10.076	10,0	5,0	76	3,2	22,0	9,2	12,8	70	24,8	12,0	12,8	79	32,0	23,2	8,8	102	40,0	36,0	128,0
241.14.10.305	10,0	5,0	305	1,1	89,7	37,5	52,2	99	101,0	48,9	52,2	111	130,4	94,5	35,9	143	163,0	142,0	179,3

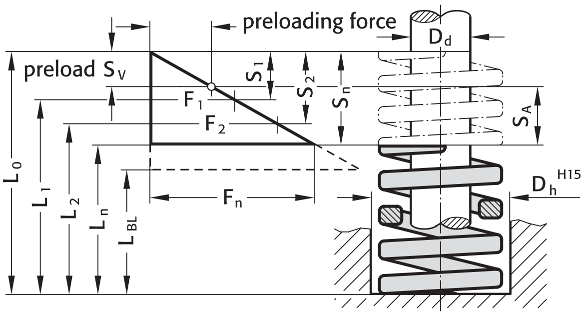
241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue”

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.15.10.025	10,0	5,0	25	16,0	3,3	1,4	1,9	53	4,4	1,4	3,0	70	5,0	1,4	3,6	80	5,5	2,0	3,5	88
241.15.10.032	10,0	5,0	32	13,1	3,9	1,7	2,2	51	5,2	1,7	3,5	68	5,9	1,7	4,2	77	6,5	2,3	4,2	85
241.15.10.038	10,0	5,0	38	11,9	4,8	2,1	2,7	57	6,4	2,1	4,3	76	7,2	2,1	5,1	86	8,0	2,9	5,1	95
241.15.10.044	10,0	5,0	44	10,3	5,7	2,5	3,2	59	7,6	2,5	5,1	78	8,6	2,5	6,1	89	9,5	3,4	6,1	98
241.15.10.051	10,0	5,0	51	8,9	6,3	2,7	3,6	56	8,4	2,7	5,7	75	9,5	2,7	6,8	85	10,5	3,8	6,7	93
241.15.10.064	10,0	5,0	64	7,6	8,1	3,5	4,6	62	10,8	3,5	7,3	82	12,2	3,5	8,7	93	13,5	4,9	8,6	103
241.15.10.076	10,0	5,0	76	5,3	9,9	4,3	5,6	52	13,2	4,3	8,9	70	14,9	4,3	10,6	79	16,5	5,9	10,6	87
241.15.10.305	10,0	5,0	305	1,6	40,8	17,7	23,1	65	54,4	17,7	36,7	87	61,2	17,7	43,5	98	68,0	24,5	43,5	109

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.15.10.025	10,0	5,0	25	16,0	6,1	2,5	3,6	98	6,8	3,3	3,5	109	8,8	6,4	2,4	141	11,0	14,0	176,0
241.15.10.032	10,0	5,0	32	13,1	7,2	3,0	4,2	94	8,1	3,9	4,2	106	10,4	7,5	2,9	136	13,0	19,0	170,3
241.15.10.038	10,0	5,0	38	11,9	8,8	3,7	5,1	105	9,9	4,8	5,1	118	12,8	9,3	3,5	152	16,0	22,0	190,4
241.15.10.044	10,0	5,0	44	10,3	10,5	4,4	6,1	108	11,8	5,7	6,1	122	15,2	11,0	4,2	157	19,0	25,0	195,7
241.15.10.051	10,0	5,0	51	8,9	11,6	4,8	6,8	103	13,0	6,3	6,7	116	16,8	12,2	4,6	150	21,0	30,0	186,9
241.15.10.064	10,0	5,0	64	7,6	14,9	6,2	8,7	113	16,7	8,1	8,6	127	21,6	15,7	5,9	164	27,0	37,0	205,2
241.15.10.076	10,0	5,0	76	5,3	18,2	7,6	10,6	96	20,5	9,9	10,6	109	26,4	19,1	7,3	140	33,0	43,0	174,9
241.15.10.305	10,0	5,0	305	1,6	74,8	31,3	43,5	120	84,3	40,8	43,5	135	108,8	78,9	29,9	174	136,0	169,0	217,6

High Performance Compression Springs DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm)



241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red"

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.10.025	10,0	5,0	25	22,6	2,7	1,2	1,5	61	3,6	1,2	2,4	81	4,0	1,2	2,8	90	4,5	1,6	2,9	102
241.16.10.032	10,0	5,0	32	17,7	3,5	1,5	2,0	62	4,7	1,5	3,2	83	5,3	1,5	3,8	94	5,9	2,1	3,8	104
241.16.10.038	10,0	5,0	38	16,7	4,2	1,8	2,4	70	5,6	1,8	3,8	94	6,3	1,8	4,5	105	7,0	2,5	4,5	117
241.16.10.044	10,0	5,0	44	14,7	5,1	2,2	2,9	75	6,8	2,2	4,6	100	7,7	2,2	5,5	113	8,5	3,1	5,4	125
241.16.10.051	10,0	5,0	51	12,8	5,7	2,5	3,2	73	7,6	2,5	5,1	97	8,6	2,5	6,1	110	9,5	3,4	6,1	122
241.16.10.064	10,0	5,0	64	10,8	7,5	3,3	4,2	81	10,0	3,3	6,7	108	11,3	3,3	8,0	122	12,5	4,5	8,0	135
241.16.10.076	10,0	5,0	76	7,8	8,7	3,8	4,9	68	11,6	3,8	7,8	90	13,1	3,8	9,3	102	14,5	5,2	9,3	113
241.16.10.305	10,0	5,0	305	2,0	36,0	15,6	20,4	72	48,0	15,6	32,4	96	54,0	15,6	38,4	108	60,0	21,6	38,4	120

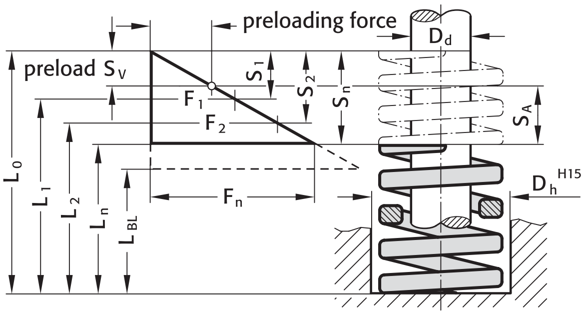
					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.10.025	10,0	5,0	25	22,6	4,9	2,0	2,9	111	5,5	2,7	2,8	124	7,1	5,2	1,9	160	8,9	16,1	201,1
241.16.10.032	10,0	5,0	32	17,7	6,4	2,7	3,7	113	7,3	3,5	3,8	129	9,4	6,8	2,6	166	11,7	20,3	207,1
241.16.10.038	10,0	5,0	38	16,7	7,7	3,2	4,5	129	8,7	4,2	4,5	145	11,2	8,1	3,1	187	14,0	24,0	233,8
241.16.10.044	10,0	5,0	44	14,7	9,4	3,9	5,5	138	10,5	5,1	5,4	154	13,6	9,9	3,7	200	17,0	27,0	249,9
241.16.10.051	10,0	5,0	51	12,8	10,5	4,4	6,1	134	11,8	5,7	6,1	151	15,2	11,0	4,2	195	19,0	32,0	243,2
241.16.10.064	10,0	5,0	64	10,8	13,8	5,8	8,0	149	15,5	7,5	8,0	167	20,0	14,5	5,5	216	25,0	39,0	270,0
241.16.10.076	10,0	5,0	76	7,8	16,0	6,7	9,3	125	18,0	8,7	9,3	140	23,2	16,8	6,4	181	29,0	47,0	226,2
241.16.10.305	10,0	5,0	305	2,0	66,0	27,6	38,4	132	74,4	36,0	38,4	149	96,0	69,6	26,4	192	120,0	185,0	240,0

241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow"

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.17.10.025	10,0	5,0	25	34,3	2,1	0,9	1,2	72	2,8	0,9	1,9	96	3,1	0,9	2,2	106	3,5	1,4	2,1	120
241.17.10.032	10,0	5,0	32	25,5	2,4	1,0	1,4	61	3,2	1,0	2,2	82	3,6	1,0	2,6	92	4,0	1,5	2,5	102
241.17.10.038	10,0	5,0	38	21,6	3,5	1,5	2,0	76	4,6	1,5	3,1	99	5,2	1,5	3,7	112	5,8	2,2	3,6	125
241.17.10.044	10,0	5,0	44	17,9	3,9	1,7	2,2	70	5,2	1,7	3,5	93	5,8	1,7	4,1	104	6,5	2,5	4,0	116
241.17.10.051	10,0	5,0	51	15,1	4,5	1,9	2,6	68	6,0	1,9	4,1	91	6,7	1,9	4,8	101	7,5	2,9	4,6	113
241.17.10.064	10,0	5,0	64	12,3	6,4	2,8	3,6	78	8,5	2,8	5,7	104	9,6	2,8	6,8	118	10,7	4,1	6,6	131
241.17.10.076	10,0	5,0	76	10,2	7,4	3,2	4,2	75	9,8	3,2	6,6	100	11,1	3,2	7,9	113	12,3	4,7	7,6	125
241.17.10.305	10,0	5,0	305	2,5	31,2	13,5	17,7	76	41,6	13,5	28,1	102	46,8	13,5	33,3	115	52,0	20,0	32,0	127

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.17.10.025	10,0	5,0	25	34,3	3,8	1,7	2,1	130	4,3	2,2	2,1	148	5,6	4,1	1,5	192	7,0	18,0	240,4
241.17.10.032	10,0	5,0	32	25,5	4,4	1,9	2,5	112	5,0	2,5	2,5	128	6,4	4,7	1,7	163	8,0	24,0	204,1
241.17.10.038	10,0	5,0	38	21,6	6,4	2,8	3,6	138	7,2	3,6	3,6	155	9,3	6,8	2,5	201	11,6	26,4	250,3
241.17.10.044	10,0	5,0	44	17,9	7,2	3,1	4,1	129	8,1	4,1	4,0	145	10,4	7,6	2,8	186	13,0	31,0	232,1
241.17.10.051	10,0	5,0	51	15,1	8,2	3,6	4,6	124	9,3	4,7	4,6	141	12,0	8,8	3,2	181	15,0	36,0	226,7
241.17.10.064	10,0	5,0	64	12,3	11,7	5,2	6,5	143	13,2	6,7	6,5	162	17,0	12,4	4,6	208	21,3	42,7	261,1
241.17.10.076	10,0	5,0	76	10,2	13,5	6,0	7,5	138	15,2	7,7	7,5	155	19,7	14,4	5,3	201	24,6	51,4	250,9
241.17.10.305	10,0	5,0	305	2,5	57,2	25,2	32,0	140	64,5	32,5	32,0	158	83,2	60,8	22,4	204	104,0	201,0	254,8

High Performance Compression Springs
DIN ISO 10243



D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1...L_n$	=	length of loaded spring (mm) as related to spring forces $F_1...F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1...F_n$	=	forces (N) as related to length of spring $L_1...L_n$
$S_{v1}...S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1...S_7$
$S_1...S_n$	=	compr. as related to spring forces $F_1...F_n$
R	=	spring rate (N/mm)
$S_{A1}...S_{A7}$	=	working stroke (mm)

241.14. High P erformance Compression Springs DIN ISO 10243 C olour: „Green"

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.13.025	12,5	6,3	25	18,0	3,9	1,7	2,2	70	5,2	1,7	3,5	94	5,9	1,7	4,2	106	6,5	2,3	4,2	117
241.14.13.032	12,5	6,3	32	16,4	5,1	2,2	2,9	84	6,8	2,2	4,6	112	7,7	2,2	5,5	126	8,5	3,1	5,4	139
241.14.13.038	12,5	6,3	38	13,6	6,0	2,6	3,4	82	8,0	2,6	5,4	109	9,0	2,6	6,4	122	10,0	3,6	6,4	136
241.14.13.044	12,5	6,3	44	12,1	6,9	3,0	3,9	83	9,2	3,0	6,2	111	10,4	3,0	7,4	126	11,5	4,1	7,4	139
241.14.13.051	12,5	6,3	51	11,4	8,1	3,5	4,6	92	10,8	3,5	7,3	123	12,2	3,5	8,7	139	13,5	4,9	8,6	154
241.14.13.064	12,5	6,3	64	9,3	10,5	4,6	5,9	98	14,0	4,6	9,4	130	15,8	4,6	11,2	147	17,5	6,3	11,2	163
241.14.13.076	12,5	6,3	76	7,1	12,3	5,3	7,0	87	16,4	5,3	11,1	116	18,5	5,3	13,2	131	20,5	7,4	13,1	146
241.14.13.089	12,5	6,3	89	5,4	14,7	6,4	8,3	79	19,6	6,4	13,2	106	22,1	6,4	15,7	119	24,5	8,8	15,7	132
241.14.13.305	12,5	6,3	305	1,4	49,8	21,6	28,2	70	66,4	21,6	44,8	93	74,7	21,6	53,1	105	83,0	29,9	53,1	116

					55% str oke				62% stroke				80% stroke				100% str oke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.13.025	12,5	6,3	25	18,0	7,2	3,0	4,2	130	8,1	3,9	4,2	146	10,4	7,5	2,9	187	13,0	12,0	234,0
241.14.13.032	12,5	6,3	32	16,4	9,4	3,9	5,5	154	10,5	5,1	5,4	172	13,6	9,9	3,7	223	17,0	15,0	278,8
241.14.13.038	12,5	6,3	38	13,6	11,0	4,6	6,4	150	12,4	6,0	6,4	169	16,0	11,6	4,4	218	20,0	18,0	272,0
241.14.13.044	12,5	6,3	44	12,1	12,7	5,3	7,4	154	14,3	6,9	7,4	173	18,4	13,3	5,1	223	23,0	21,0	278,3
241.14.13.051	12,5	6,3	51	11,4	14,9	6,2	8,7	170	16,7	8,1	8,6	190	21,6	15,7	5,9	246	27,0	24,0	307,8
241.14.13.064	12,5	6,3	64	9,3	19,3	8,1	11,2	179	21,7	10,5	11,2	202	28,0	20,3	7,7	260	35,0	29,0	325,5
241.14.13.076	12,5	6,3	76	7,1	22,6	9,4	13,2	160	25,4	12,3	13,1	180	32,8	23,8	9,0	233	41,0	35,0	291,1
241.14.13.089	12,5	6,3	89	5,4	27,0	11,3	15,7	146	30,4	14,7	15,7	164	39,2	28,4	10,8	212	49,0	40,0	264,6
241.14.13.305	12,5	6,3	305	1,4	91,3	38,2	53,1	128	103,0	49,8	53,1	144	132,8	96,3	36,5	186	166,0	139,0	232,4

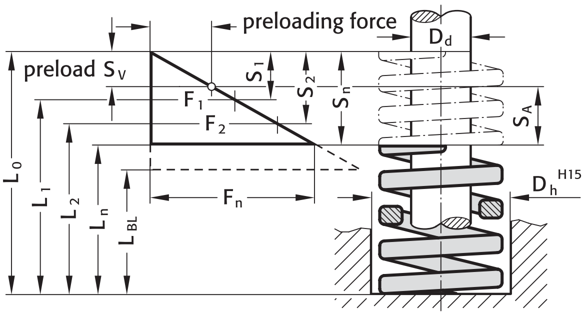
241.15. High P erformance Compression Springs DIN ISO 10243 C olour: „Blue"

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.15.13.025	12,5	6,3	25	30,0	3,3	1,4	1,9	99	4,4	1,4	3,0	132	5,0	1,4	3,6	150	5,5	2,0	3,5	165
241.15.13.032	12,5	6,3	32	24,8	3,9	1,7	2,2	97	5,2	1,7	3,5	129	5,9	1,7	4,2	146	6,5	2,3	4,2	161
241.15.13.038	12,5	6,3	38	21,4	4,8	2,1	2,7	103	6,4	2,1	4,3	137	7,2	2,1	5,1	154	8,0	2,9	5,1	171
241.15.13.044	12,5	6,3	44	18,5	5,7	2,5	3,2	105	7,6	2,5	5,1	141	8,6	2,5	6,1	159	9,5	3,4	6,1	176
241.15.13.051	12,5	6,3	51	15,5	6,6	2,9	3,7	102	8,8	2,9	5,9	136	9,9	2,9	7,0	153	11,0	4,0	7,0	171
241.15.13.064	12,5	6,3	64	12,1	8,4	3,6	4,8	102	11,2	3,6	7,6	136	12,6	3,6	9,0	152	14,0	5,0	9,0	169
241.15.13.076	12,5	6,3	76	10,2	10,2	4,4	5,8	104	13,6	4,4	9,2	139	15,3	4,4	10,9	156	17,0	6,1	10,9	173
241.15.13.089	12,5	6,3	89	8,4	12,3	5,3	7,0	103	16,4	5,3	11,1	138	18,5	5,3	13,2	155	20,5	7,4	13,1	172
241.15.13.305	12,5	6,3	305	2,1	43,2	18,7	24,5	91	57,6	18,7	38,9	121	64,8	18,7	46,1	136	72,0	25,9	46,1	151

					55% str oke				62% stroke				80% stroke				100% str oke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.15.13.025	12,5	6,3	25	30,0	6,1	2,5	3,6	183	6,8	3,3	3,5	204	8,8	6,4	2,4	264	11,0	14,0	330,0
241.15.13.032	12,5	6,3	32	24,8	7,2	3,0	4,2	179	8,1	3,9	4,2	201	10,4	7,5	2,9	258	13,0	19,0	322,4
241.15.13.038	12,5	6,3	38	21,4	8,8	3,7	5,1	188	9,9	4,8	5,1	212	12,8	9,3	3,5	274	16,0	22,0	342,4
241.15.13.044	12,5	6,3	44	18,5	10,5	4,4	6,1	194	11,8	5,7	6,1	218	15,2	11,0	4,2	281	19,0	25,0	351,5
241.15.13.051	12,5	6,3	51	15,5	12,1	5,1	7,0	188	13,6	6,6	7,0	211	17,6	12,8	4,8	273	22,0	29,0	341,0
241.15.13.064	12,5	6,3	64	12,1	15,4	6,4	9,0	186	17,4	8,4	9,0	211	22,4	16,2	6,2	271	28,0	36,0	338,8
241.15.13.076	12,5	6,3	76	10,2	18,7	7,8	10,9	191	21,1	10,2	10,9	215	27,2	19,7	7,5	277	34,0	42,0	346,8
241.15.13.089	12,5	6,3	89	8,4	22,6	9,4	13,2	190	25,4	12,3	13,1	213	32,8	23,8	9,0	276	41,0	48,0	344,4
241.15.13.305	12,5	6,3	305	2,1	79,2	33,1	46,1	166	89,3	43,2	46,1	188	115,2	83,5	31,7	242	144,0	161,0	302,4

High Performance Compression Springs DIN ISO 10243

- D_h = dia. of guide sleeve
- D_d = diameter of guide pin
- L_0 = free length of spring
- $L_1 \ldots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \ldots F_n$
- L_{BL} = length of compacted-spring (i.e. wire-to-wire)
- $F_1 \ldots F_n$ = forces (N) as related to length of spring $L_1 \ldots L_n$
- $S_{v1} \ldots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \ldots S_7$
- $S_1 \ldots S_n$ = compr. as related to spring forces $F_1 \ldots F_n$
- R = spring rate (N/mm)
- $S_{A1} \ldots S_{A7}$ = working stroke (mm)



241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.13.025	12,5	6,3	25	42,2	2,6	1,1	1,5	110	3,5	1,1	2,4	148	3,9	1,1	2,8	165	4,4	1,6	2,8	186
241.16.13.032	12,5	6,3	32	33,4	3,3	1,4	1,9	110	4,4	1,4	3,0	147	5,0	1,4	3,6	167	5,5	2,0	3,5	184
241.16.13.038	12,5	6,3	38	29,4	4,1	1,8	2,3	121	5,4	1,8	3,6	159	6,1	1,8	4,3	179	6,8	2,4	4,4	200
241.16.13.044	12,5	6,3	44	24,5	4,8	2,1	2,7	118	6,4	2,1	4,3	157	7,2	2,1	5,1	176	8,0	2,9	5,1	196
241.16.13.051	12,5	6,3	51	19,6	5,7	2,5	3,2	112	7,6	2,5	5,1	149	8,6	2,5	6,1	169	9,5	3,4	6,1	186
241.16.13.064	12,5	6,3	64	14,7	7,2	3,1	4,1	106	9,6	3,1	6,5	141	10,8	3,1	7,7	159	12,0	4,3	7,7	176
241.16.13.076	12,5	6,3	76	13,7	8,7	3,8	4,9	119	11,6	3,8	7,8	159	13,1	3,8	9,3	179	14,5	5,2	9,3	199
241.16.13.089	12,5	6,3	89	11,8	9,9	4,3	5,6	117	13,2	4,3	8,9	156	14,9	4,3	10,6	176	16,5	5,9	10,6	195
241.16.13.305	12,5	6,3	305	2,9	36,0	15,6	20,4	104	48,0	15,6	32,4	139	54,0	15,6	38,4	157	60,0	21,6	38,4	174

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.13.025	12,5	6,3	25	42,2	4,8	2,0	2,8	203	5,4	2,6	2,8	228	7,0	5,0	2,0	295	8,7	16,3	367,1
241.16.13.032	12,5	6,3	32	33,4	6,1	2,5	3,6	204	6,8	3,3	3,5	227	8,8	6,4	2,4	294	11,0	21,0	367,4
241.16.13.038	12,5	6,3	38	29,4	7,4	3,1	4,3	218	8,4	4,1	4,3	247	10,8	7,8	3,0	318	13,5	24,5	396,9
241.16.13.044	12,5	6,3	44	24,5	8,8	3,7	5,1	216	9,9	4,8	5,1	243	12,8	9,3	3,5	314	16,0	28,0	392,0
241.16.13.051	12,5	6,3	51	19,6	10,5	4,4	6,1	206	11,8	5,7	6,1	231	15,2	11,0	4,2	298	19,0	32,0	372,4
241.16.13.064	12,5	6,3	64	14,7	13,2	5,5	7,7	194	14,9	7,2	7,7	219	19,2	13,9	5,3	282	24,0	40,0	352,8
241.16.13.076	12,5	6,3	76	13,7	16,0	6,7	9,3	219	18,0	8,7	9,3	247	23,2	16,8	6,4	318	29,0	47,0	397,3
241.16.13.089	12,5	6,3	89	11,8	18,2	7,6	10,6	215	20,5	9,9	10,6	242	26,4	19,1	7,3	312	33,0	56,0	389,4
241.16.13.305	12,5	6,3	305	2,9	66,0	27,6	38,4	191	74,4	36,0	38,4	216	96,0	69,6	26,4	278	120,0	185,0	348,0

241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.17.13.025	12,5	6,3	25	58,6	2,7	1,2	1,5	158	3,6	1,2	2,4	211	4,1	1,2	2,9	237	4,5	1,6	2,9	264
241.17.13.032	12,5	6,3	32	43,9	3,2	1,4	1,8	140	4,2	1,4	2,9	186	4,8	1,4	3,4	209	5,3	1,9	3,4	233
241.17.13.038	12,5	6,3	38	36,0	3,9	1,7	2,2	140	5,2	1,7	3,5	187	5,9	1,7	4,2	211	6,5	2,3	4,2	234
241.17.13.044	12,5	6,3	44	30,3	4,7	2,0	2,6	141	6,2	2,0	4,2	188	7,0	2,0	5,0	211	7,8	2,8	5,0	235
241.17.13.051	12,5	6,3	51	26,2	5,4	2,3	3,1	141	7,2	2,3	4,9	189	8,1	2,3	5,8	212	9,0	3,2	5,8	236
241.17.13.064	12,5	6,3	64	21,2	6,6	2,9	3,7	140	8,8	2,9	5,9	187	9,9	2,9	7,0	210	11,0	4,0	7,0	233
241.17.13.076	12,5	6,3	76	17,1	8,1	3,5	4,6	139	10,8	3,5	7,3	185	12,2	3,5	8,6	208	13,5	4,9	8,6	231
241.17.13.089	12,5	6,3	89	14,5	9,9	4,3	5,6	144	13,2	4,3	8,9	191	14,9	4,3	10,6	215	16,5	5,9	10,6	239
241.17.13.305	12,5	6,3	305	4,3	33,6	14,6	19,0	144	44,8	14,6	30,2	193	50,4	14,6	35,8	217	56,0	20,2	35,8	241

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.17.13.025	12,5	6,3	25	58,6	5,0	2,1	2,9	290	5,6	2,7	2,9	327	7,2	5,2	2,0	422	9,0	16,0	527,1
241.17.13.032	12,5	6,3	32	43,9	5,8	2,4	3,4	256	6,6	3,2	3,4	289	8,5	6,1	2,3	372	10,6	21,4	465,3
241.17.13.038	12,5	6,3	38	36,0	7,2	3,0	4,2	257	8,1	3,9	4,2	290	10,4	7,5	2,9	374	13,0	25,0	468,0
241.17.13.044	12,5	6,3	44	30,3	8,5	3,6	5,0	258	9,6	4,7	5,0	291	12,4	9,0	3,4	376	15,5	28,5	469,7
241.17.13.051	12,5	6,3	51	26,2	9,9	4,1	5,8	259	11,2	5,4	5,8	292	14,4	10,4	4,0	377	18,0	33,0	471,6
241.17.13.064	12,5	6,3	64	21,2	12,1	5,1	7,0	257	13,6	6,6	7,0	289	17,6	12,8	4,8	373	22,0	42,0	466,4
241.17.13.076	12,5	6,3	76	17,1	14,9	6,2	8,6	254	16,7	8,1	8,6	286	21,6	15,7	5,9	369	27,0	49,0	461,7
241.17.13.089	12,5	6,3	89	14,5	18,2	7,6	10,6	263	20,5	9,9	10,6	297	26,4	19,1	7,3	383	33,0	56,0	478,5
241.17.13.305	12,5	6,3	305	4,3	61,6	25,8	35,8	265	69,4	33,6	35,8	299	89,6	65,0	24,6	385	112,0	193,0	481,6

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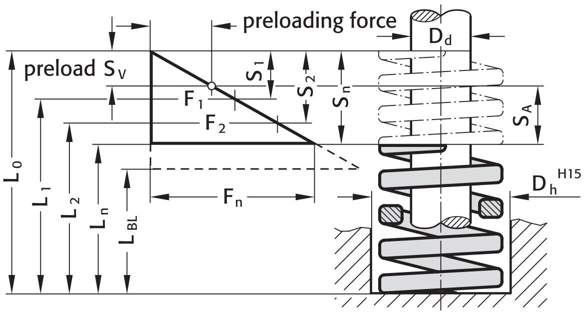


D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 ... L_n$	=	length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$	=	forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$	=	compr. as related to spring forces $F_1 ... F_n$
R	=	spring rate (N/mm)
$S_{A1} ... S_{A7}$	=	working stroke (mm)

241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.16.025	16,0	8,0	25	23,5	3,9	1,7	2,2	92	5,2	1,7	3,5	122	5,9	1,7	4,2	139	6,5	2,3	4,2	153
241.14.16.032	16,0	8,0	32	23,0	4,8	2,1	2,7	110	6,4	2,1	4,3	147	7,2	2,1	5,1	166	8,0	2,9	5,1	184
241.14.16.038	16,0	8,0	38	19,3	6,0	2,6	3,4	116	8,0	2,6	5,4	154	9,0	2,6	6,4	174	10,0	3,6	6,4	193
241.14.16.044	16,0	8,0	44	17,1	6,9	3,0	3,9	118	9,2	3,0	6,2	157	10,4	3,0	7,4	178	11,5	4,1	7,4	197
241.14.16.051	16,0	8,0	51	15,7	8,1	3,5	4,6	127	10,8	3,5	7,3	170	12,2	3,5	8,7	192	13,5	4,9	8,6	212
241.14.16.064	16,0	8,0	64	10,7	10,2	4,4	5,8	109	13,6	4,4	9,2	146	15,3	4,4	10,9	164	17,0	6,1	10,9	182
241.14.16.076	16,0	8,0	76	10,0	12,3	5,3	7,0	123	16,4	5,3	11,1	164	18,5	5,3	13,2	185	20,5	7,4	13,1	205
241.14.16.089	16,0	8,0	89	8,6	14,7	6,4	8,3	126	19,6	6,4	13,2	169	22,1	6,4	15,7	190	24,5	8,8	15,7	211
241.14.16.102	16,0	8,0	102	7,9	16,8	7,3	9,5	133	22,4	7,3	15,1	177	25,2	7,3	17,9	199	28,0	10,1	17,9	221
241.14.16.305	16,0	8,0	305	2,6	51,0	22,1	28,9	133	68,0	22,1	45,9	177	76,5	22,1	54,4	199	85,0	30,6	54,4	221

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.16.025	16,0	8,0	25	23,5	7,2	3,0	4,2	169	8,1	3,9	4,2	190	10,4	7,5	2,9	244	13,0	12,0	305,5
241.14.16.032	16,0	8,0	32	23,0	8,8	3,7	5,1	202	9,9	4,8	5,1	228	12,8	9,3	3,5	294	16,0	16,0	368,0
241.14.16.038	16,0	8,0	38	19,3	11,0	4,6	6,4	212	12,4	6,0	6,4	239	16,0	11,6	4,4	309	20,0	18,0	386,0
241.14.16.044	16,0	8,0	44	17,1	12,7	5,3	7,4	217	14,3	6,9	7,4	245	18,4	13,3	5,1	315	23,0	21,0	393,3
241.14.16.051	16,0	8,0	51	15,7	14,9	6,2	8,7	234	16,7	8,1	8,6	262	21,6	15,7	5,9	339	27,0	24,0	423,9
241.14.16.064	16,0	8,0	64	10,7	18,7	7,8	10,9	200	21,1	10,2	10,9	226	27,2	19,7	7,5	291	34,0	30,0	363,8
241.14.16.076	16,0	8,0	76	10,0	22,6	9,4	13,2	226	25,4	12,3	13,1	254	32,8	23,8	9,0	328	41,0	35,0	410,0
241.14.16.089	16,0	8,0	89	8,6	27,0	11,3	15,7	232	30,4	14,7	15,7	261	39,2	28,4	10,8	337	49,0	40,0	421,4
241.14.16.102	16,0	8,0	102	7,9	30,8	12,9	17,9	243	34,7	16,8	17,9	274	44,8	32,5	12,3	354	56,0	46,0	442,4
241.14.16.305	16,0	8,0	305	2,6	93,5	39,1	54,4	243	105,0	51,0	54,4	274	136,0	98,6	37,4	354	170,0	135,0	442,0

High Performance Compression Springs DIN ISO 10243

D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$

L_{BL} = length of compacted-spring (i.e. wire-to-wire)

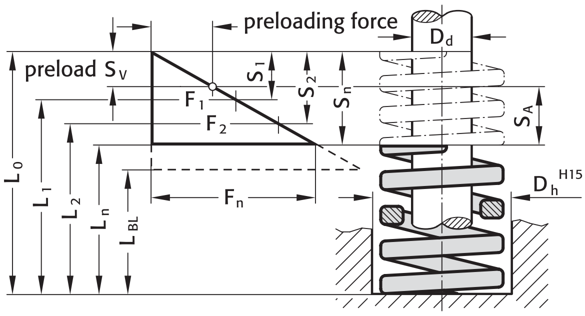
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$

$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$

$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$

R = spring rate (N/mm)

$S_{A1} ... S_{A7}$ = working stroke (mm)



241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.15.16.025	16,0	8,0	25	49,4	3,3	1,4	1,9	163	4,4	1,4	3,0	217	5,0	1,4	3,6	247	5,5	2,0	3,5	272
241.15.16.032	16,0	8,0	32	37,1	3,9	1,7	2,2	145	5,2	1,7	3,5	193	5,9	1,7	4,2	219	6,5	2,3	4,2	241
241.15.16.038	16,0	8,0	38	33,9	4,8	2,1	2,7	163	6,4	2,1	4,3	217	7,2	2,1	5,1	244	8,0	2,9	5,1	271
241.15.16.044	16,0	8,0	44	30,0	5,7	2,5	3,2	171	7,6	2,5	5,1	228	8,6	2,5	6,1	258	9,5	3,4	6,1	285
241.15.16.051	16,0	8,0	51	26,4	6,3	2,7	3,6	166	8,4	2,7	5,7	222	9,5	2,7	6,8	251	10,5	3,8	6,7	277
241.15.16.064	16,0	8,0	64	20,2	8,1	3,5	4,6	164	10,8	3,5	7,3	218	12,2	3,5	8,7	246	13,5	4,9	8,6	273
241.15.16.076	16,0	8,0	76	17,9	9,9	4,3	5,6	177	13,2	4,3	8,9	236	14,9	4,3	10,6	267	16,5	5,9	10,6	295
241.15.16.089	16,0	8,0	89	15,2	11,7	5,1	6,6	178	15,6	5,1	10,5	237	17,6	5,1	12,5	268	19,5	7,0	12,5	296
241.15.16.102	16,0	8,0	102	13,5	13,5	5,9	7,6	182	18,0	5,9	12,1	243	20,3	5,9	14,4	274	22,5	8,1	14,4	304
241.15.16.305	16,0	8,0	305	4,8	41,4	17,9	23,5	199	55,2	17,9	37,3	265	62,1	17,9	44,2	298	69,0	24,8	44,2	331

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.15.16.025	16,0	8,0	25	49,4	6,1	2,5	3,6	301	6,8	3,3	3,5	336	8,8	6,4	2,4	435	11,0	14,0	543,4
241.15.16.032	16,0	8,0	32	37,1	7,2	3,0	4,2	267	8,1	3,9	4,2	301	10,4	7,5	2,9	386	13,0	19,0	482,3
241.15.16.038	16,0	8,0	38	33,9	8,8	3,7	5,1	298	9,9	4,8	5,1	336	12,8	9,3	3,5	434	16,0	22,0	542,4
241.15.16.044	16,0	8,0	44	30,0	10,5	4,4	6,1	315	11,8	5,7	6,1	354	15,2	11,0	4,2	456	19,0	25,0	570,0
241.15.16.051	16,0	8,0	51	26,4	11,6	4,8	6,8	306	13,0	6,3	6,7	343	16,8	12,2	4,6	444	21,0	30,0	554,4
241.15.16.064	16,0	8,0	64	20,2	14,9	6,2	8,7	301	16,7	8,1	8,6	337	21,6	15,7	5,9	436	27,0	37,0	545,4
241.15.16.076	16,0	8,0	76	17,9	18,2	7,6	10,6	326	20,5	9,9	10,6	367	26,4	19,1	7,3	473	33,0	43,0	590,7
241.15.16.089	16,0	8,0	89	15,2	21,5	9,0	12,5	327	24,2	11,7	12,5	368	31,2	22,6	8,6	474	39,0	50,0	592,8
241.15.16.102	16,0	8,0	102	13,5	24,8	10,4	14,4	335	27,9	13,5	14,4	377	36,0	26,1	9,9	486	45,0	57,0	607,5
241.15.16.305	16,0	8,0	305	4,8	75,9	31,7	44,2	364	85,6	41,4	44,2	411	110,4	80,0	30,4	530	138,0	167,0	662,4

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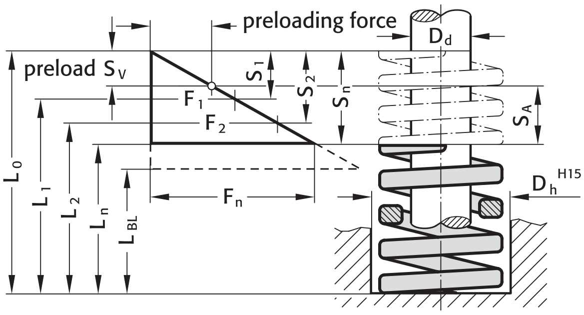


D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 ... L_n$	=	length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$	=	forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$	=	compr. as related to spring forces $F_1 ... F_n$
R	=	spring rate (N/mm)
$S_{A1} ... S_{A7}$	=	working stroke (mm)

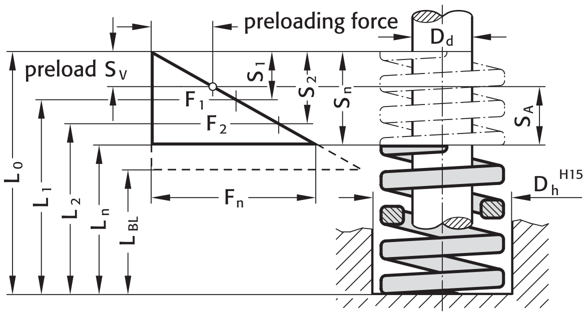
241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.16.025	16,0	8,0	25	75,5	2,6	1,1	1,5	196	3,5	1,1	2,4	264	3,9	1,1	2,8	294	4,4	1,6	2,8	332
241.16.16.032	16,0	8,0	32	53,0	3,3	1,4	1,9	175	4,4	1,4	3,0	233	5,0	1,4	3,6	265	5,5	2,0	3,5	292
241.16.16.038	16,0	8,0	38	49,1	4,1	1,8	2,3	201	5,5	1,8	3,7	270	6,2	1,8	4,4	304	6,9	2,5	4,4	339
241.16.16.044	16,0	8,0	44	43,2	4,7	2,0	2,7	203	6,3	2,0	4,3	272	7,1	2,0	5,1	307	7,9	2,8	5,1	341
241.16.16.051	16,0	8,0	51	37,3	5,6	2,4	3,2	209	7,4	2,4	5,0	276	8,3	2,4	5,9	310	9,3	3,3	6,0	347
241.16.16.064	16,0	8,0	64	30,4	7,1	3,1	4,0	216	9,4	3,1	6,3	286	10,6	3,1	7,5	322	11,8	4,2	7,6	359
241.16.16.076	16,0	8,0	76	25,5	8,7	3,8	4,9	222	11,6	3,8	7,8	296	13,1	3,8	9,3	334	14,5	5,2	9,3	370
241.16.16.089	16,0	8,0	89	21,6	10,4	4,5	5,9	225	13,8	4,5	9,3	298	15,5	4,5	11,0	335	17,3	6,2	11,1	374
241.16.16.102	16,0	8,0	102	19,6	12,0	5,2	6,8	235	16,0	5,2	10,8	314	18,0	5,2	12,8	353	20,0	7,2	12,8	392
241.16.16.305	16,0	8,0	305	6,9	36,6	15,9	20,7	253	48,8	15,9	32,9	337	54,9	15,9	39,0	379	61,0	22,0	39,0	421

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.16.025	16,0	8,0	25	75,5	4,8	2,0	2,8	362	5,4	2,6	2,8	408	7,0	5,0	2,0	529	8,7	16,3	656,9
241.16.16.032	16,0	8,0	32	53,0	6,1	2,5	3,6	323	6,8	3,3	3,5	360	8,8	6,4	2,4	466	11,0	21,0	583,0
241.16.16.038	16,0	8,0	38	49,1	7,5	3,2	4,3	368	8,5	4,1	4,4	417	11,0	7,9	3,1	540	13,7	24,3	672,7
241.16.16.044	16,0	8,0	44	43,2	8,6	3,6	5,0	372	9,7	4,7	5,0	419	12,6	9,1	3,5	544	15,7	28,3	678,2
241.16.16.051	16,0	8,0	51	37,3	10,2	4,3	5,9	380	11,5	5,6	5,9	429	14,8	10,7	4,1	552	18,5	32,5	690,1
241.16.16.064	16,0	8,0	64	30,4	12,9	5,4	7,5	392	14,6	7,1	7,5	444	18,8	13,6	5,2	572	23,5	40,5	714,4
241.16.16.076	16,0	8,0	76	25,5	16,0	6,7	9,3	408	18,0	8,7	9,3	459	23,2	16,8	6,4	592	29,0	47,0	739,5
241.16.16.089	16,0	8,0	89	21,6	19,0	7,9	11,1	410	21,4	10,4	11,0	462	27,6	20,0	7,6	596	34,5	54,5	745,2
241.16.16.102	16,0	8,0	102	19,6	22,0	9,2	12,8	431	24,8	12,0	12,8	486	32,0	23,2	8,8	627	40,0	62,0	784,0
241.16.16.305	16,0	8,0	305	6,9	67,1	28,1	39,0	463	75,6	36,6	39,0	522	97,6	70,8	26,8	673	122,0	183,0	841,8

High Performance Compression Springs
DIN ISO 10243

- D_h = dia. of guide sleeve
- D_d = diameter of guide pin
- L_0 = free length of spring
- $L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
- L_{BL} = length of compacted-spring (i.e. wire-to-wire)
- $F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
- $S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
- $S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
- R = spring rate (N/mm)
- $S_{A1} ... S_{A7}$ = working stroke (mm)

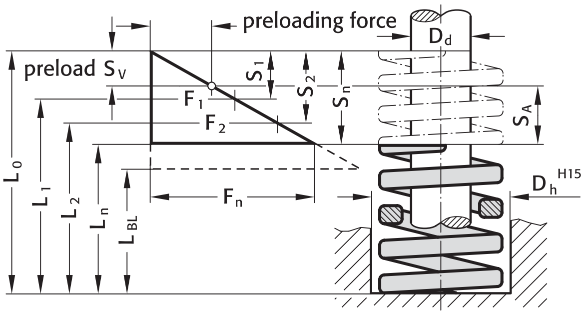


241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.17.16.025	16,0	8,0	25	118	2,7	1,2	1,5	319	3,6	1,2	2,4	425	4,1	1,2	2,9	484	4,5	1,6	2,9	531
241.17.16.032	16,0	8,0	32	89,1	3,2	1,4	1,8	285	4,3	1,4	2,9	383	4,9	1,4	3,5	437	5,4	1,9	3,5	481
241.17.16.038	16,0	8,0	38	72,1	3,9	1,7	2,2	281	5,2	1,7	3,5	375	5,9	1,7	4,2	425	6,5	2,3	4,2	469
241.17.16.044	16,0	8,0	44	60,9	4,5	2,0	2,5	274	6,0	2,0	4,0	365	6,8	2,0	4,8	414	7,5	2,7	4,8	457
241.17.16.051	16,0	8,0	51	52,3	5,4	2,3	3,1	282	7,2	2,3	4,9	377	8,1	2,3	5,8	424	9,0	3,2	5,8	471
241.17.16.064	16,0	8,0	64	41,2	6,6	2,9	3,7	272	8,8	2,9	5,9	363	9,9	2,9	7,0	408	11,0	4,0	7,0	453
241.17.16.076	16,0	8,0	76	34,1	8,0	3,4	4,6	273	10,6	3,4	7,2	361	11,9	3,4	8,5	406	13,3	4,8	8,5	454
241.17.16.089	16,0	8,0	89	29,5	9,5	4,1	5,4	280	12,6	4,1	8,5	372	14,2	4,1	10,1	419	15,8	5,7	10,1	466
241.17.16.102	16,0	8,0	102	25,6	11,0	4,7	6,3	282	14,6	4,7	9,9	374	16,4	4,7	11,7	420	18,3	6,6	11,7	468
241.17.16.305	16,0	8,0	305	8,4	33,0	14,3	18,7	277	44,0	14,3	29,7	370	49,5	14,3	35,2	416	55,0	19,8	35,2	462

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.17.16.025	16,0	8,0	25	118	5,0	2,1	2,9	590	5,6	2,7	2,9	661	7,2	5,2	2,0	850	9,0	16,0	1062,0
241.17.16.032	16,0	8,0	32	89,1	5,9	2,5	3,4	526	6,7	3,2	3,5	597	8,6	6,3	2,3	766	10,8	21,2	962,3
241.17.16.038	16,0	8,0	38	72,1	7,2	3,0	4,2	519	8,1	3,9	4,2	584	10,4	7,5	2,9	750	13,0	25,0	937,3
241.17.16.044	16,0	8,0	44	60,9	8,3	3,5	4,8	505	9,3	4,5	4,8	566	12,0	8,7	3,3	731	15,0	29,0	913,5
241.17.16.051	16,0	8,0	51	52,3	9,9	4,1	5,8	518	11,2	5,4	5,8	586	14,4	10,4	4,0	753	18,0	33,0	941,4
241.17.16.064	16,0	8,0	64	41,2	12,1	5,1	7,0	499	13,6	6,6	7,0	560	17,6	12,8	4,8	725	22,0	42,0	906,4
241.17.16.076	16,0	8,0	76	34,1	14,6	6,1	8,5	498	16,4	8,0	8,4	559	21,2	15,4	5,8	723	26,5	49,5	903,7
241.17.16.089	16,0	8,0	89	29,5	17,3	7,2	10,1	510	19,5	9,5	10,0	575	25,2	18,3	6,9	743	31,5	57,5	929,3
241.17.16.102	16,0	8,0	102	25,6	20,1	8,4	11,7	515	22,6	11,0	11,6	579	29,2	21,2	8,0	748	36,5	65,5	934,4
241.17.16.305	16,0	8,0	305	8,4	60,5	25,3	35,2	508	68,2	33,0	35,2	573	88,0	63,8	24,2	739	110,0	195,0	924,0

High Performance Compression Springs
DIN ISO 10243



D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces $F_1...F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring $L_1...L_n$
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1...S_7$
$S_1...S_n$ = compr. as related to spring forces $F_1...F_n$
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.20.025	20,0	10,0	25	55,8	3,9	1,7	2,2	218	5,2	1,7	3,5	290	5,9	1,7	4,2	329	6,5	2,3	4,2	363
241.14.20.032	20,0	10,0	32	45,0	4,8	2,1	2,7	216	6,4	2,1	4,3	288	7,2	2,1	5,1	324	8,0	2,9	5,1	360
241.14.20.038	20,0	10,0	38	33,4	5,7	2,5	3,2	190	7,6	2,5	5,1	254	8,6	2,5	6,1	287	9,5	3,4	6,1	317
241.14.20.044	20,0	10,0	44	30,0	6,9	3,0	3,9	207	9,2	3,0	6,2	276	10,4	3,0	7,4	312	11,5	4,1	7,4	345
241.14.20.051	20,0	10,0	51	24,5	7,8	3,4	4,4	191	10,4	3,4	7,0	255	11,7	3,4	8,3	287	13,0	4,7	8,3	319
241.14.20.064	20,0	10,0	64	20,0	9,6	4,2	5,4	192	12,8	4,2	8,6	256	14,4	4,2	10,2	288	16,0	5,8	10,2	320
241.14.20.076	20,0	10,0	76	16,0	12,0	5,2	6,8	192	16,0	5,2	10,8	256	18,0	5,2	12,8	288	20,0	7,2	12,8	320
241.14.20.089	20,0	10,0	89	14,0	13,8	6,0	7,8	193	18,4	6,0	12,4	258	20,7	6,0	14,7	290	23,0	8,3	14,7	322
241.14.20.102	20,0	10,0	102	12,0	15,9	6,9	9,0	191	21,2	6,9	14,3	254	23,9	6,9	17,0	287	26,5	9,5	17,0	318
241.14.20.115	20,0	10,0	115	10,9	18,0	7,8	10,2	196	24,0	7,8	16,2	262	27,0	7,8	19,2	294	30,0	10,8	19,2	327
241.14.20.127	20,0	10,0	127	9,5	20,1	8,7	11,4	191	26,8	8,7	18,1	255	30,2	8,7	21,5	287	33,5	12,1	21,4	318
241.14.20.139	20,0	10,0	139	8,4	21,9	9,5	12,4	184	29,2	9,5	19,7	245	32,9	9,5	23,4	276	36,5	13,1	23,4	307
241.14.20.152	20,0	10,0	152	7,6	24,3	10,5	13,8	185	32,4	10,5	21,9	246	36,5	10,5	26,0	277	40,5	14,6	25,9	308
241.14.20.305	20,0	10,0	305	4,0	48,6	21,1	27,5	194	64,8	21,1	43,7	259	72,9	21,1	51,8	292	81,0	29,2	51,8	324

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.20.025	20,0	10,0	25	55,8	7,2	3,0	4,2	402	8,1	3,9	4,2	452	10,4	7,5	2,9	580	13,0	12,0	725,4
241.14.20.032	20,0	10,0	32	45,0	8,8	3,7	5,1	396	9,9	4,8	5,1	446	12,8	9,3	3,5	576	16,0	16,0	720,0
241.14.20.038	20,0	10,0	38	33,4	10,5	4,4	6,1	351	11,8	5,7	6,1	394	15,2	11,0	4,2	508	19,0	19,0	634,6
241.14.20.044	20,0	10,0	44	30,0	12,7	5,3	7,4	381	14,3	6,9	7,4	429	18,4	13,3	5,1	552	23,0	21,0	690,0
241.14.20.051	20,0	10,0	51	24,5	14,3	6,0	8,3	350	16,1	7,8	8,3	394	20,8	15,1	5,7	510	26,0	25,0	637,0
241.14.20.064	20,0	10,0	64	20,0	17,6	7,4	10,2	352	19,8	9,6	10,2	396	25,6	18,6	7,0	512	32,0	32,0	640,0
241.14.20.076	20,0	10,0	76	16,0	22,0	9,2	12,8	352	24,8	12,0	12,8	397	32,0	23,2	8,8	512	40,0	36,0	640,0
241.14.20.089	20,0	10,0	89	14,0	25,3	10,6	14,7	354	28,5	13,8	14,7	399	36,8	26,7	10,1	515	46,0	43,0	644,0
241.14.20.102	20,0	10,0	102	12,0	29,2	12,2	17,0	350	32,9	15,9	17,0	395	42,4	30,7	11,7	509	53,0	49,0	636,0
241.14.20.115	20,0	10,0	115	10,9	33,0	13,8	19,2	360	37,2	18,0	19,2	405	48,0	34,8	13,2	523	60,0	55,0	654,0
241.14.20.127	20,0	10,0	127	9,5	36,9	15,4	21,5	351	41,5	20,1	21,4	394	53,6	38,9	14,7	509	67,0	60,0	636,5
241.14.20.139	20,0	10,0	139	8,4	40,2	16,8	23,4	338	45,3	21,9	23,4	381	58,4	42,3	16,1	491	73,0	66,0	613,2
241.14.20.152	20,0	10,0	152	7,6	44,6	18,6	26,0	339	50,2	24,3	25,9	382	64,8	47,0	17,8	492	81,0	71,0	615,6
241.14.20.305	20,0	10,0	305	4,0	89,1	37,3	51,8	356	100,0	48,6	51,8	402	129,6	94,0	35,6	518	162,0	143,0	648,0

High Performance Compression Springs
DIN ISO 10243

D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

$L_1 \dots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$

L_{BL} = length of compacted-spring (i.e. wire-to-wire)

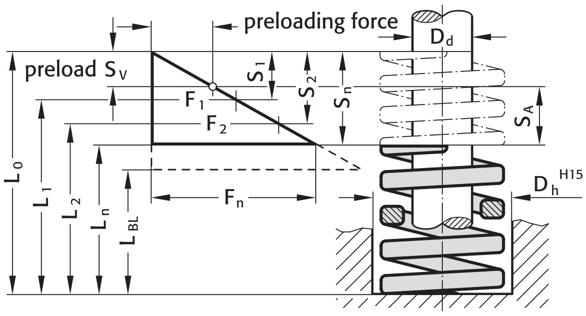
$F_1 \dots F_n$ = forces (N) as related to length of spring $L_1 \dots L_n$

$S_{v1} \dots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$

$S_1 \dots S_n$ = compr. as related to spring forces $F_1 \dots F_n$

R = spring rate (N/mm)

$S_{A1} \dots S_{A7}$ = working stroke (mm)

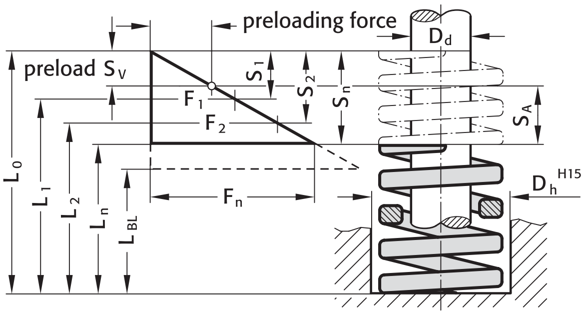


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.15.20.025	20,0	10,0	25	98,1	3,3	1,4	1,9	324	4,4	1,4	3,0	432	5,0	1,4	3,6	491	5,5	2,0	3,5	540
241.15.20.032	20,0	10,0	32	72,7	3,9	1,7	2,2	284	5,2	1,7	3,5	378	5,9	1,7	4,2	429	6,5	2,3	4,2	473
241.15.20.038	20,0	10,0	38	56,0	4,8	2,1	2,7	269	6,4	2,1	4,3	358	7,2	2,1	5,1	403	8,0	2,9	5,1	448
241.15.20.044	20,0	10,0	44	47,6	5,7	2,5	3,2	271	7,6	2,5	5,1	362	8,6	2,5	6,1	409	9,5	3,4	6,1	452
241.15.20.051	20,0	10,0	51	41,7	6,3	2,7	3,6	263	8,4	2,7	5,7	350	9,5	2,7	6,8	396	10,5	3,8	6,7	438
241.15.20.064	20,0	10,0	64	32,3	8,1	3,5	4,6	262	10,8	3,5	7,3	349	12,2	3,5	8,7	394	13,5	4,9	8,6	436
241.15.20.076	20,0	10,0	76	25,1	9,9	4,3	5,6	248	13,2	4,3	8,9	331	14,9	4,3	10,6	374	16,5	5,9	10,6	414
241.15.20.089	20,0	10,0	89	22,0	11,7	5,1	6,6	257	15,6	5,1	10,5	343	17,6	5,1	12,5	387	19,5	7,0	12,5	429
241.15.20.102	20,0	10,0	102	19,8	13,2	5,7	7,5	261	17,6	5,7	11,9	348	19,8	5,7	14,1	392	22,0	7,9	14,1	436
241.15.20.115	20,0	10,0	115	18,2	14,7	6,4	8,3	268	19,6	6,4	13,2	357	22,1	6,4	15,7	402	24,5	8,8	15,7	446
241.15.20.127	20,0	10,0	127	16,6	16,5	7,2	9,3	274	22,0	7,2	14,8	365	24,8	7,2	17,6	412	27,5	9,9	17,6	457
241.15.20.139	20,0	10,0	139	15,1	18,3	7,9	10,4	276	24,4	7,9	16,5	368	27,5	7,9	19,6	415	30,5	11,0	19,5	461
241.15.20.152	20,0	10,0	152	13,2	19,8	8,6	11,2	261	26,4	8,6	17,8	348	29,7	8,6	21,1	392	33,0	11,9	21,1	436
241.15.20.305	20,0	10,0	305	6,1	40,8	17,7	23,1	249	54,4	17,7	36,7	332	61,2	17,7	43,5	373	68,0	24,5	43,5	415

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.15.20.025	20,0	10,0	25	98,1	6,1	2,5	3,6	598	6,8	3,3	3,5	667	8,8	6,4	2,4	863	11,0	14,0	1079,1
241.15.20.032	20,0	10,0	32	72,7	7,2	3,0	4,2	523	8,1	3,9	4,2	589	10,4	7,5	2,9	756	13,0	19,0	945,1
241.15.20.038	20,0	10,0	38	56,0	8,8	3,7	5,1	493	9,9	4,8	5,1	554	12,8	9,3	3,5	717	16,0	22,0	896,0
241.15.20.044	20,0	10,0	44	47,6	10,5	4,4	6,1	500	11,8	5,7	6,1	562	15,2	11,0	4,2	724	19,0	25,0	904,4
241.15.20.051	20,0	10,0	51	41,7	11,6	4,8	6,8	484	13,0	6,3	6,7	542	16,8	12,2	4,6	701	21,0	30,0	875,7
241.15.20.064	20,0	10,0	64	32,3	14,9	6,2	8,7	481	16,7	8,1	8,6	539	21,6	15,7	5,9	698	27,0	37,0	872,1
241.15.20.076	20,0	10,0	76	25,1	18,2	7,6	10,6	457	20,5	9,9	10,6	515	26,4	19,1	7,3	663	33,0	43,0	828,3
241.15.20.089	20,0	10,0	89	22,0	21,5	9,0	12,5	473	24,2	11.7	12,5	532	31,2	22,6	8,6	686	39,0	50,0	858,0
241.15.20.102	20,0	10,0	102	19,8	24,2	10,1	14,1	479	27,3	13,2	14,1	541	35,2	25,5	9,7	697	44,0	58,0	871,2
241.15.20.115	20,0	10,0	115	18,2	27,0	11,3	15,7	491	30,4	14,7	15,7	553	39,2	28,4	10,8	713	49,0	66,0	891,8
241.15.20.127	20,0	10,0	127	16,6	30,3	12,7	17,6	503	34,1	16,5	17,6	566	44,0	31,9	12,1	730	55,0	72,0	913,0
241.15.20.139	20,0	10,0	139	15,1	33,6	14,0	19,6	507	37,8	18,3	19,5	571	48,8	35,4	13,4	737	61,0	78,0	921,1
241.15.20.152	20,0	10,0	152	13,2	36,3	15,2	21,1	479	40,9	19,8	21,1	540	52,8	38,3	14,5	697	66,0	86,0	871,2
241.15.20.305	20,0	10,0	305	6,1	74,8	31,3	43,5	456	84,3	40,8	43,5	514	108,8	78,9	29,9	664	136,0	169,0	829,6

High Performance Compression Springs
DIN ISO 10243



D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm)

241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.20.025	20,0	10,0	25	215,8	2,5	1,1	1,4	540	3,4	1,1	2,3	734	3,8	1,1	2,7	820	4,2	1,5	2,7	906
241.16.20.032	20,0	10,0	32	167,8	3,2	1,4	1,8	537	4,2	1,4	2,8	705	4,7	1,4	3,3	789	5,3	1,9	3,4	889
241.16.20.038	20,0	10,0	38	133,4	3,8	1,6	2,2	507	5,0	1,6	3,4	667	5,6	1,6	4,0	747	6,3	2,3	4,0	840
241.16.20.044	20,0	10,0	44	111,8	4,4	1,9	2,5	492	5,8	1,9	3,9	648	6,5	1,9	4,6	727	7,3	2,6	4,7	816
241.16.20.051	20,0	10,0	51	94,2	5,0	2,1	2,9	471	6,6	2,1	4,5	622	7,4	2,1	5,3	697	8,3	3,0	5,3	782
241.16.20.064	20,0	10,0	64	72,6	6,3	2,7	3,6	457	8,4	2,7	5,7	610	9,5	2,7	6,8	690	10,5	3,8	6,7	762
241.16.20.076	20,0	10,0	76	59,8	7,8	3,4	4,4	466	10,4	3,4	7,0	622	11,7	3,4	8,3	700	13,0	4,7	8,3	777
241.16.20.089	20,0	10,0	89	51,0	9,0	3,9	5,1	459	12,0	3,9	8,1	612	13,5	3,9	9,6	689	15,0	5,4	9,6	765
241.16.20.102	20,0	10,0	102	44,1	10,5	4,6	5,9	463	14,0	4,6	9,4	617	15,8	4,6	11,2	697	17,5	6,3	11,2	772
241.16.20.115	20,0	10,0	115	38,3	12,0	5,2	6,8	460	16,0	5,2	10,8	613	18,0	5,2	12,8	689	20,0	7,2	12,8	766
241.16.20.127	20,0	10,0	127	34,3	13,2	5,7	7,5	453	17,6	5,7	11,9	604	19,8	5,7	14,1	679	22,0	7,9	14,1	755
241.16.20.139	20,0	10,0	139	31,4	14,7	6,4	8,3	462	19,6	6,4	13,2	615	22,1	6,4	15,7	694	24,5	8,8	15,7	769
241.16.20.152	20,0	10,0	152	28,4	15,9	6,9	9,0	452	21,2	6,9	14,3	602	23,9	6,9	17,0	679	26,5	9,5	17,0	753
241.16.20.305	20,0	10,0	305	14,7	32,4	14,0	18,4	476	43,2	14,0	29,2	635	48,6	14,0	34,6	714	54,0	19,4	34,6	794

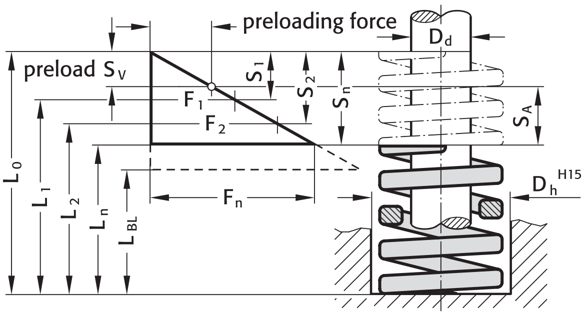
					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.20.025	20,0	10,0	25	215,8	4,6	1,9	2,7	993	5,2	2,5	2,7	1122	6,7	4,9	1,8	1446	8,4	16,6	1812,7
241.16.20.032	20,0	10,0	32	167,8	5,8	2,4	3,4	973	6,5	3,2	3,3	1091	8,4	6,1	2,3	1410	10,5	21,5	1761,9
241.16.20.038	20,0	10,0	38	133,4	6,9	2,9	4,0	920	7,8	3,8	4,0	1041	10,0	7,3	2,7	1334	12,5	25,5	1667,5
241.16.20.044	20,0	10,0	44	111,8	8,0	3,3	4,7	894	9,0	4,4	4,6	1006	11,6	8,4	3,2	1297	14,5	29,5	1621,1
241.16.20.051	20,0	10,0	51	94,2	9,1	3,8	5,3	857	10,2	5,0	5,2	961	13,2	9,6	3,6	1243	16,5	34,5	1554,3
241.16.20.064	20,0	10,0	64	72,6	11,6	4,8	6,8	842	13,0	6,3	6,7	944	16,8	12,2	4,6	1220	21,0	43,0	1524,6
241.16.20.076	20,0	10,0	76	59,8	14,3	6,0	8,3	855	16,1	7,8	8,3	963	20,8	15,1	5,7	1244	26,0	50,0	1554,8
241.16.20.089	20,0	10,0	89	51,0	16,5	6,9	9,6	842	18,6	9,0	9,6	949	24,0	17,4	6,6	1224	30,0	59,0	1530,0
241.16.20.102	20,0	10,0	102	44,1	19,3	8,1	11,2	851	21,7	10,5	11,2	957	28,0	20,3	7,7	1235	35,0	67,0	1543,5
241.16.20.115	20,0	10,0	115	38,3	22,0	9,2	12,8	843	24,8	12,0	12,8	950	32,0	23,2	8,8	1226	40,0	75,0	1532,0
241.16.20.127	20,0	10,0	127	34,3	24,2	10,1	14,1	830	27,3	13,2	14,1	936	35,2	25,5	9,7	1207	44,0	83,0	1509,2
241.16.20.139	20,0	10,0	139	31,4	27,0	11,3	15,7	848	30,4	14,7	15,7	955	39,2	28,4	10,8	1231	49,0	90,0	1538,6
241.16.20.152	20,0	10,0	152	28,4	29,2	12,2	17,0	829	32,9	15,9	17,0	934	42,4	30,7	11,7	1204	53,0	99,0	1505,2
241.16.20.305	20,0	10,0	305	14,7	59,4	24,8	34,6	873	67,0	32,4	34,6	985	86,4	62,6	23,8	1270	108,0	197,0	1587,6

subject to alterations

High Performance Compression Springs
DIN ISO 10243

FIBRO

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \ldots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \ldots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \ldots F_n$ = forces (N) as related to length of spring $L_1 \ldots L_n$
$S_{v1} \ldots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \ldots S_7$
$S_1 \ldots S_n$ = compr. as related to spring forces $F_1 \ldots F_n$
R = spring rate (N/mm)
$S_{A1} \ldots S_{A7}$ = working stroke (mm)



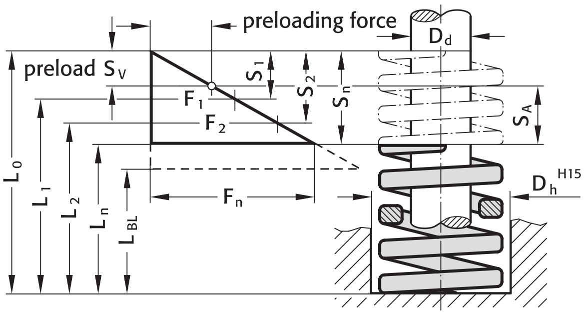
241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow"

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.17.20.025	20,0	10,0	25	293	2,3	1,0	1,3	674	3,1	1,0	2,1	908	3,5	1,0	2,5	1026	3,9	1,4	2,5	1143
241.17.20.032	20,0	10,0	32	224	2,9	1,3	1,6	650	3,9	1,3	2,6	874	4,4	1,3	3,1	986	4,9	1,8	3,1	1098
241.17.20.038	20,0	10,0	38	177	3,6	1,6	2,0	637	4,8	1,6	3,2	850	5,4	1,6	3,8	956	6,0	2,2	3,8	1062
241.17.20.044	20,0	10,0	44	149	4,2	1,8	2,4	626	5,6	1,8	3,8	834	6,3	1,8	4,5	939	7,0	2,5	4,5	1043
241.17.20.051	20,0	10,0	51	128	4,8	2,1	2,7	614	6,4	2,1	4,3	819	7,2	2,1	5,1	922	8,0	2,9	5,1	1024
241.17.20.064	20,0	10,0	64	99,1	6,3	2,7	3,6	624	8,4	2,7	5,7	832	9,5	2,7	6,8	941	10,5	3,8	6,7	1041
241.17.20.076	20,0	10,0	76	86,6	7,5	3,3	4,2	650	10,0	3,3	6,7	866	11,3	3,3	8,0	979	12,5	4,5	8,0	1083
241.17.20.089	20,0	10,0	89	69,6	9,0	3,9	5,1	626	12,0	3,9	8,1	835	13,5	3,9	9,6	940	15,0	5,4	9,6	1044
241.17.20.102	20,0	10,0	102	60,6	10,2	4,4	5,8	618	13,6	4,4	9,2	824	15,3	4,4	10,9	927	17,0	6,1	10,9	1030
241.17.20.115	20,0	10,0	115	53,1	11,4	4,9	6,5	605	15,2	4,9	10,3	807	17,1	4,9	12,2	908	19,0	6,8	12,2	1009
241.17.20.127	20,0	10,0	127	47,6	12,9	5,6	7,3	614	17,2	5,6	11,6	819	19,4	5,6	13,8	923	21,5	7,7	13,8	1023
241.17.20.139	20,0	10,0	139	43,1	14,1	6,1	8,0	608	18,8	6,1	12,7	810	21,2	6,1	15,1	914	23,5	8,5	15,0	1013
241.17.20.152	20,0	10,0	152	39,0	15,3	6,6	8,7	597	20,4	6,6	13,8	796	23,0	6,6	16,4	897	25,5	9,2	16,3	995
241.17.20.305	20,0	10,0	305	21,2	31,5	13,7	17,8	668	42,0	13,7	28,3	890	47,3	13,7	33,6	1003	52,5	18,9	33,6	1113

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.17.20.025	20,0	10,0	25	293	4,2	1,8	2,4	1231	4,8	2,3	2,5	1406	6,2	4,5	1,7	1817	7,7	17,3	2256,1
241.17.20.032	20,0	10,0	32	224	5,4	2,3	3,1	1210	6,1	2,9	3,2	1366	7,8	5,7	2,1	1747	9,8	22,2	2195,2
241.17.20.038	20,0	10,0	38	177	6,6	2,8	3,8	1168	7,4	3,6	3,8	1310	9,6	7,0	2,6	1699	12,0	26,0	2124,0
241.17.20.044	20,0	10,0	44	149	7,7	3,2	4,5	1147	8,7	4,2	4,5	1296	11,2	8,1	3,1	1669	14,0	30,0	2086,0
241.17.20.051	20,0	10,0	51	128	8,8	3,7	5,1	1126	9,9	4,8	5,1	1267	12,8	9,3	3,5	1638	16,0	35,0	2048,0
241.17.20.064	20,0	10,0	64	99,1	11,6	4,8	6,8	1150	13,0	6,3	6,7	1288	16,8	12,2	4,6	1665	21,0	43,0	2081,1
241.17.20.076	20,0	10,0	76	86,6	13,8	5,8	8,0	1195	15,5	7,5	8,0	1342	20,0	14,5	5,5	1732	25,0	51,0	2165,0
241.17.20.089	20,0	10,0	89	69,6	16,5	6,9	9,6	1148	18,6	9,0	9,6	1295	24,0	17,4	6,6	1670	30,0	59,0	2088,0
241.17.20.102	20,0	10,0	102	60,6	18,7	7,8	10,9	1133	21,1	10,2	10,9	1279	27,2	19,7	7,5	1648	34,0	68,0	2060,4
241.17.20.115	20,0	10,0	115	53,1	20,9	8,7	12,2	1110	23,6	11,4	12,2	1253	30,4	22,0	8,4	1614	38,0	77,0	2017,8
241.17.20.127	20,0	10,0	127	47,6	23,7	9,9	13,8	1128	26,7	12,9	13,8	1271	34,4	24,9	9,5	1637	43,0	84,0	2046,8
241.17.20.139	20,0	10,0	139	43,1	25,9	10,8	15,1	1116	29,1	14,1	15,0	1254	37,6	27,3	10,3	1621	47,0	92,0	2025,7
241.17.20.152	20,0	10,0	152	39,0	28,1	11,7	16,4	1096	31,6	15,3	16,3	1232	40,8	29,6	11,2	1591	51,0	101,0	1989,0
241.17.20.305	20,0	10,0	305	21,2	57,8	24,2	33,6	1225	65,1	31,5	33,6	1380	84,0	60,9	23,1	1781	105,0	200,0	2226,0

FIBRO

High Performance Compression Springs
DIN ISO 10243



- D_h = dia. of guide sleeve
- D_d = diameter of guide pin
- L_0 = free length of spring
- $L_1...L_n$ = length of loaded spring (mm) as related to spring forces $F_1...F_n$
- L_{BL} = length of compacted-spring (i.e. wire-to-wire)
- $F_1...F_n$ = forces (N) as related to length of spring $L_1...L_n$
- $S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1...S_7$
- $S_1...S_n$ = compr. as related to spring forces $F_1...F_n$
- R = spring rate (N/mm)
- $S_{A1}...S_{A7}$ = working stroke (mm)

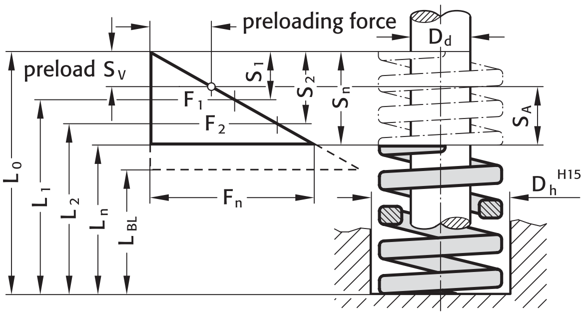
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.25.025	25,0	12,5	25	100,0	3,9	1,7	2,2	390	5,2	1,7	3,5	520	5,9	1,7	4,2	590	6,5	2,3	4,2	650
241.14.25.032	25,0	12,5	32	80,3	4,8	2,1	2,7	385	6,4	2,1	4,3	514	7,2	2,1	5,1	578	8,0	2,9	5,1	642
241.14.25.038	25,0	12,5	38	62,0	5,7	2,5	3,2	353	7,6	2,5	5,1	471	8,6	2,5	6,1	533	9,5	3,4	6,1	589
241.14.25.044	25,0	12,5	44	53,0	6,9	3,0	3,9	366	9,2	3,0	6,2	488	10,4	3,0	7,4	551	11,5	4,1	7,4	610
241.14.25.051	25,0	12,5	51	44,1	7,5	3,3	4,2	331	10,0	3,3	6,7	441	11,3	3,3	8,0	498	12,5	4,5	8,0	551
241.14.25.064	25,0	12,5	64	35,2	9,3	4,0	5,3	327	12,4	4,0	8,4	436	14,0	4,0	10,0	493	15,5	5,6	9,9	546
241.14.25.076	25,0	12,5	76	28,1	11,7	5,1	6,6	329	15,6	5,1	10,5	438	17,6	5,1	12,5	495	19,5	7,0	12,5	548
241.14.25.089	25,0	12,5	89	24,0	13,8	6,0	7,8	331	18,4	6,0	12,4	442	20,7	6,0	14,7	497	23,0	8,3	14,7	552
241.14.25.102	25,0	12,5	102	21,1	15,6	6,8	8,8	329	20,8	6,8	14,0	439	23,4	6,8	16,6	494	26,0	9,4	16,6	549
241.14.25.115	25,0	12,5	115	18,7	17,7	7,7	10,0	331	23,6	7,7	15,9	441	26,6	7,7	18,9	497	29,5	10,6	18,9	552
241.14.25.127	25,0	12,5	127	16,7	19,8	8,6	11,2	331	26,4	8,6	17,8	441	29,7	8,6	21,1	496	33,0	11,9	21,1	551
241.14.25.139	25,0	12,5	139	15,3	22,2	9,6	12,6	340	29,6	9,6	20,0	453	33,3	9,6	23,7	509	37,0	13,3	23,7	566
241.14.25.152	25,0	12,5	152	14,0	24,0	10,4	13,6	336	32,0	10,4	21,6	448	36,0	10,4	25,6	504	40,0	14,4	25,6	560
241.14.25.178	25,0	12,5	178	12,6	27,9	12,1	15,8	352	37,2	12,1	25,1	469	41,9	12,1	29,8	528	46,5	16,7	29,8	586
241.14.25.203	25,0	12,5	203	10,4	32,1	13,9	18,2	334	42,8	13,9	28,9	445	48,2	13,9	34,3	501	53,5	19,3	34,2	556
241.14.25.305	25,0	12,5	305	7,0	48,0	20,8	27,2	336	64,0	20,8	43,2	448	72,0	20,8	51,2	504	80,0	28,8	51,2	560

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.25.025	25,0	12,5	25	100,0	7,2	3,0	4,2	720	8,1	3,9	4,2	810	10,4	7,5	2,9	1040	13,0	12,0	1300,0
241.14.25.032	25,0	12,5	32	80,3	8,8	3,7	5,1	707	9,9	4,8	5,1	795	12,8	9,3	3,5	1028	16,0	16,0	1284,8
241.14.25.038	25,0	12,5	38	62,0	10,5	4,4	6,1	651	11,8	5,7	6,1	732	15,2	11,0	4,2	942	19,0	19,0	1178,0
241.14.25.044	25,0	12,5	44	53,0	12,7	5,3	7,4	673	14,3	6,9	7,4	758	18,4	13,3	5,1	975	23,0	21,0	1219,0
241.14.25.051	25,0	12,5	51	44,1	13,8	5,8	8,0	609	15,5	7,5	8,0	684	20,0	14,5	5,5	882	25,0	26,0	1102,5
241.14.25.064	25,0	12,5	64	35,2	17,1	7,1	10,0	602	19,2	9,3	9,9	676	24,8	18,0	6,8	873	31,0	33,0	1091,2
241.14.25.076	25,0	12,5	76	28,1	21,5	9,0	12,5	604	24,2	11,7	12,5	680	31,2	22,6	8,6	877	39,0	37,0	1095,9
241.14.25.089	25,0	12,5	89	24,0	25,3	10,6	14,7	607	28,5	13,8	14,7	684	36,8	26,7	10,1	883	46,0	43,0	1104,0
241.14.25.102	25,0	12,5	102	21,1	28,6	12,0	16,6	603	32,2	15,6	16,6	679	41,6	30,2	11,4	878	52,0	50,0	1097,2
241.14.25.115	25,0	12,5	115	18,7	32,5	13,6	18,9	608	36,6	17,7	18,9	684	47,2	34,2	13,0	883	59,0	56,0	1103,3
241.14.25.127	25,0	12,5	127	16,7	36,3	15,2	21,1	606	40,9	19,8	21,1	683	52,8	38,3	14,5	882	66,0	61,0	1102,2
241.14.25.139	25,0	12,5	139	15,3	40,7	17,0	23,7	623	45,9	22,2	23,7	702	59,2	42,9	16,3	906	74,0	65,0	1132,2
241.14.25.152	25,0	12,5	152	14,0	44,0	18,4	25,6	616	49,6	24,0	25,6	694	64,0	46,4	17,6	896	80,0	72,0	1120,0
241.14.25.178	25,0	12,5	178	12,6	51,2	21,4	29,8	645	57,7	27,9	29,8	727	74,4	53,9	20,5	937	93,0	85,0	1171,8
241.14.25.203	25,0	12,5	203	10,4	58,9	24,6	34,3	613	66,3	32,1	34,2	690	85,6	62,1	23,5	890	107,0	96,0	1112,8
241.14.25.305	25,0	12,5	305	7,0	88,0	36,8	51,2	616	99,2	48,0	51,2	694	128,0	92,8	35,2	896	160,0	145,0	1120,0

High Performance Compression Springs
DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces $F_1...F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring $L_1...L_n$
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1...S_7$
$S_1...S_n$ = compr. as related to spring forces $F_1...F_n$
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

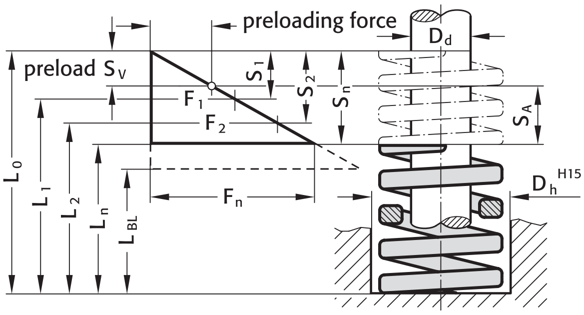


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.15.25.025	25,0	12,5	25	147,0	3,3	1,4	1,9	485	4,4	1,4	3,0	647	5,0	1,4	3,6	735	5,5	2,0	3,5	809
241.15.25.032	25,0	12,5	32	118,1	3,9	1,7	2,2	461	5,2	1,7	3,5	614	5,9	1,7	4,2	697	6,5	2,3	4,2	768
241.15.25.038	25,0	12,5	38	93,1	4,8	2,1	2,7	447	6,4	2,1	4,3	596	7,2	2,1	5,1	670	8,0	2,9	5,1	745
241.15.25.044	25,0	12,5	44	80,8	5,7	2,5	3,2	461	7,6	2,5	5,1	614	8,6	2,5	6,1	695	9,5	3,4	6,1	768
241.15.25.051	25,0	12,5	51	68,7	6,3	2,7	3,6	433	8,4	2,7	5,7	577	9,5	2,7	6,8	653	10,5	3,8	6,7	721
241.15.25.064	25,0	12,5	64	53,1	8,1	3,5	4,6	430	10,8	3,5	7,3	573	12,2	3,5	8,7	648	13,5	4,9	8,6	717
241.15.25.076	25,0	12,5	76	43,3	9,9	4,3	5,6	429	13,2	4,3	8,9	572	14,9	4,3	10,6	645	16,5	5,9	10,6	714
241.15.25.089	25,0	12,5	89	38,3	11,7	5,1	6,6	448	15,6	5,1	10,5	597	17,6	5,1	12,5	674	19,5	7,0	12,5	747
241.15.25.102	25,0	12,5	102	33,1	13,2	5,7	7,5	437	17,6	5,7	11,9	583	19,8	5,7	14,1	655	22,0	7,9	14,1	728
241.15.25.115	25,0	12,5	115	28,1	15,0	6,5	8,5	422	20,0	6,5	13,5	562	22,5	6,5	16,0	632	25,0	9,0	16,0	703
241.15.25.127	25,0	12,5	127	25,9	16,8	7,3	9,5	435	22,4	7,3	15,1	580	25,2	7,3	17,9	653	28,0	10,1	17,9	725
241.15.25.139	25,0	12,5	139	23,3	18,9	8,2	10,7	440	25,2	8,2	17,0	587	28,4	8,2	20,2	662	31,5	11,3	20,2	734
241.15.25.152	25,0	12,5	152	20,8	20,1	8,7	11,4	418	26,8	8,7	18,1	557	30,2	8,7	21,5	628	33,5	12,1	21,4	697
241.15.25.178	25,0	12,5	178	17,9	23,7	10,3	13,4	424	31,6	10,3	21,3	566	35,6	10,3	25,3	637	39,5	14,2	25,3	707
241.15.25.203	25,0	12,5	203	15,8	27,0	11,7	15,3	427	36,0	11,7	24,3	569	40,5	11,7	28,8	640	45,0	16,2	28,8	711
241.15.25.305	25,0	12,5	305	10,2	40,5	17,6	22,9	413	54,0	17,6	36,4	551	60,8	17,6	43,2	620	67,5	24,3	43,2	689

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.15.25.025	25,0	12,5	25	147,0	6,1	2,5	3,6	897	6,8	3,3	3,5	1000	8,8	6,4	2,4	1294	11,0	14,0	1617,0
241.15.25.032	25,0	12,5	32	118,1	7,2	3,0	4,2	850	8,1	3,9	4,2	957	10,4	7,5	2,9	1228	13,0	19,0	1535,3
241.15.25.038	25,0	12,5	38	93,1	8,8	3,7	5,1	819	9,9	4,8	5,1	922	12,8	9,3	3,5	1192	16,0	22,0	1489,6
241.15.25.044	25,0	12,5	44	80,8	10,5	4,4	6,1	848	11,8	5,7	6,1	953	15,2	11,0	4,2	1228	19,0	25,0	1535,2
241.15.25.051	25,0	12,5	51	68,7	11,6	4,8	6,8	797	13,0	6,3	6,7	893	16,8	12,2	4,6	1154	21,0	30,0	1442,7
241.15.25.064	25,0	12,5	64	53,1	14,9	6,2	8,7	791	16,7	8,1	8,6	887	21,6	15,7	5,9	1147	27,0	37,0	1433,7
241.15.25.076	25,0	12,5	76	43,3	18,2	7,6	10,6	788	20,5	9,9	10,6	888	26,4	19,1	7,3	1143	33,0	43,0	1428,9
241.15.25.089	25,0	12,5	89	38,3	21,5	9,0	12,5	823	24,2	11,7	12,5	927	31,2	22,6	8,6	1195	39,0	50,0	1493,7
241.15.25.102	25,0	12,5	102	33,1	24,2	10,1	14,1	801	27,3	13,2	14,1	904	35,2	25,5	9,7	1165	44,0	58,0	1456,4
241.15.25.115	25,0	12,5	115	28,1	27,5	11,5	16,0	773	31,0	15,0	16,0	871	40,0	29,0	11,0	1124	50,0	65,0	1405,0
241.15.25.127	25,0	12,5	127	25,9	30,8	12,9	17,9	798	34,7	16,8	17,9	899	44,8	32,5	12,3	1160	56,0	71,0	1450,4
241.15.25.139	25,0	12,5	139	23,3	34,7	14,5	20,2	809	39,1	18,9	20,2	911	50,4	36,5	13,9	1174	63,0	76,0	1467,9
241.15.25.152	25,0	12,5	152	20,8	36,9	15,4	21,5	768	41,5	20,1	21,4	863	53,6	38,9	14,7	1115	67,0	85,0	1393,6
241.15.25.178	25,0	12,5	178	17,9	43,5	18,2	25,3	779	49,0	23,7	25,3	877	63,2	45,8	17,4	1131	79,0	99,0	1414,1
241.15.25.203	25,0	12,5	203	15,8	49,5	20,7	28,8	782	55,8	27,0	28,8	882	72,0	52,2	19,8	1138	90,0	113,0	1422,0
241.15.25.305	25,0	12,5	305	10,2	74,3	31,1	43,2	758	83,7	40,5	43,2	854	108,0	78,3	29,7	1102	135,0	170,0	1377,0

High Performance Compression Springs DIN ISO 10243



D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm)

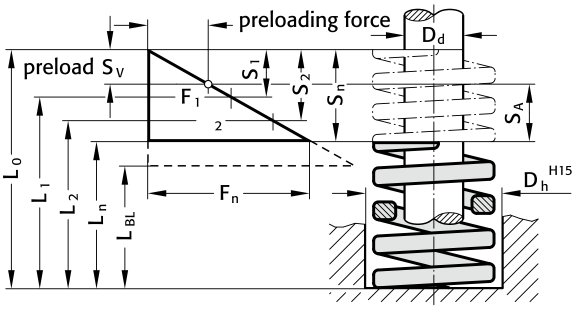
241.16. High P erformance Compression Springs DIN ISO 10243 C olour: „Red“

					30% Stroke				40% Stroke				45% Stroke				50% Stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.25.025	25,0	12,5	25	375,7	2,7	1,2	1,5	1014	3,6	1,2	2,4	1353	4,1	1,2	2,9	1540	4,5	1,6	2,9	1691
241.16.25.032	25,0	12,5	32	297,2	3,2	1,4	1,8	951	4,2	1,4	2,8	1248	4,7	1,4	3,3	1397	5,3	1,9	3,4	1575
241.16.25.038	25,0	12,5	38	218,8	3,9	1,7	2,2	853	5,2	1,7	3,5	1138	5,9	1,7	4,2	1291	6,5	2,3	4,2	1422
241.16.25.044	25,0	12,5	44	187,4	4,7	2,0	2,7	881	6,2	2,0	4,2	1162	7,0	2,0	5,0	1312	7,8	2,8	5,0	1462
241.16.25.051	25,0	12,5	51	156,0	5,4	2,3	3,1	842	7,2	2,3	4,9	1123	8,1	2,3	5,8	1264	9,0	3,2	5,8	1404
241.16.25.064	25,0	12,5	64	123,6	6,8	2,9	3,9	840	9,0	2,9	6,1	1112	10,1	2,9	7,2	1248	11,3	4,1	7,2	1397
241.16.25.076	25,0	12,5	76	99,1	8,3	3,6	4,7	823	11,0	3,6	7,4	1090	12,4	3,6	8,8	1229	13,8	5,0	8,8	1368
241.16.25.089	25,0	12,5	89	84,4	9,8	4,2	5,6	827	13,0	4,2	8,8	1097	14,6	4,2	10,4	1232	16,3	5,9	10,4	1376
241.16.25.102	25,0	12,5	102	73,6	11,3	4,9	6,4	832	15,0	4,9	10,1	1104	16,9	4,9	12,0	1244	18,8	6,8	12,0	1384
241.16.25.115	25,0	12,5	115	64,7	12,8	5,6	7,2	828	17,1	5,6	11,5	1106	19,2	5,6	13,6	1242	21,4	7,7	13,7	1385
241.16.25.127	25,0	12,5	127	57,9	14,1	6,1	8,0	816	18,8	6,1	12,7	1089	21,2	6,1	15,1	1227	23,5	8,5	15,0	1361
241.16.25.139	25,0	12,5	139	53,0	15,6	6,8	8,8	827	20,8	6,8	14,0	1102	23,4	6,8	16,6	1240	26,0	9,4	16,6	1378
241.16.25.152	25,0	12,5	152	48,1	17,3	7,5	9,8	832	23,0	7,5	15,5	1106	25,9	7,5	18,4	1246	28,8	10,4	18,4	1385
241.16.25.178	25,0	12,5	178	41,2	20,4	8,8	11,6	840	27,2	8,8	18,4	1121	30,6	8,8	21,8	1261	34,0	12,2	21,8	1401
241.16.25.203	25,0	12,5	203	36,3	23,1	10,0	13,1	839	30,8	10,0	20,8	1118	34,7	10,0	24,7	1260	38,5	13,9	24,6	1398
241.16.25.305	25,0	12,5	305	22,6	34,5	15,0	19,5	780	46,0	15,0	31,0	1040	51,8	15,0	36,8	1171	57,5	20,7	36,8	1300

					55% Str oke				62% Stroke				80% Stroke				100% Str oke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.25.025	25,0	12,5	25	375,7	5,0	2,1	2,9	1879	5,6	2,7	2,9	2104	7,2	5,2	2,0	2705	9,0	16,0	3381,3
241.16.25.032	25,0	12,5	32	297,2	5,8	2,4	3,4	1724	6,5	3,2	3,3	1932	8,4	6,1	2,3	2496	10,5	21,5	3120,6
241.16.25.038	25,0	12,5	38	218,8	7,2	3,0	4,2	1575	8,1	3,9	4,2	1772	10,4	7,5	2,9	2276	13,0	25,0	2844,4
241.16.25.044	25,0	12,5	44	187,4	8,5	3,6	4,9	1593	9,6	4,7	4,9	1799	12,4	9,0	3,4	2324	15,5	28,5	2904,7
241.16.25.051	25,0	12,5	51	156,0	9,9	4,1	5,8	1544	11,2	5,4	5,8	1747	14,4	10,4	4,0	2246	18,0	33,0	2808,0
241.16.25.064	25,0	12,5	64	123,6	12,4	5,2	7,2	1533	14,0	6,8	7,2	1730	18,0	13,1	4,9	2225	22,5	41,5	2781,0
241.16.25.076	25,0	12,5	76	99,1	15,1	6,3	8,8	1496	17,1	8,3	8,8	1695	22,0	16,0	6,0	2180	27,5	48,5	2725,3
241.16.25.089	25,0	12,5	89	84,4	17,9	7,5	10,4	1511	20,2	9,8	10,4	1705	26,0	18,9	7,1	2194	32,5	56,5	2743,0
241.16.25.102	25,0	12,5	102	73,6	20,6	8,6	12,0	1516	23,3	11,3	12,0	1715	30,0	21,8	8,2	2208	37,5	64,5	2760,0
241.16.25.115	25,0	12,5	115	64,7	23,5	9,8	13,7	1520	26,5	12,8	13,7	1715	34,2	24,8	9,4	2213	42,7	72,3	2762,7
241.16.25.127	25,0	12,5	127	57,9	25,9	10,8	15,1	1500	29,1	14,1	15,0	1685	37,6	27,3	10,3	2177	47,0	80,0	2721,3
241.16.25.139	25,0	12,5	139	53,0	28,6	12,0	16,6	1516	32,2	15,6	16,6	1707	41,6	30,2	11,4	2205	52,0	87,0	2756,0
241.16.25.152	25,0	12,5	152	48,1	31,6	13,2	18,4	1520	35,7	17,3	18,4	1717	46,0	33,4	12,6	2213	57,5	94,5	2765,8
241.16.25.178	25,0	12,5	178	41,2	37,4	15,6	21,8	1541	42,2	20,4	21,8	1739	54,4	39,4	15,0	2241	68,0	110,0	2801,6
241.16.25.203	25,0	12,5	203	36,3	42,4	17,7	24,7	1539	47,7	23,1	24,6	1732	61,6	44,7	16,9	2236	77,0	126,0	2795,1
241.16.25.305	25,0	12,5	305	22,6	63,3	26,5	36,8	1431	71,3	34,5	36,8	1611	92,0	66,7	25,3	2079	115,0	190,0	2599,0

HIGH PERFORMANCE COMPRESSION SPRING, DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \ldots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \ldots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \ldots F_n$ = forces (N) as related to length of spring $L_1 \ldots L_n$
$S_{v1} \ldots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \ldots S_7$
$S_1 \ldots S_n$ = compr. as related to spring forces $F_1 \ldots F_n$
R = spring rate N/mm
$S_{A1} \ldots S_{A7}$ = working stroke (mm)

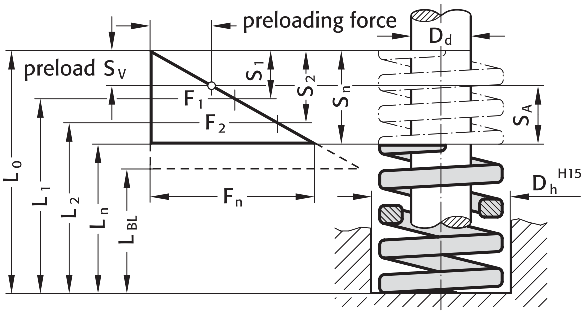


241.17. High performance compression spring, DIN ISO 10243 Colour: „Yellow“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.17.25.025	25,0	12,5	25	459	2,0	0,9	1,1	918	2,7	0,9	1,8	1239	3,0	0,9	2,1	1377	3,4	1,2	2,2	1561
241.17.25.032	25,0	12,5	32	375	3,0	1,3	1,7	1125	4,0	1,3	2,7	1500	4,5	1,3	3,2	1688	5,0	1,8	3,2	1875
241.17.25.038	25,0	12,5	38	346	3,6	1,6	2,0	1246	4,8	1,6	3,2	1661	5,4	1,6	3,8	1868	6,0	2,2	3,8	2076
241.17.25.044	25,0	12,5	44	244	4,2	1,8	2,4	1025	5,6	1,8	3,8	1366	6,3	1,8	4,5	1537	7,0	2,5	4,5	1708
241.17.25.051	25,0	12,5	51	208	4,8	2,1	2,7	998	6,4	2,1	4,3	1331	7,2	2,1	5,1	1498	8,0	2,9	5,1	1664
241.17.25.064	25,0	12,5	64	161	6,3	2,7	3,6	1014	8,4	2,7	5,7	1352	9,5	2,7	6,8	1530	10,5	3,8	6,7	1691
241.17.25.076	25,0	12,5	76	131	7,5	3,3	4,2	983	10,0	3,3	6,7	1310	11,3	3,3	8,0	1480	12,5	4,5	8,0	1638
241.17.25.089	25,0	12,5	89	111	8,7	3,8	4,9	966	11,6	3,8	7,8	1288	13,1	3,8	9,3	1454	14,5	5,2	9,3	1610
241.17.25.102	25,0	12,5	102	96,3	10,2	4,4	5,8	982	13,6	4,4	9,2	1310	15,3	4,4	10,9	1473	17,0	6,1	10,9	1637
241.17.25.115	25,0	12,5	115	85,7	11,7	5,1	6,6	1003	15,6	5,1	10,5	1337	17,6	5,1	12,5	1508	19,5	7,0	12,5	1671
241.17.25.127	25,0	12,5	127	76,3	12,9	5,6	7,3	984	17,2	5,6	11,6	1312	19,4	5,6	13,8	1480	21,5	7,7	13,8	1640
241.17.25.139	25,0	12,5	139	66,0	14,3	6,2	8,1	944	19,0	6,2	12,8	11254	21,4	6,2	15,2	1412	23,8	8,6	15,2	1571
241.17.25.152	25,0	12,5	152	63,6	15,9	6,9	9,0	1011	21,2	6,9	14,3	1348	23,9	6,9	17,0	1520	26,5	9,5	17,0	1685
241.17.25.178	25,0	12,5	178	54,0	18,6	8,1	10,5	1004	24,8	8,1	16,7	1339	27,9	8,1	19,8	1507	31,0	11,2	19,8	1674
241.17.25.203	25,0	12,5	203	47,0	21,0	9,1	11,9	987	28,0	9,1	18,9	1316	31,5	9,1	22,4	1481	35,0	12,6	22,4	1645
241.17.25.305	25,0	12,5	305	30,9	32,4	14,0	18,4	1001	43,2	14,0	29,2	1335	48,6	14,0	34,6	1502	54,0	19,4	34,6	1669

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.17.25.025	25,0	12,5	25	459	3,7	1,5	2,2	1698	4,2	2,0	2,2	1928	5,4	3,9	1,5	2479	6,7	18,3	3075,0
241.17.25.032	25,0	12,5	32	375	5,5	2,3	3,2	2063	6,2	3,0	3,2	2325	8,0	5,8	2,2	3000	10,0	22,0	3750,0
241.17.25.038	25,0	12,5	38	346	6,6	2,8	3,8	2284	7,4	3,6	3,8	2560	9,6	7,0	2,6	3322	12,0	26,0	4152,0
241.17.25.044	25,0	12,5	44	244	7,7	3,2	4,5	1879	8,7	4,2	4,5	2123	11,2	8,1	3,1	2733	14,0	30,0	3416,0
241.17.25.051	25,0	12,5	51	208	8,8	3,7	5,1	1830	9,9	4,8	5,1	2059	12,8	9,3	3,5	2662	16,0	35,0	3328,0
241.17.25.064	25,0	12,5	64	161	11,6	4,8	6,8	1868	13,0	6,3	6,7	2093	16,8	12,2	4,6	2705	21,0	43,0	3381,0
241.17.25.076	25,0	12,5	76	131	13,8	5,8	8,0	1808	15,5	7,5	8,0	2031	20,0	14,5	5,5	2620	25,0	51,0	3275,0
241.17.25.089	25,0	12,5	89	111	16,0	6,7	9,3	1776	18,0	8,7	9,3	1998	23,2	16,8	6,4	2575	29,0	60,0	3219,0
241.17.25.102	25,0	12,5	102	96,3	18,7	7,8	10,9	1801	21,1	10,2	10,9	2032	27,2	19,7	7,5	2619	34,0	68,0	3274,2
241.17.25.115	25,0	12,5	115	85,7	21,5	9,0	12,5	1843	24,2	11,7	12,5	2074	31,2	22,6	8,6	2674	39,0	76,0	3342,3
241.17.25.127	25,0	12,5	127	76,3	23,7	9,9	13,8	1808	26,7	12,9	13,8	2037	34,4	24,9	9,5	2625	43,0	84,0	3280,9
241.17.25.139	25,0	12,5	139	66,0	26,2	11,0	15,2	1729	29,5	14,3	15,2	1947	38,1	27,6	10,5	2515	47,6	91,4	3142,0
241.17.25.152	25,0	12,5	152	63,6	29,2	12,2	17,0	1857	32,9	15,9	17,0	2092	42,4	30,7	11,7	2697	53,0	99,0	3370,8
241.17.25.178	25,0	12,5	178	54,0	34,1	14,3	19,8	1841	38,4	18,6	19,8	2074	49,6	36,0	13,6	2678	62,0	116,0	3348,0
241.17.25.203	25,0	12,5	203	47,0	38,5	16,1	22,4	1810	43,4	21,0	22,4	2040	56,0	40,6	15,4	2632	70,0	133,0	3290,0
241.17.25.305	25,0	12,5	305	30,9	59,4	24,8	34,6	1835	67,0	32,4	34,6	2070	86,4	62,6	23,8	2670	108,0	197,0	3337,2

High Performance Compression Springs
DIN ISO 10243



D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 \dots L_n$	=	length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1 \dots F_n$	=	forces (N) as related to length of spring $L_1 \dots L_n$
$S_{v1} \dots S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$
$S_1 \dots S_n$	=	compr. as related to spring forces $F_1 \dots F_n$
R	=	spring rate (N/mm)
$S_{A1} \dots S_{A7}$	=	working stroke (mm)

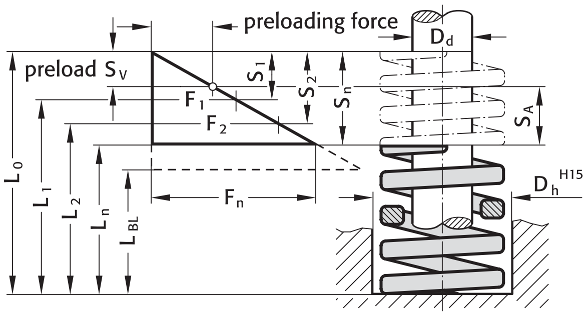
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.32.038	32,0	16,0	38	94,1	5,7	2,5	3,2	536	7,6	2,5	5,1	715	8,6	2,5	6,1	809	9,5	3,4	6,1	894
241.14.32.044	32,0	16,0	44	79,6	6,6	2,9	3,7	525	8,8	2,9	5,9	700	9,9	2,9	7,0	788	11,0	4,0	7,0	876
241.14.32.051	32,0	16,0	51	67,0	7,5	3,3	4,2	503	10,0	3,3	6,7	670	11,3	3,3	8,0	757	12,5	4,5	8,0	838
241.14.32.064	32,0	16,0	64	53,0	9,6	4,2	5,4	509	12,8	4,2	8,6	678	14,4	4,2	10,2	763	16,0	5,8	10,2	848
241.14.32.076	32,0	16,0	76	44,1	11,7	5,1	6,6	516	15,6	5,1	10,5	688	17,6	5,1	12,5	776	19,5	7,0	12,5	860
241.14.32.089	32,0	16,0	89	37,2	13,5	5,9	7,6	502	18,0	5,9	12,1	670	20,3	5,9	14,4	755	22,5	8,1	14,4	837
241.14.32.102	32,0	16,0	102	32,0	15,6	6,8	8,8	499	20,8	6,8	14,0	666	23,4	6,8	16,6	749	26,0	9,4	16,6	832
241.14.32.115	32,0	16,0	115	29,0	17,4	7,5	9,9	505	23,2	7,5	15,7	673	26,1	7,5	18,6	757	29,0	10,4	18,6	841
241.14.32.127	32,0	16,0	127	25,0	19,5	8,5	11,0	488	26,0	8,5	17,5	650	29,3	8,5	20,8	733	32,5	11,7	20,8	813
241.14.32.139	32,0	16,0	139	23,1	21,6	9,4	12,2	499	28,8	9,4	19,4	665	32,4	9,4	23,0	748	36,0	13,0	23,0	832
241.14.32.152	32,0	16,0	152	21,5	23,4	10,1	13,3	503	31,2	10,1	21,1	671	35,1	10,1	25,0	755	39,0	14,0	25,0	839
241.14.32.178	32,0	16,0	178	18,3	26,4	11,4	15,0	483	35,2	11,4	23,8	644	39,6	11,4	28,2	725	44,0	15,8	28,2	805
241.14.32.203	32,0	16,0	203	15,8	31,2	13,5	17,7	493	41,6	13,5	28,1	657	46,8	13,5	33,3	739	52,0	18,7	33,3	822
241.14.32.254	32,0	16,0	254	12,6	39,0	16,9	22,1	491	52,0	16,9	35,1	655	58,5	16,9	41,6	737	65,0	23,4	41,6	819
241.14.32.305	32,0	16,0	305	10,3	46,5	20,2	26,3	479	62,0	20,2	41,8	639	69,8	20,2	49,6	719	77,5	27,9	49,6	798

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.32.038	32,0	16,0	38	94,1	10,5	4,4	6,1	988	11,8	5,7	6,1	1110	15,2	11,0	4,2	1430	19,0	19,0	1787,9
241.14.32.044	32,0	16,0	44	79,6	12,1	5,1	7,0	963	13,6	6,6	7,0	1083	17,6	12,8	4,8	1401	22,0	22,0	1751,2
241.14.32.051	32,0	16,0	51	67,0	13,8	5,8	8,0	925	15,5	7,5	8,0	1039	20,0	14,5	5,5	1340	25,0	26,0	1675,0
241.14.32.064	32,0	16,0	64	53,0	17,6	7,4	10,2	933	19,8	9,6	10,2	1049	25,6	18,6	7,0	1357	32,0	32,0	1696,0
241.14.32.076	32,0	16,0	76	44,1	21,5	9,0	12,5	948	24,2	11,7	12,5	1067	31,2	22,6	8,6	1376	39,0	37,0	1719,9
241.14.32.089	32,0	16,0	89	37,2	24,8	10,4	14,4	923	27,9	13,5	14,4	1038	36,0	26,1	9,9	1339	45,0	44,0	1674,0
241.14.32.102	32,0	16,0	102	32,0	28,6	12,0	16,6	915	32,2	15,6	16,6	1030	41,6	30,2	11,4	1331	52,0	50,0	1664,0
241.14.32.115	32,0	16,0	115	29,0	31,9	13,3	18,6	925	36,0	17,4	18,6	1044	46,4	33,6	12,8	1346	58,0	57,0	1682,0
241.14.32.127	32,0	16,0	127	25,0	35,8	15,0	20,8	895	40,3	19,5	20,8	1008	52,0	37,7	14,3	1300	65,0	62,0	1625,0
241.14.32.139	32,0	16,0	139	23,1	39,6	16,6	23,0	915	44,6	21,6	23,0	1030	57,6	41,8	15,8	1331	72,0	67,0	1663,2
241.14.32.152	32,0	16,0	152	21,5	42,9	17,9	25,0	922	48,4	23,4	25,0	1041	62,4	45,2	17,2	1342	78,0	74,0	1677,0
241.14.32.178	32,0	16,0	178	18,3	48,4	20,2	28,2	886	54,6	26,4	28,2	999	70,4	51,0	19,4	1288	88,0	90,0	1610,4
241.14.32.203	32,0	16,0	203	15,8	57,2	23,9	33,3	904	64,5	31,2	33,3	1019	83,2	60,3	22,9	1315	104,0	99,0	1643,2
241.14.32.254	32,0	16,0	254	12,6	71,5	29,9	41,6	901	80,6	39,0	41,6	1016	104,0	75,4	28,6	1310	130,0	124,0	1638,0
241.14.32.305	32,0	16,0	305	10,3	85,3	35,7	49,6	879	96,1	46,5	49,6	990	124,0	89,9	34,1	1277	155,0	150,0	1596,5

High Performance Compression Springs
DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm)

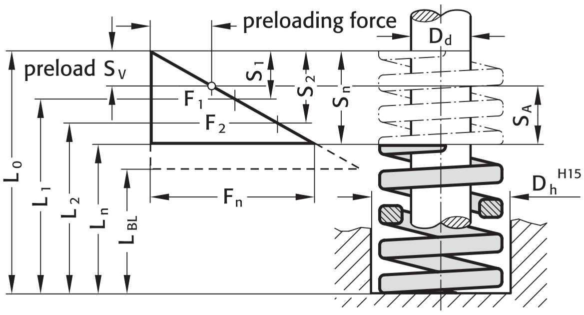


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.15.32.038	32,0	16,0	38	185,1	4,8	2,1	2,7	888	6,4	2,1	4,3	1185	7,2	2,1	5,1	1333	8,0	2,9	5,1	1481
241.15.32.044	32,0	16,0	44	158,1	5,7	2,5	3,2	901	7,6	2,5	5,1	1202	8,6	2,5	6,1	1360	9,5	3,4	6,1	1502
241.15.32.051	32,0	16,0	51	134,1	6,3	2,7	3,6	845	8,4	2,7	5,7	1126	9,5	2,7	6,8	1274	10,5	3,8	6,7	1408
241.15.32.064	32,0	16,0	64	99,1	8,1	3,5	4,6	803	10,8	3,5	7,3	1070	12,2	3,5	8,7	1209	13,5	4,9	8,6	1338
241.15.32.076	32,0	16,0	76	80,5	9,6	4,2	5,4	773	12,8	4,2	8,6	1030	14,4	4,2	10,2	1159	16,0	5,8	10,2	1288
241.15.32.089	32,0	16,0	89	69,2	11,1	4,8	6,3	768	14,8	4,8	10,0	1024	16,7	4,8	11,9	1156	18,5	6,7	11,8	1280
241.15.32.102	32,0	16,0	102	58,9	12,9	5,6	7,3	760	17,2	5,6	11,6	1013	19,4	5,6	13,8	1143	21,5	7,7	13,8	1266
241.15.32.115	32,0	16,0	115	51,5	14,7	6,4	8,3	757	19,6	6,4	13,2	1009	22,1	6,4	15,7	1138	24,5	8,8	15,7	1262
241.15.32.127	32,0	16,0	127	44,8	16,5	7,2	9,3	739	22,0	7,2	14,8	986	24,8	7,2	17,6	1111	27,5	9,9	17,6	1232
241.15.32.139	32,0	16,0	139	42,3	18,0	7,8	10,2	761	24,0	7,8	16,2	1015	27,0	7,8	19,2	1142	30,0	10,8	19,2	1269
241.15.32.152	32,0	16,0	152	37,9	19,8	8,6	11,2	750	26,4	8,6	17,8	1001	29,7	8,6	21,1	1126	33,0	11,9	21,1	1251
241.15.32.178	32,0	16,0	178	32,6	23,1	10,0	13,1	753	30,8	10,0	20,8	1004	34,7	10,0	24,7	1131	38,5	13,9	24,6	1255
241.15.32.203	32,0	16,0	203	28,9	26,4	11,4	15,0	763	35,2	11,4	23,8	1017	39,6	11,4	28,2	1144	44,0	15,8	28,2	1272
241.15.32.254	32,0	16,0	254	21,4	33,0	14,3	18,7	706	44,0	14,3	29,7	942	49,5	14,3	35,2	1059	55,0	19,8	35,2	1177
241.15.32.305	32,0	16,0	305	18,3	39,9	17,3	22,6	730	53,2	17,3	35,9	974	59,9	17,3	42,6	1096	66,5	23,9	42,6	1217

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.15.32.038	32,0	16,0	38	185,1	8,8	3,7	5,1	1629	9,9	4,8	5,1	1832	12,8	9,3	3,5	2369	16,0	22,0	2961,6
241.15.32.044	32,0	16,0	44	158,1	10,5	4,4	6,1	1660	11,8	5,7	6,1	1866	15,2	11,0	4,2	2403	19,0	25,0	3003,9
241.15.32.051	32,0	16,0	51	134,1	11,6	4,8	6,8	1556	13,0	6,3	6,7	1743	16,8	12,2	4,6	2253	21,0	30,0	2816,1
241.15.32.064	32,0	16,0	64	99,1	14,9	6,2	8,7	1477	16,7	8,1	8,6	1655	21,6	15,7	5,9	2141	27,0	37,0	2675,7
241.15.32.076	32,0	16,0	76	80,5	17,6	7,4	10,2	1417	19,8	9,6	10,2	1594	25,6	18,6	7,0	2061	32,0	44,0	2576,0
241.15.32.089	32,0	16,0	89	69,2	20,4	8,5	11,9	1412	22,9	11,1	11,8	1585	29,6	21,5	8,1	2048	37,0	52,0	2560,4
241.15.32.102	32,0	16,0	102	58,9	23,7	9,9	13,8	1396	26,7	12,9	13,8	1573	34,4	24,9	9,5	2026	43,0	59,0	2532,7
241.15.32.115	32,0	16,0	115	51,5	27,0	11,3	15,7	1391	30,4	14,7	15,7	1566	39,2	28,4	10,8	2019	49,0	66,0	2523,5
241.15.32.127	32,0	16,0	127	44,8	30,3	12,7	17,6	1357	34,1	16,5	17,6	1528	44,0	31,9	12,1	1971	55,0	72,0	2464,0
241.15.32.139	32,0	16,0	139	42,3	33,0	13,8	19,2	1396	37,2	18,0	19,2	1574	48,0	34,8	13,2	2030	60,0	79,0	2538,0
241.15.32.152	32,0	16,0	152	37,9	36,3	15,2	21,1	1376	40,9	19,8	21,1	1550	52,8	38,3	14,5	2001	66,0	86,0	2501,4
241.15.32.178	32,0	16,0	178	32,6	42,4	17,7	24,7	1382	47,7	23,1	24,6	1555	61,6	44,7	16,9	2008	77,0	101,0	2510,2
241.15.32.203	32,0	16,0	203	28,9	48,4	20,2	28,2	1399	54,6	26,4	28,2	1578	70,4	51,0	19,4	2035	88,0	115,0	2543,2
241.15.32.254	32,0	16,0	254	21,4	60,5	25,3	35,2	1295	68,2	33,0	35,2	1459	88,0	63,8	24,2	1883	110,0	144,0	2354,0
241.15.32.305	32,0	16,0	305	18,3	73,2	30,6	42,6	1340	82,5	39,9	42,6	1510	106,4	77,1	29,3	1947	133,0	172,0	2433,9

High Performance Compression Springs
DIN ISO 10243



D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 ... L_n$	=	length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$	=	forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$	=	compr. as related to spring forces $F_1 ... F_n$
R	=	spring rate (N/mm)
$S_{A1} ... S_{A7}$	=	working stroke (mm)

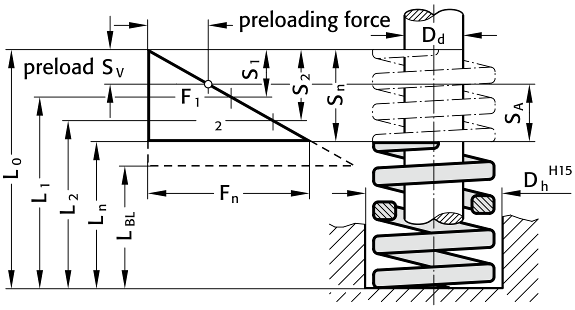
241.16. High P erformance Compression Springs DIN ISO 10243 C olour: „Red“

					30% Stroke				40% Stroke				45% Stroke				50% Stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.32.038	32,0	16,0	38	388,5	3,6	1,6	2,0	1399	4,8	1,6	3,2	1865	5,4	1,6	3,8	2098	6,0	2,2	3,8	2331
241.16.32.044	32,0	16,0	44	324,7	4,2	1,8	2,4	1364	5,6	1,8	3,8	1818	6,3	1,8	4,5	2046	7,0	2,5	4,5	2273
241.16.32.051	32,0	16,0	51	271,7	5,0	2,1	2,9	1359	6,6	2,1	4,5	1793	7,4	2,1	5,3	2011	8,3	3,0	5,3	2255
241.16.32.064	32,0	16,0	64	211,9	6,5	2,8	3,7	1377	8,6	2,8	5,8	1822	9,7	2,8	6,9	2055	10,8	3,9	6,9	2289
241.16.32.076	32,0	16,0	76	171,7	7,8	3,4	4,4	1339	10,4	3,4	7,0	1786	11,7	3,4	8,3	2009	13,0	4,7	8,3	2232
241.16.32.089	32,0	16,0	89	141,3	9,2	4,0	5,2	1300	12,2	4,0	8,2	1724	13,7	4,0	9,7	1936	15,3	5,5	9,8	2162
241.16.32.102	32,0	16,0	102	121,6	10,7	4,6	6,1	1301	14,2	4,6	9,6	1727	16,0	4,6	11,4	1946	17,8	6,4	11,4	2164
241.16.32.115	32,0	16,0	115	106,9	12,2	5,3	6,9	1304	16,2	5,3	10,9	1732	18,2	5,3	12,9	1946	20,3	7,3	13,0	2170
241.16.32.127	32,0	16,0	127	93,2	13,5	5,9	7,6	1258	18,0	5,9	12,1	1678	20,3	5,9	14,4	1892	22,5	8,1	14,4	2097
241.16.32.139	32,0	16,0	139	86,3	15,0	6,5	8,5	1295	20,0	6,5	13,5	1726	22,5	6,5	16,0	1942	25,0	9,0	16,0	2158
241.16.32.152	32,0	16,0	152	78,5	16,2	7,0	9,2	1272	21,6	7,0	14,6	1696	24,3	7,0	17,3	1908	27,0	9,7	17,3	2120
241.16.32.178	32,0	16,0	178	67,7	18,9	8,2	10,7	1280	25,2	8,2	17,0	1706	28,4	8,2	20,2	1923	31,5	11,3	20,2	2133
241.16.32.203	32,0	16,0	203	58,9	21,6	9,4	12,2	1272	28,8	9,4	19,4	1696	32,4	9,4	23,0	1908	36,0	13,0	23,0	2120
241.16.32.254	32,0	16,0	254	46,1	27,6	12,0	15,6	1272	36,8	12,0	24,8	1696	41,4	12,0	29,4	1909	46,0	16,6	29,4	2121
241.16.32.305	32,0	16,0	305	38,3	33,0	14,3	18,7	1264	44,0	14,3	29,7	1685	49,5	14,3	35,2	1896	55,0	19,8	35,2	2107

					55% Str oke				62% Stroke				80% Stroke				100% Str oke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.32.038	32,0	16,0	38	388,5	6,6	2,8	3,8	2564	7,4	3,6	3,8	2875	9,6	7,0	2,6	3730	12,0	26,0	4662,0
241.16.32.044	32,0	16,0	44	324,7	7,7	3,2	4,5	2500	8,7	4,2	4,5	2825	11,2	8,1	3,1	3637	14,0	30,0	4545,8
241.16.32.051	32,0	16,0	51	271,7	9,1	3,8	5,3	2472	10,2	5,0	5,2	2771	13,2	9,6	3,6	3586	16,5	34,5	4483,1
241.16.32.064	32,0	16,0	64	211,9	11,8	4,9	6,9	2500	13,3	6,5	6,8	2818	17,2	12,5	4,7	3645	21,5	42,5	4555,9
241.16.32.076	32,0	16,0	76	171,7	14,3	6,0	8,3	2455	16,1	7,8	8,3	2764	20,8	15,1	5,7	3571	26,0	50,0	4464,2
241.16.32.089	32,0	16,0	89	141,3	16,8	7,0	9,8	2374	18,9	9,2	9,7	2671	24,4	17,7	6,7	3448	30,5	58,5	4309,7
241.16.32.102	32,0	16,0	102	121,6	19,5	8,2	11,3	2371	22,0	10,7	11,3	2675	28,4	20,6	7,8	3453	35,5	66,5	4316,8
241.16.32.115	32,0	16,0	115	106,9	22,3	9,3	13,0	2384	25,1	12,2	12,9	2683	32,4	23,5	8,9	3464	40,5	74,5	4329,5
241.16.32.127	32,0	16,0	127	93,2	24,8	10,4	14,4	2311	27,9	13,5	14,4	2600	36,0	26,1	9,9	3355	45,0	82,0	4194,0
241.16.32.139	32,0	16,0	139	86,3	27,5	11,5	16,0	2373	31,0	15,0	16,0	2675	40,0	29,0	11,0	3452	50,0	89,0	4315,0
241.16.32.152	32,0	16,0	152	78,5	29,7	12,4	17,3	2331	33,5	16,2	17,3	2630	43,2	31,3	11,9	3391	54,0	98,0	4239,0
241.16.32.178	32,0	16,0	178	67,7	34,7	14,5	20,2	2349	39,1	18,9	20,2	2647	50,4	36,5	13,9	3412	63,0	115,0	4265,1
241.16.32.203	32,0	16,0	203	58,9	39,6	16,6	23,0	2332	44,6	21,6	23,0	2627	57,6	41,8	15,8	3393	72,0	131,0	4240,8
241.16.32.254	32,0	16,0	254	46,1	50,6	21,2	29,4	2333	57,0	27,6	29,4	2628	73,6	53,4	20,2	3393	92,0	162,0	4241,2
241.16.32.305	32,0	16,0	305	38,3	60,5	25,3	35,2	2317	68,2	33,0	35,2	2612	88,0	63,8	24,2	3370	110,0	195,0	4213,0

HIGH PERFORMANCE COMPRESSION SPRING, DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \ldots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \ldots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \ldots F_n$ = forces (N) as related to length of spring $L_1 \ldots L_n$
$S_{v1} \ldots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \ldots S_7$
$S_1 \ldots S_n$ = compr. as related to spring forces $F_1 \ldots F_n$
R = spring rate N/mm
$S_{A1} \ldots S_{A7}$ = working stroke (mm)

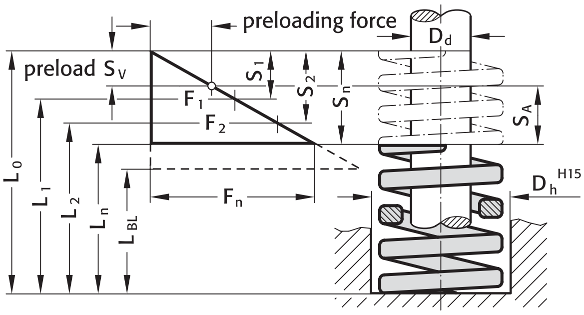


241.17. High performance compression spring, DIN ISO 10243 Colour: „Yellow“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.17.32.038	32,0	16,0	38	529	3,3	1,4	1,9	1746	4,4	1,4	3,0	2328	5,0	1,4	3,6	2645	5,5	2,0	3,5	2910
241.17.32.044	32,0	16,0	44	425	3,9	1,7	2,2	1958	5,2	1,7	3,5	2210	5,9	1,7	4,2	2508	6,5	2,3	4,2	2763
241.17.32.051	32,0	16,0	51	353	4,5	2,0	2,5	1589	6,0	2,0	4,0	2118	6,8	2,0	4,8	2400	7,5	2,7	4,8	2648
241.17.32.064	32,0	16,0	64	269	6,0	2,6	3,4	1614	8,0	2,6	5,4	2152	9,0	2,6	6,4	2421	10,0	3,6	6,4	2690
241.17.32.076	32,0	16,0	76	219	7,2	3,1	4,1	1577	9,6	3,1	6,5	2102	10,8	3,1	7,7	2365	12,0	4,3	7,7	2628
241.17.32.089	32,0	16,0	89	180	8,7	3,8	4,9	1566	11,6	3,8	7,8	2088	13,1	3,8	9,3	2358	14,5	5,2	9,3	2610
241.17.32.102	32,0	16,0	102	155	9,9	4,3	5,6	1535	13,2	4,3	8,9	2046	14,9	4,3	10,6	2310	16,5	5,9	10,6	2558
241.17.32.115	32,0	16,0	115	140	10,8	4,7	6,1	1512	14,4	4,7	9,7	2016	16,2	4,7	11,5	2268	18,0	6,5	11,5	2520
241.17.32.127	32,0	16,0	127	124	12,3	5,3	7,0	1525	16,4	5,3	11,1	2034	18,5	5,3	13,2	2294	20,5	7,4	13,1	2542
241.17.32.139	32,0	16,0	139	112	14,4	6,2	8,2	1613	19,2	6,2	13,0	2150	21,6	6,2	15,4	2419	24,0	8,6	15,4	2688
241.17.32.152	32,0	16,0	152	102	15,0	6,5	8,5	1530	20,0	6,5	13,5	2040	22,5	6,5	16,0	2295	25,0	9,0	16,0	2550
241.17.32.178	32,0	16,0	178	88,3	17,7	7,7	10,0	1563	23,6	7,8	15,9	2084	26,6	7,7	18,9	2349	29,5	10,6	18,9	2605
241.17.32.203	32,0	16,0	203	76,0	20,4	8,8	11,6	1550	27,2	8,8	18,4	2067	30,6	8,8	21,8	2326	34,0	12,2	21,8	2584
241.17.32.254	32,0	16,0	254	60,8	25,5	11,1	14,4	1550	34,0	11,1	22,9	2067	38,3	11,1	27,2	2329	42,5	15,3	27,2	2584
241.17.32.305	32,0	16,0	305	49,1	30,9	13,4	17,5	1517	41,2	13,4	27,8	2023	46,4	13,4	33,0	2278	51,5	18,5	33,0	2529

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.17.32.038	32,0	16,0	38	529	6,1	2,5	3,6	3227	6,8	3,3	3,5	3597	8,8	6,4	2,4	4655	11,0	27,0	5819,0
241.17.32.044	32,0	16,0	44	425	7,2	3,0	4,2	3060	8,1	3,9	4,2	3443	10,4	7,5	2,9	4420	13,0	31,0	5525,0
241.17.32.051	32,0	16,0	51	353	8,3	3,5	4,8	2930	9,3	4,5	4,8	3283	12,0	8,7	3,3	4236	15,0	36,0	5295,0
241.17.32.064	32,0	16,0	64	269	11,0	4,6	6,4	2959	12,4	6,0	6,4	3336	16,0	11,6	4,4	4304	20,0	44,0	5380,0
241.17.32.076	32,0	16,0	76	219	13,2	5,5	7,7	2891	14,9	7,2	7,7	3263	19,2	13,9	5,3	4205	24,0	52,0	5256,0
241.17.32.089	32,0	16,0	89	180	16,0	6,7	9,3	2880	18,0	8,7	9,3	3240	23,2	16,8	6,4	4176	29,0	60,0	5220,0
241.17.32.102	32,0	16,0	102	155	18,2	7,6	10,6	2821	20,5	9,9	10,6	3178	26,4	19,1	7,3	4092	33,0	69,0	5115,0
241.17.32.115	32,0	16,0	115	140	19,8	8,3	11,5	2772	22,3	10,8	11,5	3122	28,8	20,9	7,9	4032	36,0	79,0	5040,0
241.17.32.127	32,0	16,0	127	124	22,6	9,4	13,2	2802	25,4	12,3	13,1	3150	32,8	23,8	9,0	4067	41,0	86,0	5084,0
241.17.32.139	32,0	16,0	139	112	26,4	11,0	15,4	2957	29,8	14,4	15,4	3338	38,4	27,8	10,6	4301	48,0	91,0	5376,0
241.17.32.152	32,0	16,0	152	102	27,5	11,5	16,0	2805	31,0	15,0	16,0	3162	40,0	29,0	11,0	4080	50,0	102,0	5100,0
241.17.32.178	32,0	16,0	178	88,3	32,5	13,6	18,9	2870	36,6	17,7	18,9	3232	47,2	34,2	13,0	4168	59,0	119,0	5209,7
241.17.32.203	32,0	16,0	203	76,0	37,4	15,6	21,8	2842	42,2	20,4	21,8	3207	54,4	39,4	15,0	4134	68,0	135,0	5168,0
241.17.32.254	32,0	16,0	254	60,8	46,8	19,6	27,2	2845	52,7	25,5	27,2	3204	68,0	49,3	18,7	4134	85,0	169,0	5168,0
241.17.32.305	32,0	16,0	305	49,1	56,7	23,7	33,0	2784	63,9	30,9	33,0	3137	82,4	59,7	22,7	4046	103,0	202,0	5057,3

High Performance Compression Springs DIN ISO 10243



D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 ... L_n$	=	length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$	=	forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$	=	compr. as related to spring forces $F_1 ... F_n$
R	=	spring rate (N/mm)
$S_{A1} ... S_{A7}$	=	working stroke (mm)

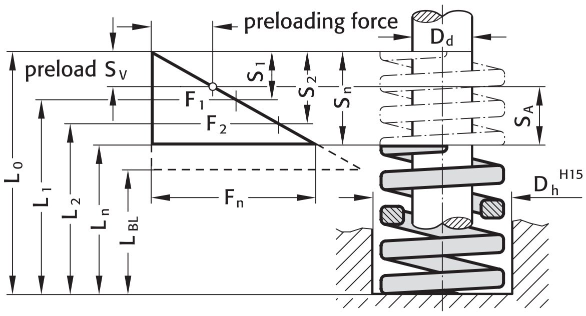
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.40.051	40,0	20,0	51	92,0	7,5	3,3	4,2	690	10,0	3,3	6,7	920	11,3	3,3	8,0	1040	12,5	4,5	8,0	1150
241.14.40.064	40,0	20,0	64	73,1	9,6	4,2	5,4	702	12,8	4,2	8,6	936	14,4	4,2	10,2	1053	16,0	5,8	10,2	1170
241.14.40.076	40,0	20,0	76	63,1	11,4	4,9	6,5	719	15,2	4,9	10,3	959	17,1	4,9	12,2	1079	19,0	6,8	12,2	1199
241.14.40.089	40,0	20,0	89	51,0	13,5	5,9	7,6	689	18,0	5,9	12,1	918	20,3	5,9	14,4	1035	22,5	8,1	14,4	1148
241.14.40.102	40,0	20,0	102	43,1	15,3	6,6	8,7	659	20,4	6,6	13,8	879	23,0	6,6	16,4	991	25,5	9,2	16,3	1099
241.14.40.115	40,0	20,0	115	39,6	17,4	7,5	9,9	689	23,2	7,5	15,7	919	26,1	7,5	18,6	1034	29,0	10,4	18,6	1148
241.14.40.127	40,0	20,0	127	37,0	19,5	8,5	11,0	722	26,0	8,5	17,5	962	29,3	8,5	20,8	1084	32,5	11,7	20,8	1203
241.14.40.139	40,0	20,0	139	32,0	21,3	9,2	12,1	682	28,4	9,2	19,2	909	32,0	9,2	22,8	1024	35,5	12,8	22,7	1136
241.14.40.152	40,0	20,0	152	28,1	23,4	10,1	13,3	658	31,2	10,1	21,1	877	35,1	10,1	25,0	986	39,0	14,0	25,0	1096
241.14.40.178	40,0	20,0	178	25,2	27,6	12,0	15,6	696	36,8	12,0	24,8	927	41,4	12,0	29,4	1043	46,0	16,6	29,4	1159
241.14.40.203	40,0	20,0	203	22,7	31,5	13,7	17,8	715	42,0	13,7	28,3	953	47,3	13,7	33,6	1074	52,5	18,9	33,6	1192
241.14.40.254	40,0	20,0	254	17,0	39,3	17,0	22,3	668	52,4	17,0	35,4	891	59,0	17,0	42,0	1003	65,5	23,6	41,9	1114
241.14.40.305	40,0	20,0	305	14,8	47,1	20,4	26,7	697	62,8	20,4	42,4	929	70,7	20,4	50,3	1046	78,5	28,3	50,2	1162

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.40.051	40,0	20,0	51	92,0	13,8	5,8	8,0	1270	15,5	7,5	8,0	1426	20,0	14,5	5,5	1840	25,0	26,0	2300,0
241.14.40.064	40,0	20,0	64	73,1	17,6	7,4	10,2	1287	19,8	9,6	10,2	1447	25,6	18,6	7,0	1871	32,0	32,0	2339,2
241.14.40.076	40,0	20,0	76	63,1	20,9	8,7	12,2	1319	23,6	11,4	12,2	1489	30,4	22,0	8,4	1918	38,0	38,0	2397,8
241.14.40.089	40,0	20,0	89	51,0	24,8	10,4	14,4	1265	27,9	13,5	14,4	1423	36,0	26,1	9,9	1836	45,0	44,0	2295,0
241.14.40.102	40,0	20,0	102	43,1	28,1	11,7	16,4	1211	31,6	15,3	16,3	1362	40,8	29,6	11,2	1758	51,0	51,0	2198,1
241.14.40.115	40,0	20,0	115	39,6	31,9	13,3	18,6	1263	36,0	17,4	18,6	1426	46,4	33,6	12,8	1837	58,0	57,0	2296,8
241.14.40.127	40,0	20,0	127	37,0	35,8	15,0	20,8	1325	40,3	19,5	20,8	1491	52,0	37,7	14,3	1924	65,0	62,0	2405,0
241.14.40.139	40,0	20,0	139	32,0	39,1	16,3	22,8	1251	44,0	21,3	22,7	1408	56,8	41,2	15,6	1818	71,0	68,0	2272,0
241.14.40.152	40,0	20,0	152	28,1	42,9	17,9	25,0	1205	48,4	23,4	25,0	1360	62,4	45,2	17,2	1753	78,0	74,0	2191,8
241.14.40.178	40,0	20,0	178	25,2	50,6	21,2	29,4	1275	57,0	27,6	29,4	1436	73,6	53,4	20,2	1855	92,0	86,0	2318,4
241.14.40.203	40,0	20,0	203	22,7	57,8	24,2	33,6	1312	65,1	31,5	33,6	1478	84,0	60,9	23,1	1907	105,0	98,0	2383,5
241.14.40.254	40,0	20,0	254	17,0	72,1	30,1	42,0	1226	81,2	39,3	41,9	1380	104,8	76,0	28,8	1782	131,0	123,0	2227,0
241.14.40.305	40,0	20,0	305	14,8	86,4	36,1	50,3	1279	97,3	47,1	50,2	1440	125,6	91,1	34,5	1859	157,0	148,0	2323,6

High Performance Compression Springs DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \dots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \dots F_n$ = forces (N) as related to length of spring $L_1 \dots L_n$
$S_{v1} \dots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$
$S_1 \dots S_n$ = compr. as related to spring forces $F_1 \dots F_n$
R = spring rate (N/mm)
$S_{A1} \dots S_{A7}$ = working stroke (mm)

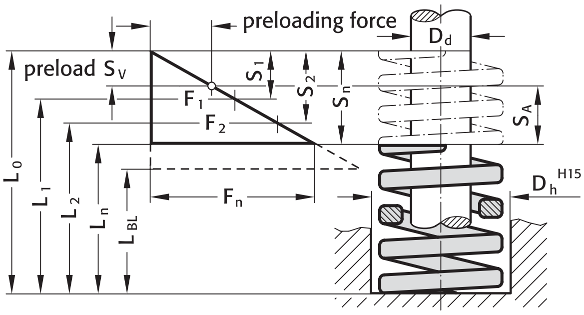


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.15.40.051	40,0	20,0	51	179,0	6,3	2,7	3,6	1128	8,4	2,7	5,7	1504	9,5	2,7	6,8	1701	10,5	3,8	6,7	1880
241.15.40.064	40,0	20,0	64	140,0	7,8	3,4	4,4	1092	10,4	3,4	7,0	1456	11,7	3,4	8,3	1638	13,0	4,7	8,3	1820
241.15.40.076	40,0	20,0	76	108,1	9,6	4,2	5,4	1038	12,8	4,2	8,6	1384	14,4	4,2	10,2	1557	16,0	5,8	10,2	1730
241.15.40.089	40,0	20,0	89	90,7	11,1	4,8	6,3	1007	14,8	4,8	10,0	1342	16,7	4,8	11,9	1515	18,5	6,7	11,8	1678
241.15.40.102	40,0	20,0	102	81,0	12,9	5,6	7,3	1045	17,2	5,6	11,6	1393	19,4	5,6	13,8	1571	21,5	7,7	13,8	1742
241.15.40.115	40,0	20,0	115	71,8	14,4	6,2	8,2	1034	19,2	6,2	13,0	1379	21,6	6,2	15,4	1551	24,0	8,6	15,4	1723
241.15.40.127	40,0	20,0	127	62,8	16,2	7,0	9,2	1017	21,6	7,0	14,6	1356	24,3	7,0	17,3	1526	27,0	9,7	17,3	1696
241.15.40.139	40,0	20,0	139	57,6	17,7	7,7	10,0	1020	23,6	7,7	15,9	1359	26,6	7,7	18,9	1532	29,5	10,6	18,9	1699
241.15.40.152	40,0	20,0	152	51,6	19,5	8,5	11,0	1006	26,0	8,5	17,5	1342	29,3	8,5	20,8	1512	32,5	11,7	20,8	1677
241.15.40.178	40,0	20,0	178	44,2	22,8	9,9	12,9	1008	30,4	9,9	20,5	1344	34,2	9,9	24,3	1512	38,0	13,7	24,3	1680
241.15.40.203	40,0	20,0	203	36,7	26,1	11,3	14,8	958	34,8	11,3	23,5	1277	39,2	11,3	27,9	1439	43,5	15,7	27,8	1596
241.15.40.254	40,0	20,0	254	30,1	33,0	14,3	18,7	993	44,0	14,3	29,7	1324	49,5	14,3	35,2	1490	55,0	19,8	35,2	1656
241.15.40.305	40,0	20,0	305	24,6	39,3	17,0	22,3	967	52,4	17,0	35,4	1289	59,0	17,0	42,0	1451	65,5	23,6	41,9	1611

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.15.40.051	40,0	20,0	51	179,0	11,6	4,8	6,8	2076	13,0	6,3	6,7	2327	16,8	12,2	4,6	3007	21,0	30,0	3759,0
241.15.40.064	40,0	20,0	64	140,0	14,3	6,0	8,3	2002	16,1	7,8	8,3	2254	20,8	15,1	5,7	2912	26,0	38,0	3640,0
241.15.40.076	40,0	20,0	76	108,1	17,6	7,4	10,2	1903	19,8	9,6	10,2	2140	25,6	18,6	7,0	2767	32,0	44,0	3459,2
241.15.40.089	40,0	20,0	89	90,7	20,4	8,5	11,9	1850	22,9	11,1	11,8	2077	29,6	21,5	8,1	2685	37,0	52,0	3355,9
241.15.40.102	40,0	20,0	102	81,0	23,7	9,9	13,8	1920	26,7	12,9	13,8	2163	34,4	24,9	9,5	2786	43,0	59,0	3483,0
241.15.40.115	40,0	20,0	115	71,8	26,4	11,0	15,4	1896	29,8	14,4	15,4	2140	38,4	27,8	10,6	2757	48,0	67,0	3446,4
241.15.40.127	40,0	20,0	127	62,8	29,7	12,4	17,3	1865	33,5	16,2	17,3	2104	43,2	31,3	11,9	2713	54,0	73,0	3391,2
241.15.40.139	40,0	20,0	139	57,6	32,5	13,6	18,9	1872	36,6	17,7	18,9	2108	47,2	34,2	13,0	2719	59,0	80,0	3398,4
241.15.40.152	40,0	20,0	152	51,6	35,8	15,0	20,8	1847	40,3	19,5	20,8	2079	52,0	37,7	14,3	2683	65,0	87,0	3354,0
241.15.40.178	40,0	20,0	178	44,2	41,8	17,5	24,3	1848	47,1	22,8	24,3	2082	60,8	44,1	16,7	2687	76,0	102,0	3359,2
241.15.40.203	40,0	20,0	203	36,7	47,9	20,0	27,9	1758	53,9	26,1	27,8	1978	69,6	50,5	19,1	2554	87,0	116,0	3192,9
241.15.40.254	40,0	20,0	254	30,1	60,5	25,3	35,2	1821	68,2	33,0	35,2	2053	88,0	63,8	24,2	2649	110,0	144,0	3311,0
241.15.40.305	40,0	20,0	305	24,6	72,1	30,1	42,0	1774	81,2	39,3	41,9	1998	104,8	76,0	28,8	2578	131,0	174,0	3222,6

High Performance Compression Springs
DIN ISO 10243



- D_h = dia. of guide sleeve
- D_d = diameter of guide pin
- L_0 = free length of spring
- $L_1 \dots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$
- L_{BL} = length of compacted-spring (i.e. wire-to-wire)
- $F_1 \dots F_n$ = forces (N) as related to length of spring $L_1 \dots L_n$
- $S_{v1} \dots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$
- $S_1 \dots S_n$ = compr. as related to spring forces $F_1 \dots F_n$
- R = spring rate (N/mm)
- $S_{A1} \dots S_{A7}$ = working stroke (mm)

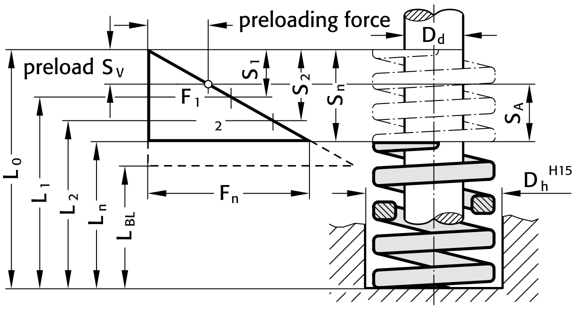
241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

					30% Stroke				40% Stroke				45% Stroke				50% Stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.40.051	40,0	20,0	51	350,2	5,1	2,2	2,9	1786	6,8	2,2	4,6	2381	7,7	2,2	5,5	2697	8,5	3,1	5,4	2977
241.16.40.064	40,0	20,0	64	268,8	6,6	2,9	3,7	1774	8,8	2,9	5,9	2365	9,9	2,9	7,0	2661	11,0	4,0	7,0	2957
241.16.40.076	40,0	20,0	76	218,8	8,1	3,5	4,6	1772	10,8	3,5	7,3	2363	12,2	3,5	8,7	2669	13,5	4,9	8,6	2954
241.16.40.089	40,0	20,0	89	190,3	9,6	4,2	5,4	1827	12,8	4,2	8,6	2436	14,4	4,2	10,2	2740	16,0	5,8	10,2	3045
241.16.40.102	40,0	20,0	102	162,8	11,1	4,8	6,3	1807	14,8	4,8	10,0	2409	16,7	4,8	11,9	2719	18,5	6,7	11,8	3012
241.16.40.115	40,0	20,0	115	142,2	12,6	5,5	7,1	1792	16,8	5,5	11,3	2389	18,9	5,5	13,4	2688	21,0	7,6	13,4	2986
241.16.40.127	40,0	20,0	127	128,5	14,1	6,1	8,0	1812	18,8	6,1	12,7	2416	21,2	6,1	15,1	2724	23,5	8,5	15,0	3020
241.16.40.139	40,0	20,0	139	114,8	15,6	6,8	8,8	1791	20,8	6,8	14,0	2388	23,4	6,8	16,6	2686	26,0	9,4	16,6	2985
241.16.40.152	40,0	20,0	152	105,0	17,3	7,5	9,8	1817	23,0	7,5	15,5	2415	25,9	7,5	18,4	2720	28,8	10,4	18,4	3024
241.16.40.178	40,0	20,0	178	89,3	20,1	8,7	11,4	1795	26,8	8,7	18,1	2393	30,2	8,7	21,5	2697	33,5	12,1	21,4	2992
241.16.40.203	40,0	20,0	203	77,5	22,8	9,9	12,9	1767	30,4	9,9	20,5	2356	34,2	9,9	24,3	2651	38,0	13,7	24,3	2945
241.16.40.254	40,0	20,0	254	60,8	29,1	12,6	16,5	1769	38,8	12,6	26,2	2359	43,7	12,6	31,1	2657	48,5	17,5	31,0	2949
241.16.40.305	40,0	20,0	305	51,0	34,8	15,1	19,7	1775	46,4	15,1	31,3	2366	52,2	15,1	37,1	2662	58,0	20,9	37,1	2958

					55% Stroke				62% Stroke				80% Stroke				100% Stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.40.051	40,0	20,0	51	350,2	9,4	3,9	5,5	3292	10,5	5,1	5,4	3677	13,6	9,9	3,7	4763	17,0	34,0	5953,4
241.16.40.064	40,0	20,0	64	268,8	12,1	5,1	7,0	3252	13,6	6,6	7,0	3656	17,6	12,8	4,8	4731	22,0	42,0	5913,6
241.16.40.076	40,0	20,0	76	218,8	14,9	6,2	8,7	3260	16,7	8,1	8,6	3654	21,6	15,7	5,9	4726	27,0	49,0	5907,6
241.16.40.089	40,0	20,0	89	190,3	17,6	7,4	10,2	3349	19,8	9,6	10,2	3768	25,6	18,6	7,0	4872	32,0	57,0	6089,6
241.16.40.102	40,0	20,0	102	162,8	20,4	8,5	11,9	3321	22,9	11,1	11,8	3728	29,6	21,5	8,1	4819	37,0	65,0	6023,6
241.16.40.115	40,0	20,0	115	142,2	23,1	9,7	13,4	3285	26,0	12,6	13,4	3697	33,6	24,4	9,2	4778	42,0	73,0	5972,4
241.16.40.127	40,0	20,0	127	128,5	25,9	10,8	15,1	3328	29,1	14,1	15,0	3739	37,6	27,3	10,3	4832	47,0	80,0	6039,5
241.16.40.139	40,0	20,0	139	114,8	28,6	12,0	16,6	3283	32,2	15,6	16,6	3697	41,6	30,2	11,4	4776	52,0	87,0	5969,6
241.16.40.152	40,0	20,0	152	105,0	31,6	13,2	18,4	3318	35,7	17,3	18,4	3749	46,0	33,4	12,6	4830	57,5	94,5	6037,5
241.16.40.178	40,0	20,0	178	89,3	36,9	15,4	21,5	3295	41,5	20,1	21,4	3706	53,6	38,9	14,7	4786	67,0	111,0	5983,1
241.16.40.203	40,0	20,0	203	77,5	41,8	17,5	24,3	3240	47,1	22,8	24,3	3650	60,8	44,1	16,7	4712	76,0	127,0	5890,0
241.16.40.254	40,0	20,0	254	60,8	53,4	22,3	31,1	3247	60,1	29,1	31,0	3654	77,6	56,3	21,3	4718	97,0	157,0	5897,6
241.16.40.305	40,0	20,0	305	51,0	63,8	26,7	37,1	3254	71,9	34,8	37,1	3667	92,8	67,3	25,5	4733	116,0	189,0	5916,0

HIGH PERFORMANCE COMPRESSION SPRING, DIN ISO 10243

D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 \ldots L_n$	=	length of loaded spring (mm) as related to spring forces $F_1 \ldots F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1 \ldots F_n$	=	forces (N) as related to length of spring $L_1 \ldots L_n$
$S_{v1} \ldots S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1 \ldots S_7$
$S_1 \ldots S_n$	=	compr. as related to spring forces $F_1 \ldots F_n$
R	=	spring rate N/mm
$S_{A1} \ldots S_{A7}$	=	working stroke (mm)



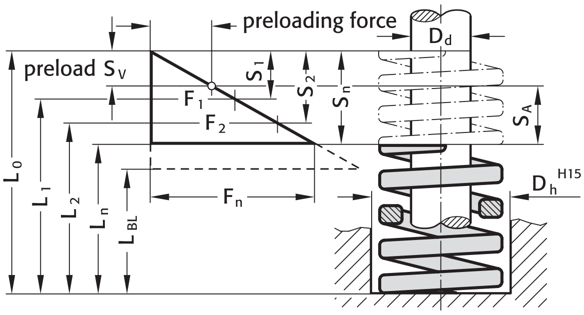
Ø 40

241.17. High performance compression spring, DIN ISO 10243 Colour: „Yellow“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.17.40.051	40,0	20,0	51	628	4,5	2,0	2,5	2826	6,0	2,0	4,0	3768	6,8	2,0	4,8	4270	7,5	2,7	4,8	4710
241.17.40.064	40,0	20,0	64	488	5,7	2,5	3,2	2782	7,6	2,5	5,1	3709	8,6	2,5	6,1	4197	9,5	3,4	6,1	4636
241.17.40.076	40,0	20,0	76	379	7,2	3,1	4,1	2729	9,6	3,1	6,5	3638	10,8	3,1	7,7	4093	12,0	4,3	7,7	4548
241.17.40.089	40,0	20,0	89	321	8,4	3,6	4,8	2696	11,2	3,6	7,6	3595	12,6	3,6	9,0	4045	14,0	5,0	9,0	4494
241.17.40.102	40,0	20,0	102	281	9,9	4,3	5,6	2782	13,2	4,3	8,9	3709	14,9	4,3	10,6	4187	16,5	5,9	10,6	4637
241.17.40.115	40,0	20,0	115	245	11,1	4,8	6,3	2720	14,8	4,8	10,0	3626	16,7	4,8	11,9	4092	18,5	6,7	11,8	4533
241.17.40.127	40,0	20,0	127	221	12,3	5,3	7,0	2718	16,4	5,3	11,1	3624	18,5	5,3	13,2	4089	20,5	7,4	13,1	4531
241.17.40.139	40,0	20,0	139	171	12,6	5,5	7,1	2155	16,8	5,5	11,3	2873	18,9	6,5	13,4	3232	21,0	7,6	13,4	3591
241.17.40.152	40,0	20,0	152	168	15,0	6,5	8,5	2520	20,0	6,5	13,5	3360	22,5	6,5	16,0	3780	25,0	9,0	16,0	4200
241.17.40.178	40,0	20,0	178	150	17,0	7,4	9,6	2550	22,6	7,4	15,2	3390	25,4	7,4	18,0	3810	28,3	10,2	18,1	4245
241.17.40.203	40,0	20,0	203	132	20,1	8,7	11,4	2653	26,8	8,7	18,1	3538	30,2	8,7	21,5	3986	33,5	12,1	21,4	4422
241.17.40.254	40,0	20,0	254	107	25,5	11,1	14,4	2729	34,0	11,1	22,9	3638	38,3	11,1	27,2	4098	42,5	15,3	27,2	4548
241.17.40.305	40,0	20,0	305	87,9	30,6	13,3	17,3	2690	40,8	13,3	27,5	3586	45,9	13,3	32,6	4035	51,0	18,4	32,6	4483

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.17.40.051	40,0	20,0	51	628	8,3	3,5	4,8	5212	9,3	4,5	4,8	5840	12,0	8,7	3,3	7536	15,0	36,0	9420,0
241.17.40.064	40,0	20,0	64	488	10,5	4,4	6,1	5124	11,8	5,7	6,1	5758	15,2	11,0	4,2	7418	19,0	45,0	9272,0
241.17.40.076	40,0	20,0	76	379	13,2	5,5	7,7	5003	14,9	7,2	7,7	5647	19,2	13,9	5,3	7277	24,0	52,0	9096,0
241.17.40.089	40,0	20,0	89	321	15,4	6,4	9,0	4943	17,4	8,4	9,0	5585	22,4	16,2	6,2	7190	28,0	61,0	8988,0
241.17.40.102	40,0	20,0	102	281	18,2	7,6	10,6	5114	20,5	9,9	10,6	5761	26,4	19,1	7,3	7418	33,0	69,0	9273,0
241.17.40.115	40,0	20,0	115	245	20,4	8,5	11,9	4998	22,9	11,1	11,8	5611	29,6	21,5	8,1	7252	37,0	78,0	9065,0
241.17.40.127	40,0	20,0	127	221	22,6	9,4	13,2	4995	25,4	12,3	13,1	5613	32,8	23,8	9,0	7249	41,0	86,0	9061,0
241.17.40.139	40,0	20,0	139	171	23,1	9,7	13,4	3950	26,0	12,6	13,4	4446	33,6	24,4	9,2	5746	42,0	97,0	7182,0
241.17.40.152	40,0	20,0	152	168	27,5	11,5	16,0	4620	31,0	15,0	16,0	5208	40,0	29,0	11,0	6720	50,0	102,0	8400,0
241.17.40.178	40,0	20,0	178	150	31,1	13,0	18,1	4665	35,0	17,0	18,0	5250	45,2	32,8	12,4	6780	56,5	121,5	8475,0
241.17.40.203	40,0	20,0	203	132	36,9	15,4	21,5	4871	41,5	20,1	21,4	5478	53,6	38,9	14,7	7075	67,0	136,0	8844,0
241.17.40.254	40,0	20,0	254	107	46,8	19,6	27,2	5008	52,7	25,5	27,2	5639	68,0	49,3	18,7	7276	85,0	169,0	9095,0
241.17.40.305	40,0	20,0	305	87,9	56,1	23,5	32,6	4931	63,2	30,6	32,6	5555	81,6	59,2	22,4	7173	102,0	203,0	8965,8

High Performance Compression Springs
DIN ISO 10243



D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \dots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \dots F_n$ = forces (N) as related to length of spring $L_1 \dots L_n$
$S_{v1} \dots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$
$S_1 \dots S_n$ = compr. as related to spring forces $F_1 \dots F_n$
R = spring rate (N/mm)
$S_{A1} \dots S_{A7}$ = working stroke (mm)

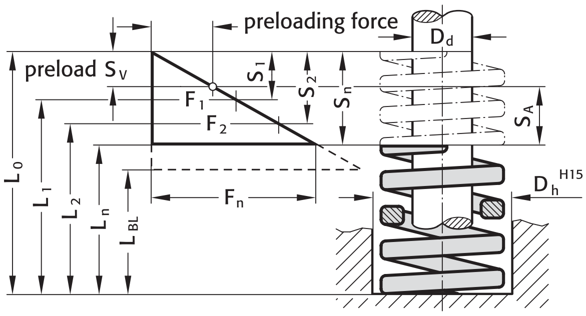
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.50.064	50,0	25,0	64	156,0	9,6	4,2	5,4	1498	12,8	4,2	8,6	1997	14,4	4,2	10,2	2246	16,0	5,8	10,2	2496
241.14.50.076	50,0	25,0	76	125,0	11,7	5,1	6,6	1463	15,6	5,1	10,5	1950	17,6	5,1	12,5	2200	19,5	7,0	12,5	2438
241.14.50.089	50,0	25,0	89	109,0	13,5	5,9	7,6	1472	18,0	5,9	12,1	1962	20,3	5,9	14,4	2213	22,5	8,1	14,4	2453
241.14.50.102	50,0	25,0	102	94,1	15,6	6,8	8,8	1468	20,8	6,8	14,0	1957	23,4	6,8	16,6	2202	26,0	9,4	16,6	2447
241.14.50.115	50,0	25,0	115	81,0	17,4	7,5	9,9	1409	23,2	7,5	15,7	1879	26,1	7,5	18,6	2114	29,0	10,4	18,6	2349
241.14.50.127	50,0	25,0	127	71,0	19,5	8,5	11,0	1385	26,0	8,5	17,5	1846	29,3	8,5	20,8	2080	32,5	11,7	20,8	2308
241.14.50.139	50,0	25,0	139	66,5	21,6	9,4	12,2	1436	28,8	9,4	19,4	1915	32,4	9,4	23,0	2155	36,0	13,0	23,0	2394
241.14.50.152	50,0	25,0	152	60,0	23,4	10,1	13,3	1404	31,2	10,1	21,1	1872	35,1	10,1	25,0	2106	39,0	14,0	25,0	2340
241.14.50.178	50,0	25,0	178	52,0	27,6	12,0	15,6	1435	36,8	12,0	24,8	1914	41,4	12,0	29,4	2153	46,0	16,6	29,4	2392
241.14.50.203	50,0	25,0	203	44,1	31,2	13,5	17,7	1376	41,6	13,5	28,1	1835	46,8	13,5	33,3	2064	52,0	18,7	33,3	2293
241.14.50.254	50,0	25,0	254	35,0	39,0	16,9	22,1	1365	52,0	16,9	35,1	1820	58,5	16,9	41,6	2048	65,0	23,4	41,6	2275
241.14.50.305	50,0	25,0	305	28,6	46,8	20,3	26,5	1338	62,4	20,3	42,1	1785	70,2	20,3	49,9	2008	78,0	28,1	49,9	2231

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.50.064	50,0	25,0	64	156,0	17,6	7,4	10,2	2746	19,8	9,6	10,2	3089	25,6	18,6	7,0	3994	32,0	32,0	4992,0
241.14.50.076	50,0	25,0	76	125,0	21,5	9,0	12,5	2688	24,2	11,7	12,5	3025	31,2	22,6	8,6	3900	39,0	37,0	4875,0
241.14.50.089	50,0	25,0	89	109,0	24,8	10,4	14,4	2703	27,9	13,5	14,4	3041	36,0	26,1	9,9	3924	45,0	44,0	4905,0
241.14.50.102	50,0	25,0	102	94,1	28,6	12,0	16,6	2691	32,2	15,6	16,6	3030	41,6	30,2	11,4	3915	52,0	50,0	4893,2
241.14.50.115	50,0	25,0	115	81,0	31,9	13,3	18,6	2584	36,0	17,4	18,6	2916	46,4	33,6	12,8	3758	58,0	57,0	4698,0
241.14.50.127	50,0	25,0	127	71,0	35,8	15,0	20,8	2542	40,3	19,5	20,8	2861	52,0	37,7	14,3	3692	65,0	62,0	4615,0
241.14.50.139	50,0	25,0	139	66,5	39,6	16,6	23,0	2633	44,6	21,6	23,0	2966	57,6	41,8	15,8	3830	72,0	67,0	4788,0
241.14.50.152	50,0	25,0	152	60,0	42,9	17,9	25,0	2574	48,4	23,4	25,0	2904	62,4	45,2	17,2	3744	78,0	74,0	4680,0
241.14.50.178	50,0	25,0	178	52,0	50,6	21,2	29,4	2631	57,0	27,6	29,4	2964	73,6	53,4	20,2	3827	92,0	86,0	4784,0
241.14.50.203	50,0	25,0	203	44,1	57,2	23,9	33,3	2523	64,5	31,2	33,3	2844	83,2	60,3	22,9	3669	104,0	99,0	4586,4
241.14.50.254	50,0	25,0	254	35,0	71,5	29,9	41,6	2503	80,6	39,0	41,6	2821	104,0	75,4	28,6	3640	130,0	124,0	4550,0
241.14.50.305	50,0	25,0	305	28,6	85,8	35,9	49,9	2454	96,7	46,8	49,9	2766	124,8	90,5	34,3	3569	156,0	149,0	4461,6

High Performance Compression Springs
DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm)

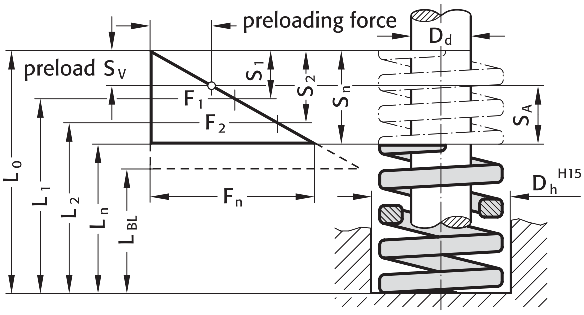


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.15.50.064	50,0	25,0	64	209,1	8,1	3,5	4,6	1694	10,8	3,5	7,3	2258	12,2	3,5	8,7	2551	13,5	4,9	8,6	2823
241.15.50.076	50,0	25,0	76	168,1	9,6	4,2	5,4	1614	12,8	4,2	8,6	2152	14,4	4,2	10,2	2421	16,0	5,8	10,2	2690
241.15.50.089	50,0	25,0	89	140,0	11,1	4,8	6,3	1554	14,8	4,8	10,0	2072	16,7	4,8	11,9	2338	18,5	6,7	11,8	2590
241.15.50.102	50,0	25,0	102	119,0	12,9	5,6	7,3	1535	17,2	5,6	11,6	2047	19,4	5,6	13,8	2309	21,5	7,7	13,8	2559
241.15.50.115	50,0	25,0	115	106,0	14,7	6,4	8,3	1558	19,6	6,4	13,2	2078	22,1	6,4	15,7	2343	24,5	8,8	15,7	2597
241.15.50.127	50,0	25,0	127	97,0	16,2	7,0	9,2	1571	21,6	7,0	14,6	2095	24,3	7,0	17,3	2357	27,0	9,7	17,3	2619
241.15.50.139	50,0	25,0	139	87,0	17,7	7,7	10,0	1540	23,6	7,7	15,9	2053	26,6	7,7	18,9	2314	29,5	10,6	18,9	2567
241.15.50.152	50,0	25,0	152	80,1	19,8	8,6	11,2	1586	26,4	8,6	17,8	2115	29,7	8,6	21,1	2379	33,0	11,9	21,1	2643
241.15.50.178	50,0	25,0	178	69,6	23,1	10,0	13,1	1608	30,8	10,0	20,8	2144	34,7	10,0	24,7	2415	38,5	13,9	24,6	2680
241.15.50.203	50,0	25,0	203	59,8	26,4	11,4	15,0	1579	35,2	11,4	23,8	2105	39,6	11,4	28,2	2368	44,0	15,8	28,2	2631
241.15.50.229	50,0	25,0	229	50,9	30,0	13,0	17,0	1527	40,0	13,0	27,0	2036	45,0	13,0	32,0	2291	50,0	18,0	32,0	2545
241.15.50.254	50,0	25,0	254	44,0	35,1	15,2	19,9	1544	46,8	15,2	31,6	2059	52,7	15,2	37,5	2319	58,5	21,1	37,4	2574
241.15.50.305	50,0	25,0	305	38,7	40,2	17,4	22,8	1556	53,6	17,4	36,2	2074	60,3	17,4	42,9	2334	67,0	24,1	42,9	2593

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.15.50.064	50,0	25,0	64	209,1	14,9	6,2	8,7	3116	16,7	8,1	8,6	3492	21,6	15,7	5,9	4517	27,0	37,0	5645,7
241.15.50.076	50,0	25,0	76	168,1	17,6	7,4	10,2	2959	19,8	9,6	10,2	3328	25,6	18,6	7,0	4303	32,0	44,0	5379,2
241.15.50.089	50,0	25,0	89	140,0	20,4	8,5	11,9	2856	22,9	11,1	11,8	3206	29,6	21,5	8,1	4144	37,0	52,0	5180,0
241.15.50.102	50,0	25,0	102	119,0	23,7	9,9	13,8	2820	26,7	12,9	13,8	3177	34,4	24,9	9,5	4094	43,0	59,0	5117,0
241.15.50.115	50,0	25,0	115	106,0	27,0	11,3	15,7	2862	30,4	14,7	15,7	3222	39,2	28,4	10,8	4155	49,0	66,0	5194,0
241.15.50.127	50,0	25,0	127	97,0	29,7	12,4	17,3	2881	33,5	16,2	17,3	3250	43,2	31,3	11,9	4190	54,0	73,0	5238,0
241.15.50.139	50,0	25,0	139	87,0	32,5	13,6	18,9	2828	36,6	17,7	18,9	3184	47,2	34,2	13,0	4106	59,0	80,0	5133,0
241.15.50.152	50,0	25,0	152	80,1	36,3	15,2	21,1	2908	40,9	19,8	21,1	3276	52,8	38,3	14,5	4229	66,0	86,0	5286,6
241.15.50.178	50,0	25,0	178	69,6	42,4	17,7	24,7	2951	47,7	23,1	24,6	3320	61,6	44,7	16,9	4287	77,0	101,0	5359,2
241.15.50.203	50,0	25,0	203	59,8	48,4	20,2	28,2	2894	54,6	26,4	28,2	3265	70,4	51,0	19,4	4210	88,0	115,0	5262,4
241.15.50.229	50,0	25,0	229	50,9	55,0	23,0	32,0	2800	62,0	30,0	32,0	3156	80,0	58,0	22,0	4072	100,0	129,0	5090,0
241.15.50.254	50,0	25,0	254	44,0	64,4	26,9	37,5	2834	72,5	35,1	37,4	3190	93,6	67,9	25,7	4118	117,0	137,0	5148,0
241.15.50.305	50,0	25,0	305	38,7	73,7	30,8	42,9	2852	83,1	40,2	42,9	3216	107,2	77,7	29,5	4149	134,0	171,0	5185,8

High Performance Compression Springs DIN ISO 10243



- D_h = dia. of guide sleeve
- D_d = diameter of guide pin
- L_0 = free length of spring
- $L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
- L_{BL} = length of compacted-spring (i.e. wire-to-wire)
- $F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
- $S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
- $S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
- R = spring rate (N/mm)
- $S_{A1} ... S_{A7}$ = working stroke (mm)

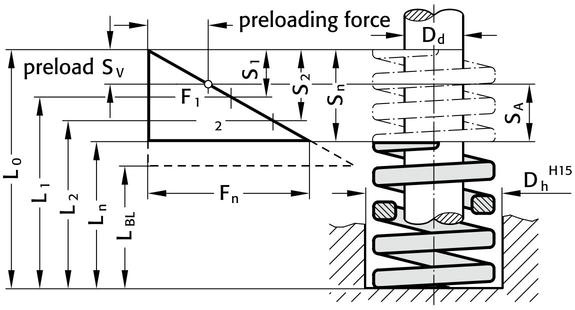
241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

					30% Stroke				40% Stroke				45% Stroke				50% Stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.50.064	50,0	25,0	64	413,0	6,5	2,8	3,7	2685	8,6	2,8	5,8	3552	9,7	2,8	6,9	4006	10,8	3,9	6,9	4460
241.16.50.076	50,0	25,0	76	339,4	7,8	3,4	4,4	2647	10,4	3,4	7,0	3530	11,7	3,4	8,3	3971	13,0	4,7	8,3	4412
241.16.50.089	50,0	25,0	89	288,4	9,2	4,0	5,2	2653	12,2	4,0	8,2	3518	13,7	4,0	9,7	3951	15,3	5,5	9,8	4413
241.16.50.102	50,0	25,0	102	245,3	10,5	4,6	5,9	2576	14,0	4,6	9,4	3434	15,8	4,6	11,2	3876	17,5	6,3	11,2	4293
241.16.50.115	50,0	25,0	115	214,8	12,0	5,2	6,8	2578	16,0	5,2	10,8	3437	18,0	5,2	12,8	3866	20,0	7,2	12,8	4296
241.16.50.127	50,0	25,0	127	192,3	13,5	5,9	7,6	2596	18,0	5,9	12,1	3461	20,3	5,9	14,4	3904	22,5	8,1	14,4	4327
241.16.50.139	50,0	25,0	139	170,7	15,0	6,5	8,5	2561	20,0	6,5	13,5	3414	22,5	6,5	16,0	3841	25,0	9,0	16,0	4268
241.16.50.152	50,0	25,0	152	154,0	16,2	7,0	9,2	2495	21,6	7,0	14,6	3326	24,3	7,0	17,3	3742	27,0	9,7	17,3	4158
241.16.50.178	50,0	25,0	178	134,4	19,2	8,3	10,9	2580	25,6	8,3	17,3	3441	28,8	8,3	20,5	3871	32,0	11,5	20,5	4301
241.16.50.203	50,0	25,0	203	116,7	21,8	9,4	12,4	2544	29,0	9,4	19,6	3384	32,6	9,4	23,2	3804	36,3	13,1	23,2	4236
241.16.50.254	50,0	25,0	254	89,3	27,6	12,0	15,6	2465	36,8	12,0	24,8	3286	41,4	12,0	29,4	3697	46,0	16,6	29,4	4108
241.16.50.305	50,0	25,0	305	73,6	33,6	14,6	19,0	2473	44,8	14,6	30,2	3297	50,4	14,6	35,8	3709	56,0	20,2	35,8	4122

					55% Stroke				62% Stroke				80% Stroke				100% Stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.50.064	50,0	25,0	64	413,0	11,8	4,9	6,9	4873	13,3	6,5	6,8	5493	17,2	12,5	4,7	7104	21,5	42,5	8879,5
241.16.50.076	50,0	25,0	76	339,4	14,3	6,0	8,3	4853	16,1	7,8	8,3	5464	20,8	15,1	5,7	7060	26,0	50,0	8824,4
241.16.50.089	50,0	25,0	89	288,4	16,8	7,0	9,8	4845	18,9	9,2	9,7	5451	24,4	17,7	6,7	7037	30,5	58,5	8796,2
241.16.50.102	50,0	25,0	102	245,3	19,3	8,1	11,2	4734	21,7	10,5	11,2	5323	28,0	20,3	7,7	6868	35,0	67,0	8585,5
241.16.50.115	50,0	25,0	115	214,8	22,0	9,2	12,8	4726	24,8	12,0	12,8	5327	32,0	23,2	8,8	6874	40,0	75,0	8592,0
241.16.50.127	50,0	25,0	127	192,3	24,8	10,4	14,4	4769	27,9	13,5	14,4	5365	36,0	26,1	9,9	6923	45,0	82,0	8653,5
241.16.50.139	50,0	25,0	139	170,7	27,5	11,5	16,0	4694	31,0	15,0	16,0	5292	40,0	29,0	11,0	6828	50,0	89,0	8535,0
241.16.50.152	50,0	25,0	152	154,0	29,7	12,4	17,3	4574	33,5	16,2	17,3	5159	43,2	31,3	11,9	6653	54,0	98,0	8316,0
241.16.50.178	50,0	25,0	178	134,4	35,2	14,7	20,5	4731	39,7	19,2	20,5	5336	51,2	37,1	14,1	6881	64,0	114,0	8601,6
241.16.50.203	50,0	25,0	203	116,7	39,9	16,7	23,2	4656	45,0	21,8	23,2	5252	58,0	42,1	15,9	6769	72,5	130,5	8460,8
241.16.50.254	50,0	25,0	254	89,3	50,6	21,2	29,4	4519	57,0	27,6	29,4	5090	73,6	53,4	20,2	6572	92,0	162,0	8215,6
241.16.50.305	50,0	25,0	305	73,6	61,6	25,8	35,8	4534	69,4	33,6	35,8	5108	89,6	65,0	24,6	6595	112,0	193,0	8243,2

HIGH PERFORMANCE COMPRESSION SPRING, DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \ldots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \ldots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \ldots F_n$ = forces (N) as related to length of spring $L_1 \ldots L_n$
$S_{v1} \ldots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \ldots S_7$
$S_1 \ldots S_n$ = compr. as related to spring forces $F_1 \ldots F_n$
R = spring rate N/mm
$S_{A1} \ldots S_{A7}$ = working stroke (mm)

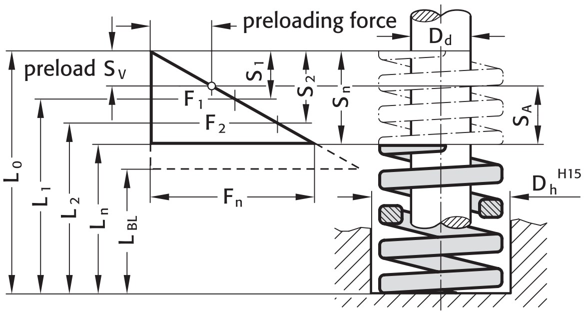


241.17. High performance compression spring, DIN ISO 10243 Colour: „Yellow“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.17.50.064	50,0	25,0	64	709	5,7	2,5	3,2	4041	7,6	2,5	5,1	5388	8,6	2,5	6,1	6097	9,5	3,4	6,1	6736
241.17.50.076	50,0	25,0	76	572	6,9	3,0	3,9	3947	9,2	3,0	6,2	5262	10,4	3,0	7,4	5949	11,5	4,1	7,4	6578
241.17.50.089	50,0	25,0	89	475	8,1	3,5	4,6	3848	10,8	3,5	7,3	5130	12,2	3,5	8,7	5795	13,5	4,9	8,6	6413
241.17.50.102	50,0	25,0	102	405	9,3	4,0	5,3	3767	12,4	4,0	8,4	5022	14,0	4,0	10,0	5670	15,5	5,6	9,9	6278
241.17.50.115	50,0	25,0	115	352	10,5	4,6	5,9	3696	14,0	4,6	9,4	4928	15,8	4,6	11,2	5562	17,5	6,3	11,2	6160
241.17.50.127	50,0	25,0	127	316	11,7	5,1	6,6	3697	15,6	5,1	10,5	4930	17,6	5,1	12,5	5562	19,5	7,0	12,5	6162
241.17.50.139	50,0	25,0	139	289	14,2	6,1	8,0	4101	18,9	6,1	12,8	5468	21,3	6,1	15,1	6151	23,7	8,5	15,1	6835
241.17.50.152	50,0	25,0	152	239	15,1	6,5	8,5	3599	20,1	6,5	13,6	4799	22,6	6,5	16,1	5399	25,1	9,0	16,1	5999
241.17.50.178	50,0	25,0	178	215	18,3	7,9	10,4	3941	24,4	7,9	16,5	5255	27,5	7,9	19,6	5911	30,6	11,0	19,6	6568
241.17.50.203	50,0	25,0	203	187	22,2	9,6	12,6	4151	29,6	9,6	20,0	5535	33,3	9,6	23,7	6227	37,0	13,3	23,7	6919
241.17.50.254	50,0	25,0	254	153	24,0	10,4	13,6	3672	32,0	10,4	21,6	4896	36,0	10,4	25,6	5508	40,0	14,4	25,6	6120
241.17.50.305	50,0	25,0	305	127	29,1	12,6	16,5	3696	38,8	12,6	26,2	4928	43,7	12,6	31,1	5550	48,5	17,5	31,0	6160

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.17.50.064	50,0	25,0	64	709	10,5	4,4	6,1	7445	11,8	5,7	6,1	8366	15,2	11,0	4,2	10777	19,0	45,0	13471,0
241.17.50.076	50,0	25,0	76	572	12,7	5,3	7,4	7264	14,3	6,9	7,4	8180	18,4	13,3	5,1	10525	23,0	53,0	13156,0
241.17.50.089	50,0	25,0	89	475	14,9	6,2	8,7	7078	16,7	8,1	8,6	7933	21,6	15,7	5,9	10260	27,0	62,0	12825,0
241.17.50.102	50,0	25,0	102	405	17,1	7,1	10,0	6926	19,2	9,3	9,9	7776	24,8	18,0	6,8	10044	31,0	71,0	12555,0
241.17.50.115	50,0	25,0	115	352	19,3	8,1	11,2	6794	21,7	10,5	11,2	7638	28,0	20,3	7,7	9856	35,0	80,0	12320,0
241.17.50.127	50,0	25,0	127	316	21,5	9,0	12,5	6794	24,2	11,7	12,5	7647	31,2	22,6	8,6	9859	39,0	88,0	12324,0
241.17.50.139	50,0	25,0	139	289	26,0	10,9	15,1	7518	29,3	14,2	15,1	8475	37,8	27,4	10,4	10936	47,3	91,7	13670,0
241.17.50.152	50,0	25,0	152	239	27,6	11,5	16,1	6599	31,1	15,1	16,1	7439	40,2	29,1	11,0	9598	50,2	101,8	11998,0
241.17.50.178	50,0	25,0	178	215	33,6	14,1	19,6	7225	37,9	18,3	19,6	8145	48,9	35,4	13,4	10509	61,1	116,9	13137,0
241.17.50.203	50,0	25,0	203	187	40,7	17,0	23,7	7611	45,9	22,2	23,7	8583	59,2	42,9	16,3	11070	74,0	129,0	13838,0
241.17.50.254	50,0	25,0	254	153	44,0	18,4	25,6	6732	49,6	24,0	25,6	7589	64,0	46,4	17,6	9792	80,0	174,0	12240,0
241.17.50.305	50,0	25,0	305	127	53,4	22,3	31,1	6782	60,1	29,1	31,0	7633	77,6	56,3	21,3	9855	97,0	208,0	12319,0

High Performance Compression Springs
DIN ISO 10243



D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \dots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \dots F_n$ = forces (N) as related to length of spring $L_1 \dots L_n$
$S_{v1} \dots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$
$S_1 \dots S_n$ = compr. as related to spring forces $F_1 \dots F_n$
R = spring rate (N/mm)
$S_{A1} \dots S_{A7}$ = working stroke (mm)

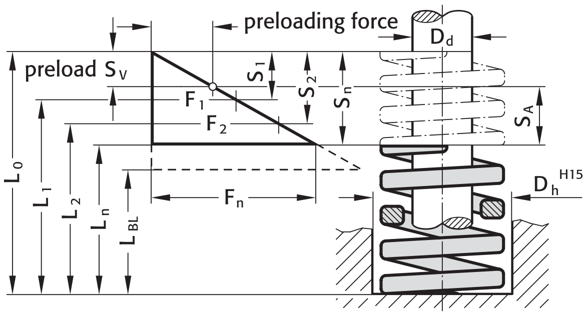
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.14.63.076	63,0	38,0	76	189,1	11,4	4,9	6,5	2156	15,2	4,9	10,3	2874	17,1	4,9	12,2	3234	19,0	6,8	12,2	3593
241.14.63.089	63,0	38,0	89	158,1	13,2	5,7	7,5	2087	17,6	5,7	11,9	2783	19,8	5,7	14,1	3130	22,0	7,9	14,1	3478
241.14.63.102	63,0	38,0	102	131,0	15,0	6,5	8,5	1965	20,0	6,5	13,5	2620	22,5	6,5	16,0	2948	25,0	9,0	16,0	3275
241.14.63.115	63,0	38,0	115	116,0	17,1	7,4	9,7	1984	22,8	7,4	15,4	2645	25,7	7,4	18,3	2981	28,5	10,3	18,2	3306
241.14.63.127	63,0	38,0	127	103,1	19,2	8,3	10,9	1980	25,6	8,3	17,3	2639	28,8	8,3	20,5	2969	32,0	11,5	20,5	3299
241.14.63.152	63,0	38,0	152	84,4	22,8	9,9	12,9	1924	30,4	9,9	20,5	2566	34,2	9,9	24,3	2886	38,0	13,7	24,3	3207
241.14.63.178	63,0	38,0	178	71,5	26,7	11,6	15,1	1909	35,6	11,6	24,0	2545	40,1	11,6	28,5	2867	44,5	16,0	28,5	3182
241.14.63.203	63,0	38,0	203	61,7	30,6	13,3	17,3	1888	40,8	13,3	27,5	2517	45,9	13,3	32,6	2832	51,0	18,4	32,6	3147
241.14.63.254	63,0	38,0	254	47,0	38,4	16,6	21,8	1805	51,2	16,6	34,6	2406	57,6	16,6	41,0	2707	64,0	23,0	41,0	3008
241.14.63.305	63,0	38,0	305	38,3	45,6	19,8	25,8	1746	60,8	19,8	41,0	2329	68,4	19,8	48,6	2620	76,0	27,4	48,6	2911

					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.14.63.076	63,0	38,0	76	189,1	20,9	8,7	12,2	3952	23,6	11,4	12,2	4463	30,4	22,0	8,4	5749	38,0	38,0	7185,8
241.14.63.089	63,0	38,0	89	158,1	24,2	10,1	14,1	3826	27,3	13,2	14,1	4316	35,2	25,5	9,7	5565	44,0	45,0	6956,4
241.14.63.102	63,0	38,0	102	131,0	27,5	11,5	16,0	3603	31,0	15,0	16,0	4061	40,0	29,0	11,0	5240	50,0	52,0	6550,0
241.14.63.115	63,0	38,0	115	116,0	31,4	13,1	18,3	3642	35,3	17,1	18,2	4095	45,6	33,1	12,5	5290	57,0	58,0	6612,0
241.14.63.127	63,0	38,0	127	103,1	35,2	14,7	20,5	3629	39,7	19,2	20,5	4093	51,2	37,1	14,1	5279	64,0	63,0	6598,4
241.14.63.152	63,0	38,0	152	84,4	41,8	17,5	24,3	3528	47,1	22,8	24,3	3975	60,8	44,1	16,7	5132	76,0	76,0	6414,4
241.14.63.178	63,0	38,0	178	71,5	49,0	20,5	28,5	3504	55,2	26,7	28,5	3947	71,2	51,6	19,6	5091	89,0	89,0	6363,5
241.14.63.203	63,0	38,0	203	61,7	56,1	23,5	32,6	3461	63,2	30,6	32,6	3899	81,6	59,2	22,4	5035	102,0	101,0	6293,4
241.14.63.254	63,0	38,0	254	47,0	70,4	29,4	41,0	3309	79,4	38,4	41,0	3732	102,4	74,2	28,2	4813	128,0	126,0	6016,0
241.14.63.305	63,0	38,0	305	38,3	83,6	35,0	48,6	3202	94,2	45,6	48,6	3608	121,6	88,2	33,4	4657	152,0	153,0	5821,6

High Performance Compression Springs
DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 ... L_n$ = length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$ = compr. as related to spring forces $F_1 ... F_n$
R = spring rate (N/mm)
$S_{A1} ... S_{A7}$ = working stroke (mm)



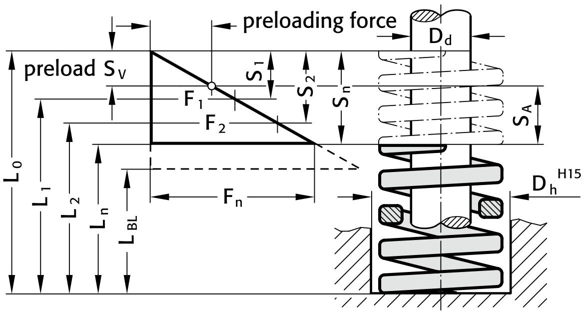
241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

Order No	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.15.63.076	63,0	38,0	76	312,1	9,6	4,2	5,4	2996	12,8	4,2	8,6	3995	14,4	4,2	10,2	4494	16,0	5,8	10,2	4994
241.15.63.089	63,0	38,0	89	260,1	11,4	4,9	6,5	2965	15,2	4,9	10,3	3954	17,1	4,9	12,2	4448	19,0	6,8	12,2	4942
241.15.63.102	63,0	38,0	102	221,1	13,2	5,7	7,5	2919	17,6	5,7	11,9	3891	19,8	5,7	14,1	4378	22,0	7,9	14,1	4864
241.15.63.115	63,0	38,0	115	187,0	15,0	6,5	8,5	2805	20,0	6,5	13,5	3740	22,5	6,5	16,0	4208	25,0	9,0	16,0	4675
241.15.63.127	63,0	38,0	127	168,1	16,8	7,3	9,5	2824	22,4	7,3	15,1	3765	25,2	7,3	17,9	4236	28,0	10,1	17,9	4707
241.15.63.152	63,0	38,0	152	136,0	20,1	8,7	11,4	2734	26,8	8,7	18,1	3645	30,2	8,7	21,5	4107	33,5	12,1	21,4	4556
241.15.63.178	63,0	38,0	178	114,0	23,4	10,1	13,3	2668	31,2	10,1	21,1	3557	35,1	10,1	25,0	4001	39,0	14,0	25,0	4446
241.15.63.203	63,0	38,0	203	100,0	27,0	11,7	15,3	2700	36,0	11,7	24,3	3600	40,5	11,7	28,8	4050	45,0	16,2	28,8	4500
241.15.63.229	63,0	38,0	229	89,3	30,6	13,3	17,3	2733	40,8	13,3	27,5	3643	45,9	13,3	32,6	4099	51,0	18,4	32,6	4554
241.15.63.254	63,0	38,0	254	78,5	34,5	15,0	19,5	2708	46,0	15,0	31,0	3611	51,8	15,0	36,8	4066	57,5	20,7	36,8	4514
241.15.63.305	63,0	38,0	305	64,8	41,4	17,9	23,5	2683	55,2	17,9	37,3	3577	62,1	17,9	44,2	4024	69,0	24,8	44,2	4471

Order No	D_h	D_d	L_0	R	55% stroke S_5	S_{v5}	S_{A5}	F_5	62% stroke S_6	S_{v6}	S_{A6}	F_6	80% stroke S_7	S_{v7}	S_{A7}	F_7	100% stroke S_n	L_n	F_n
241.15.63.076	63,0	38,0	76	312,1	17,6	7,4	10,2	5493	19,8	9,6	10,2	6180	25,6	18,6	7,0	7990	32,0	44,0	9987,2
241.15.63.089	63,0	38,0	89	260,1	20,9	8,7	12,2	5436	23,6	11,4	12,2	6138	30,4	22,0	8,4	7907	38,0	51,0	9883,8
241.15.63.102	63,0	38,0	102	221,1	24,2	10,1	14,1	5351	27,3	13,2	14,1	6036	35,2	25,5	9,7	7783	44,0	58,0	9728,4
241.15.63.115	63,0	38,0	115	187,0	27,5	11,5	16,0	5143	31,0	15,0	16,0	5797	40,0	29,0	11,0	7480	50,0	65,0	9350,0
241.15.63.127	63,0	38,0	127	168,1	30,8	12,9	17,9	5177	34,7	16,8	17,9	5833	44,8	32,5	12,3	7531	56,0	71,0	9413,6
241.15.63.152	63,0	38,0	152	136,0	36,9	15,4	21,5	5018	41,5	20,1	21,4	5644	53,6	38,9	14,7	7290	67,0	85,0	9112,0
241.15.63.178	63,0	38,0	178	114,0	42,9	17,9	25,0	4891	48,4	23,4	25,0	5518	62,4	45,2	17,2	7114	78,0	100,0	8892,0
241.15.63.203	63,0	38,0	203	100,0	49,5	20,7	28,8	4950	55,8	27,0	28,8	5580	72,0	52,2	19,8	7200	90,0	113,0	9000,0
241.15.63.229	63,0	38,0	229	89,3	56,1	23,5	32,6	5010	63,2	30,6	32,6	5644	81,6	59,2	22,4	7287	102,0	127,0	9108,6
241.15.63.254	63,0	38,0	254	78,5	63,3	26,5	36,8	4969	71,3	34,5	36,8	5597	92,0	66,7	25,3	7222	115,0	139,0	9027,5
241.15.63.305	63,0	38,0	305	64,8	75,9	31,7	44,2	4918	85,6	41,4	44,2	5547	110,4	80,0	30,4	7154	138,0	167,0	8942,4

FIBRO

High Performance Compression Springs
DIN ISO 10243



D_h	=	dia. of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 ... L_n$	=	length of loaded spring (mm) as related to spring forces $F_1 ... F_n$
L_{BL}	=	length of compacted-spring (i.e. wire-to-wire)
$F_1 ... F_n$	=	forces (N) as related to length of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$	=	recommend. preload. compression, as relat. to compress. $S_1 ... S_7$
$S_1 ... S_n$	=	compr. as related to spring forces $F_1 ... F_n$
R	=	spring rate (N/mm)
$S_{A1} ... S_{A7}$	=	working stroke (mm)

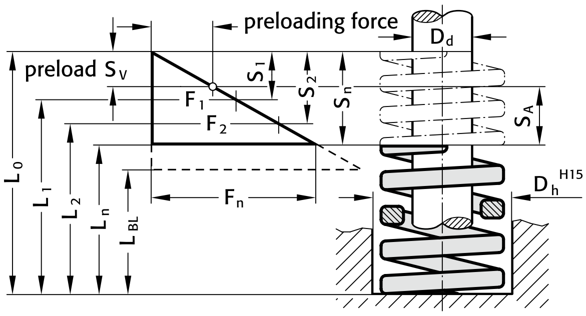
241.16. High P erformance Compression Springs DIN ISO 10243 C olour: „Red“

					30% Stroke				40% Stroke				45% Stroke				50% Stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.63.076	63,0	38,0	76	618,0	7,4	3,2	4,2	4579	9,9	3,2	6,7	6106	11,1	3,2	7,9	6869	12,4	4,4	7,9	7632
241.16.63.089	63,0	38,0	89	515,0	9,0	3,9	5,1	4635	12,0	3,9	8,1	6180	13,5	3,9	9,6	6953	15,0	5,4	9,6	7725
241.16.63.102	63,0	38,0	102	438,0	10,5	4,6	6,0	4612	14,0	4,6	9,5	6150	15,8	4,6	11,2	6918	17,6	6,3	11,2	7687
241.16.63.115	63,0	38,0	115	370,0	11,3	4,9	6,4	4163	15,0	4,9	10,1	5550	16,9	4,9	12,0	6244	18,8	6,8	12,0	6938
241.16.63.127	63,0	38,0	127	333,0	13,8	6,0	7,8	4585	18,4	6,0	12,4	6114	20,7	6,0	14,7	6878	23,0	8,3	14,7	7642
241.16.63.152	63,0	38,0	152	269,0	17,0	7,3	9,6	4560	22,6	7,3	15,3	6079	25,4	7,3	18,1	6839	28,3	10,2	18,1	7599
241.16.63.178	63,0	38,0	178	226,0	20,0	8,7	11,4	4529	26,7	8,7	18,0	6039	30,1	8,7	21,4	6794	33,4	12,0	21,4	7548
241.16.63.203	63,0	38,0	203	198,0	23,6	10,2	13,4	4681	31,5	10,2	21,3	6241	35,5	10,2	25,2	7021	39,4	14,2	25,2	7801
241.16.63.254	63,0	38,0	254	155,0	30,6	13,3	17,3	4743	40,8	13,3	27,5	6324	45,9	13,3	32,6	7115	51,0	18,4	32,6	7905
241.16.63.305	63,0	38,0	305	128,0	36,6	15,9	20,7	4685	48,8	15,9	32,9	6246	54,9	15,9	39,0	7027	61,0	22,0	39,0	7808

					55% Str oke				62% Stroke				80% Stroke				100% Str oke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.63.076	63,0	38,0	76	618,0	13,6	5,7	7,9	8396	15,3	7,4	7,9	9464	19,8	14,3	5,4	12212	24,7	51,3	15265
241.16.63.089	63,0	38,0	89	515,0	16,5	6,9	9,6	8498	18,6	9,0	9,6	9579	24,0	17,4	6,6	12360	30,0	59,0	15450
241.16.63.102	63,0	38,0	102	438,0	19,3	8,1	11,2	8456	21,8	10,5	11,2	9532	28,1	20,4	7,7	12299	35,1	66,9	15374
241.16.63.115	63,0	38,0	115	370,0	20,6	8,6	12,0	7631	23,3	11,3	12,0	8603	30,0	21,8	8,3	11100	37,5	77,5	13875
241.16.63.127	63,0	38,0	127	333,0	25,2	10,6	14,7	8407	28,5	13,8	14,7	9477	36,7	26,6	10,1	12228	45,9	81,1	15285
241.16.63.152	63,0	38,0	152	269,0	31,1	13,0	18,1	8359	35,0	17,0	18,1	9423	45,2	32,8	12,4	12159	56,5	95,5	15199
241.16.63.178	63,0	38,0	178	226,0	36,7	15,4	21,4	8303	41,4	20,0	21,4	9360	53,4	38,7	14,7	12077	66,8	109,2	15097
241.16.63.203	63,0	38,0	203	198,0	43,3	18,1	25,2	8581	48,9	23,6	25,2	9673	63,0	45,7	17,3	12482	78,8	124,2	15602
241.16.63.254	63,0	38,0	254	155,0	56,1	23,5	32,6	8696	63,2	30,6	32,6	9802	81,6	59,2	22,4	12648	102,0	152,0	15810
241.16.63.305	63,0	38,0	305	128,0	67,1	28,1	39,0	8589	75,6	36,6	39,0	9682	97,6	70,8	26,8	12493	122,0	183,0	15616

High Performance Compression Springs
DIN ISO 10243

D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \ldots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \ldots F_n$
L_{BL} = length of compacted-spring (i.e. wire-to-wire)
$F_1 \ldots F_n$ = forces (N) as related to length of spring $L_1 \ldots L_n$
$S_{v1} \ldots S_{v7}$ = recommend. preload. compression, as relat. to compress. $S_1 \ldots S_7$
$S_1 \ldots S_n$ = compr. as related to spring forces $F_1 \ldots F_n$
R = spring rate (N/mm)
$S_{A1} \ldots S_{A7}$ = working stroke (mm)

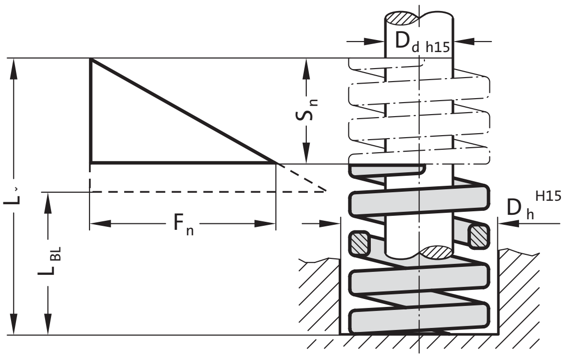


241.17. High P erformance Compression Springs DIN ISO 10243 C olour: „Yellow“

					30% stroke				40% stroke				45% stroke				50% stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.17.63.076	63,0	38,0	76	952,0	4,7	2,0	2,6	4427	6,2	2,0	4,2	5902	7,0	2,0	5,0	6640	7,8	2,8	5,0	7378
241.17.63.089	63,0	38,0	89	819,0	6,0	2,6	3,4	4914	8,0	2,6	5,4	6552	9,0	2,6	6,4	7371	10,0	3,6	6,4	8190
241.17.63.102	63,0	38,0	102	700,0	9,2	4,0	5,2	6447	12,3	4,0	8,3	8596	13,8	4,0	9,8	9671	15,4	5,5	9,8	10745
241.17.63.115	63,0	38,0	115	620,0	10,5	4,5	5,9	6491	14,0	4,5	9,4	8655	15,7	4,5	11,2	9737	17,5	6,3	11,2	10819
241.17.63.127	63,0	38,0	127	565,0	11,4	4,9	6,5	6441	15,2	4,9	10,3	8588	17,1	4,9	12,2	9662	19,0	6,8	12,2	10735
241.17.63.152	63,0	38,0	152	458,0	14,2	6,1	8,0	6485	18,9	6,1	12,7	8647	21,2	6,1	15,1	9728	23,6	8,5	15,1	10809
241.17.63.178	63,0	38,0	178	384,0	16,7	7,3	9,5	6428	22,3	7,3	15,1	8571	25,1	7,3	17,9	9642	27,9	10,0	17,9	10714
241.17.63.203	63,0	38,0	203	337,0	19,4	8,4	11,0	6551	25,9	8,4	17,5	8735	29,2	8,4	20,7	9827	32,4	11,7	20,7	10919
241.17.63.254	63,0	38,0	254	263,0	26,0	11,3	14,7	6841	34,7	11,3	23,4	9121	39,0	11,3	27,7	10261	43,4	15,6	27,7	11401
241.17.63.305	63,0	38,0	305	218,0	31,8	13,8	18,0	6932	42,4	13,8	28,6	9243	47,7	13,8	33,9	10399	53,0	19,1	33,9	11554

					55% str oke				62% stroke				80% stroke				100% str oke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.17.63.076	63,0	38,0	76	952,0	8,5	3,6	5,0	8116	9,6	4,7	5,0	9149	12,4	9,0	3,4	11805	15,5	60,5	14756
241.17.63.089	63,0	38,0	89	819,0	11,0	4,6	6,4	9009	12,4	6,0	6,4	10156	16,0	11,6	4,4	13104	20,0	69,0	16380
241.17.63.102	63,0	38,0	102	700,0	16,9	7,1	9,8	11820	19,0	9,2	9,8	13324	24,6	17,8	6,8	17192	30,7	71,3	21490
241.17.63.115	63,0	38,0	115	620,0	19,2	8,0	11,2	11901	21,6	10,5	11,2	13416	27,9	20,2	7,7	17310	34,9	80,1	21638
241.17.63.127	63,0	38,0	127	565,0	20,9	8,7	12,2	11809	23,6	11,4	12,2	13311	30,4	22,0	8,4	17176	38,0	89,0	21470
241.17.63.152	63,0	38,0	152	458,0	26,0	10,9	15,1	11890	29,3	14,2	15,1	13403	37,8	27,4	10,4	17294	47,2	104,8	21618
241.17.63.178	63,0	38,0	178	384,0	30,7	12,8	17,9	11785	34,6	16,7	17,9	13285	44,6	32,4	12,3	17142	55,8	120,2	21427
241.17.63.203	63,0	38,0	203	337,0	35,6	14,9	20,7	12011	40,2	19,4	20,7	13539	51,8	37,6	14,3	17470	64,8	138,2	21838
241.17.63.254	63,0	38,0	254	263,0	47,7	19,9	27,7	12541	53,8	26,0	27,7	14137	69,4	50,3	19,1	18242	86,7	167,3	22802
241.17.63.305	63,0	38,0	305	218,0	58,3	24,4	33,9	12709	65,7	31,8	33,9	14327	84,8	61,5	23,3	18486	106,0	199,0	23108

High performance compression spring, 3XLF, Colour "White"



D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

L_{BL} = length of compacted spring (i.e. wire-to-wire)

F_n = Spring force in N

S_n = Stroke

R = spring rate (N/mm)

Description:

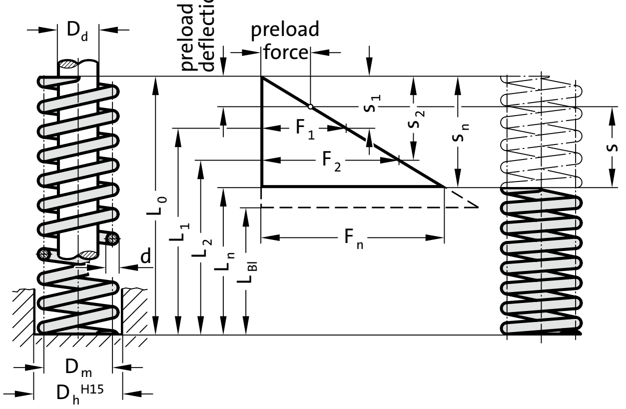
The diameters are comparable with the high performance compression springs DIN ISO 10243. The special flat wound wire cross section brings a reduction of the medium winding diameter for the same winding ratio with an edge-wound spring. Consequently, the high performance compression spring 3XLF has a 6x larger starting spring force than the high performance compression spring DIN ISO 10243 colour code “yellow”.

241.19. High performance compression spring, 3XLF, Colour "White"

Order No	D_h	D_d	L_0	R	S_1	S_{V1}	S_{A1}	F_1	S_n	F_n
241.19.16.020	16	6.3	20	1818	2.2	1	1.2	4000	3	5454
241.19.16.035	16	6.3	35	1000	4	1.8	2.2	4000	5.5	5500
241.19.16.050	16	6.3	50	615	6.5	2.5	4	3998	8	4920
241.19.16.075	16	6.3	75	400	10	3.8	6.2	4000	12.5	5000
241.19.16.100	16	6.3	100	286	14	5	9	4004	16.3	4662
241.19.19.025	19	8	25	2400	2.5	1.2	1.2	6000	3.4	8160
241.19.19.040	19	8	40	1333	4.5	2	2.5	5998	5.9	7865
241.19.19.050	19	8	50	1000	6	2.5	3.5	6000	7.8	7800
241.19.19.075	19	8	75	600	10	3.8	6.2	6000	12.4	7440
241.19.19.100	19	8	100	429	14	5	9	6006	16.5	7078
241.19.25.030	25	10	30	4800	2.5	1.5	1	12000	3	14400
241.19.25.050	25	10	50	2400	5	2.5	2.5	12000	5.9	14160
241.19.25.075	25	10	75	1500	8	3.8	4.2	12000	9.5	14250
241.19.25.100	25	10	100	1000	12	5	7	12000	14.7	14700
241.19.25.125	25	10	125	857	14	6.2	7.8	11998	16.9	14483
241.19.32.035	32	12.5	35	6667	3	1.8	1.2	20001	3.7	24668
241.19.32.050	32	12.5	50	3636	5.5	2.5	3	19998	6.3	22907
241.19.32.075	32	12.5	75	2222	9	3.8	5.2	19998	11.3	25109
241.19.32.100	32	12.5	100	1538	13	5	8	19994	17.9	27530
241.19.32.125	32	12.5	125	1250	16	6.2	9.8	20000	18.3	22875
241.19.32.150	32	12.5	150	1053	19	7.5	11.5	20007	21.7	22850
241.19.38.040	38	16	40	7143	3.5	2	1.5	25000	4.5	32144
241.19.38.050	38	16	50	5000	5	2.5	2.5	25000	5.9	29500
241.19.38.075	38	16	75	2778	9	3.8	5.2	25002	10.4	28891
241.19.38.100	38	16	100	1923	13	5	8	24999	15	28845
241.19.38.150	38	16	150	1316	19	7.5	11.5	25004	22.4	29478
241.19.38.200	38	16	200	926	27	10	17	25002	29.9	27687

ROUND WIRE COMPRESSION SPRING

241.02.



Material:

Spring steel wire class C DIN 17.223 sheet 1, drawn and patented.
For highly stressed compression springs and for loads both static and oscillating.

Execution:

Manufacturing tolerances to DIN 2095 class 2, load-stabilized, surface homogenized by ball-shot, oiled.
Flattened and ground end coils.

Note:

Max. working temperature 100 °C.
All spring sizes listed also available in “making-up-”lengths of 500 mm. When ordering these, please add “500” at the end of the order number – e. g. 241.02.11.040.500.

D_h = diameter of guide sleeve
D_m = mean coil diameter
D_d = diameter of guide pin
d = diameter of spring wire
L_0 = free length of spring
$L_1...L_n$ = lengths of loaded spring as related to spring forces $F_1...F_n$
R = spring rate [N/mm]
L_{Bl} = length of compacted spring (i.-e. wire-to-wire)
$F_1...F_n$ = forces [N] as related to lengths of spring $L_1...L_n$
$s_1...s_n$ = deflection as related to spring forces $F_1...F_n$
i_f = number of active coils
s = working stroke of spring – i. e. working deflection

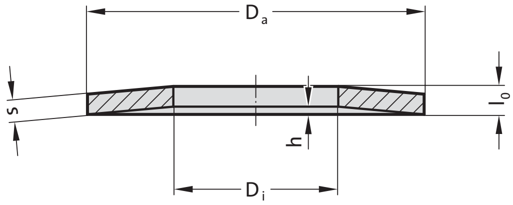
241.02. Round wire compression spring

Order No	D_h	D_d	D_m	d	L_0	R	s_1	F_1 [N]*	l_1	s_2	F_2 [N]**	l_2	s_n	F_n [N]***	L_n	i_f
241.02.11.040	11	6.5	8.5	1.5	40	8.08	11.3	91	28.7	13.7	110	26.3	16.1	130	23.9	10.5
241.02.13.055	13	8.5	10.5	1.5	55	3.8	20.8	79	34.2	25.2	95	29.8	29.7	112	25.3	12
241.02.15.040	15	9.5	12	2	40	11.93	12.3	146	27.7	15	178	25	17.6	210	22.4	8
241.02.15.050	15	9.5	12	2	50	10	17.5	175	32.5	21.2	212	28.8	25	250	25	9.5
241.02.16.040	16	10.5	13	2	40	11	14	154	26	17	187	23	20	220	20	7
241.02.18.085	18	12	14.75	2.25	85	5.92	30.8	182	54.2	37.4	221	47.6	44	260	41	14
241.02.19.045	19	11	14.5	3	45	35	9.8	343	35.2	11.9	416	33.1	14	490	31	8
241.02.19.050	19	11	14.5	3	50	30	11.2	336	38.8	13.6	408	36.4	16	480	34	8.5
241.02.19.083	19.5	9	14	4	83	75	12.6	945	70.4	15.3	1,147	67.7	18	1,350	65	16
241.02.20.035	20.5	10	15	4	35	170	5.6	952	29.4	6.8	1,156	28.2	8	1,360	27	4.5
241.02.20.090	20.5	9	14.5	4.5	90	97.8	12.3	1,202	77.7	15	1,467	75	17.6	1,714	72.4	4
241.02.21.035	21	13.5	17	2.5	35	13.32	10.5	139	24.5	12.7	169	22.3	15	200	20	6
241.02.21.040	21	12	16.25	3	40	32.1	9.8	314	30.2	11.9	381	28.1	14	450	26	5.5
241.02.22.095	22	14.5	18	2.5	95	4.1	34.2	140	60.8	41.5	170	53.5	48.8	200	46.2	17
241.02.22.040	22.5	12	17	4	40	105.5	7.7	812	32.3	9.3	981	30.7	11	1,160	29	5
241.02.23.045	23	14.5	18.5	3	45	25.7	15	385	30	18.2	467	26.8	21.4	550	23.6	5
241.02.23.050	23	12.5	17.5	4	50	74.3	11	817	39	13.3	988	36.7	15.6	1,160	34.4	6.5
241.02.26.024	26.5	16	21	4	24	133.2	5	666	19	6.1	812	17.9	7.2	960	16.8	2
241.02.30.070	30	13	20.8	7	70	341	7.7	2,625	62.3	9.3	3,171	60.7	11	3,750	59	8
241.02.32.070	32	21	26	4	70	24.2	23.8	575	46.2	28.9	700	41.1	34	822	36	6
241.02.32.150	32	16	23.5	6.5	150	103.6	19.6	2,030	130.4	23.8	2,465	126	28	2,900	122	14
241.02.34.125	34	19	26	6	125	67.2	22.4	1,505	102.6	27.2	1,827	97.8	32	2,150	93	11.5
241.02.44.130	44	25	34	8	130	108.2	25.2	2,726	104.8	30.6	3,310	99.4	36	3,895	94	10
241.02.44.200	44	25	34	7.5	200	61.8	43.4	2,679	156.6	52.7	3,254	147.3	62	3,847	137.7	17
241.02.48.067	48	25	36	10	67	640	6.3	4,032	60.7	7.6	4,864	59.4	9	5,760	58	3.5
241.02.49.050	49	29	38.5	8.5	50	337	7.7	2,594	42.3	9.3	3,134	40.7	11	3,707	39	2.5
241.02.55.200	55	30	42	11	200	157	30.1	4,725	169.9	36.6	5,746	163.4	43	6,750	157	13
241.02.58.050	58	39	48	8	50	151.2	9.8	1,481	40.2	11.9	1,799	38.1	14	2,117	36	2.5
241.02.63.180	63	38	50	11	180	121	30.1	3,642	149.9	36.6	4,428	143.4	43	5,203	137	10

* = long spring life; ** = medium spring life; *** = max. spring loading

Disc spring DIN 2093

242.01.



Material:

50 CrV 4 Vanadium Spring Steel

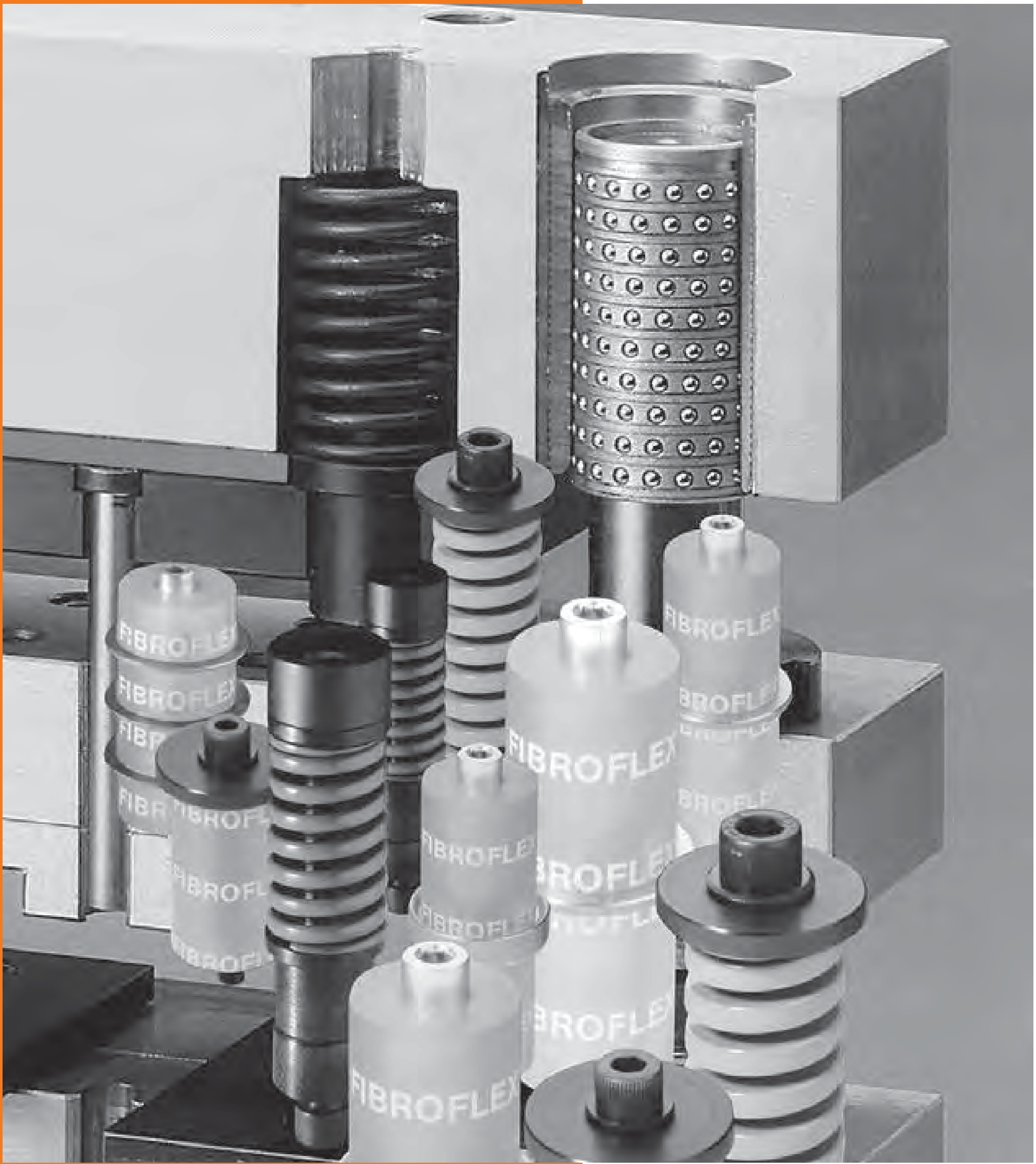
Note:

FIBRO Disc Springs 242.01. are made from 50 CrV 4 premier grade spring steel. This "classic" spring material guarantes optimal performance levels within the temperature range from –15 °C to +150 °C. "Hot pressetting" allows working temperatures from –25 °C to +200 °C.

D_a = outside diameter of spring
D_i = diameter of hole
s = crossectional thickness of spring
h = concavity of free spring
l_0 =total height of free spring
f = deflection of spring, caused by load F
F = load F [N], causing deflection f

242.01. Disc spring DIN 2093

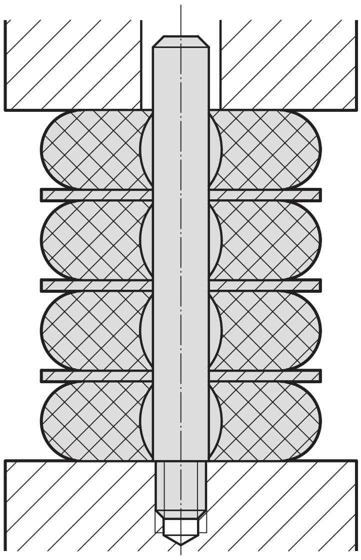
Order No	in accord. with DIN 2093 series	D_a h12	D_i H12	s	h	l_0	f_1= 0,2 h	F_1 [N]	f_2= 0,4 h	F_2 [N]	f_3= 0,6 h	F_3 [N]	f_4= 0,7 h	F_4 [N]	f_5= 0,8 h	F_5 [N]
242.01.080.032.040		8	3.2	0.4	0.2	0.6	0.04	58	0.08	110	0.12	160	0.14	180	0.16	200
242.01.100.052.040	B	10	5.2	0.4	0.3	0.7	0.06	73	0.12	134	0.18	180	0.21	200	0.24	220
242.01.125.062.050	B	12.5	6.2	0.5	0.35	0.85	0.07	100	0.14	180	0.21	250	0.24	280	0.28	310
242.01.140.072.080	A	14	7.2	0.8	0.3	1.1	0.06	230	0.12	450	0.18	660	0.21	770	0.24	870
242.01.150.052.070		15	5.2	0.7	0.4	1.1	0.08	180	0.16	340	0.24	470	0.28	540	0.32	610
242.01.160.082.060	B	16	8.2	0.6	0.45	1.05	0.09	145	0.18	260	0.27	360	0.31	400	0.36	440
242.01.160.082.090	A	16	8.2	0.9	0.35	1.25	0.07	300	0.14	580	0.21	850	0.24	970	0.28	1100
242.01.180.092.100	A	18	9.2	1	0.4	1.4	0.08	370	0.16	720	0.24	1050	0.28	1200	0.32	1350
242.01.200.102.080	B	20	10.2	0.8	0.55	1.35	0.11	250	0.22	470	0.33	650	0.38	730	0.44	800
242.01.200.102.090		20	10.2	0.9	0.55	1.45	0.11	340	0.22	640	0.33	900	0.38	1000	0.44	1150
242.01.200.102.110	A	20	10.2	1.1	0.45	1.55	0.09	450	0.18	870	0.27	1350	0.31	1450	0.36	1650
242.01.230.122.125		23	12.2	1.25	0.6	1.85	0.12	710	0.24	1360	0.36	1960	0.42	2240	0.48	2520
242.01.250.122.150	A	25	12.2	1.5	0.55	2.05	0.11	860	0.22	1650	0.33	2450	0.38	2800	0.44	3100
242.01.250.122.100		25	12.2	1	0.6	1.6	0.12	320	0.24	600	0.36	840	0.42	950	0.48	1050
242.01.280.142.100	B	28	14.2	1	0.8	1.8	0.16	400	0.32	720	0.48	970	0.56	1100	0.64	1200
242.01.280.142.150	A	28	14.2	1.5	0.65	2.15	0.13	850	0.26	1650	0.39	2400	0.45	2700	0.52	3100
242.01.315.163.125	B	31.5	16.3	1.25	0.9	2.15	0.18	660	0.36	1200	0.54	1650	0.63	1850	0.72	2000
242.01.315.163.175	A	31.5	16.3	1.75	0.7	2.45	0.14	1150	0.28	2200	0.42	3200	0.49	3700	0.56	4200
242.01.355.183.200	A	35.5	18.3	2	0.8	2.8	0.16	1550	0.32	3000	0.48	4300	0.56	5000	0.64	5600
242.01.400.142.150		40	14.2	1.5	1.25	2.75	0.25	950	0.5	1700	0.75	2200	0.87	2500	1	2700
242.01.400.204.225	A	40	20.4	2.25	0.9	3.15	0.18	1900	0.36	3700	0.54	5400	0.63	5200	0.72	7000
242.01.450.224.250	A	45	22.4	2.5	1	3.5	0.2	2300	0.4	4500	0.6	6400	0.7	7400	0.8	8500
242.01.500.183.150		50	18.3	1.5	1.8	3.3	0.36	1200	0.72	2000	1.08	2400	1.26	2600	1.44	2700
242.01.500.254.250		50	25.4	2.5	1.4	3.9	0.28	2850	0.56	5350	0.84	7600	0.98	8650	1.12	9650
242.01.500.254.300	A	50	25.4	3	1.1	4.1	0.22	3500	0.44	6800	0.66	10000	0.77	11500	0.88	13000
242.01.560.285.200	B	56	28.5	2	1.6	3.6	0.32	1600	0.64	2900	0.96	3900	1.12	4300	1.28	4700
242.01.600.204.200		60	20.4	2	2.1	4.1	0.42	2000	0.84	3400	1.26	4300	1.47	4700	1.68	5000



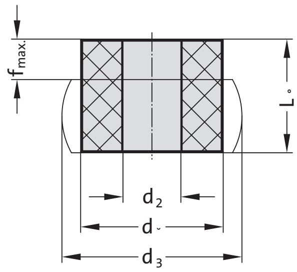
Elastomer Springs
Spring and spacer units
Accessories

FIBROFLEX®-Elastomer spring for FIBROFLEX®-Spring system

Mounting example



244.1.



Description:

FIBROFLEX® Spring Systems represent a finely graded range of elastomer spring units (material: polyurethane) exhibiting particular suitability for all stamping dies and related tools.

The 244.-Systems comprise FIBROFLEX® Spring Elements 244.1., available in three Shore hardnesses. With the aid of Stacking Washers 244.4. and Guide Pins 244.5., the elements can be stacked.
Note that stacking with interposed stacking washers results in the addition of the individual spring deflections – without addition of the spring forces.

Note:

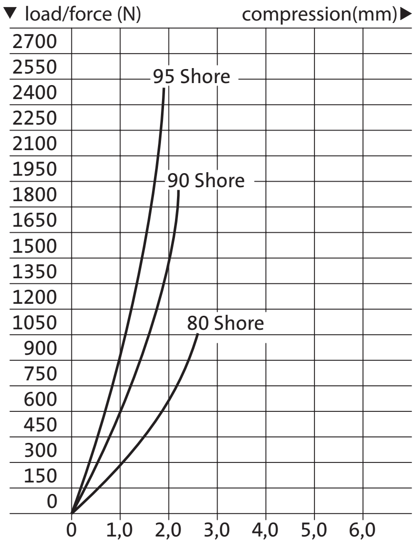
Physical and chemical properties of FIBROFLEX®-Elastomer – see at the beginning of chapter G.
Dowel pins (235./2351.1.) or guide pins (244.5.), recommended for stacks higher than 1,5 x d_2.

244.1. FIBROFLEX®-Elastomer spring for FIBROFLEX®-Spring system

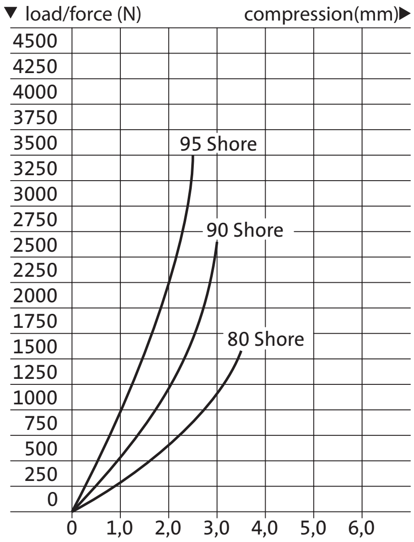
Order No	Spring hardness	d_1	d_2	d_3	L_0	f max.	F max. [N]
244.1.16.5	80 Shore A	16	6.5	20	7.5	2.6	1060
244.1.20.5	80 Shore A	20	8.5	26	10	3.5	1580
244.1.25.5	80 Shore A	25	10.5	32	12.5	4.3	2670
244.1.32.5	80 Shore A	32	13.5	40	15	5.2	4500
244.1.40.5	80 Shore A	40	13.5	50	17.5	6.1	7200
244.1.16.6	90 Shore A	16	6.5	20	7.5	2.2	1900
244.1.20.6	90 Shore A	20	8.5	26	10	3	2650
244.1.25.6	90 Shore A	25	10.5	32	12.5	3.7	4400
244.1.32.6	90 Shore A	32	13.5	40	15	4.5	6550
244.1.40.6	90 Shore A	40	13.5	50	17.5	5.2	11200
244.1.16.7	95 Shore A	16	6.5	20	7.5	1.9	2500
244.1.20.7	95 Shore A	20	8.5	26	10	2.5	3500
244.1.25.7	95 Shore A	25	10.5	32	12.5	3.1	4500
244.1.32.7	95 Shore A	32	13.5	40	15	3.9	7800
244.1.40.7	95 Shore A	40	13.5	50	17.5	4.4	13500

FIBROFLEX®-Elastomer spring for FIBROFLEX®-Spring system

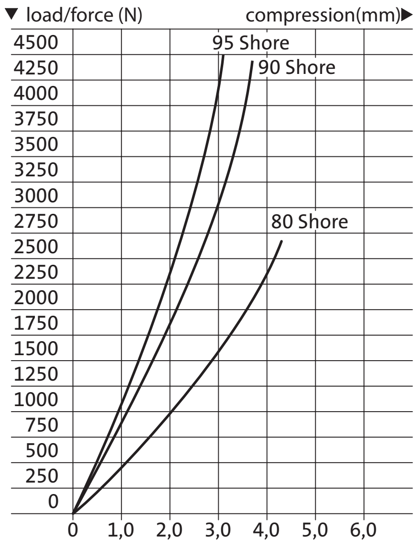
244.1.16. – Ø 16



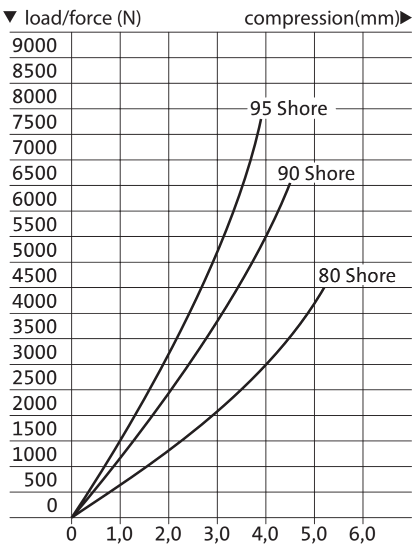
244.1.20. – Ø 20



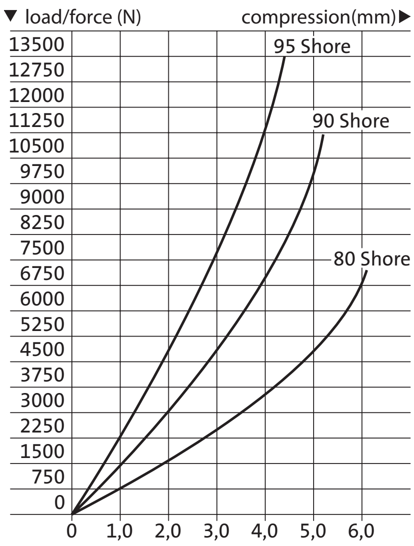
244.1.25. – Ø 25



244.1.32. – Ø 32

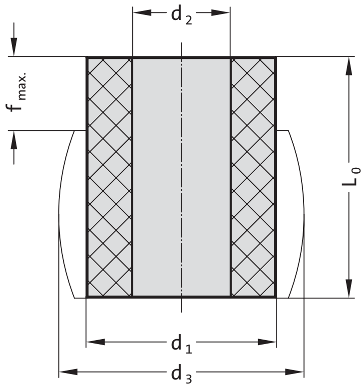


244.1.40. – Ø 40



FIBROFLEX®-Tubular spring element 80 Shore A, to DIN ISO 10069-1

246.5.



Description:

FIBROFLEX® Spring Elements are made from highly elastic polyurethane elastomers.
Shore hardness is the most significant rating of the various FIBROFLEX®-Elements. Shore hardness ratings are symbolized by distinctive colour coding.
Correct selection of Shore hardness has a fundamental bearing on the success of FIBROFLEX®-applications.

Material:

Polyurethan 80 Shore A
Colour: green

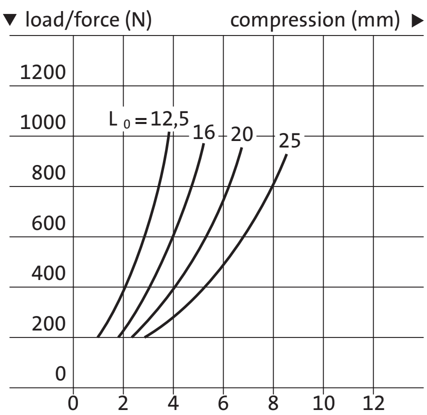
Note:

The physical properties of polyurethane elastomers means that they have a tendency to settle. The extent of such settlement is dependent on the internal heat of friction, speed and number of load changes, the spring travel and the Shore hardness.
Settlement may be as much as 4 to 7% of the spring length L_0.

246.5. FIBROFLEX®-Tubular spring element 80 Shore A, to DIN ISO 10069-1

Order No	d_1	L_0	d_2	d_3	f max.	F max. [N]
246.5.016.012	16	12.5	6.5	21	4.3	1020
246.5.016.016	16	16	6.5	21	5.6	980
246.5.016.020	16	20	6.5	21	7	950
246.5.016.025	16	25	6.5	21	8.7	940
246.5.020.016	20	16	8.5	26	5.6	1530
246.5.020.020	20	20	8.5	26	7	1510
246.5.020.025	20	25	8.5	26	8.7	1500
246.5.020.032	20	32	8.5	26	10.6	1490
246.5.025.020	25	20	10.5	32	7	2600
246.5.025.025	25	25	10.5	32	8.7	2550
246.5.025.032	25	32	10.5	32	10.6	2520
246.5.025.040	25	40	10.5	32	14	2500
246.5.032.032	32	32	13.5	42	10.6	3900
246.5.032.040	32	40	13.5	42	14	3850
246.5.032.050	32	50	13.5	42	17.5	3820
246.5.032.063	32	63	13.5	42	22	3800
246.5.040.032	40	32	13.5	52	10.6	6700
246.5.040.040	40	40	13.5	52	14	6600
246.5.040.050	40	50	13.5	52	17.5	6550
246.5.040.063	40	63	13.5	52	22	6500
246.5.040.080	40	80	13.5	52	28	6480
246.5.050.032	50	32	17	65	10.6	10800
246.5.050.040	50	40	17	65	14	10400
246.5.050.050	50	50	17	65	17.5	10200
246.5.050.063	50	63	17	65	22	10000
246.5.050.080	50	80	17	65	28	9950
246.5.050.100	50	100	17	65	35	9900
246.5.063.032	63	32	17	81	11.2	18650
246.5.063.040	63	40	17	81	14	18000
246.5.063.050	63	50	17	81	17.5	17500
246.5.063.063	63	63	17	81	22	17000
246.5.063.080	63	80	17	81	28	16500
246.5.063.100	63	100	17	81	35	16200
246.5.063.125	63	125	17	81	43.7	16000
246.5.080.032	80	32	21	104	11.2	31500
246.5.080.040	80	40	21	104	14	30100
246.5.080.050	80	50	21	104	17.5	29900
246.5.080.063	80	63	21	104	22	28800
246.5.080.080	80	80	21	104	28	28300
246.5.080.100	80	100	21	104	35	28100
246.5.080.125	80	125	21	104	43.7	28000
246.5.100.032	100	32	21	130	10.6	56000
246.5.100.040	100	40	21	130	14	52000
246.5.100.050	100	50	21	130	17.5	50000
246.5.100.063	100	63	21	130	22	47500
246.5.100.080	100	80	21	130	28	45000
246.5.100.100	100	100	21	130	35	43300
246.5.100.125	100	125	21	130	43.7	41500
246.5.125.032	125	32	27	160	10.6	92000
246.5.125.040	125	40	27	160	14	85000
246.5.125.050	125	50	27	160	17.5	80000
246.5.125.063	125	63	27	160	22	75000
246.5.125.080	125	80	27	160	28	71000
246.5.125.100	125	100	27	160	35	70500
246.5.125.125	125	125	27	160	43.7	70000
246.5.125.160	125	160	27	160	56	68000

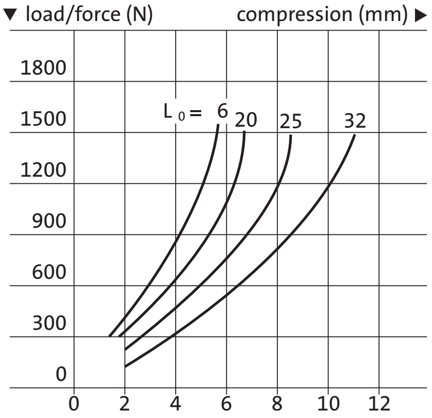
246.5.016.
Ø 16/80 Sho e A



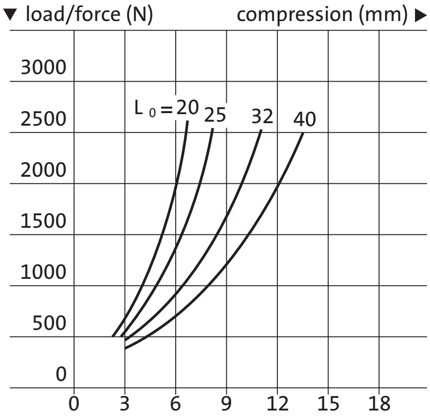
subject to alterations

FIBROFLEX®-Tubular Spring Elements 80 Shore A

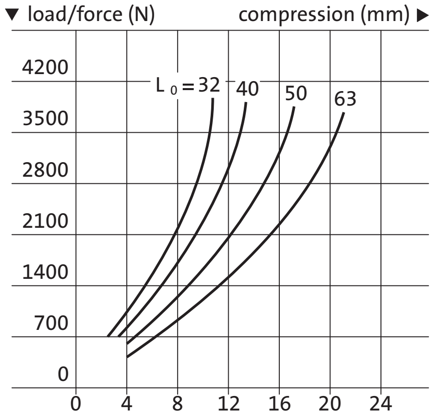
246.5.020.
Ø 20/80 Sho e A



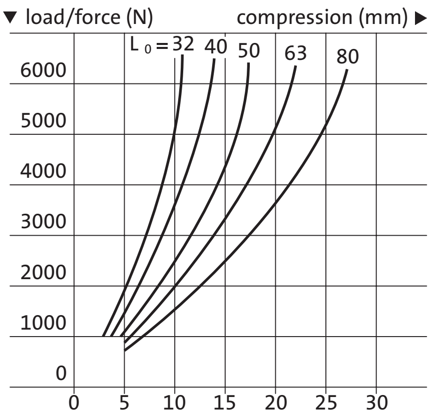
246.5.025.
Ø 25/80 Sho e A



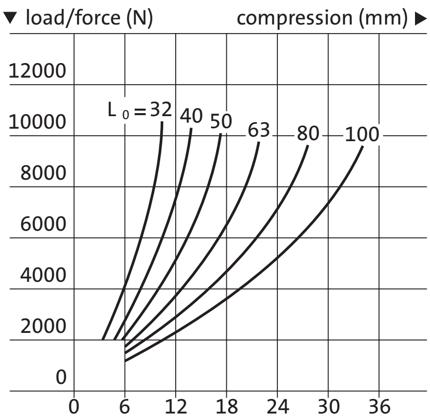
246.5.032.
Ø 32/80 Sho e A



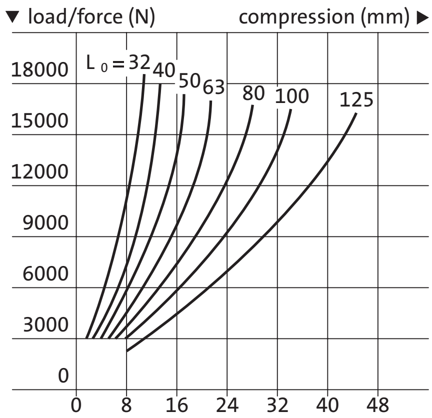
246.5.040.
Ø 40/80 Sho e A



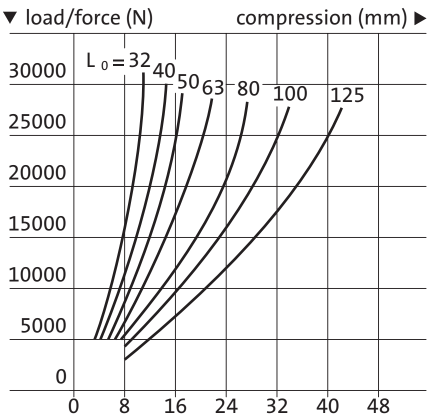
246.5.050.
Ø 50/80 Sho e A



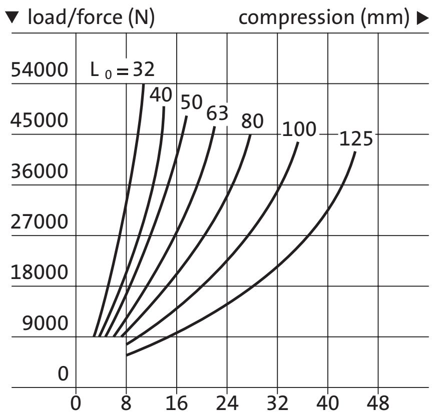
246.5.063.
Ø 63/80 Sho e A



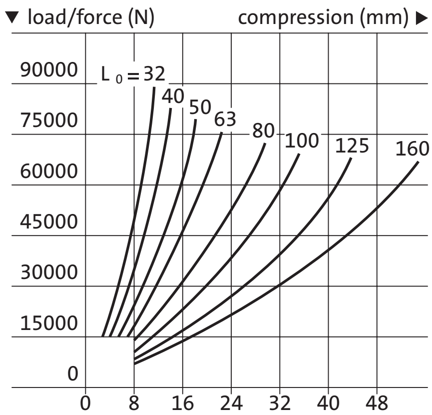
246.5.080.
Ø 80/80 Sho e A



246.5.100.
Ø 100/80 Sho e A

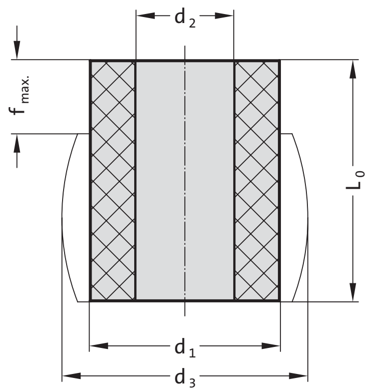


246.5.125.
Ø 125/80 Sho e A



FIBROFLEX®-Tubular spring element 90 Shore A, to DIN ISO 10069-1

246.6.



Description:

FIBROFLEX® Spring Elements are made from highly elastic polyurethane elastomers.
Shore hardness is the most significant rating of the various FIBROFLEX®-Elements. Shore hardness ratings are symbolized by distinctive colour coding.
Correct selection of Shore hardness has a fundamental bearing on the success of FIBROFLEX®-applications.

Material:

Polyurethan 90 Shore A
Colour: yellow

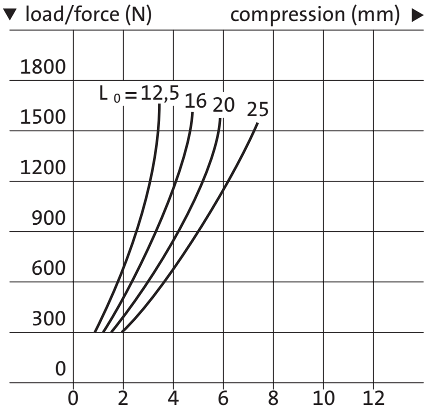
Note:

The physical properties of polyurethane elastomers means that they have a tendency to settle. The extent of such settlement is dependent on the internal heat of friction, speed and number of load changes, the spring travel and the Shore hardness.
Settlement may be as much as 4 to 7% of the spring length L_0.

246.6. FIBROFLEX®-Tubular spring element 90 Shore A, to DIN ISO 10069-1

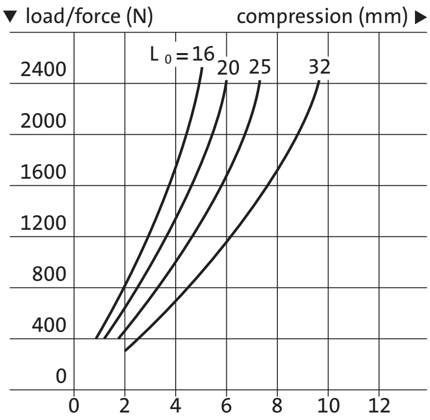
Order No	d_1	L_0	d_2	d_3	f max.	F max. [N]
246.6.016.012	16	12.5	6.5	21	3.6	1680
246.6.016.016	16	16	6.5	21	4.8	1650
246.6.016.020	16	20	6.5	21	6	1620
246.6.016.025	16	25	6.5	21	7.5	1580
246.6.020.016	20	16	8.5	26	4.8	2600
246.6.020.020	20	20	8.5	26	6	2550
246.6.020.025	20	25	8.5	26	7.5	2530
246.6.020.032	20	32	8.5	26	9.6	2500
246.6.025.020	25	20	10.5	32	6	4300
246.6.025.025	25	25	10.5	32	7.5	4200
246.6.025.032	25	32	10.5	32	9.6	4150
246.6.025.040	25	40	10.5	32	12	4120
246.6.032.032	32	32	13.5	42	9.6	6400
246.6.032.040	32	40	13.5	42	12	6350
246.6.032.050	32	50	13.5	42	15	6300
246.6.032.063	32	63	13.5	42	18.9	6250
246.6.040.032	40	32	13.5	52	9.6	11000
246.6.040.040	40	40	13.5	52	12	10900
246.6.040.050	40	50	13.5	52	15	10800
246.6.040.063	40	63	13.5	52	18.9	10750
246.6.040.080	40	80	13.5	52	24	10700
246.6.050.032	50	32	17	65	9.6	17400
246.6.050.040	50	40	17	65	12	17300
246.6.050.050	50	50	17	65	15	17000
246.6.050.063	50	63	17	65	18.9	16650
246.6.050.080	50	80	17	65	24	16500
246.6.050.100	50	100	17	65	30	16400
246.6.063.032	63	32	17	81	9.6	30100
246.6.063.040	63	40	17	81	12	29500
246.6.063.050	63	50	17	81	15	28900
246.6.063.063	63	63	17	81	18.9	28000
246.6.063.080	63	80	17	81	24	27500
246.6.063.100	63	100	17	81	30	27300
246.6.063.125	63	125	17	81	37.5	26800
246.6.080.032	80	32	21	104	9.6	53000
246.6.080.040	80	40	21	104	12	50500
246.6.080.050	80	50	21	104	15	48000
246.6.080.063	80	63	21	104	18.9	46500
246.6.080.080	80	80	21	104	24	45500
246.6.080.100	80	100	21	104	30	44900
246.6.080.125	80	125	21	104	37.5	44000
246.6.100.032	100	32	21	130	9.6	90000
246.6.100.040	100	40	21	130	12	84800
246.6.100.050	100	50	21	130	15	81000
246.6.100.063	100	63	21	130	18.9	78000
246.6.100.080	100	80	21	130	24	75000
246.6.100.100	100	100	21	130	30	73000
246.6.100.125	100	125	21	130	37.5	71000
246.6.125.032	125	32	27	160	9.6	150000
246.6.125.040	125	40	27	160	12	142500
246.6.125.050	125	50	27	160	15	132000
246.6.125.063	125	63	27	160	18.9	125000
246.6.125.080	125	80	27	160	24	118000
246.6.125.100	125	100	27	160	30	115000
246.6.125.125	125	125	27	160	37.5	113000
246.6.125.160	125	160	27	160	48	111300

246.6.016.
Ø 16/90 Sho e A

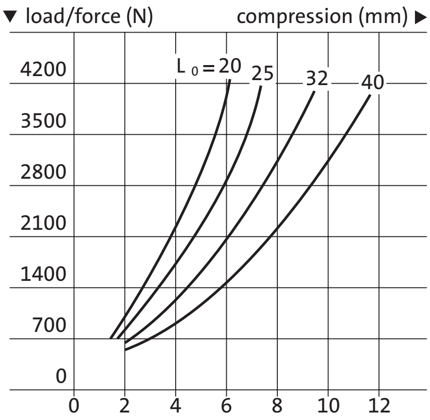


FIBROFLEX®-Tubular Spring Elements 90 Shore A

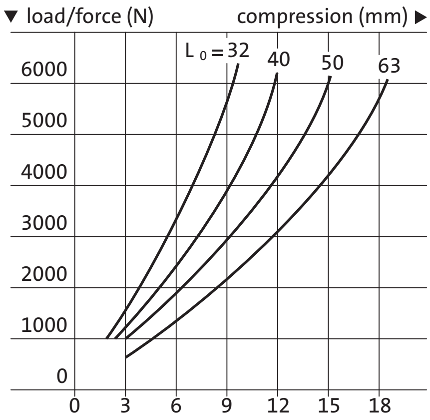
246.6.020.
Ø 20/90 Sho e A



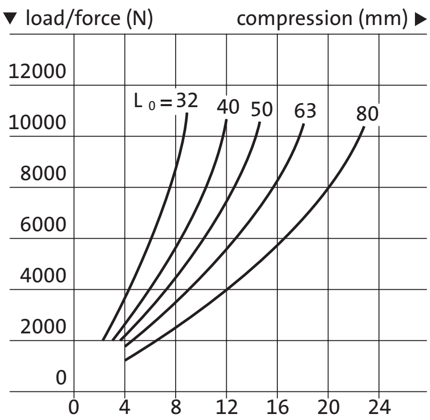
246.6.025.
Ø 25/90 Sho e A



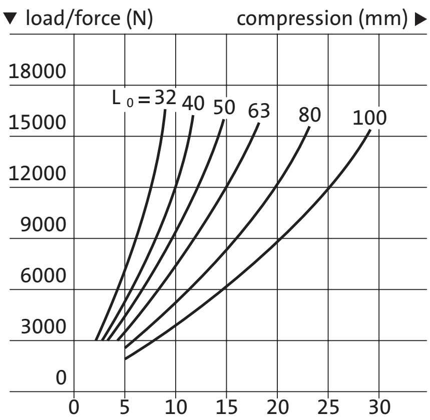
246.6.032.
Ø 32/90 Sho e A



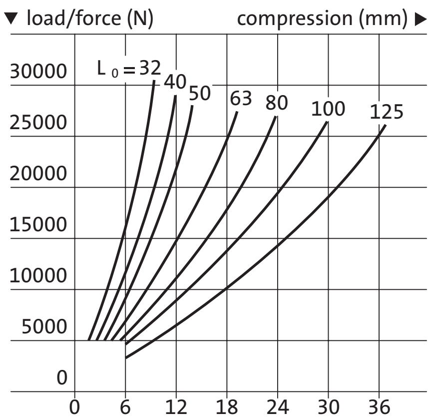
246.6.040.
Ø 40/90 Sho e A



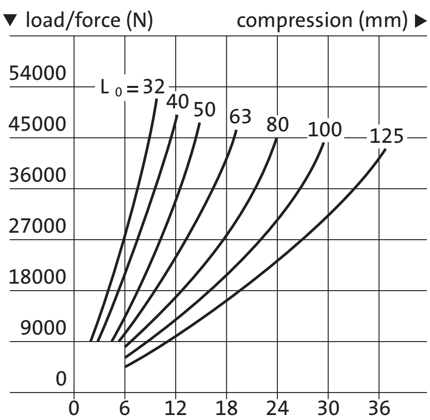
246.6.050.
Ø 50/90 Sho e A



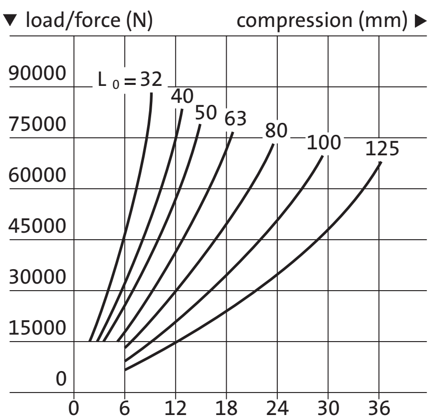
246.6.063.
Ø 63/90 Sho e A



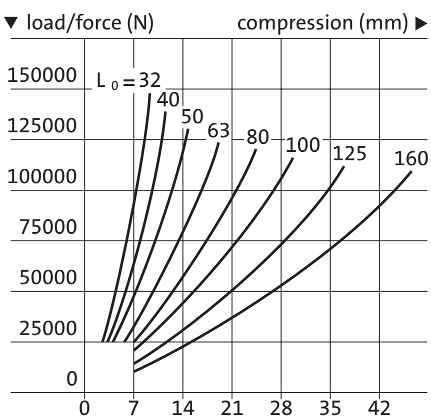
246.6.080.
Ø 80/90 Sho e A



246.6.100.
Ø 100/90 Sho e A

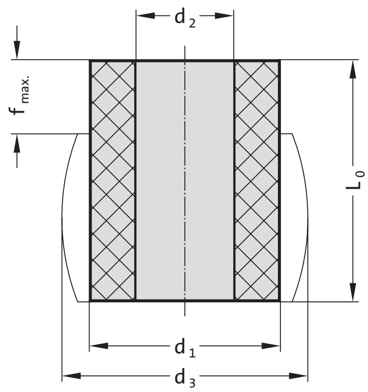


246.6.125.
Ø 125/90 Sho e A



FIBROFLEX®-Tubular spring element 95 Shore A, to DIN ISO 10069-1

246.7.



Description:

FIBROFLEX® Spring Elements are made from highly elastic polyurethane elastomers.
Shore hardness is the most significant rating of the various FIBROFLEX®-Elements. Shore hardness ratings are symbolized by distinctive colour coding.
Correct selection of Shore hardness has a fundamental bearing on the success of FIBROFLEX®-applications.

Material:

Polyurethan 95 Shore A
Colour: red

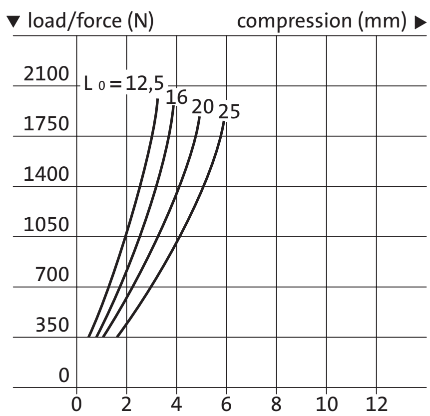
Note:

The physical properties of polyurethane elastomers means that they have a tendency to settle. The extent of such settlement is dependent on the internal heat of friction, speed and number of load changes, the spring travel and the Shore hardness.
Settlement may be as much as 4 to 7% of the spring length L_0.

246.7. FIBROFLEX®-Tubular spring element 95 Shore A, to DIN ISO 10069-1

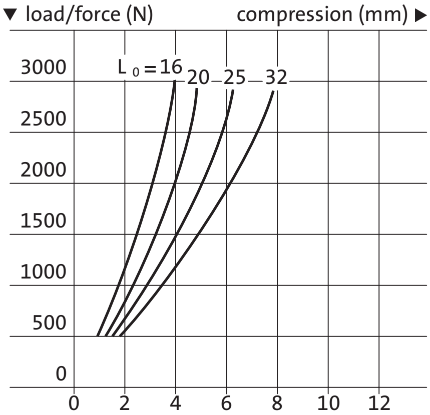
Order No	d_1	L_0	d_2	d_3	f max.	F max. [N]
246.7.016.012	16	12.5	6.5	21	3.1	2000
246.7.016.016	16	16	6.5	21	4	1920
246.7.016.020	16	20	6.5	21	5	1900
246.7.016.025	16	25	6.5	21	6.2	1870
246.7.020.016	20	16	8.5	26	4	3050
246.7.020.020	20	20	8.5	26	5	3000
246.7.020.025	20	25	8.5	26	6.2	2980
246.7.020.032	20	32	8.5	26	8	2950
246.7.025.020	25	20	10.5	32	5	5100
246.7.025.025	25	25	10.5	32	6.2	5080
246.7.025.032	25	32	10.5	32	8	5020
246.7.025.040	25	40	10.5	32	10	5000
246.7.032.032	32	32	13.5	42	8	7600
246.7.032.040	32	40	13.5	42	10	7500
246.7.032.050	32	50	13.5	42	12	7480
246.7.032.063	32	63	13.5	42	15.7	7450
246.7.040.032	40	32	13.5	52	8	13000
246.7.040.040	40	40	13.5	52	10	12700
246.7.040.050	40	50	13.5	52	12.5	12500
246.7.040.063	40	63	13.5	52	15.7	12450
246.7.040.080	40	80	13.5	52	20	12430
246.7.050.032	50	32	17	65	8	21000
246.7.050.040	50	40	17	65	10	20100
246.7.050.050	50	50	17	65	12.5	19600
246.7.050.063	50	63	17	65	15.7	19200
246.7.050.080	50	80	17	65	20	19100
246.7.050.100	50	100	17	65	25	19050
246.7.063.032	63	32	17	81	8	37000
246.7.063.040	63	40	17	81	10	35900
246.7.063.050	63	50	17	81	12.5	34000
246.7.063.063	63	63	17	81	15.7	33000
246.7.063.080	63	80	17	81	20	32000
246.7.063.100	63	100	17	81	25	31800
246.7.063.125	63	125	17	81	31.2	31600
246.7.080.032	80	32	21	104	8	62500
246.7.080.040	80	40	21	104	10	59000
246.7.080.050	80	50	21	104	12.5	58000
246.7.080.063	80	63	21	104	15.7	55000
246.7.080.080	80	80	21	104	20	54000
246.7.080.100	80	100	21	104	25	53000
246.7.080.125	80	125	21	104	31.2	52000
246.7.100.032	100	32	21	130	8	110000
246.7.100.040	100	40	21	130	10	102500
246.7.100.050	100	50	21	130	12.5	95000
246.7.100.063	100	63	21	130	15.7	92000
246.7.100.080	100	80	21	130	20	89000
246.7.100.100	100	100	21	130	25	87000
246.7.100.125	100	125	21	130	31.2	86000
246.7.125.032	125	32	27	160	8	178000
246.7.125.040	125	40	27	160	10	168000
246.7.125.050	125	50	27	160	12.5	157000
246.7.125.063	125	63	27	160	15.7	150000
246.7.125.080	125	80	27	160	20	142000
246.7.125.100	125	100	27	160	25	135000
246.7.125.125	125	125	27	160	31.2	133000
246.7.125.160	125	160	27	160	40	130000

246.7.016.
∅ 16/95 Shore A

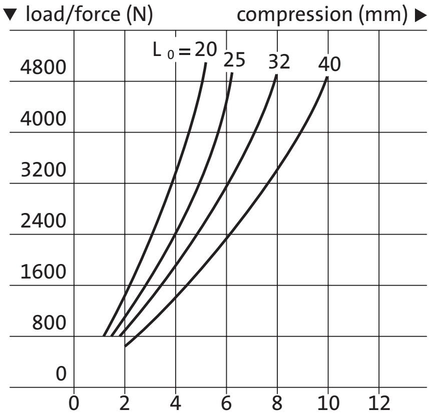


FIBROFLEX®-Tubular Spring Elements 95 Shore A

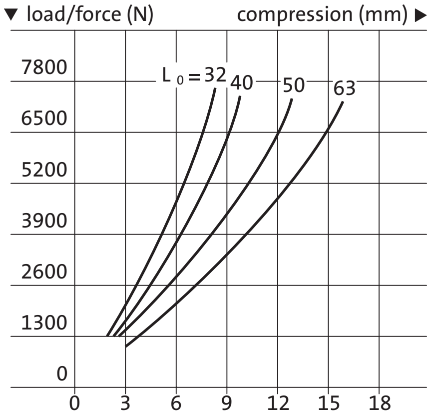
246.7.020.
Ø 20/95 Sho e A



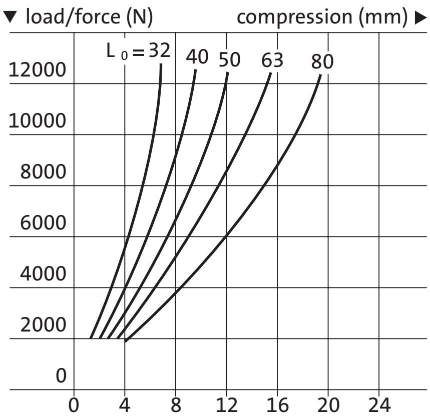
246.7.025.
Ø 25/95 Sho e A



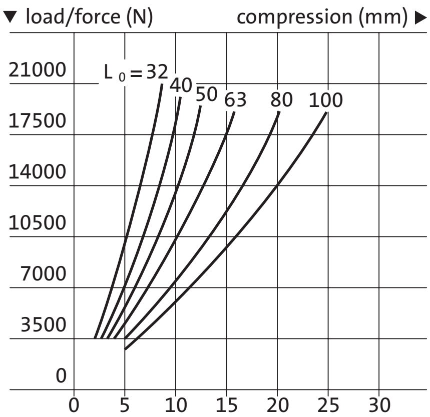
246.7.032.
Ø 32/95 Sho e A



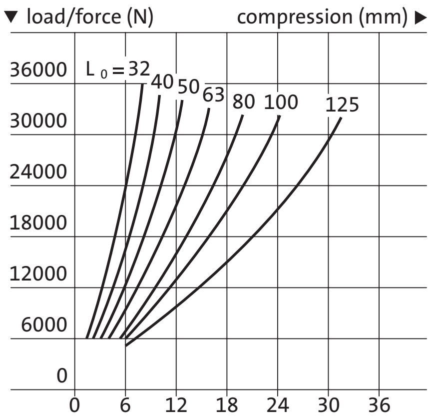
246.7.040.
Ø 40/95 Sho e A



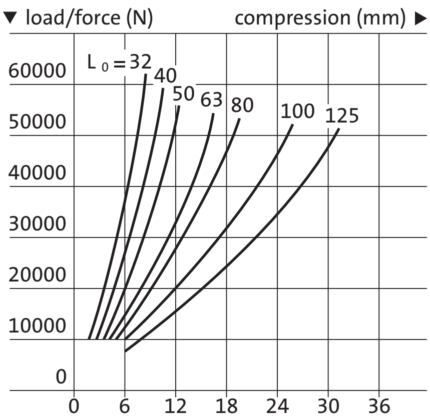
246.7.050.
Ø 50/95 Sho e A



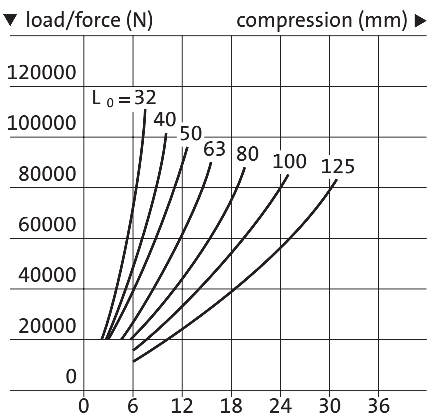
246.7.063.
Ø 63/95 Sho e A



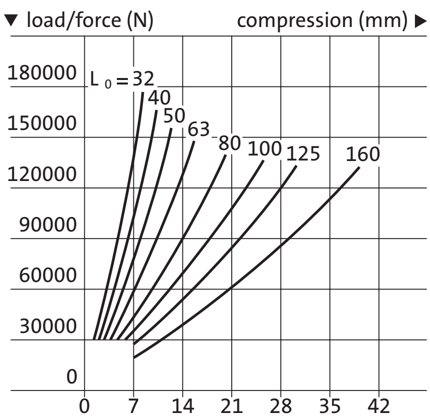
246.7.080.
Ø 80/95 Sho e A



246.7.100.
Ø 100/95 Sho e A

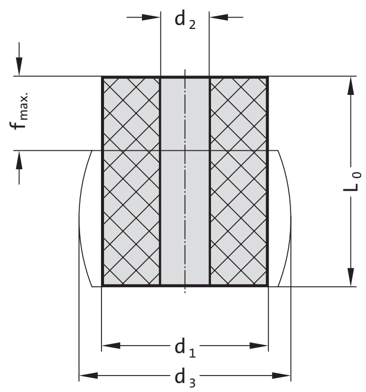


246.7.125.
Ø 125/95 Sho e A



FIBROELAST® Tubular spring element 70 Shore A

2461.4.



Material:

Polyester-based polyurethane 70 Shore A
Colour: white

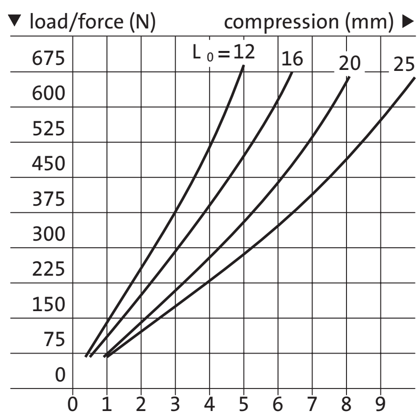
Note:

The physical properties of polyurethane elastomers means that they have a tendency to settle. The extent of such settlement is dependent on the internal heat of friction, speed and number of load changes, the spring travel and the Shore hardness.
Settlement may be as much as 4 to 7% of the spring length L_0.

2461.4. FIBROELAST® Tubular spring element 70 Shore A

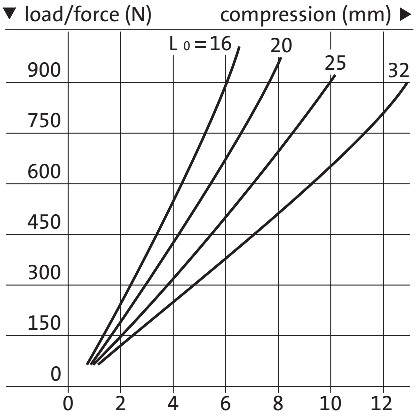
Order No	d_1	L_0	d_2	d_3	f max.
2461.4.016.012	16	12	6.5	21	4.8
2461.4.016.016	16	16	6.5	21	6.4
2461.4.016.020	16	20	6.5	21	8
2461.4.016.025	16	25	6.5	21	10
2461.4.020.016	20	16	8.5	26	6.4
2461.4.020.020	20	20	8.5	26	8
2461.4.020.025	20	25	8.5	26	10
2461.4.020.032	20	32	8.5	26	12.8
2461.4.025.020	25	20	10.5	32	8
2461.4.025.025	25	25	10.5	32	10
2461.4.025.032	25	32	10.5	32	12.8
2461.4.025.040	25	40	10.5	32	16
2461.4.032.032	32	32	13.5	42	12.8
2461.4.032.040	32	40	13.5	42	16
2461.4.032.050	32	50	13.5	42	20
2461.4.032.063	32	63	13.5	42	25.2
2461.4.040.032	40	32	13.5	52	12.8
2461.4.040.040	40	40	13.5	52	16
2461.4.040.050	40	50	13.5	52	20
2461.4.040.063	40	63	13.5	52	25.2
2461.4.040.080	40	80	13.5	52	32
2461.4.050.032	50	32	17	65	12.8
2461.4.050.040	50	40	17	65	16
2461.4.050.050	50	50	17	65	20
2461.4.050.063	50	63	17	65	25.2
2461.4.050.080	50	80	17	65	32
2461.4.050.100	50	100	17	65	40
2461.4.063.032	63	32	17	81	12.8
2461.4.063.040	63	40	17	81	16
2461.4.063.050	63	50	17	81	20
2461.4.063.063	63	63	17	81	25.2
2461.4.063.080	63	80	17	81	32
2461.4.063.100	63	100	17	81	40
2461.4.063.125	63	125	17	81	50
2461.4.080.032	80	32	21	104	12.8
2461.4.080.040	80	40	21	104	16
2461.4.080.050	80	50	21	104	20
2461.4.080.063	80	63	21	104	25.2
2461.4.080.080	80	80	21	104	32
2461.4.080.100	80	100	21	104	40
2461.4.080.125	80	125	21	104	50
2461.4.100.032	100	32	21	130	12.8
2461.4.100.040	100	40	21	130	16
2461.4.100.050	100	50	21	130	20
2461.4.100.063	100	63	21	130	25.2
2461.4.100.080	100	80	21	130	32
2461.4.100.100	100	100	21	130	40
2461.4.100.125	100	125	21	130	50
2461.4.125.032	125	32	27	160	12.8
2461.4.125.040	125	40	27	160	16
2461.4.125.050	125	50	27	160	20
2461.4.125.063	125	63	27	160	25.2
2461.4.125.080	125	80	27	160	32
2461.4.125.100	125	100	27	160	40
2461.4.125.125	125	125	27	160	50
2461.4.125.160	125	160	27	160	64

2461.4.016.
∅ 16/70 Shore A

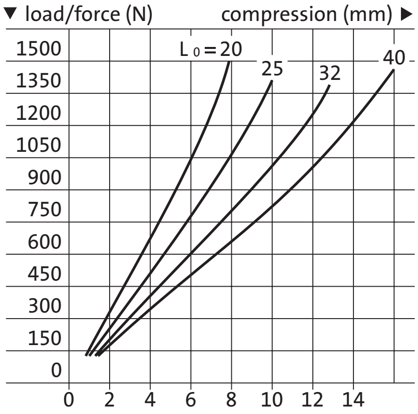


FIBROELAST®-Tubular Spring Elements 70 Shore A

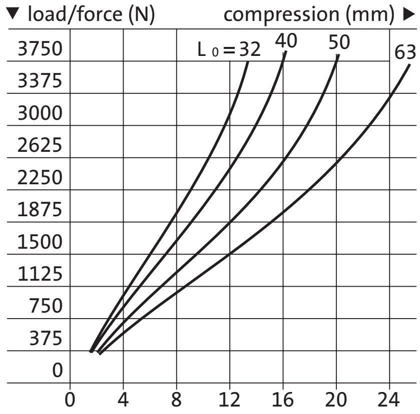
2461.4.020.
⌀ 20/70 Shore A



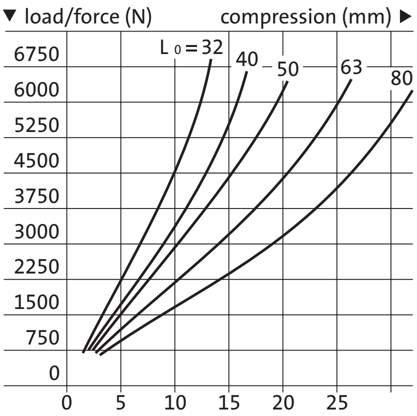
2461.4.025.
⌀ 25/70 Shore A



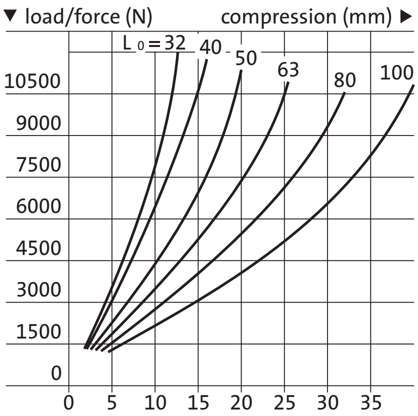
2461.4.032.
⌀ 32/70 Shore A



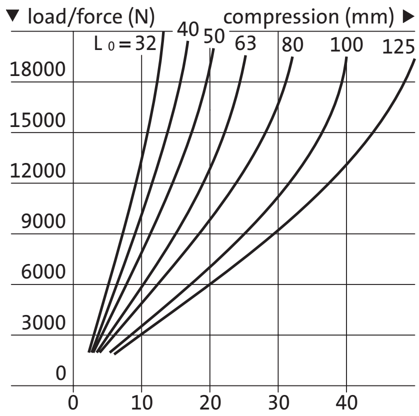
2461.4.040.
⌀ 40/70 Shore A



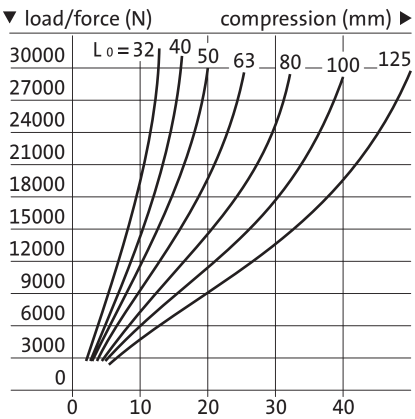
2461.4.050.
⌀ 50/70 Shore A



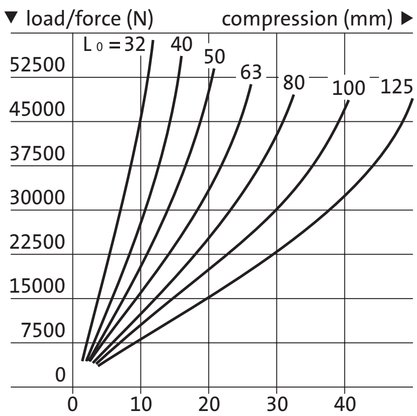
2461.4.063.
⌀ 63/70 Shore A



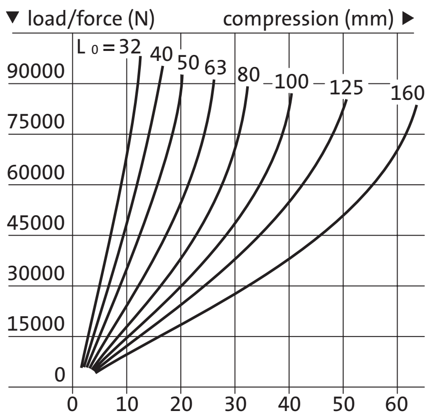
2461.4.080.
⌀ 80/70 Shore A



2461.4.100.
⌀ 100/70 Shore A

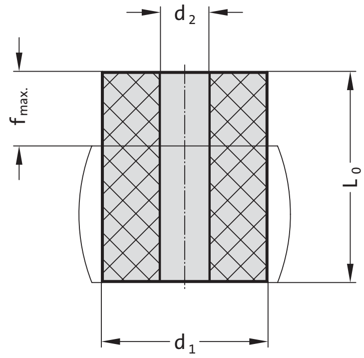


2461.4.125.
⌀ 125/70 Shore A



Tubular Spring Element, Rubber 70 Shore A

2461.2.



Material:

Chloroprene rubber 70 shore A
Colour: black

Note:

The physical properties of elastomere springs means that they have a tendency to settle. The extent of such settlement is dependent on the internal heat of friction, speed and number of load changes, the spring travel and the Shore hardness.
Settlement may be as much as 3 to 5% of the spring length L_0.

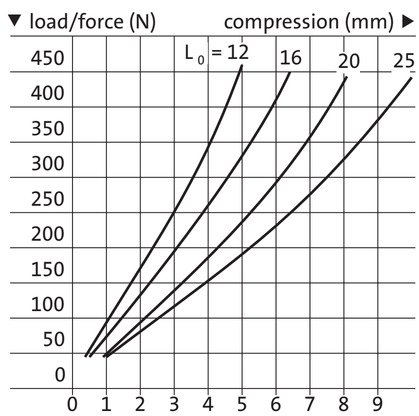
Physical characteristics:

Tensile strength acc. to DIN 53504:
≥ 12 N/mm²
Elongation at break acc. to DIN 53504:
≥ 250 %
Bulk density acc. to DIN 53479: 1.37 g/cm³
Compression set acc. to DIN 53517:
≤ 20 % (24 h/70 °C)
Temperature scope: -20 °C to 80 °C,
short-term to max. 120 °C

2461.2. Tubular Spring Element, Rubber 70 Shore A

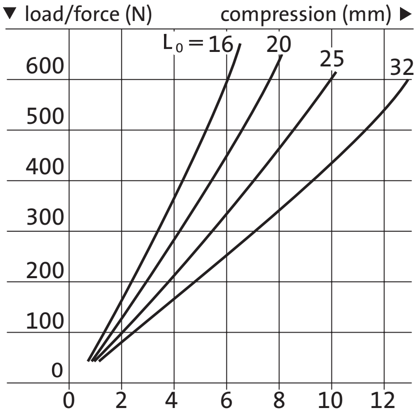
Order No	d_1	L_0	d_2	f max.
2461.2.016.012	16	12	6.5	4.8
2461.2.016.016	16	16	6.5	6.4
2461.2.016.020	16	20	6.5	8.0
2461.2.016.025	16	25	6.5	10.0
2461.2.020.016	20	16	8.5	6.4
2461.2.020.020	20	20	8.5	8.0
2461.2.020.025	20	25	8.5	10.0
2461.2.020.032	20	32	8.5	12.8
2461.2.025.020	25	20	10.5	8.0
2461.2.025.025	25	25	10.5	10.0
2461.2.025.032	25	32	10.5	12.8
2461.2.025.040	25	40	10.5	16.0
2461.2.032.032	32	32	13.5	12.8
2461.2.032.040	32	40	13.5	16.0
2461.2.032.050	32	50	13.5	20.0
2461.2.032.063	32	63	13.5	25.2
2461.2.040.032	40	32	13.5	12.8
2461.2.040.040	40	40	13.5	16.0
2461.2.040.050	40	50	13.5	20.0
2461.2.040.063	40	63	13.5	25.2
2461.2.040.080	40	80	13.5	32.0
2461.2.050.032	50	32	17	12.8
2461.2.050.040	50	40	17	16.0
2461.2.050.050	50	50	17	20.0
2461.2.050.063	50	63	17	25.2
2461.2.050.080	50	80	17	32.0
2461.2.050.100	50	100	17	40.0
2461.2.063.032	63	32	17	12.8
2461.2.063.040	63	40	17	16.0
2461.2.063.050	63	50	17	20.0
2461.2.063.063	63	63	17	25.2
2461.2.063.080	63	80	17	32.0
2461.2.063.100	63	100	17	40.0
2461.2.063.125	63	125	17	50.0
2461.2.080.032	80	32	21	12.8
2461.2.080.040	80	40	21	16.0
2461.2.080.050	80	50	21	20.0
2461.2.080.063	80	63	21	25.2
2461.2.080.080	80	80	21	32.0
2461.2.080.100	80	100	21	40.0
2461.2.080.125	80	125	21	50.0
2461.2.100.032	100	32	21	12.8
2461.2.100.040	100	40	21	16.0
2461.2.100.050	100	50	21	20.0
2461.2.100.063	100	63	21	25.2
2461.2.100.080	100	80	21	32.0
2461.2.100.100	100	100	21	40.0
2461.2.100.125	100	125	21	50.0
2461.2.125.032	125	32	27	12.8
2461.2.125.040	125	40	27	16.0
2461.2.125.050	125	50	27	20.0
2461.2.125.063	125	63	27	25.2
2461.2.125.080	125	80	27	32.0
2461.2.125.100	125	100	27	40.0
2461.2.125.125	125	125	27	50.0
2461.2.125.160	125	160	27	64.0

2461.2.016.
⌀ 16/70 Shore A

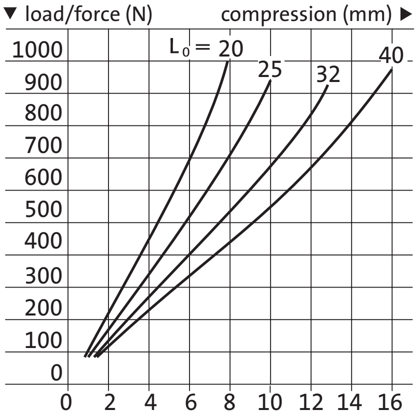


Tubular Spring Elements, Rubber 70 Shore A

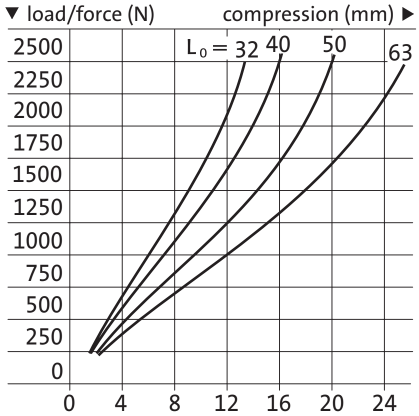
2461.2.020.
∅ 20/70 Shore A



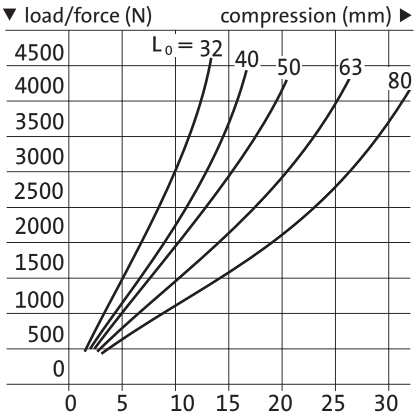
2461.2.025.
∅ 25/70 Shore A



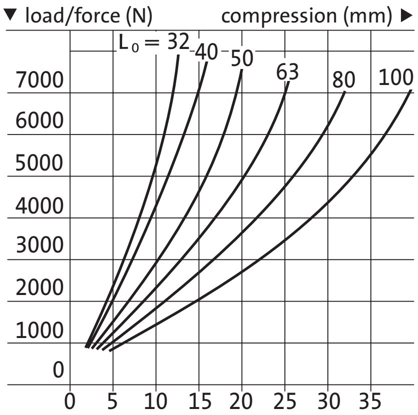
2461.2.032.
∅ 32/70 Shore A



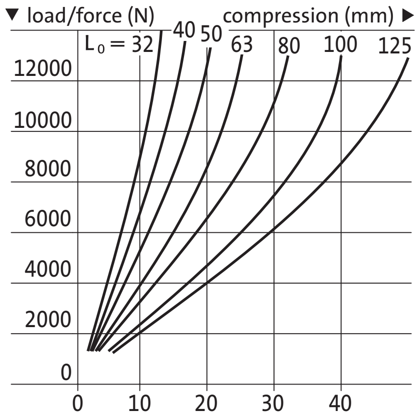
2461.2.040.
∅ 40/70 Shore A



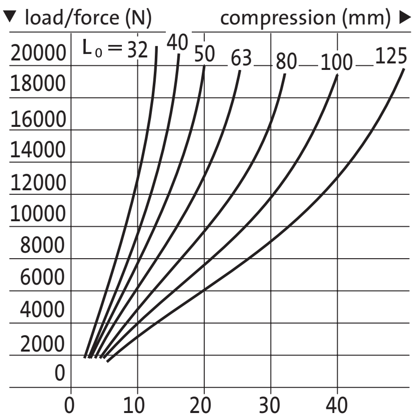
2461.2.050.
∅ 50/70 Shore A



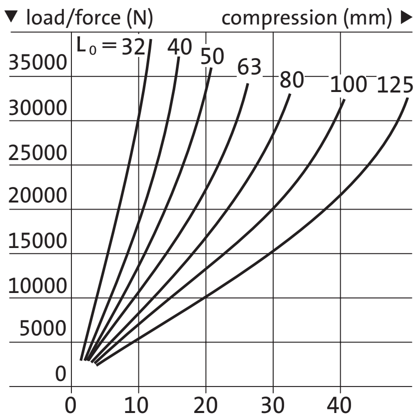
2461.2.063.
∅ 63/70 Shore A



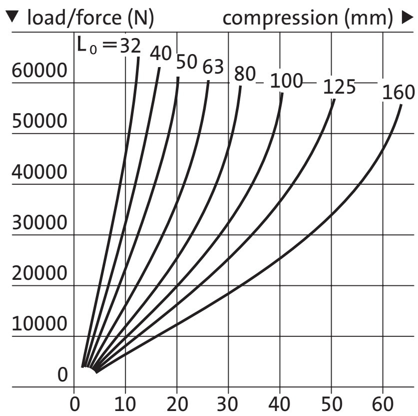
2461.2.080.
∅ 80/70 Shore A



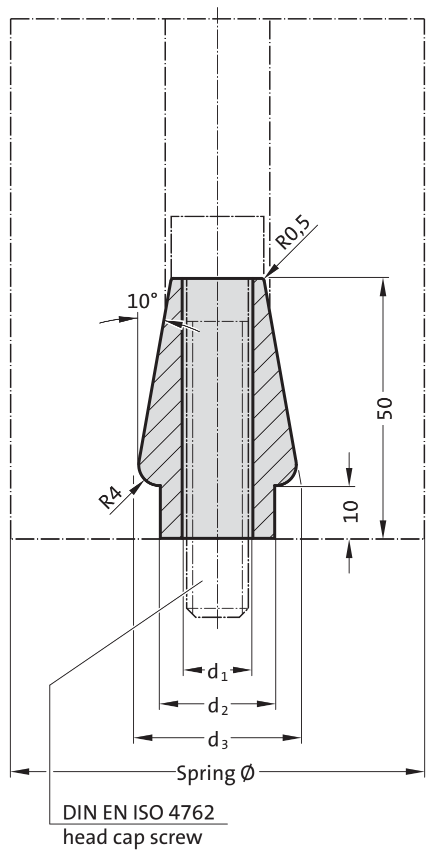
2461.2.100.
∅ 100/70 Shore A



2461.2.125.
∅ 125/70 Shore A



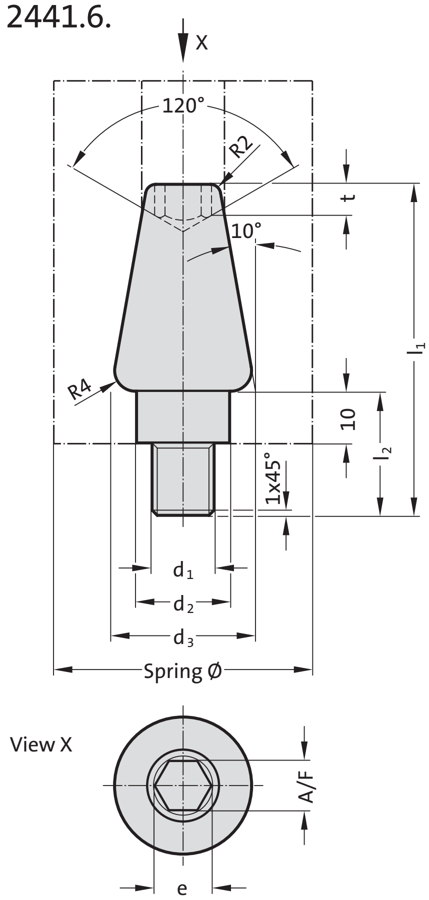
Locating bolt
Locating bolt, threaded



2441.5.
Locating bolt

Order No	Spring Ø	d_1	d_2	d_3	Socket cap screw DIN EN ISO 4762
2441.5.10	63	11	18	28	M10x65
2441.5.12	80 100	13.5	22	32	M12x70
2441.5.16	125	17.5	28	38	M16x70

Note:
Elastomeric round springs are positioned and secured in place by the locating bolts.
Screws are not included.



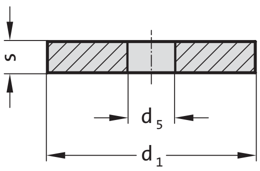
2441.6.
Locating bolt, threaded

Order No	Spring Ø	d_1	d_2	d_3	l_1	l_2	A/F	e	t
2441.6.12	63	M12	18	28	64	24	10	11.4	6
2441.6.16	80 100	M16	22	32	68	28	10	11.4	6
2441.6.20	125	M20	28	38	72	32	14	16	8

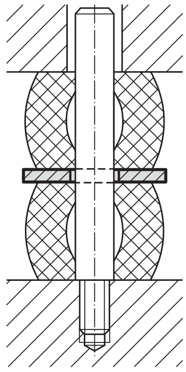
Note:
Elastomeric round springs are positioned and secured in place by the locating bolts.

Stacking washer DIN ISO 10069-2
Thrust washer

2441.3.



Mounting example



2441.3. Stacking washer DIN ISO 10069-2

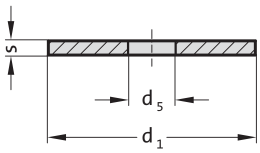
Spring-Ø	16	20	25	32	40	50	63	80	100	125
d_1	20	25	30	40	50	60	80	100	120	150
d_5	6.5	8.5	10.5	13.5	13.5	16.5	16.5	20.5	20.5	26
s	4	4	5	5	5	6	6	8	8	8

Material:
Brass

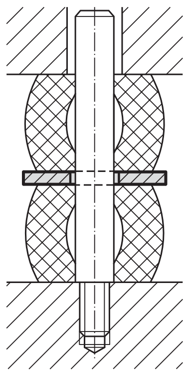
Ordering Code (example):

Stacking washer DIN ISO 10069-2		=2441.3.
Spring diameter Spring-Ø	16 mm =	016
Order No		=2441.3.016

244.4.



Mounting example



244.4. Thrust washer

Spring-Ø	16	20	25	32	40	50	63	80	100	125
d_1	20	26	32	40	50	60	80	100	120	150
d_5	6.5	8.5	10.5	13.5	13.5	16.5	16.5	20.5	20.5	26
s	1	1.5	2	2.5	2.5	3	3	4	4	5

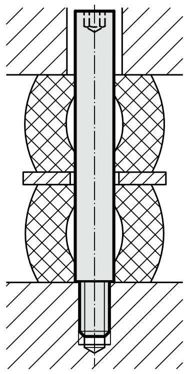
Material:
St 37

Ordering Code (example):

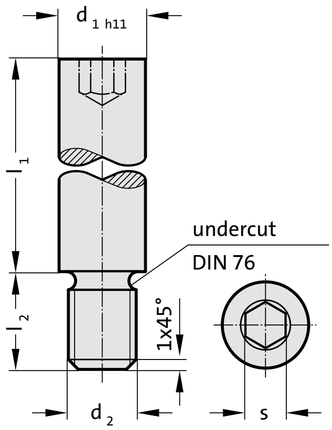
Thrust washer		=244.4.
Spring diameter Spring-Ø	16 mm =	016
Order No		=244.4. 016

GUIDE PIN
TRUST WASHER FOR ELASTOMER SPRINGS

Mounting example



244.5.



Material:
C 15

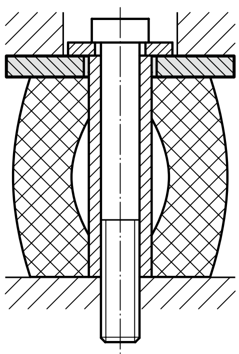
244.5. Guide pin

d_1	6	8	10	13	16	20	25
d_2	M4	M6	M8	M10	M12	M16	M20
l_2	6	9	15	15	18	25	30
s	3	4	5	6	8	10	14
l_1							
20	●	●	●				
25	●	●	●				
32	●	●	●	●	●		
40	●	●	●	●	●		
50		●	●	●	●	●	●
63			●	●	●	●	●
80				●	●	●	●
95				●	●	●	●
118					●	●	●
140					●	●	●
180					●	●	●

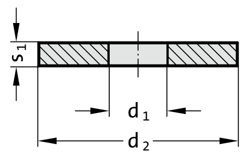
Ordering Code (example):

Guide pin		=244.5.
Nominal diameter d_1	16 mm	= 16.
Guide length l_1	40 mm	= 040
Order No		=244.5. 16.040

Mounting example



244.6.



Material:
St 37

244.6. Trust washer for elastomer springs

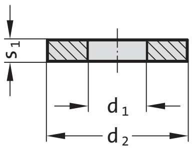
Spring-Ø	25	32	40	50	63	80	100	125
d_1	10.5	13.5	13.5	16.5	16.5	20.5	20.5	26
d_2	32	40	50	60	80	100	120	150
s_1	4	5	5	6	8	10	12	15

Ordering Code (example):

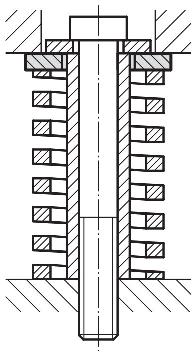
Trust washer for elastomer springs		=244.6.
Spring diameter Spring-Ø	63 mm	= 063
Order No		=244.6. 063

Trust washer for compression springs

244.7.



Mounting example



244.7. Trust washer for compression springs

Spring-∅	20	25	32	40	50	63
d_1	10.5	12.5	16.5	20.5	25.5	35.5
d_2	25	25	38	38	50	65
s_1	4	4	5	5	6	8

Material:

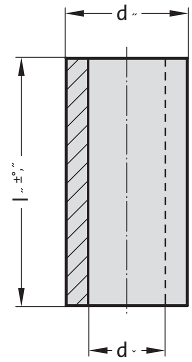
No 1.1191, heat treated

Ordering Code (example):

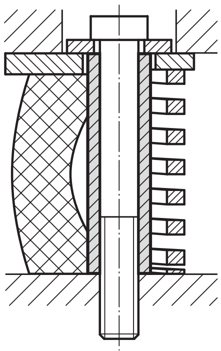
Trust washer for compression springs		=244.7.
Spring diameter Spring-∅	20 mm =	020
Order No		=244.7. 020

Spacer tube

244.9.



Mounting example



Material:
St 35.4, case-hardened

Note:
Other lengths on request!

244.9. Spacer tube

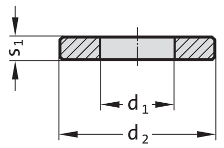
d_1	10	12	13	16	19	20	25	30	32	35	36	42
d_2	6.4	8.4	9	11	13	13	17	22	22	23	26	32
l_1												
27	●	●										
30			●	●	●							
33	●	●		●		●						
38	●	●		●		●						
40			●	●	●							
44	●	●		●		●						
48	●	●		●		●	●					
50			●	●	●	●	●	●				
61	●	●		●		●	●					
63		●	●	●	●	●	●	●				
70							●	●				
72	●	●		●		●	●	●		●	●	
80	●	●	●	●	●	●	●	●		●	●	
90		●		●		●	●	●		●	●	
95							●		●			
100		●	●	●	●	●	●	●		●	●	
105							●		●			
115							●					
125				●	●	●	●	●	●	●	●	
135							●					
145									●			
150				●		●	●	●		●	●	●
155							●					
165									●			
175							●	●		●	●	
185									●			
195							●					
200				●		●	●	●		●	●	●
205									●			
215							●					
225							●	●	●	●	●	
235							●					
245									●			
250							●	●		●	●	
255							●					

Ordering Code (example):

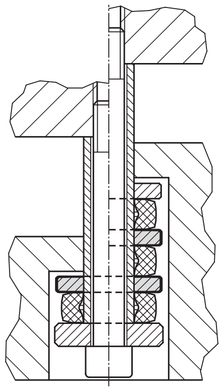
Spacer tube		=244.9.
External diameter d_1	10 mm =	10.
Length l_1	27 mm =	027
Order No		=244.9. 10. 027

Washer

244.10.15.



Mounting example



244.10.15. Washer

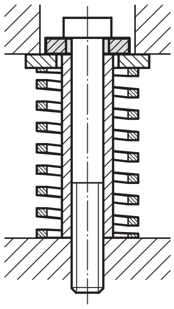
Order No	d_1	d_2	s_1
244.10.15.170.30.04	17	30	4
244.10.15.210.35.06	21	35	6
244.10.15.260.50.06	26	50	6
244.10.15.310.65.08	31	65	8
244.10.15.370.70.08	37	70	8
244.10.15.430.90.08	43	90	8

Material:

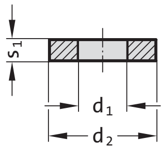
90MnCrV8, hardened

Washer
Spacer sleeve

Mounting example



244.10.



Material:

C 45 heat treated

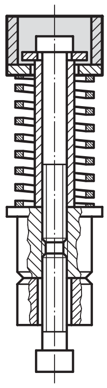
244.10. Washer

d_1	d_2	s_1	d_1	d_2	s_1	d_1	d_2	s_1	d_1	d_2	s_1
6.4	17	3	13	35	5	17	50	10	25	56	10
8.4	17	3	13	30	6	17	58	10	25	70	10
8.4	23	4	13	35	8	20.4	30	5	26	58	6
8.5	20	4	13	46	8	21	42	8	26	70	12
9	26	4	13.4	23	4	21	44	8	26	80	12
10.5	25	4	16.4	26	4	21	45	8	31	68	8
10.5	25	5	17	35	4	21	45	16	31	68	10
10.5	26	4	17	35	6	21	46	6	32	90	15
10.5	28	4	17	36	4	21	49	6	32	92	15
10.5	30	5	17	36	13	21	65	8	37	80	8
11	30	6	17	37	6	22	65	12	43	92	8
11	36	6	17	38	6	22	68	12			
12.5	28	4	17	40	6	25	46	10			
13	30	5	17	50	6	25	55	10			

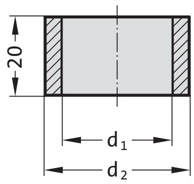
Ordering Code (example):

Washer		=244.10.
Inside diameter d_1	6.4 mm =	064.
External diameter d_2	17 mm =	17.
Thickness s_1	3 mm =	03
Order No		=244.10. 064. 17.03

Mounting example



244.11.



Material:

St 35.4 case-hardened

244.11. Spacer sleeve

Spring-Ø	20 25	32 40
d_1	20	30
d_2	25	38
Order code	25	40

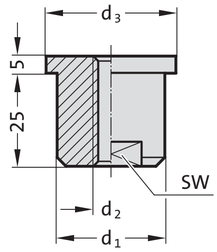
Ordering Code (example):

Spacer sleeve		=244.11.
Order code Diameter	25 mm =	25
Order No		=244.11. 25

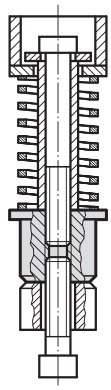
subject to alterations

Spacer plug
Adjusting washer

244.12.



Mounting example



244.12. Spacer plug

Spring-Ø	20	25	32	40
d_1	20	20	32	32
d_2	M6	M8	M10	M12
d_3	25.3	25.3	38	38
SW*	15	15	27	27

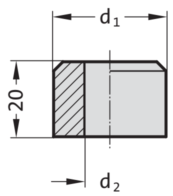
*SW = Width across flats

Material:
No. 1.7131 case-hardened

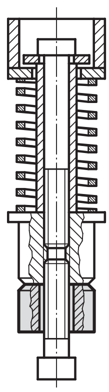
Ordering Code (example):

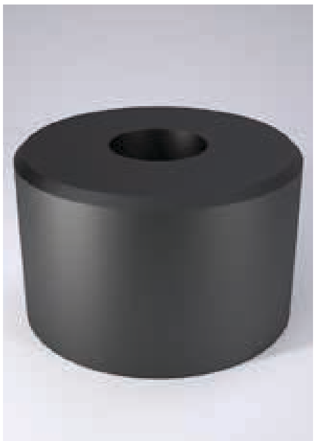
Spacer plug		=244.12.
Spring diameter Spring-Ø	20 mm =	20
Order No		=244.12.20

244.13.



Mounting example





244.13. Adjusting washer

Spring-Ø	20	25	32	40
d_1	20	20	32	32
d_2	7	9	11	14

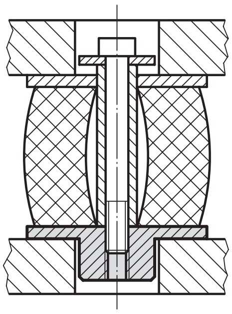
Material:
No 1.7131

Ordering Code (example):

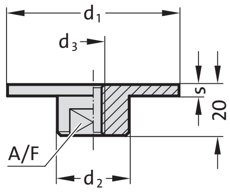
Adjusting washer		=244.13.
Spring diameter Spring-Ø	20 mm =	20
Order No		=244.13.20

Threaded disc for elastomer springs
Threaded disc for compression springs

Mounting example



2441.14.



Material:
St 60

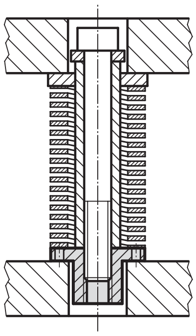
2441.14. Threaded disc for elastomer springs

Spring-Ø	25	32	40	50	63	80	100
d_1	32	40	50	60	78	98	120
d_2	18	18	18	20	20	26	26
d_3	M6	M8	M8	M10	M10	M12	M12
A/F	14	14	14	17	17	22	22
s	5	5	5	6	8	10	12

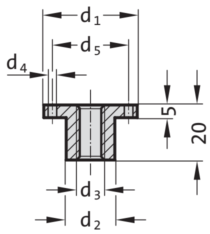
Ordering Code (example):

Threaded disc for elastomer springs		=2441.14.
Spring diameter Spring-Ø	25 mm =	025
Order No		=2441.14.025

Mounting example



2441.15.



Material:
Ck 45 heat treated

2441.15. Threaded disc for compression springs

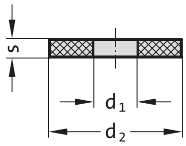
Spring-Ø d_1	20	25	32	40	50
d_2	10	12.5	16	20	25
d_3	M6	M8	M10	M12	M16
d_4	3.2	4.2	4.2	4.2	4.2
d_5	14	20	25	30	40

Ordering Code (example):

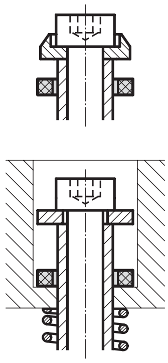
Threaded disc for compression springs		=2441.15.
Spring diameter Spring-Ø d_1	20 mm =	020
Order No		=2441.15.020

Shock absorbing washer

2450.



Mounting example



Material:
Polyurethan (FIBROFLEX®)

Execution:
2450.6. (90 Shore A) available from stock
2450.5. (80 Shore A) and
2450.7. (95 Shore A) available upon request

2450. Shock absorbing washer

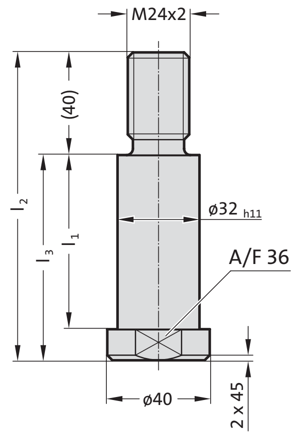
d_1	d_2	s	d_1	d_2	s	d_1	d_2	s
6.4	16	3	17	26	4	25	32	6
8.5	20	3	17	38	5	26	35	6
10.5	15	4	17	50	6	26	50	6
10.5	25	4	17	63	6	27	41	7
11	17	3	18	27	4	27	125	10
12	24	5	18	32	7	31	42	6
13	19	4	21	30	5	32	40	6
13	25	4	21	35	7	32	49	8
13.5	32	4	21	38	6	32	60	10
13.5	40	5	21	80	10	37	46	6
14	23	4	21	100	10	37	53	8
14	26	5	22	28	6	37	65	10
15.5	23	4	23.5	34	4	42	70	10

Ordering Code (example):

Shock absorbing washer		=	2450.
Shore A hardness MAT	90 Shore A	=	6.
Inside diameter d_1	6.4 mm	=	06.
External diameter d_2	16 mm	=	016.
Thickness s	3 mm	=	03
Order No		=	2450. 6. 06. 016. 03

Retaining bolt
Thrust washer

2441.18.

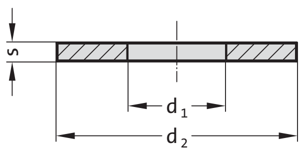


Material:
No 1.7225, heat treated

2441.18. Retaining bolt

Order No	l_1	l_2	l_3
2441.18.032.048	48	100	60
2441.18.032.068	68	120	80
2441.18.032.088	88	140	100
2441.18.032.108	108	160	120
2441.18.032.128	128	180	140
2441.18.032.148	148	200	160
2441.18.032.168	168	220	180
2441.18.032.188	188	240	200
2441.18.032.208	208	260	220
2441.18.032.228	228	280	240
2441.18.032.248	248	300	260
2441.18.032.268	268	320	280
2441.18.032.288	288	340	300

2441.16.



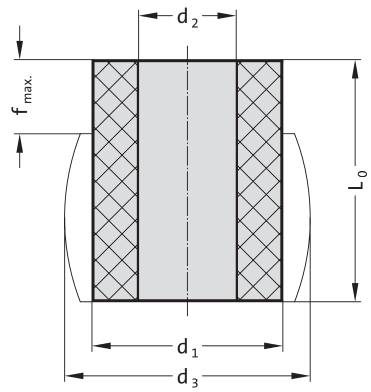
Material:
No 1.0570

2441.16. Thrust washer

Order No	d_1	d_2	s
2441.16.330.080.06	33	80	6
2441.16.330.100.08	33	100	8

FIBROFLEX®-Tubular spring element

246.6.



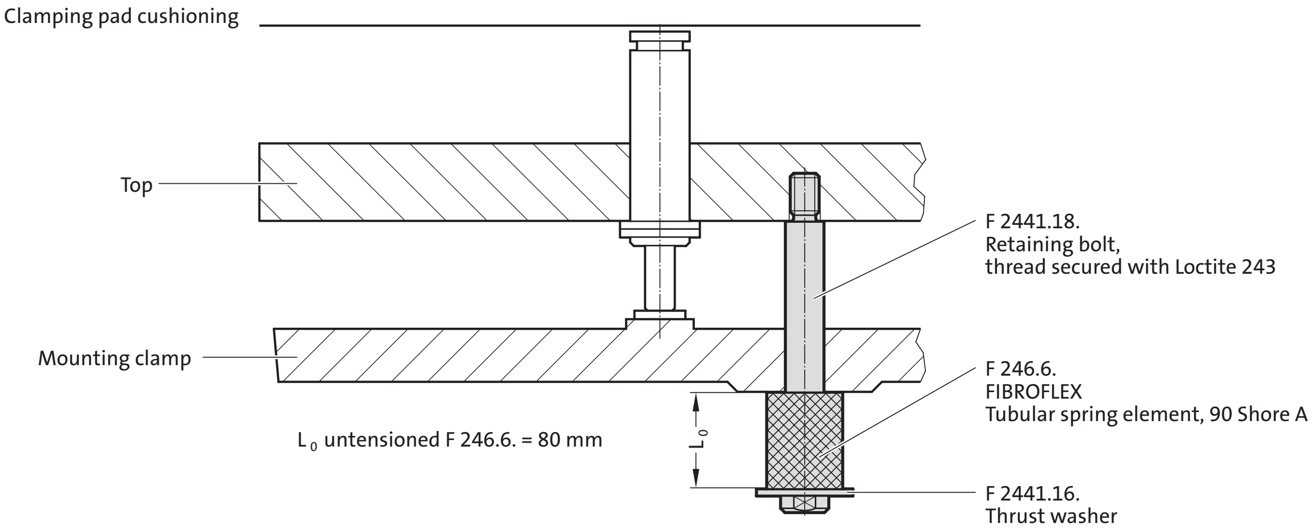
246.6. FIBROFLEX®-Tubular spring element

Order No	d_1	d_2	d_3	l_0	f max.
246.6.063.033.080	63	33	82	80	24
246.6.080.033.080	80	33	106	80	24

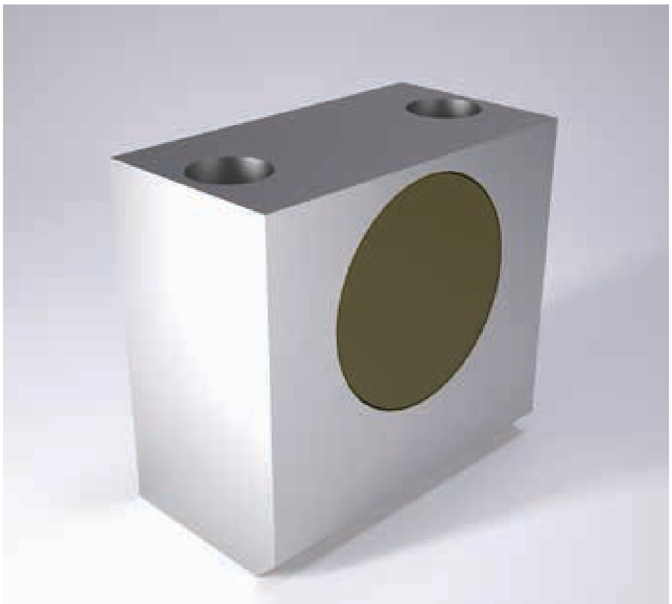
Material:

Polyurethan 90 Shore A
Colour: yellow

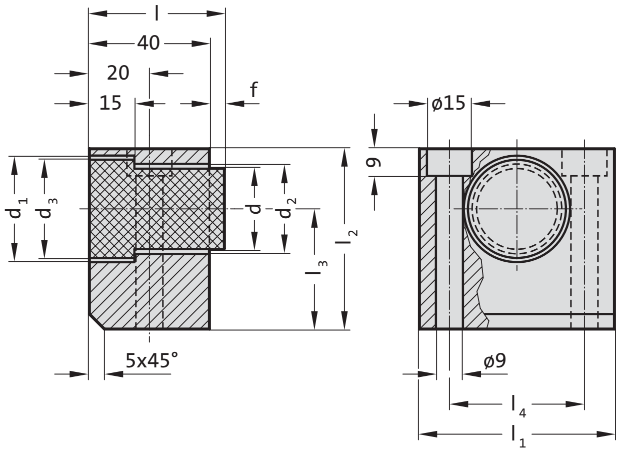
Mounting example



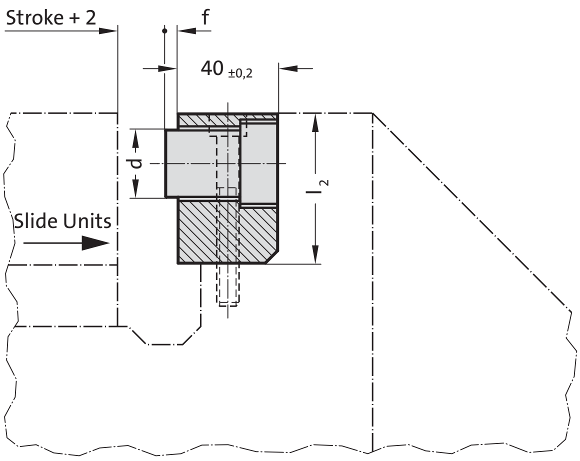
Slide stop



2451.6.



Mounting example



Material:

Mounting block: Steel
Stop buffer: FIBROFLEX®, 90 Shore A

Note:

Screws are not included.
Order No for spare part: Stop buffer 2451.6.☐☐☐.2

Fixing:

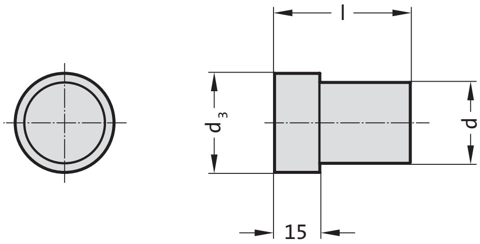
Use socket cap screws DIN EN ISO 4762 M8.

2451.6. Slide stop

Order No	d	d_1	d_2	d_3	l	l_1	l_2	l_3	l_4	f	Spring force [N]
2451.6.027	27	35	30	34	45	65	60	40	45	5	5200
2451.6.036	36	45	40	44	45	75	70	45	55	5	9800

Stop buffer

2451.6. .2



2451.6. .2 Stop buffer

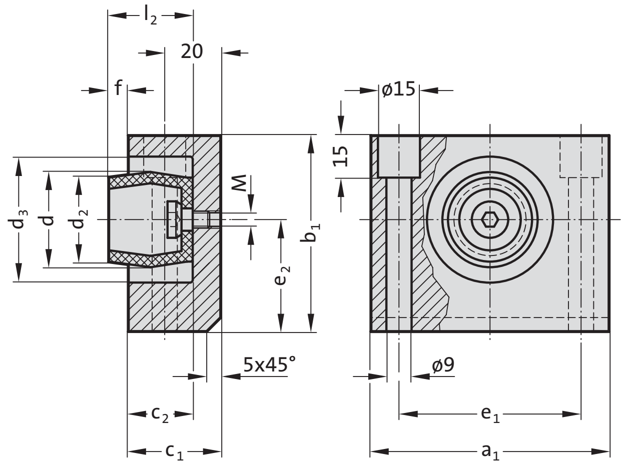
Order No	d	d_3	l
2451.6.027.2	27	34	45
2451.6.036.2	36	44	45

Material:

FIBROFLEX®, 90 Shore A

Slide stop

2452.10.



Material:

Mounting block: Steel
Damping unit SD: CO polyester elastomer, 55 Shore D

Note:

Screws are not included.
Order No for spare part: Damping unit SD, with screw 2452.10.034.030.2
For the exchange of the damping unit, the screw tightening torque for the holding screw is 10 Nm.

Fixing:

Use socket cap screws DIN EN ISO 4762 M8.

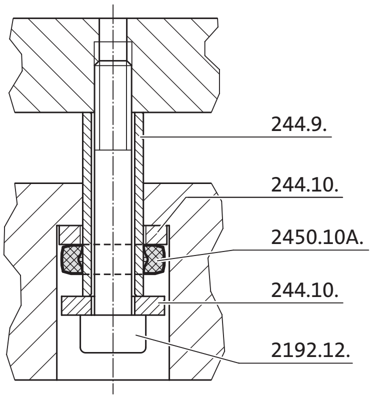
2452.10. Slide stop

Order No	d	d_2	d_3	M	a_1	b_1	c_1	c_2	e_1	e_2	l_2	f	Spring force [N]	Energy absorption per stroke under permanent load [Nm]
2452.10.034	34	30	45	M6	85	70	33	23	65	40	30	7	6000	27

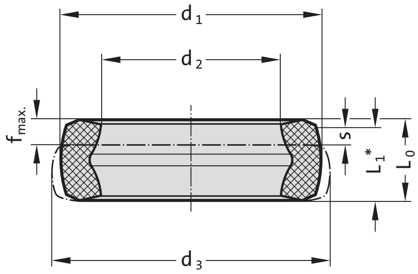
subject to alterations

Damper, light-duty

Mounting example



2450.10A.



Description:

Dampers, light duty , made of co-polyester elastomer are found in the elevating units in progressive dies in the automotive and white goods industry. The increasing stresses on screws and bolts as well as noise emission are reduced by the light duty dampers.

Benefits:

- High absorption of force and energy
- Long service life and high level of operating safety
- Noise reduction
- High degree of effectiveness

Material:

Co-Polyester-Elastomer

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

Note:

Socket cap screw 2192.12. see Section C
Spacer tube 244.9. see Section F
Washer 244.10. see Section F

2450.10A. Damper, light-duty

Order No	d_1	d_2	d_3	L_0	L_1*	Stroke (s)	$F_{max.}$ [N]	$f_{max.}$	W [Nm/stroke (s)]**	W_h [Nm/h]***	Socket cap screw
2450.10A.0236.0163.073	23.6	16.3	25.3	7.3	6.6	1.9	3000	2	3	7500	M10

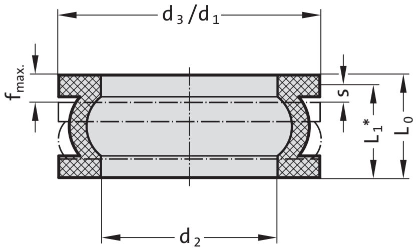
*Dimension L_1 is the slump which must be taken into account for the design.

**W = Total energy per stroke

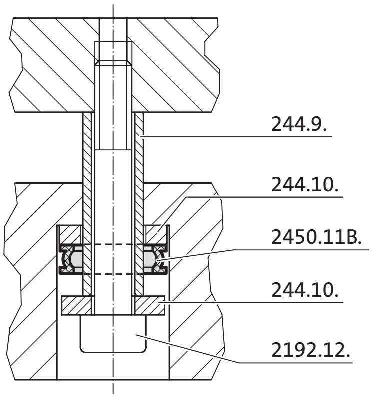
***W_h = Total energy per hour

Damper, light-duty

2450.11B.



Mounting example



Description:

Dampers, light duty , made of co-polyester elastomer are found in the elevating units in progressive dies in the automotive and white goods industry. The increasing stresses on screws and bolts as well as noise emission are reduced by the light duty dampers.
The two-ply version of the flanged damper can also be used depending on the force or stroke without the use of an additional distance washer.

Benefits:

- High absorption of force and energy
- Long service life and high level of operating safety
- Noise reduction
- High degree of effectiveness

Material:

Co-Polyester-Elastomer

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

Note:

Socket cap screw 2192.12. see Section C
Spacer tube 244.9. see Section F
Washer 244.10. see Section F

2450.11B. Damper, light-duty

Order No	d_1	d_2	d_3	L_0	L_1*	Stroke (s)	$F_{max.}$ [N]	$f_{max.}$	W [Nm/stroke (s)]**	W_h [Nm/h]***	Socket cap screw
2450.11B.0300.0203.118	30	20.3	30.2	11.8	10.7	2.7	5000	2.9	8.6	20000	M12

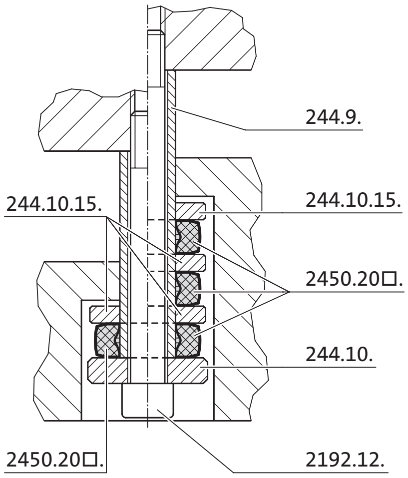
*Dimension L_1 is the slump which must be taken into account for the design.

**W = Total energy per stroke

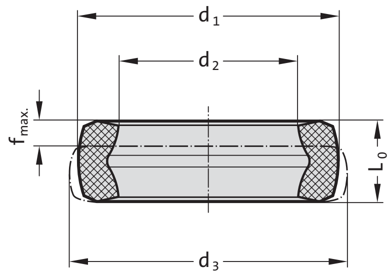
***W_h = Total energy per hour

Damper, heavy-duty

Mounting example



2450.20□.



Description:

The co-polyester elastomer dampers, heavy-duty, are used as holddown dampers in the automotive and white goods industry. Increasing return stroke speeds and the related stresses on screws and bolts in moveable, suspended tool parts are absorbed by the hold-down dampers. Reduced noise emission is a further additional positive sideeffect.

Benefits:

- High absorption of force and energy
- Slight settlement
- Energy absorption between 5 Nm and 269 Nm
- Long service life and high level of operating safety
- Noise reduction
- High degree of effectiveness

Material:

Co-Polyester-Elastomer

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

Note:

Socket cap screw 2192.12. see Section C
Spacer tube 244.9. see Section F
Washer 244.10. see Section F

2450.20□. Damper, heavy-duty

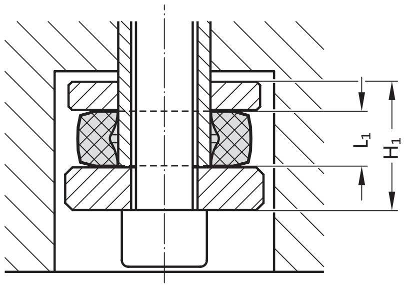
Order No	d_1	d_2	d_3	L_0	$F_{max.}$ [N] (static < 0,1)	$f_{max.}$	W [Nm/stroke (s)]*	Socket cap screw
2450.20A.0264.0163.078	26.4	16.3	28.4	7.8	5500	2	5	M10
2450.20B.0321.0203.108	32.1	20.3	35.1	10.8	9000	4.4	14.2	M12
2450.20B.0458.0253.170	45.8	25.3	49.8	17	20000	4.9	44.6	M16
2450.20A.0546.0303.213	54.6	30.3	61.8	21.3	30000	7.6	81.9	M20
2450.20A.0618.0363.215	61.8	36.3	69.9	21.5	46000	8.2	126.5	M24
2450.20A.0785.0423.294	78.5	42.3	89	29.4	75000	11.4	269	M30

*Total energy per stroke

Damper, heavy-duty
Selection table multiple layering

Simple layering

Order No.	L_1*	$F_{1\,max}$ [N] (dynamic>0,1)	W_1 [Nm/stroke (s)]**	W_{h1} [Nm/h]***	H_1 total height	socket cap screw
2450.20A.0264.0163.078	7.1	4100	3.5	9000	17.1	M10
2450.20B.0321.0203.108	9.8	6600	12	30000	23.8	M12
2450.20B.0458.0253.170	15.3	14500	19	45000	31.3	M16
2450.20A.0546.0303.213	19	22500	47	67000	39	M20
2450.20A.0618.0363.215	19.5	37500	76	114000	39.5	M24
2450.20A.0785.0423.294	27	46000	143	152000	50	M30



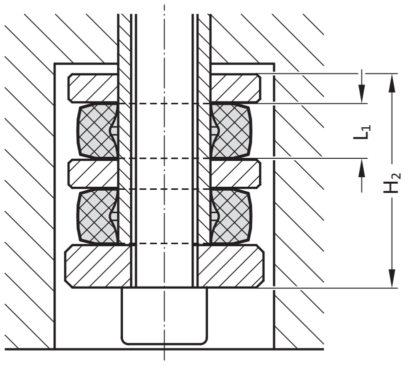
* Dimension „L_1“ is the slump which must be taken into account for the design.

** Total energy per stroke

*** Total energy per hour

Double layering

Order No.	L_1*	$F_{2\,max}$ [N] (dynamic>0,1)	W_2 [Nm/stroke (s)]**	W_{h2} [Nm/h]***	H_2 total height	socket cap screw
2450.20A.0546.0303.213	19	18000	78	107000	66	M20
2450.20A.0618.0363.215	19.5	35000	148	174000	67	M24
2450.20A.0785.0423.294	27	39000	233	272000	85	M30



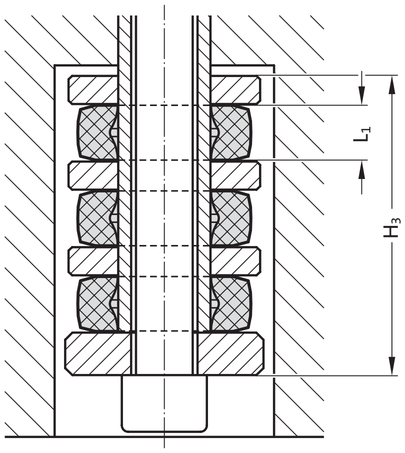
* Dimension „L_1“ is the slump which must be taken into account for the design.

** Total energy per stroke

*** Total energy per hour

Threefold layering

Order No.	L_1*	$F_{3\,max}$ [N] (dynamic>0,1)	W_3 [Nm/stroke (s)]**	W_{h3} [Nm/h]***	H_3 total height	socket cap screw
2450.20A.0546.0303.213	19	16000	100	127000	93	M20
2450.20A.0618.0363.215	19.5	28000	176	194000	94.5	M24
2450.20A.0785.0423.294	27	29000	255	281000	120	M30



* Dimension „L_1“ is the slump which must be taken into account for the design.

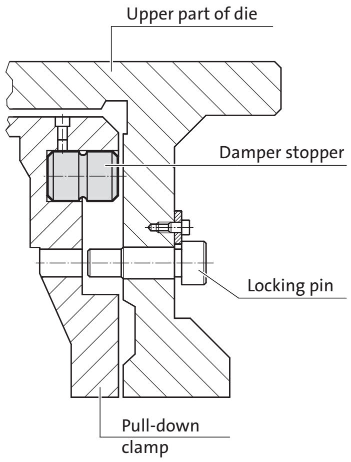
** Total energy per stroke

*** Total energy per hour

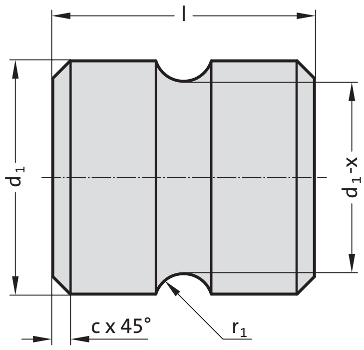
FIBRO

Damper stopper

Mounting example



2451.10D.



Description:

Damper stopper made of co-polyester elastomer dampen the recoil on the locking and unlocking pins in the manufacturing of jigs. Damper stoppers are used in the automotive and white goods industry. Damper stoppers sit inside the pull-down clamps and are radially stressed. The number and size depends on the weight and the velocity of the pull-down clamps.

Benefits:

- High absorption of force and energy
- Slight settlement
- UV protection
- Long service life and high level of operating safety
- Noise reduction
- High degree of eff ectiveness

Material:

Co-polyester elastomer, black

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

2451.10D. Damper stopper

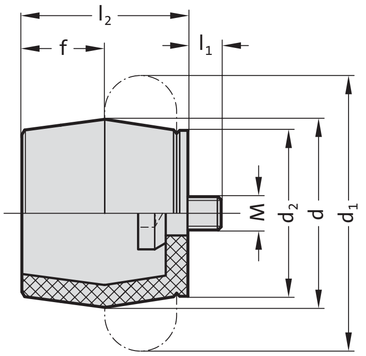
Order No	Size	d_1	Cut-in depth d_1-x	Cut-in radius r_1	c	l
2451.10D.040.060	B	40	8	7	3	60
2451.10D.050.070	C	50	10	8	4	70
2451.10D.063.080	D	63	12	9	5	80
2451.10D.080.090	E	80	14	10	6	90

Number and size (B, C, D, E) of damper stoppers for cushioning

	Pull-down clamp speed m/s												
Pull-down clamp weight kg	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3
100	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	4 x B	4 x B	4 x B	4 x B
250	3 x B	3 x B	3 x B	3 x B	3 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B
500	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x C	4 x C	4 x C
750	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C
1000	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x D	4 x D
1250	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x D	4 x D	4 x D	4 x D	4 x D
1500	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E
1750	4 x C	4 x C	4 x C	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E
2000	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E
2500	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E
3000	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E	6 x E
3500	4 x D	4 x E	4 x E	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E	8 x E	8 x E	10 x E
4000	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E	6 x E	8 x E	8 x E	10 x E	10 x E	10 x E
4500	6 x E	6 x E	6 x E	6 x E	6 x E	8 x E	10 x E	10 x E	10 x E	10 x E	10 x E	10 x E	10 x E
5000	6 x E	6 x E	8 x E	8 x E	8 x E	10 x E	10 x E	10 x E	10 x E	---	---	---	---

Damping unit SD

2452.10. .2



Material:

Damping unit SD: CO polyester elastomer, 55 Shore D
Screw: Steel
Technical data:
Resistant to microbes, seawater, and chemicals, as well as very good UV and ozone resistance. No water absorption and no bloating.

Starting speed: up to max. 5 m/s
Installation position: any
Dynamic power consumption: 870 N through 90000 N
Permissible temperature range: -40°C through 90°C
Dissipation of energy: 40% through 66%

Note:

We are happy to support you in the calculation and design of a suitable damping unit.

Dynamic (v>0.5 m/s) characteristic curves available for all types upon request.
SD damping units can also be used for emergency stop applications. Further information upon request.

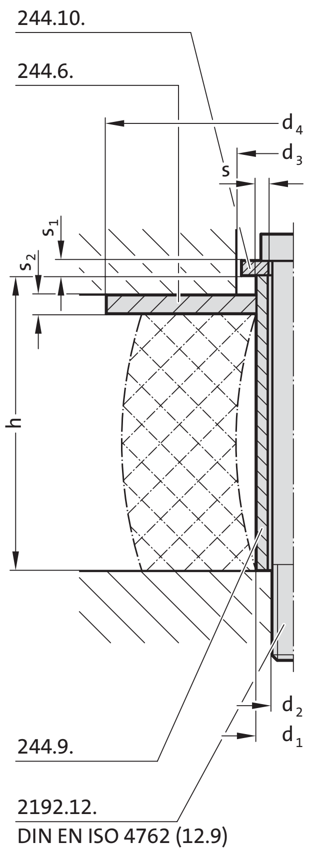
2452.10. .2 Damping unit SD

Order No	d	l_2	d_1	d_2	f	W_3 [Nm/stroke]*	M	l_1	Tightening torque [Nm]
2452.10.012.011.2	12	11	15	11	4	2	M3	3	1
2452.10.017.016.2	17	16	22	15	6	6	M4	4	1.7
2452.10.021.018.2	21	18	26	18	7	10	M5	5	2.3
2452.10.022.019.2	22	19	27	19	6	11.5	M6	6	6
2452.10.028.026.2	28	26	36	25	9	29	M6	6	6
2452.10.034.030.2	34	30	43	30	10	48	M6	6	6
2452.10.037.033.2	37	33	48	33	12	65	M6	6	6
2452.10.040.035.2	40	35	50	34	14	82	M8	8	20
2452.10.043.038.2	43	38	55	38	14	112	M8	8	20
2452.10.047.041.2	47	41	60	41	17	140	M12	12	50
2452.10.050.045.2	50	45	64	44	19	170	M12	12	50
2452.10.054.047.2	54	47	68	47	17	201	M12	12	50
2452.10.057.051.2	57	51	73	50	21	242	M12	12	50
2452.10.062.054.2	62	54	78	53	21	304	M12	12	50
2452.10.065.058.2	65	58	82	57	22	374	M12	12	50
2452.10.070.061.2	70	61	86	60	24	421	M12	12	50
2452.10.072.065.2	72	65	91	63	26	482	M16	16	120
2452.10.080.069.2	80	69	100	69	23	570	M16	16	120
2452.10.082.074.2	82	74	105	72	28	683	M16	16	120
2452.10.085.076.2	85	76	110	75	27	797	M16	16	120
2452.10.090.080.2	90	80	114	78	30	934	M16	16	120
2452.10.098.086.2	98	86	123	85	31	1147	M16	16	120
2452.10.116.101.2	116	101	146	98	38	2014	M16	16	120

*Energy absorption per stroke under permanent load

Spring unit for elastomer spring

244.14.0.



244.14.0. Spring unit for elastomer spring

Spring unit consists of:

Socket cap screw DIN EN ISO 4762 (12.9) 2192.12.
Spring abutment washer 244.6.
Spacer tube 244.9.
Stop washer 244.10.

Elastomer spring serparate order: 246.5., 246.6., 246.7., 2461.2., 2461.4.

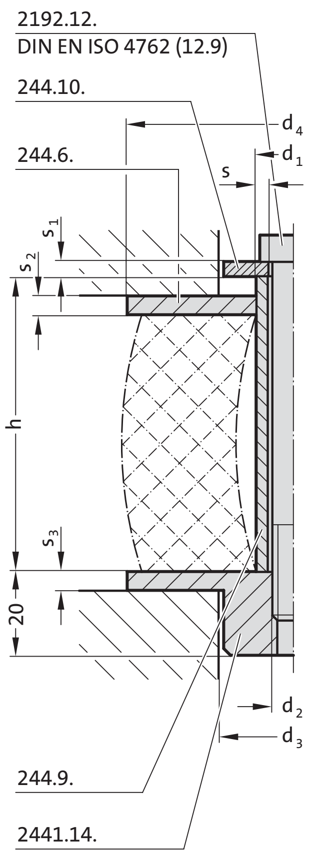
Spring-∅	$d_1 \times s$	h*	d_2	d_3	d_4	s_1	s_2
25	10 × 1,8		M 6	18	32	3	4
32	12 × 1,8		M 8		40		5
40				30	50	4	
50	16 × 2,5		M 10		60		6
63					80		8
80	20 × 3,5		M 12		100		10
100					120		12
125	25 × 4,5		M 16	39	150	6	15

*h see selection chart spacer tube 244.9. and spring data

Ordering Code (example):

Spring unit for elastomer spring	=	244.14.
not loaded	=	0.
for spring-∅ = 40 mm	=	040.
Spacer tube length h = 48 mm	=	048
Order number	=	244.14.0.040.048

2441.14.1.



2441.14.1. Spring unit for elastomer spring

Spring unit consists of:

Socket cap screw DIN EN ISO 4762 (12.9) 2192.12.
Spring abutment washer 244.6.
Spacer tube 244.9.
Stop washer 244.10.
Threaded disc 2441.14.

Elastomer spring serparate order: 246.5., 246.6., 246.7., 2461.2., 2461.4.

Spring-∅	$d_1 \times s$	h*	d_2	d_3	d_4	s_1	s_2	s_3
25	10 × 1,8		M 6	20	32	3	4	5
32	12 × 1,8		M 8	20	40	3	5	5
40	12 × 1,8		M 8	20	50	4	5	5
50	16 × 2,5		M 10	22	60	4	6	6
63	16 × 2,5		M 10	22	80	4	8	8
80	20 × 3,5		M 12	28	100	4	10	10
100	20 × 3,5		M 12	28	120	4	12	12

*h see selection chart spacer tube 244.9. and spring data

Ordering Code (example):

Spring unit for elastomer spring	=	2441.14.
preloaded	=	1.
for spring-∅ = 40 mm	=	040.
Spacer tube length h = 48 mm	=	048
Order number	=	2441.14.1.040.048

Spring unit for helical spring

244.15.0. Spring unit for helical spring

Spring unit consists of:

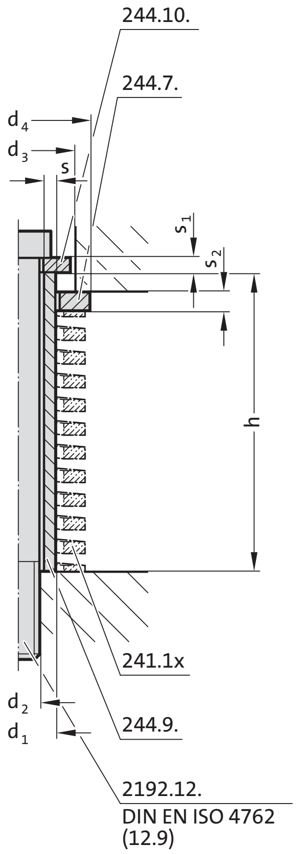
Socket cap screw DIN EN ISO 4762 (12.9) 2192.12.
Spring abutment washer 244.7.
Spacer tube 244.9.
Stop washer 244.10.

Helical spring serparate order: 241.14., 241.15., 241.16., 241.17.

Spring-∅	$d_1 \times s$	h*	d_2	d_3	d_4	s_1	s_2
20	10 × 1,8		M 6	18	25	3	4
25	12 × 1,8		M 8	18	25	3	4
32	16 × 2,5		M 10	30	38	4	5
40	20 × 3,5		M 12	30	38	4	5
50	25 × 4,0		M 16	39	50	6	6
63	35 × 6,0		M 20	52	65	6	8

*h see selection chart spacer tube 244.9. and spring Data

244.15.0.



Ordering Code (example):

Spring unit for helical spring	= 244.15.
not loaded	= 0.
for spring-∅ = 40 mm	= 040.
Spacer tube length h = 48 mm	= 048
Order number	= 244.15.0.040.048

2441.15.1. Spring unit for helical spring

Spring unit consists of:

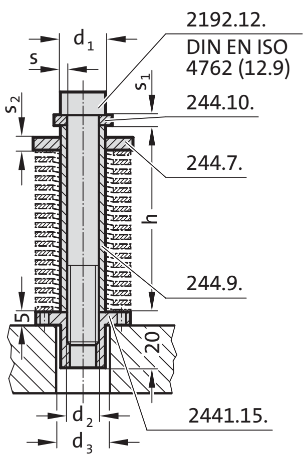
Socket cap screw DIN EN ISO 4762 (12.9) 2192.12.
Spring abutment washer 244.7.
Spacer tube 244.9.
Stop washer 244.10.
Threaded disc 2441.15.

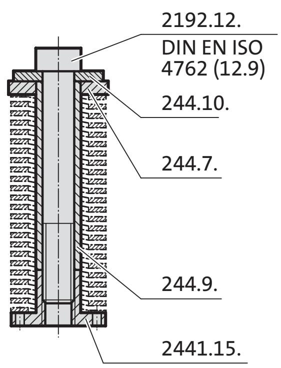
Helical spring serparate order: 241.14., 241.15., 241.16., 241.17.

Spring-∅	$d_1 \times s$	h*	d_2	d_3	d_4	s_1	s_2
20	10 × 1,8		M 6	11	25	3	4
25	12 × 1,8		M 8	14	25	3	4
32	16 × 2,5		M 10	18	38	4	5
40	20 × 3,5		M 12	22	38	4	5
50	25 × 4,0		M 16	27	50	6	6

*h see selection chart spacer tube 244.9. and spring Data

2441.15.1. Mounting examples





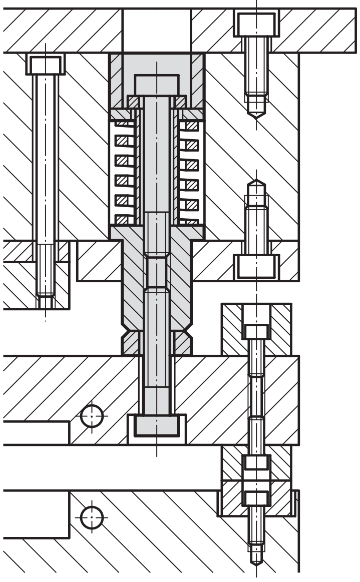
Ordering Code (example):

Spring unit for helical spring	= 2441.15.
preloaded	= 1.
for spring-∅ = 40 mm	= 040.
Spacer tube length h = 48 mm	= 048
Order number	= 2441.15.1.040.048

FIBRO

Spring- and Spacer Unit

Installation Example:

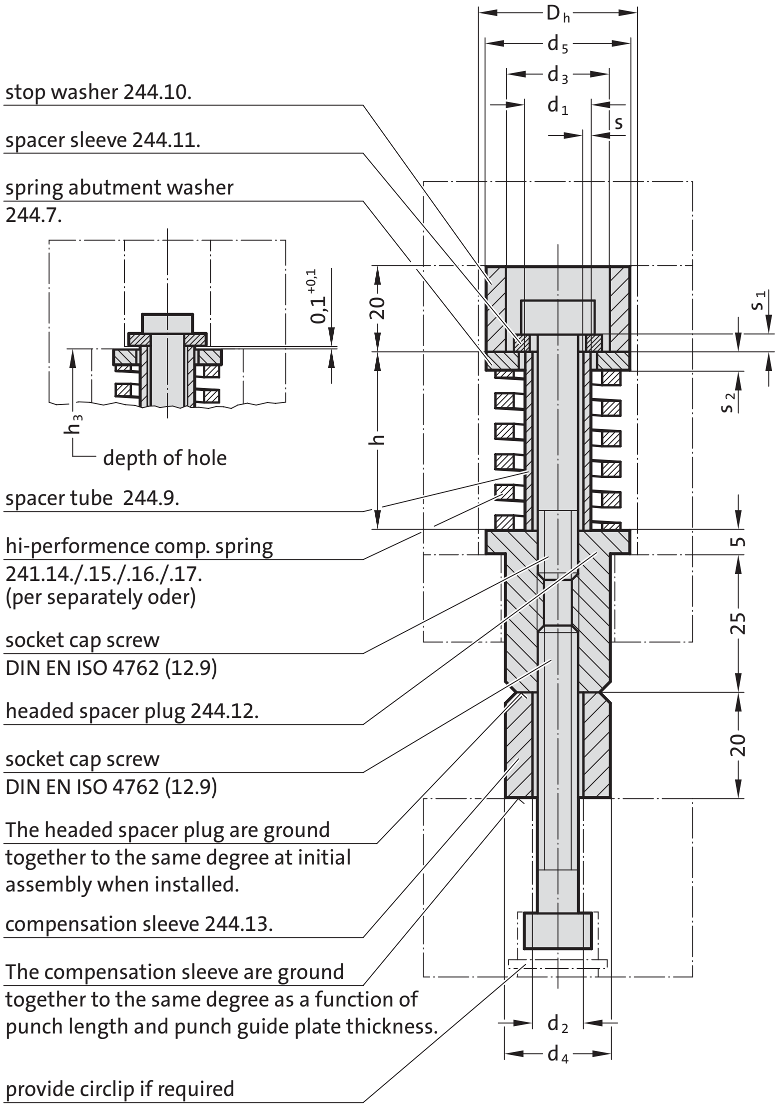


244.□□.□□□.10

Application without Spacer Sleeve
(c'bored hole)

244.□□.□□□.11

Application with Spacer Sleeve
(straight hole)



Note:

The headed spacer plugs are ground equal after assembly in the punch holder.

Note that regrinding on punch points must be compensated by grinding an equal amount off the compensation sleeves.

Adjust depth of c'bore h_3 or height of spacer sleeve so that spacer tube cap screw is relieved by about 0,1 mm.

244.20./25./32./40. Spring- and Spacer Unit

Spring-∅	$d_1 \times s$	h*	socket cap screw d_2	d_3	d_4	d_5	D_h	s_1	d_2
20	10 × 1,8		M 6	18	20	25	26	3	4
25	12 × 1,8		M 8	18	20	25	26	3	4
32	16 × 2,5		M 10	30	32	38	40	4	5
40	20 × 3,5		M 12	30	32	38	40	4	5

h* see spacer tube length 244.9. and spring selection 241.1x.

Ordering Code (example):

Spring- and Spacer Unit	
Spring-∅ = 20 mm	= 244.20.
spacer tube length h = 38 mm with screw	= 038.
spacer tube length244.11.	= 11
Order No	= 244.20.038.11

Combination Spring- and Spacer Units
Application Examples
Spring Characteristics

Without Spacer Sleeve

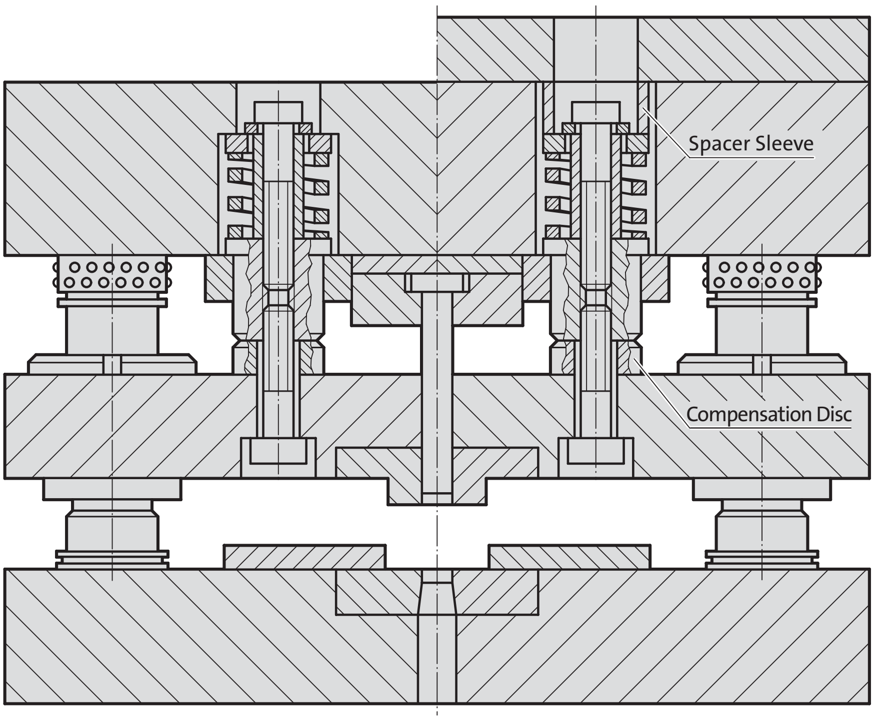
(with c`bored hole)

244.□□.□□□.10.

With Spacer Sleeve

(with straight hole)

244.□□.□□□.11.



Description:

The preloaded Combination Spring- and Spacer Unit combines the functions of providing the spring force and of spacing the stripper in one constructional element, whilst conventional designs employed two.

The resulting advantages therefore consist of space savings and reduced machining cost with regard to the various die members.

The execution with spacer sleeve makes it possible to exchange the whole unit by simply removing the top clamping plate. Removal of the compensation disc gives unimpeded access to the punches – for the purpose of sharpening/grinding.

Important Notice:

In order to preserve pre-existing conditions in regard of spring force and displacement, it is essential that regrinding of the punches equals regrinding of the compensation disc – i. e. the metal removal from either component must be kept the same.

Helical compression springs must be ordered separately, see at the beginning of chapter F.

244.20. 244.32. 244.25. 244.40. Combination Spring- and Spacer Units
Spring Characteristics

Order No	spring sizes $D_h \times l_o$	preload Compression	spring preload forces (N) Typ				max. working stroke of spring (excl. preload) Typ				spring coefficient (N/mm) Typ				max. spring forces (N) at 80% max. deflection s_2 Type			
			241.14	241.15	241.16	241.17	.14	.15	.16	.17	.14	.15	.16	.17	.14	.15	.16	.17
244.20.027.□□	20 x 25	2	111,6	196,2	432,0	586,4	10,4	8,8	6,7	6,2	55,8	98,1	216,0	293,2	580	863	1447	1818
244.20.033.□□	20 x 32	3	135,0	218,1	504,0	672,6	12,8	10,4	8,4	7,8	45,0	72,7	168,0	224,2	576	756	1411	1749
244.20.038.□□	20 x 38	4	133,6	224,0	516,0	708,4	15,2	12,8	10,0	9,6	33,4	56,0	129,0	177,1	508	717	1290	1700
244.20.044.□□	20 x 44	4	120,0	190,4	448,0	596,4	18,4	15,2	11,6	11,2	30,0	47,6	112,0	149,1	552	724	1299	1670
244.20.048.□□	20 x 51	7	171,5	291,9	658,0	896,7	20,8	16,8	13,2	12,8	24,5	41,7	94,0	128,1	510	701	1241	1640
244.25.027.□□	25 x 25	2	200,0	294,0	750,0	–	10,4	8,8	7,2	–	100,0	147,0	375,0	–	1040	1294	2700	–
244.25.033.□□	25 x 32	3	240,9	354,3	891,0	1123,8	12,8	10,4	8,4	8,0	80,3	118,1	297,0	374,6	1028	1228	2495	2997
244.25.038.□□	25 x 38	4	248,0	372,4	876,0	1384,8	15,2	12,8	10,4	9,6	62,0	93,1	219,0	346,2	942	1192	2278	3324
244.25.044.□□	25 x 44	4	212,0	323,2	748,0	976,8	18,4	15,2	12,4	11,2	53,0	80,9	187,0	244,2	975	1228	2319	2735
244.25.048.□□	25 x 51	7	308,7	480,9	1092,0	1453,9	20,0	16,8	14,4	12,8	44,1	68,7	156,0	207,7	882	1154	2246	2659
244.32.038.□□	32 x 38	5	470,5	925,5	1940,0	2643,0	15,2	12,8	9,6	8,8	94,1	185,1	388,0	528,6	1430	2369	3725	4652
244.32.044.□□	32 x 44	5	398,0	790,5	1620,0	2135,5	17,6	15,2	11,2	10,4	79,6	158,1	324,0	424,7	1401	2403	3629	4417
244.32.048.□□	32 x 51	8	536,0	1072,8	2176,0	2826,4	20,0	16,8	13,2	12,0	67,0	134,1	272,0	353,3	1340	2253	3590	4240
244.32.061.□□	32 x 64	8	424,0	792,8	1696,0	2155,2	25,6	21,6	17,2	16,0	53,0	99,1	212,0	269,4	1357	2141	3646	4310
244.32.072.□□	32 x 76	9	396,9	724,5	1548,0	1968,3	31,2	25,6	20,8	19,2	44,1	80,5	172,0	218,7	1376	2061	3578	4199
244.40.048.□□	40 x 51	8	736,0	1432,0	2801,6	5027,2	20,0	16,8	13,6	12,0	92,0	179,0	350,2	628,4	1840	3007	4763	7541
244.40.061.□□	40 x 64	8	584,8	1120,0	2152,0	3905,6	25,6	20,8	17,6	15,2	73,1	140,0	269,0	488,2	1871	2912	4734	7421
244.40.072.□□	40 x 76	9	567,9	972,9	1971,0	3413,7	30,4	25,6	21,6	19,2	63,1	108,1	219,0	379,3	1918	2767	4730	7283

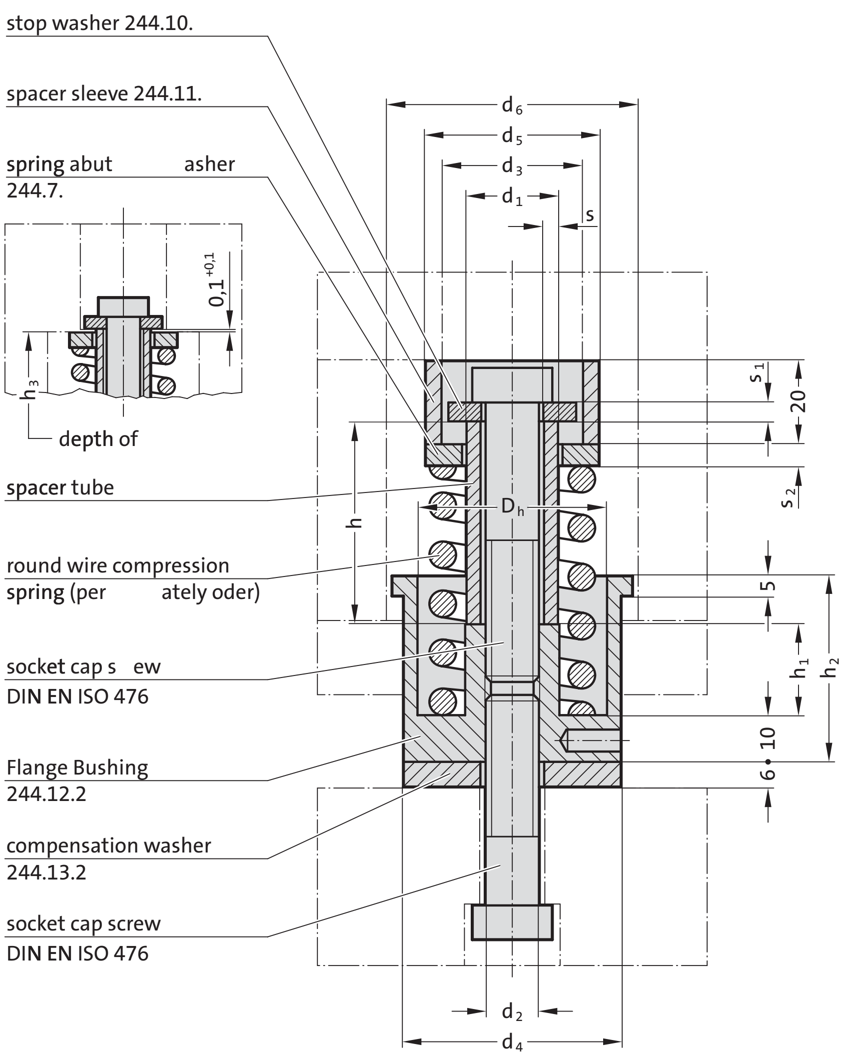
Spring- and Spacer Unit low installation space

244.□□.3.□□□.10

Application without   ve
(c'bored hole)

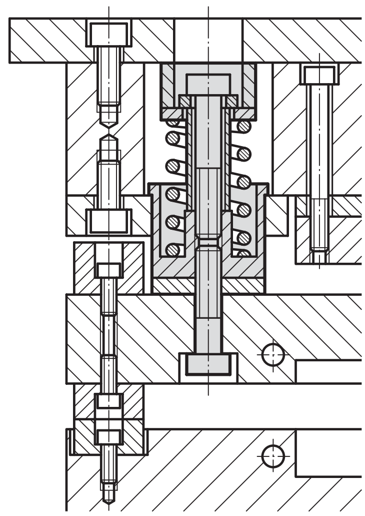
244.□□.3.□□□.11

Application with Sp   ve
(straight hole)



Installation Example:

with spacer sleeve



Note:

After fitting, the flange bushings are ground to the same length.

Note that regrind allowance on punch points must equal that taken off the compensation washers.

Adjust depth of c'bore h_3 or height of spacer sleeve so that spacer tube cap screw is relieved by about 0,1 mm.

244.20./25./32./40.3. Spring- and Spacer Unit low installation space

Spring-∅	$d_1 \times s$	h*	d_2	d_3	d_4	d_5	d_6	D_h	s_1	s_2	h_1	h_2
20	10 × 1,8		M 6	18	25	25	31	20	3	4	5	36
25	12 × 1,8		M 8	18	32	25	38	25	3	4	10	36
32	16 × 2,5		M 10	30	38	38	44	32	4	5	16	40
40	20 × 3,5		M 12	30	47	38	54	40	4	5	18	40

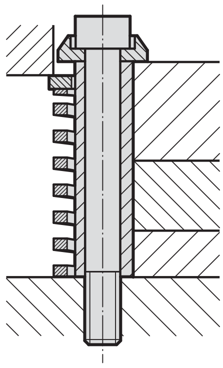
h* see spacer tube length 244.9. and spring selection 241.1x.

Ordering Code (example):

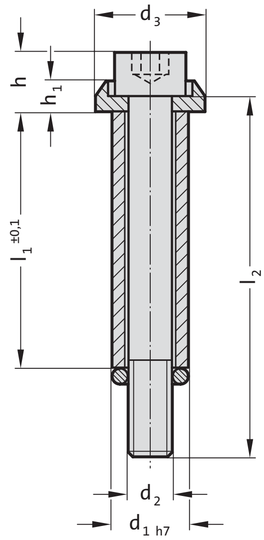
Spring- and Spacer Unit low installation space	
for spring-∅ = 20 mm	= 244.20.3.
spacer tube length h = 33 mm	= 033.
with spacer sleeve 244.11.	= 11
Order No	= 244.20.3.033.11

Spring and spacer unit

Mounting example



244.16.



Description:

These units can be used as an alternative to shoulder screws.
Advantages:
Precision length adjustments by way of grinding. The units have many uses – as can be seen from the installation examples below.

Material:

Spacer tube: Steel, hardened
Socket cap screw DIN EN ISO 4762 (12.9)

Execution:

Outside diameter ground
Tolerance: h_7

Note:

The units are supplied with a retaining O-ring **which must be removed before application.**

244.16. Spring and spacer unit

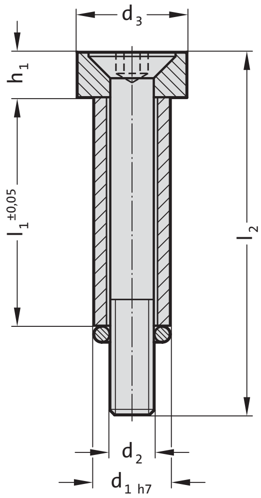
d_1	10	12.5	15	17.5	23	25
d_2	M6	M8	M10	M12	M16	M16
Tightening torque [Nm]	13	32	65	120	290	290
d_3	15	19	23	27	34	40
h	10	13	15	18	24	24
h_1	5.5	6.5	7.5	9	11	11
l_1	l_2					
20	35	35				
25	40					
30	45	45	50	50		
35	50	50	55			
40	55	55	60	60		
45	60	60	65	65		
50	65	65	70	70	80	
55	70	70 80	75	80		
60	80	80	80 90	90	90	
70	90	90	90 100	100	100	
80	100	100	100 110	110 115 120	110 125 130	110
90	110	110	110	120	120	120
100	120	120	120	130 135 140	130 140 145	130
110				140	140 150	
120			140	150	150 160	
140				180	180	
150					180	
160					200	

Ordering Code (example):

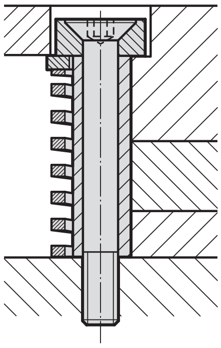
Spring and spacer unit		=244.16.
Nominal diameter d_1	10 mm	= 100.
Length l_1	20 mm	= 020.
Screw length l_2	35 mm	= 035
Order No		=244.16. 100. 020. 035

Spring and spacer unit, with hexagon socket countersunk head cap screw

244.18.



Mounting example



Description:
These units can be used as an alternative to shoulder screws.
Advantages:
Precision length adjustments by way of grinding. The units have many uses – as can be seen from the installation examples below.

Material:
Spacer tube: Steel, hardened
Countersunk head cap screw DIN EN ISO 10642 (10.9)

Execution:
Outside diameter ground
Tolerance: h_7

Note:
The units are supplied with a retaining O-ring **which must be removed before application.**

244.18. Spring and spacer unit, with hexagon socket countersunk head cap screw

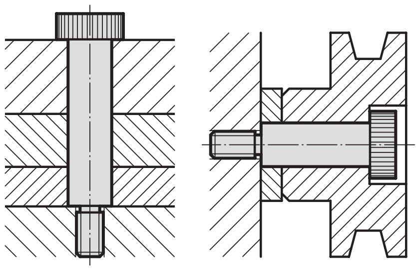
d_1	10	12.5	15	17.5	23
d_2	M6	M8	M10	M12	M16
Tightening torque [Nm]	12	28	56	98	240
d_3	15	19	23	27	34
h_1	6	8	10	12	16
l_1	l_2				
20	35				
25	40	45			
30	45	50	55	60	
35	50	55	60	70	
40	55	60	65	70	
45	60	70	70	80	
50	65	70	80	80	90
55		80	80	90	90
60		80	90	90	100
70		90	100	100	110
80		100	110	110	120
90			120	120	140
100					140
110					150
120					150

Ordering Code (example):

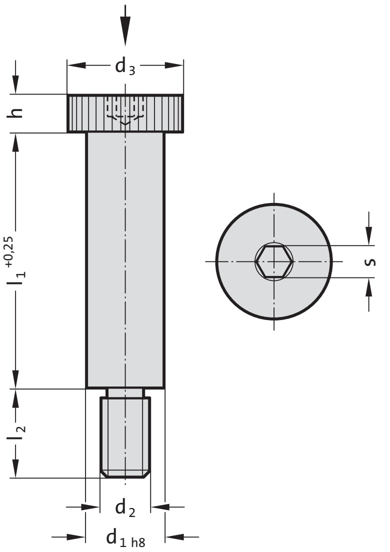
Spring and spacer unit, with hexagon socket countersunk head cap screw		=244.18.
Nominal diameter d_1	10 mm	= 100.
Length l_1	20 mm	= 020.
Screw length l_2	35 mm	= 035
Order No		=244.18. 100. 020. 035

Shoulder screw

Mounting example



244.17.



Material:
High tensile steel,
heat treated to 12.9 ISO 898-1.

Execution:
d_1 ground,
heads knurled.

244.17. Shoulder screw

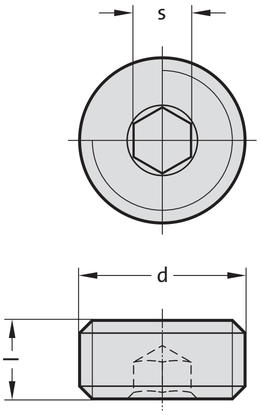
d_1	6	8	10	12	16	20	24
d_2	M5	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	7	13	32	65	120	290	500
d_3	10	13	16	18	24	30	36
h	4.5	5.5	7	9	11	14	16
s	3	4	5	6	8	10	12
l_2	9.5	11	13	16	18	22	27
l_1							
10	●	●					
12	●	●					
16	●	●	●	●			
20	●	●	●	●			
25	●	●	●	●	●		
30	●	●	●	●	●		
35	●	●	●	●	●		
40	●	●	●	●	●	●	
45			●	●	●	●	
50		●	●	●	●	●	●
55			●	●	●	●	
60			●	●	●	●	●
65			●	●	●	●	
70			●	●	●	●	●
80			●	●	●	●	●
90				●	●	●	●
100				●	●	●	●
120					●	●	●

Ordering Code (example):

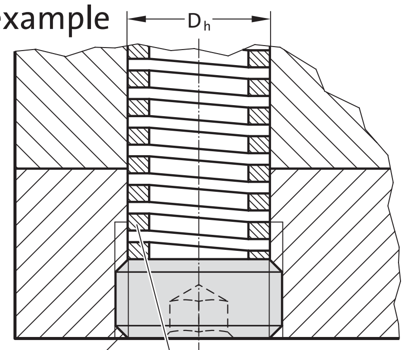
Shoulder screw		=244.17.
Nominal diameter d_1	6 mm	= 060.
Guide length l_1	10 mm	= 010
Order No		=244.17. 060. 010

Pipe plug (for compresssion spring adjustement)

241.00.1.



Mounting example



secured with
LOCTITE
Type 281.243

compression spring to separate
order - see High Performance
Compression Springs

Description:

These set screws can be used as adjustable spring stops. They are available for all customary spring sizes from ∅ 10 to ∅ 40. The set screws are suitable for springs 241.14. to .17.
Their use offers the following advantages:

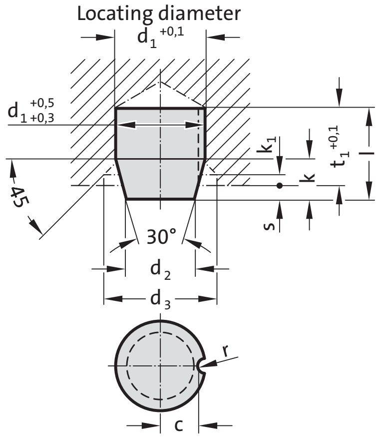
– Adjustable spring tension from under the bottom bolster, without any dismantling.
– Exchange of springs without dismantling.
– Through-holes instead of blind holes for spring accommodation.

241.00.1. Pipe plug (for compresssion spring adjustement)

Order No	d	l	s	Spring-∅	D_h
241.00.1.12	M12x1,5	10	6	10	10.5
241.00.1.14	M14x1,5	10	6	12.5	12.5
241.00.1.18	M18x1,5	10	8	16	16.5
241.00.1.22	M22x1,5	10	8	20	20.5
241.00.1.28	M28x1,5	12	10	25	26.5
241.00.1.35	M35x1,5	12	10	32	33.5
241.00.1.42	M42x1,5	12	10	40	40.5

Compression Pad
Shedder insert

2471.6.

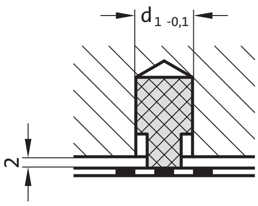


Material:
FIBROFLEX®
Hardness 90 Shore A

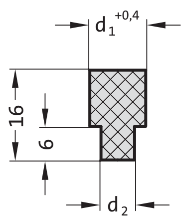
2471.6. Compression Pad

Order No	d_1	d_2	d_3	l	k	k_1	t_1	r	c	Compressive force [N]	at s
2471.6.006	6	3.6	10	9.5	4.5	1	8	-	-	100	1.5
2471.6.010	10	6	16	15.5	7.5	2	13	1	4	450	2.5
2471.6.016	16	9.5	22	25	12	5	21	1.5	6.5	1500	4
2471.6.024	24	18	32	25	10	2	21	2	10	3000	4
2471.6.030	30	20	38	35	19	10	30	2.5	12.5	3000	5
2471.6.032	32	24	40	32	14	4	26	3	13	12000	6
2471.6.039	39.5	30	50	40	16	4.75	34	3	16.8	25000	6

Mounting example



247.6.



Description:
Instead of conventional shedder pins and their springs as well as set screws, FIBROFLEX® Shedder Inserts are simply pressed into matching holes (see mounting example).

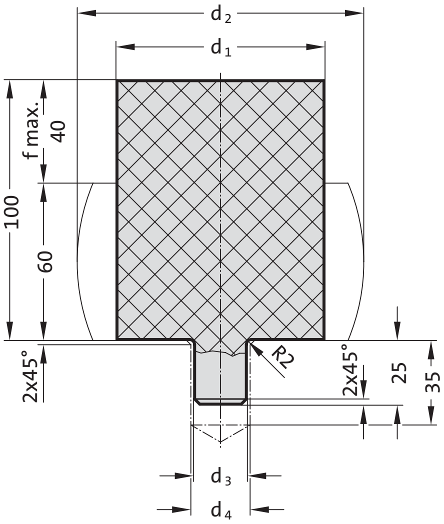
Material:
FIBROFLEX®
Hardness 90 Shore A

247.6. Shedder insert

Order No	d_1	d_2	Stripping force [daN]
247.6.008.016	8	4	20
247.6.010.016	10	6	25
247.6.012.016	12	8	30

Setting-up bumper, round

2531.7.



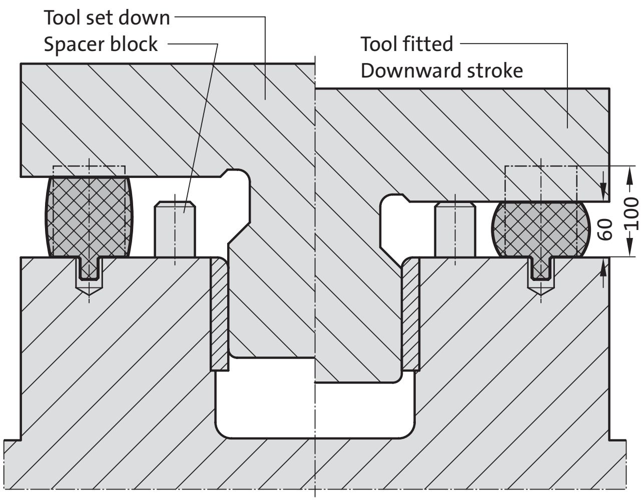
Description:
Setting up bumpers are used for setting down and setting up tools and replace shear pins.

Material:
FIBROFLEX®
Hardness 95 Shore A

Attention:
Setting up bumpers are not suitable for continuous use. To prevent damage when setting down tools, ensure that the setting up bumpers are large enough to withstand 1.5 times the weight of the tool (see table).

Implementation:
1. When setting up slowly move the ram into the bottom position.
2. Clamp the tool, then move the ram back to the top position (with the setting up bumper compressed to a height of 60 mm).
3. After setting up, remove the setting up bumpers and place them in the storage hole on the tool.

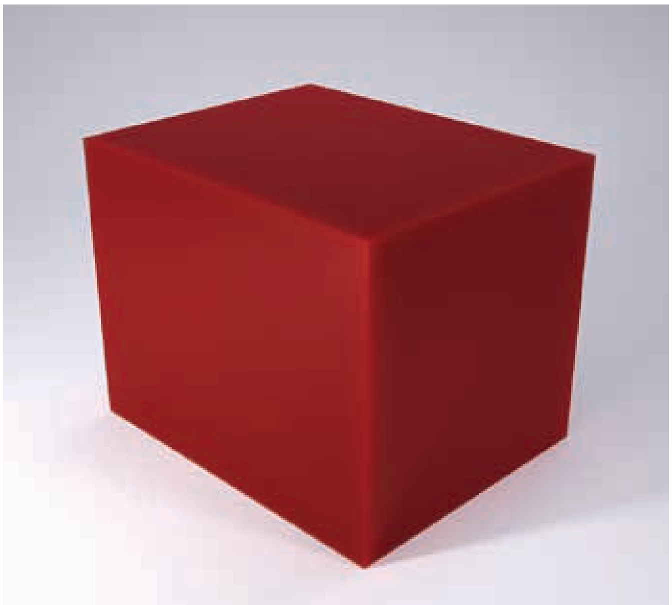
Mounting example



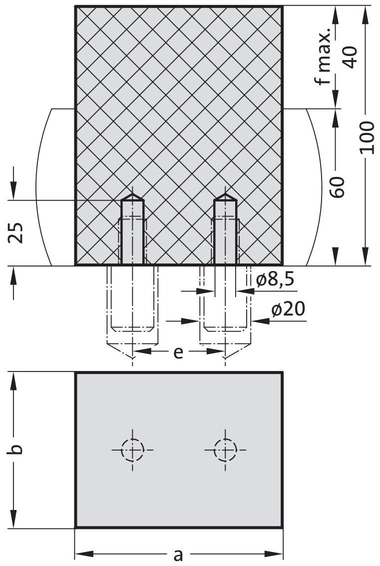
2531.7. Setting-up bumper, round

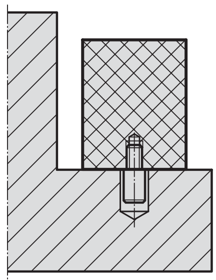
Order No	d_1	d_2	d_3	d_4	f max.	Load capacity in daN bei f=20	Load capacity in daN bei f=25	Load capacity in daN bei f=40	Admissible tool weight in kg for 4 setting up bumpers f=20/safety factor 1,5
2531.7.063	63	86	16	18	40	2200	2800	4800	5800
2531.7.080	80	111	20	22	40	3500	4600	8500	9300
2531.7.100	100	136	20	22	40	5000	6700	11700	13300
2531.7.125	125	171	25	28	40	7600	9400	18900	20200

Setting-up bumper, square



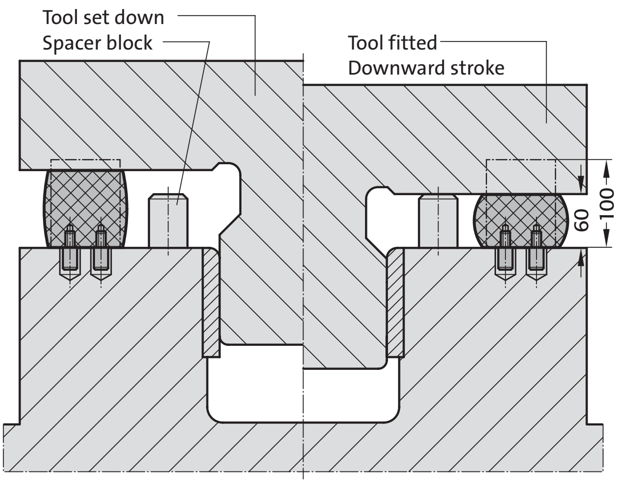
252.7.





The setting up bumper is located in the storage hole while the toll is in use (guide screw 244.5.13.040 withdrawn).

Mounting example



Description:
Setting up bumpers are used for setting down and setting up tools and replace shear pins.

Material:
FIBROFLEX®
Hardness 95 Shore A

Attention:
Setting up bumpers are not suitable for continuous use. To prevent damage when setting down tools, ensure that the setting up bumpers are large enough to withstand 1.5 times the weight of the tool (see table).

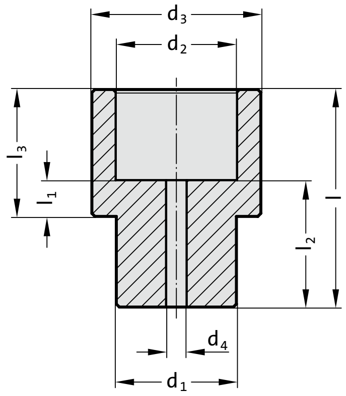
Implementation:
1. When setting up slowly move the ram into the bottom position.
2. Clamp the tool, then move the ram back to the top position (with the setting up bumper compressed to a height of 60 mm).
3. After setting up, remove the setting up bumpers and place them in the storage hole on the tool.

252.7. Setting-up bumper, square

Order No	a	b	e	Load capacity in daN bei f=20	Admissible tool weight in kg for 4 setting up bumpers f=20/safety factor 1,5
252.7.080.060	80	60	36	2700	7100
252.7.100.080	100	80	50	6200	16500
252.7.125.100	125	100	60	8600	22900
252.7.180.100	180	100	100	13600	36200

Spacer for die release

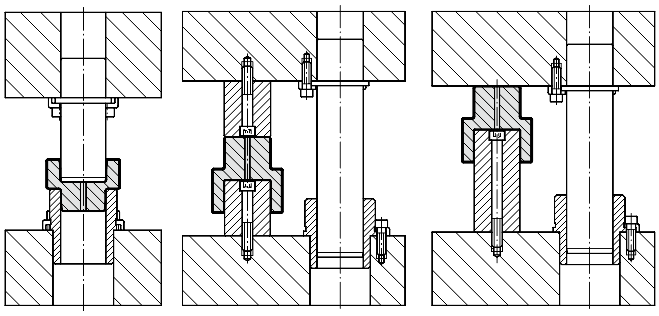
2533.10.



Description:
The spacers are inserted into the die for storage and transport purposes.

Material:
Greenamid PA6 (GF30), colour: yellow

Mounting example



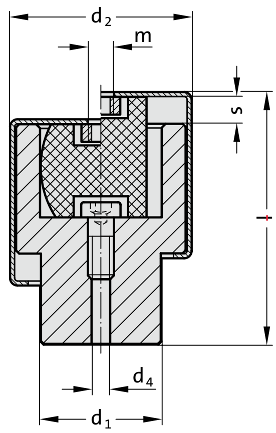
2533.10. Spacer for die release

Order No	d_2	d_1	l	l_1	l_2	l_3	d_3	d_4*	max. carrying capacity [daN]
2533.10.015	15.2	14.8	52	12	32	32	25	7	2,500
2533.10.016	16.2	15.8	52	12	32	32	26	7	2,500
2533.10.018	18.2	17.8	52	12	32	32	29	7	2,700
2533.10.019	19.2	18.8	52	12	32	32	30	7	2,700
2533.10.020	20.2	19.8	52	12	32	32	31	7	2,700
2533.10.024	24.2	23.8	56	12	34	34	36	7	3,600
2533.10.025	25.2	24.8	56	12	34	34	37	7	3,600
2533.10.030	30.2	29.8	60	12	36	36	44	7	4,500
2533.10.032	32.2	31.8	60	12	36	36	46	7	4,500
2533.10.038	38.2	37.8	73	12	43	43	54	7	6,000
2533.10.040	40.2	39.8	73	12	43	43	56	7	6,000
2533.10.042	42.2	41.8	73	12	43	43	58	7	6,000
2533.10.048	48.2	47.8	84	12	48	49	66	8.6	7,500
2533.10.050	50.2	49.8	84	12	48	49	68	8.6	7,500
2533.10.052	52.2	51.8	84	12	48	49	70	8.6	7,500
2533.10.060	60.2	59.8	92	12	52	53	79	8.6	9,400
2533.10.063	63.2	62.8	92	12	52	53	82	8.6	9,400
2533.10.080	80.2	79.8	94	14	54	54	102	8.6	12,000
2533.10.100	100.2	99.8	96	16	56	56	123	8.6	15,000
2533.10.125	125.2	124.8	96	16	56	56	150	8.6	18,000

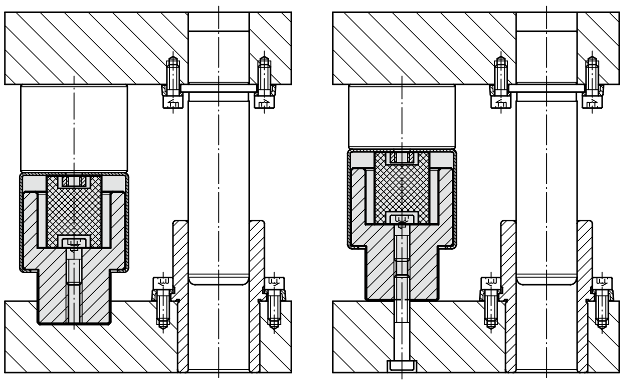
*Tap hole for thread, created by customer

SPACER WITH SPRING FOR DIE RELEASE

2533.20.



Mounting example



Description:

The spacers with springs are inserted into the die for storage and transport purposes.

Material:

Spacer: Greenamid PA6 (GF30), colour: yellow
Spring: PU
Housing: steel, painted yellow

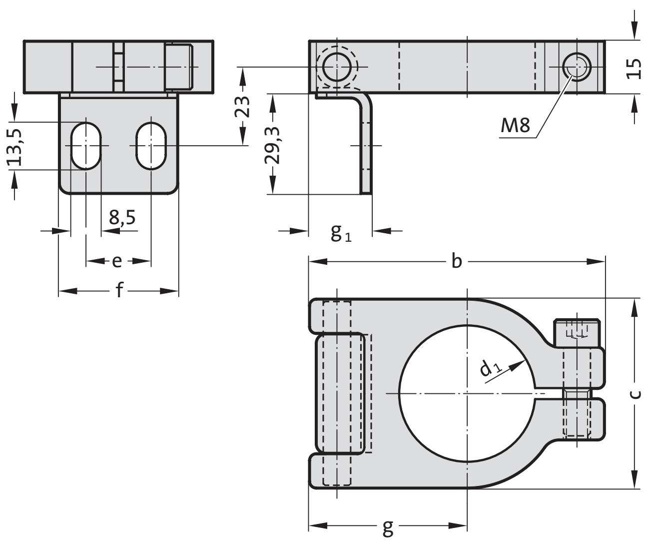
2533.20. Spacer with spring for die release

Order No	d_2	d_1	s	l	m	d_4*		max. carrying capacity [daN]
2533.20.040	60.5	39.8	10	84	M8	6.8	600	6,000
2533.20.050	72.5	49.8	10	95.5	M10	8.6	800	7,500
2533.20.063	87	62.8	10	103	M10	8.6	1,250	9,400
2533.20.080	109	79.8	10	105.5	M10	8.6	2,300	12,000
2533.20.100	129	99.8	10	107	M10	8.6	3,600	15,000
2533.20.125	155.5	124.8	10	108	M10	8.6	7,000	18,000

*Tap hole for thread, created by customer

Hinge for spacer

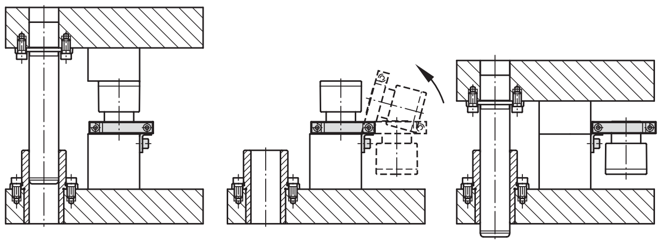
2533.00.01.



Material:
Steel, burnished

Note:
for 2533.10 and 2533.20.
Screws are not included.

Mounting example



2533.00.01. Hinge for spacer

Order No	d_1	b	c	e	f	g	g_1
2533.00.01.040	39.8	86	55	19	34.5	46	18
2533.00.01.050	49.8	97	70	25	44.5	53.5	17.5
2533.00.01.063	62.8	106	80	30	49.5	57	17.5
2533.00.01.080	79.8	140	105	40	69.5	72	19
2533.00.01.100	99.8	156	125	50	79.5	80	18.5
2533.00.01.125	124.8	183	150	70	99.5	93	18.5

Strippers for Blanking Dies
to Mercedes-Benz- / VW Standard / VDI 3362

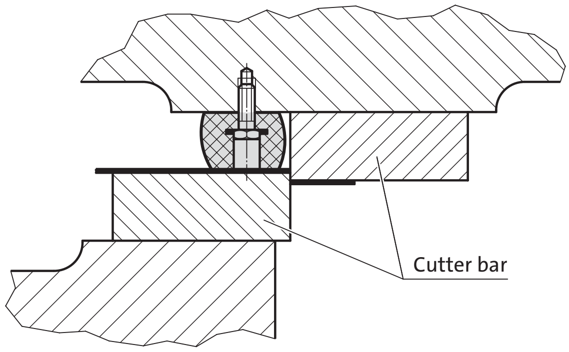
Material:
Perbunan
Hardness to DIN 53505:
Shore A65±5

Construction:
Surface quality to DIN ISO 3302-1

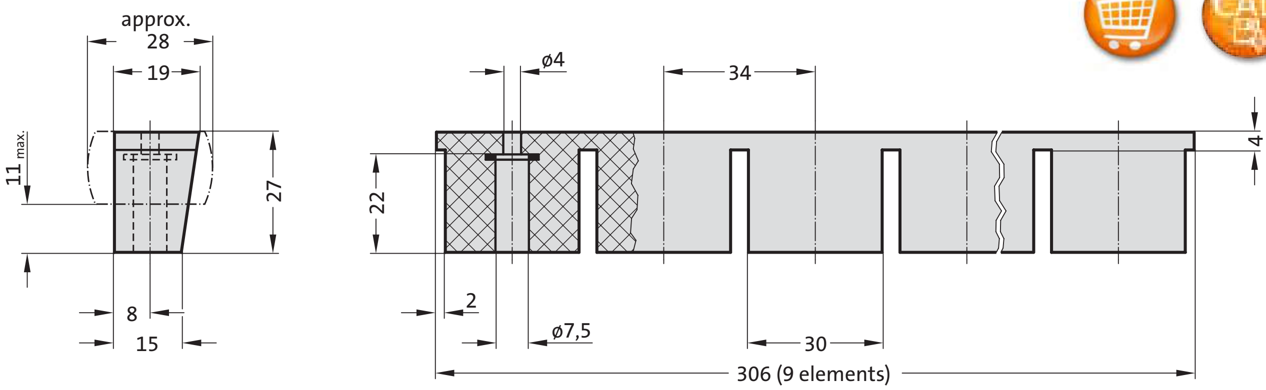
Application:
For blanking die tools

Supplied without screws

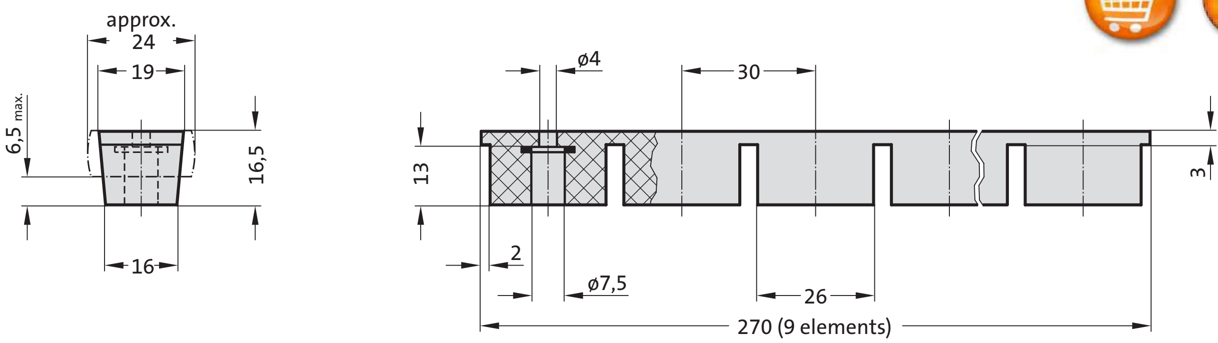
Installation example



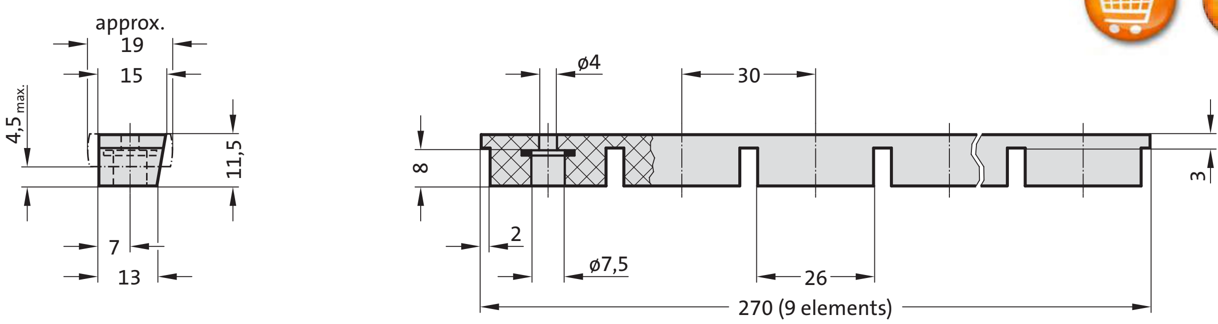
2532.2.190.270.0306



2532.2.190.165.0270



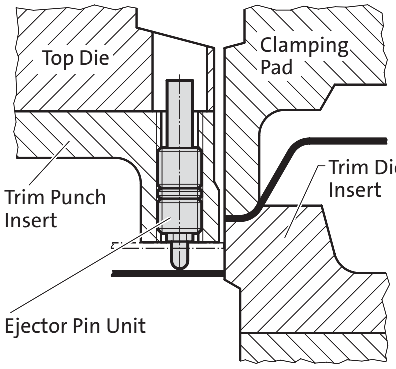
2532.2.150.115.0270



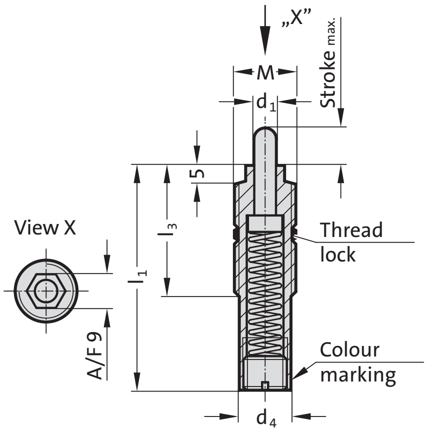
Spring plungers

Spring plunger, standard spring force, VDI 3004, Colour marking: yellow

Mounting example



2470.10. .1



Description:

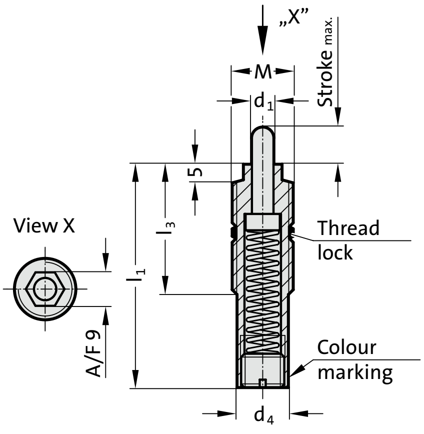
Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.10.11). The spring-loaded pins are hardened.

2470.10. .1 Spring plunger, standard spring force, VDI 3004, Colour marking: yellow

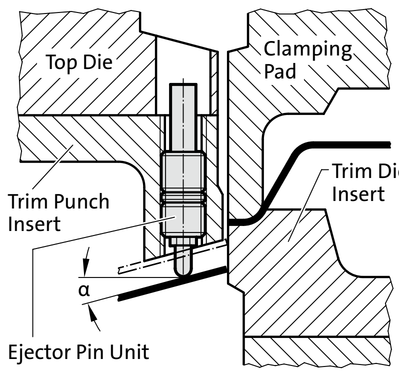
Order No	d_1	d_4	M	l_1	l_3	Stroke max.	Spring rate [N/mm]	Spring force [N] initial	Spring force [N] final
2470.10.010.060.1	6	13.4	16x2	60	35	10	0.95	3.8	13.3
2470.10.010.016.060.1	6	13.4	16x1.5	60	35	10	0.95	3.8	13.3
2470.10.015.060.1	6	13.4	16x2	60	35	15	2	10	40
2470.10.015.016.060.1	6	13.4	16x1.5	60	35	15	2	10	40
2470.10.020.080.1	6	13.4	16x2	80	35	20	1.38	6.9	34.5
2470.10.020.016.080.1	6	13.4	16x1.5	80	35	20	1.38	6.9	34.5
2470.10.030.080.1	6	13.4	16x2	80	35	30	1.3	6.5	45.5
2470.10.030.016.080.1	6	13.4	16x1.5	80	35	30	1.3	6.5	45.5
2470.10.030.120.1	6	13.4	16x2	120	35	30	0.73	18	40
2470.10.030.016.120.1	6	13.4	16x1.5	120	35	30	0.73	18	40
2470.10.040.150.1	6	13.4	16x2	150	35	40	0.6	13.2	37.2
2470.10.040.016.150.1	6	13.4	16x1.5	150	35	40	0.6	13.2	37.2
2470.10.050.150.1	6	13.4	16x2	150	35	50	0.6	13.2	43.2
2470.10.050.016.150.1	6	13.4	16x1.5	150	35	50	0.6	13.2	43.2
2470.10.060.150.1	6	13.4	16x2	150	35	60	0.6	13.2	49.2
2470.10.060.016.150.1	6	13.4	16x1.5	150	35	60	0.6	13.2	49.2
2470.10.070.200.1	6	13.4	16x2	200	35	70	0.44	9.68	40.5
2470.10.070.016.200.1	6	13.4	16x1.5	200	35	70	0.44	9.68	40.5
2470.10.080.200.1	6	13.4	16x2	200	35	80	0.44	9.68	44.8
2470.10.080.016.200.1	6	13.4	16x1.5	200	35	80	0.44	9.68	44.8

SPRING PLUNGER, LOW MAINTENANCE, STANDARD SPRING FORCE, VDI 3004, COLOUR MARKING: YELLOW

2470.20. .1



Mounting example



Description:

Resilient thrust pieces are used as knock out pins, damper pins, fixing and ejector pins in many sectors of the tool, jig and fixture manufacturing industries. Assembly requires the use of special FIBRO insertion tool (2470.10.11).

The spring pin made from high performance plastic with additives permits lateral loading of max. 15° depending on the stroke length.

Note:

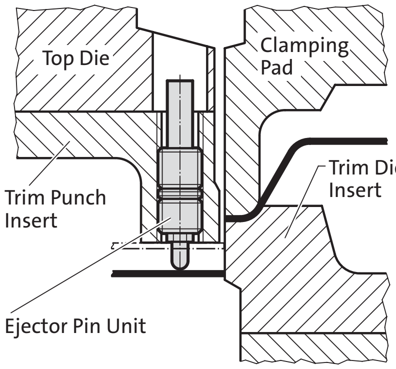
Working temperature: 0 °C to +80 °C
Max. recommended extensions per minute: approx. 120 (at 20 °C)
Max. piston speed: 1.6 m/s

2470.20. .1 **Spring plunger, low maintenance, standard spring force, VDI 3004, Colour marking: yellow**

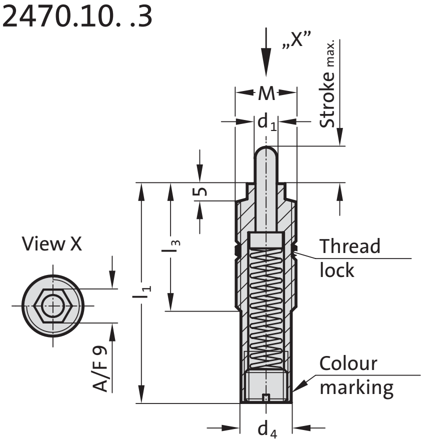
Order No	d_1	d_4	M	l_1	l_3	Stroke max.	Spring rate [N/mm]	Spring force [N] initial	Spring force [N] final	α
2470.20.010.060.1	6	13.4	16x2	60	35	10	0.95	3.8	13.3	15
2470.20.010.016.060.1	6	13.4	16x1.5	60	35	10	0.95	3.8	13.3	15
2470.20.015.060.1	6	13.4	16x2	60	35	15	2	10	40	15
2470.20.015.016.060.1	6	13.4	16x1.5	60	35	15	2	10	40	15
2470.20.020.080.1	6	13.4	16x2	80	35	20	1.38	6.9	34.5	15
2470.20.020.016.080.1	6	13.4	16x1.5	80	35	20	1.38	6.9	34.5	15
2470.20.030.080.1	6	13.4	16x2	80	35	30	1.3	6.5	45.5	15
2470.20.030.016.080.1	6	13.4	16x1.5	80	35	30	1.3	6.5	45.5	15
2470.20.030.120.1	6	13.4	16x2	120	35	30	0.73	18	40	15
2470.20.030.016.120.1	6	13.4	16x1.5	120	35	30	0.73	18	40	15
2470.20.040.150.1	6	13.4	16x2	150	35	40	0.6	13.2	37.2	10
2470.20.040.016.150.1	6	13.4	16x1.5	150	35	40	0.6	13.2	37.2	10
2470.20.050.150.1	6	13.4	16x2	150	35	50	0.6	13.2	43.2	8
2470.20.050.016.150.1	6	13.4	16x1.5	150	35	50	0.6	13.2	43.2	8

Spring plunger, medium spring force, VDI 3004, Colour marking: white

Mounting example



2470.10. .3



Description:

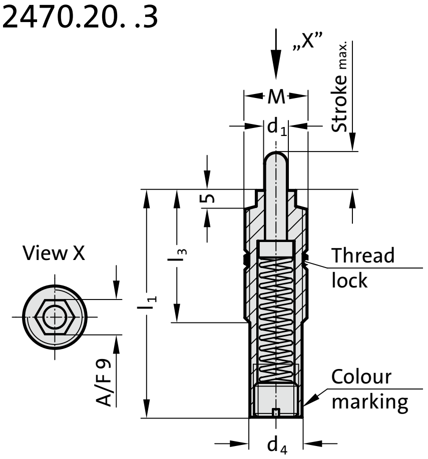
Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.10.11). The spring-loaded pins are hardened.

2470.10. .3 Spring plunger, medium spring force, VDI 3004, Colour marking: white

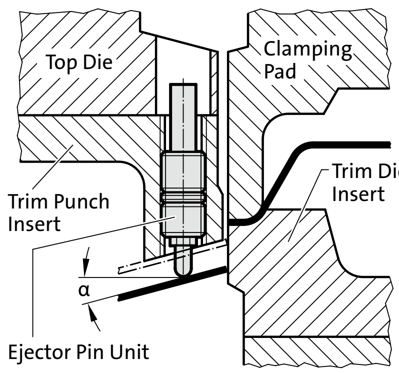
Order No	d_1	d_4	M	l_1	l_3	Stroke max.	Spring rate [N/mm]	Spring force [N] initial	Spring force [N] final
2470.10.020.080.3	6	13.4	16x2	80	35	20	3.02	15.1	75.6
2470.10.020.016.080.3	6	13.4	16x1.5	80	35	20	3.02	15.1	75.6

SPRING PLUNGER, LOW MAINTENANCE, MEDIUM SPRING FORCE, VDI 3004, COLOUR MARKING: WHITE

2470.20. .3



Mounting example



Description:

Resilient thrust pieces are used as ejectors, damping pins as well as hold-down and ejector pins in the widest range of applications in tool, equipment and machine engineering. Assembly is carried out using a FIBRO insertion tool (2470.10.11).

The low-maintenance guide means that there is a maximum permitted side load of up to 15° depending on the stroke length.

Note:

Working temperature: 0 °C to +80 °C

Max. recommended extensions per minute: approx. 120 (at 20 °C)

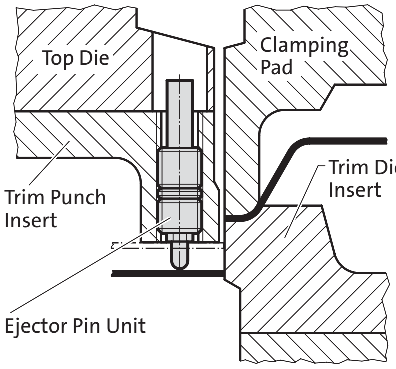
Max. piston speed: 1.6 m/s

2470.20. .3 **Spring plunger, low maintenance, medium spring force, VDI 3004, Colour marking: white**

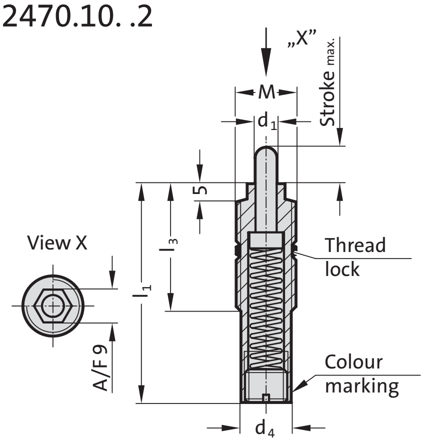
Order No	d_1	d_4	M	l_1	l_3	Stroke max.	Spring rate [N/mm]	Spring force [N] initial	Spring force [N] final	α
2470.20.020.080.3	6	13.4	16x2	80	35	20	3.02	15.1	75.6	15
2470.20.020.016.080.3	6	13.4	16x1.5	80	35	20	3.02	15.1	75.6	15

Spring plunger, increased spring force, VDI 3004, Colour marking: red

Mounting example



2470.10. .2



Description:

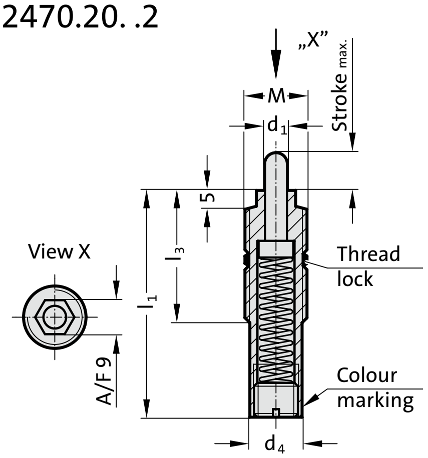
Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.10.11). The spring-loaded pins are hardened.

2470.10. .2 Spring plunger, increased spring force, VDI 3004, Colour marking: red

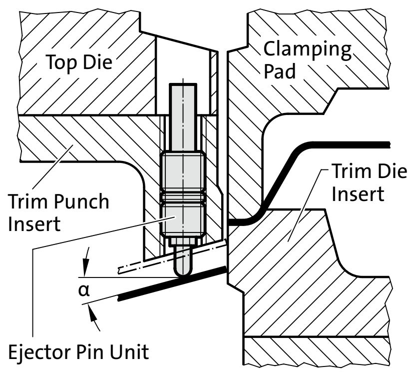
Order No	d_1	d_4	M	l_1	l_3	Stroke max.	Spring rate [N/mm]	Spring force [N] initial	Spring force [N] final
2470.10.010.060.2	6	13.4	16x2	60	35	10	3.25	13	45.5
2470.10.010.016.060.2	6	13.4	16x1.5	60	35	10	3.25	13	45.5
2470.10.015.060.2	6	13.4	16x2	60	35	15	2.6	15	56
2470.10.015.016.060.2	6	13.4	16x1.5	60	35	15	2.6	15	56
2470.10.020.080.2	6	13.4	16x2	80	35	20	6.9	34.5	172.5
2470.10.020.016.080.2	6	13.4	16x1.5	80	35	20	6.9	34.5	172.5
2470.10.030.120.2	6	13.4	16x2	120	35	30	2	20	80
2470.10.030.016.120.2	6	13.4	16x1.5	120	35	30	2	20	80
2470.10.030.150.2	6	13.4	16x2	150	35	30	2.55	56.1	132.6
2470.10.030.016.150.2	6	13.4	16x1.5	150	35	30	2.55	56.1	132.6
2470.10.040.150.2	6	13.4	16x2	150	35	40	2.55	56.1	158.1
2470.10.040.016.150.2	6	13.4	16x1.5	150	35	40	2.55	56.1	158.1
2470.10.050.200.2	6	13.4	16x2	200	35	50	1.61	19.3	99.9
2470.10.050.016.200.2	6	13.4	16x1.5	200	35	50	1.61	19.3	99.9
2470.10.060.200.2	6	13.4	16x2	200	35	60	1.61	19.3	116.1
2470.10.060.016.200.2	6	13.4	16x1.5	200	35	60	1.61	19.3	116.1
2470.10.070.200.2	6	13.4	16x2	200	35	70	1.61	19.3	132.1
2470.10.070.016.200.2	6	13.4	16x1.5	200	35	70	1.61	19.3	132.1
2470.10.080.200.2	6	13.4	16x2	200	35	80	0.94	25	100.1
2470.10.080.016.200.2	6	13.4	16x1.5	200	35	80	0.94	25	100.1

SPRING PLUNGER, LOW MAINTENANCE, INCREASED SPRING FORCE, VDI 3004, COLOUR MARKING: RED

2470.20. .2



Mounting example



Description:

Resilient thrust pieces are used as ejectors, damping pins as well as hold-down and ejector pins in the widest range of applications in tool, equipment and machine engineering. Assembly is carried out using a FIBRO insertion tool (2470.10.11).

The low-maintenance guide means that there is a maximum permitted side load of up to 15° depending on the stroke length.

Note:

Working temperature: 0 °C to +80 °C

Max. recommended extensions per minute: approx. 120 (at 20 °C)

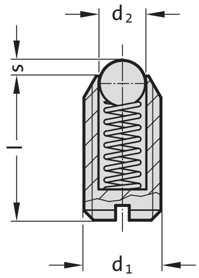
Max. piston speed: 1.6 m/s

2470.20. .2 **Spring plunger, low maintenance, increased spring force, VDI 3004, Colour marking: red**

Order No	d_1	d_4	M	l_1	l_3	Stroke max.	Spring rate [N/mm]	Spring force [N] initial	Spring force [N] final	α
2470.20.010.060.2	6	13.4	16x2	60	35	10	3.25	13	45.5	15
2470.20.010.016.060.2	6	13.4	16x1.5	60	35	10	3.25	13	45.5	15
2470.20.015.060.2	6	13.4	16x2	60	35	15	2.6	15	56	15
2470.20.015.016.060.2	6	13.4	16x1.5	60	35	15	2.6	15	56	15
2470.20.020.080.2	6	13.4	16x2	80	35	20	6.9	34.5	172.5	15
2470.20.020.016.080.2	6	13.4	16x1.5	80	35	20	6.9	34.5	172.5	15
2470.20.030.120.2	6	13.4	16x2	120	35	30	2	20	80	15
2470.20.030.016.120.2	6	13.4	16x1.5	120	35	30	2	20	80	15
2470.20.030.150.2	6	13.4	16x2	150	35	30	2.55	56.1	132.6	15
2470.20.030.016.150.2	6	13.4	16x1.5	150	35	30	2.55	56.1	132.6	15
2470.20.040.150.2	6	13.4	16x2	150	35	40	2.55	56.1	158.1	10
2470.20.040.016.150.2	6	13.4	16x1.5	150	35	40	2.55	56.1	158.1	10
2470.20.050.200.2	6	13.4	16x2	200	35	50	1.61	19.3	99.9	8
2470.20.050.016.200.2	6	13.4	16x1.5	200	35	50	1.61	19.3	99.9	8

Spring plunger, with spring loaded ball, with slot, standard spring force

2471.01.



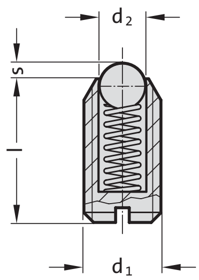
Material:
Sleeve: Free machining steel, burnished
Ball: Hardened ball bearing steel
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C

2471.01. Spring plunger, with spring loaded ball, with slot, standard spring force

Order No	d_1	l	s	d_2	Spring force [N] initial	Spring force [N] final
2471.01.003	M3	7	0.4	1.5	3	4.5
2471.01.004	M4	9	0.8	2.5	8.5	14
2471.01.005	M5	12	0.9	3	8	14
2471.01.006	M6	14	1	3.5	11	18
2471.01.008	M8	16	1.5	4.5	18	31
2471.01.010	M10	19	2	6	24	45
2471.01.012	M12	22	2.5	8	26	49
2471.01.016	M16	24	3.5	10	41	86
2471.01.020	M20	30	4.5	12	56	111
2471.01.024	M24	34	5.5	15	81	151

2471.31.



Material:
Sleeve: Nirosta 1.4305
Ball: Nirosta, hardened
Spring: Nirosta

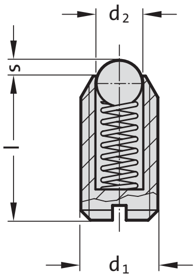
Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C

2471.31. Spring plunger, with spring loaded ball, with slot, standard spring force

Order No	d_1	l	s	d_2	Spring force [N] initial	Spring force [N] final
2471.31.003	M3	7	0.4	1.5	3	4.5
2471.31.004	M4	9	0.8	2.5	8.5	14
2471.31.005	M5	12	0.9	3	8	14
2471.31.006	M6	14	1	3.5	11	18
2471.31.008	M8	16	1.5	4.5	18	31
2471.31.010	M10	19	2	6	24	45
2471.31.012	M12	22	2.5	8	26	49
2471.31.016	M16	24	3.5	10	41	86
2471.31.020	M20	30	4.5	12	56	111
2471.31.024	M24	34	5.5	15	81	151

Spring plunger, with spring loaded ball, with slot, increased spring force

2471.02.



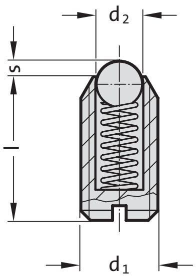
2471.02. Spring plunger, with spring loaded ball, with slot, increased spring force

Order No	d_1	l	s	d_2	Spring force [N] initial	Spring force [N] final
2471.02.005	M5	12	0.9	3	15	22
2471.02.006	M6	14	1	3.5	19	28
2471.02.008	M8	16	1.5	4.5	36	62
2471.02.010	M10	19	2	6	57	104
2471.02.012	M12	22	2.5	8	61	110
2471.02.016	M16	24	3.5	10	68	142
2471.02.020	M20	30	4.5	12	84	166
2471.02.024	M24	34	5.5	15	127	237

Material:
Sleeve: Free machining steel, burnished
Ball: Hardened ball bearing steel
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

2471.32.



2471.32. Spring plunger, with spring loaded ball, with slot, increased spring force

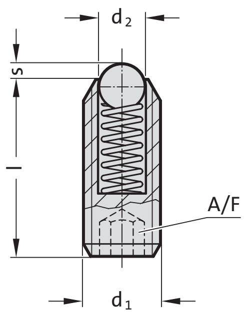
Order No	d_1	l	s	d_2	Spring force [N] initial	Spring force [N] final
2471.32.005	M5	12	0.9	3	15	22
2471.32.006	M6	14	1	3.5	19	28
2471.32.008	M8	16	1.5	4.5	36	62
2471.32.010	M10	19	2	6	57	104
2471.32.012	M12	22	2.5	8	61	110
2471.32.016	M16	24	3.5	10	68	142
2471.32.020	M20	30	4.5	12	84	166
2471.32.024	M24	34	5.5	15	127	237

Material:
Sleeve: Nirosta 1.4305
Ball: Nirosta, hardened
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C.
Identification of increased spring force by two longitudinal marks on the sleeve.

Spring plunger, with spring loaded ball, with hexagon socket, standard spring force

2471.03.



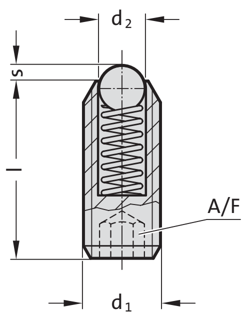
Material:
Sleeve: Free machining steel, burnished
Ball: Hardened ball bearing steel
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C

2471.03. Spring plunger, with spring loaded ball, with hexagon socket, standard spring force

Order No	d_1	d_2	A/F	l	s	Spring force [N] initial	Spring force [N] final
2471.03.003	M3	1.5	1.5	8	0.4	3	4.5
2471.03.004	M4	2.5	2	12	0.8	8.5	14
2471.03.005	M5	3	2.5	14	0.9	8	14
2471.03.006	M6	3.5	3	15	1	11	18
2471.03.008	M8	4.5	4	18	1.5	18	31
2471.03.010	M10	6	5	23	2	24	45
2471.03.012	M12	8	6	26	2.5	26	49
2471.03.016	M16	10	8	33	3.5	41	86
2471.03.020	M20	12	10	43	4.5	56	111
2471.03.024	M24	15	12	48	5.5	81	151

2471.33.



Material:
Sleeve: Nirosta 1.4305
Ball: Nirosta, hardened
Spring: Nirosta

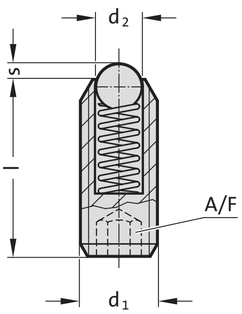
Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C

2471.33. Spring plunger, with spring loaded ball, with hexagon socket, standard spring force

Order No	d_1	d_2	A/F	l	s	Spring force [N] initial	Spring force [N] final
2471.33.003	M3	1.5	1.5	8	0.4	3	4.5
2471.33.004	M4	2.5	2	12	0.8	8.5	14
2471.33.005	M5	3	2.5	14	0.9	8	14
2471.33.006	M6	3.5	3	15	1	11	18
2471.33.008	M8	4.5	4	18	1.5	18	31
2471.33.010	M10	6	5	23	2	24	45
2471.33.012	M12	8	6	26	2.5	26	49
2471.33.016	M16	10	8	33	3.5	41	86
2471.33.020	M20	12	10	43	4.5	56	111
2471.33.024	M24	15	12	48	5.5	81	151

Spring plunger, with spring loaded ball, with hexagon socket, increased spring force

2471.04.



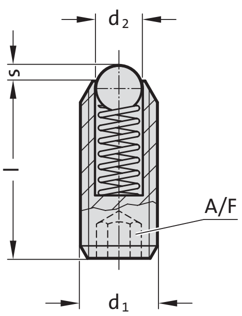
2471.04. Spring plunger, with spring loaded ball, with hexagon socket, increased spring force

Order No	d_1	d_2	A/F	l	s	Spring force [N] initial	Spring force [N] final
2471.04.005	M5	3	2.5	14	0.9	15	22
2471.04.006	M6	3.5	3	15	1	19	28
2471.04.008	M8	4.5	4	18	1.5	36	62
2471.04.010	M10	6	5	23	2	57	104
2471.04.012	M12	8	6	26	2.5	61	110
2471.04.016	M16	10	8	33	3.5	68	142
2471.04.020	M20	12	10	43	4.5	84	166
2471.04.024	M24	15	12	48	5.5	127	237

Material:
Sleeve: Free machining steel, burnished
Ball: Hardened ball bearing steel
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

2471.34.



2471.34. Spring plunger, with spring loaded ball, with hexagon socket, increased spring force

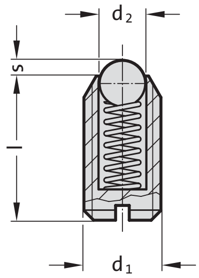
Order No	d_1	d_2	A/F	l	s	Spring force [N] initial	Spring force [N] final
2471.34.005	M5	3	2.5	14	0.9	15	22
2471.34.006	M6	3.5	3	15	1	19	28
2471.34.008	M8	4.5	4	18	1.5	36	62
2471.34.010	M10	6	5	23	2	57	104
2471.34.012	M12	8	6	26	2.5	61	110
2471.34.016	M16	10	8	33	3.5	68	142
2471.34.020	M20	12	10	43	4.5	84	166
2471.34.024	M24	15	12	48	5.5	127	237

Material:
Sleeve: Nirosta 1.4305
Ball: Nirosta, hardened
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

Spring plunger, with spring loaded ball, with slot, standard spring force

2471.05.



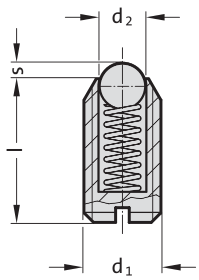
Material:
Sleeve: Delrin blue (POM)
Ball: Delrin white (POM)
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: –30°C up to 50°C

2471.05. Spring plunger, with spring loaded ball, with slot, standard spring force

Order No	d_1	l	s	d_2	Spring force [N] initial	Spring force [N] final
2471.05.006	M6	14	0.9	3.5	12	17
2471.05.008	M8	16	1.5	5	20	35
2471.05.010	M10	19	1.9	6	25	45

2471.35.



Material:
Sleeve: Delrin blue (POM)
Ball: Nirosta, hardened
Spring: Nirosta

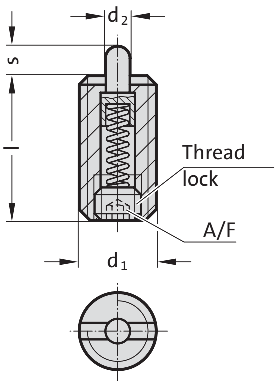
Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: -30°C to +50°C

2471.35. Spring plunger, with spring loaded ball, with slot, standard spring force

Order No	d_1	l	s	d_2	Spring force [N] initial	Spring force [N] final
2471.35.006	M6	14	0.9	3.5	12	17
2471.35.008	M8	16	1.5	5	20	35
2471.35.010	M10	19	1.9	6	25	45

Spring plunger, with spring loaded pin, with slot, standard spring force

2472.01.



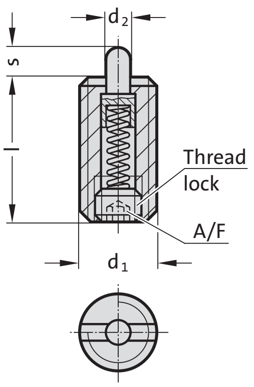
2472.01. Spring plunger, with spring loaded pin, with slot, standard spring force

Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.01.003	M3	1	12	1	0.7	2	4
2472.01.004	M4	1.5	15	1.5	1.3	4.5	16
2472.01.005	M5	2.4	18	2.3	1.5	6	19
2472.01.006	M6	2.7	20	2.5	2	6	19
2472.01.008	M8	3.5	22	3	2.5	10	39
2472.01.010	M10	4	22	3	3	10	39
2472.01.012	M12	6	28	4	4	12	53
2472.01.016	M16	7.5	32	5	5	45	100
2472.01.020	M20	10	40	7	6	52	125
2472.01.024	M24	12	52	10	8	70	170

Material:
Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards. Removable with hexagon socket screw key or slotted screwdriver.

2472.31.



2472.31. Spring plunger, with spring loaded pin, with slot, standard spring force

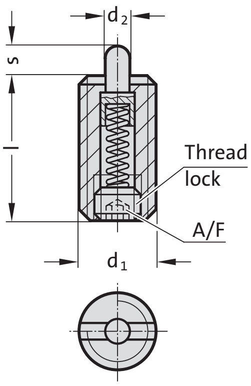
Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.31.004	M4	1.5	15	1.5	1.3	4.5	16
2472.31.005	M5	2.4	18	2.3	1.5	6	19
2472.31.006	M6	2.7	20	2.5	2	6	19
2472.31.008	M8	3.5	22	3	2.5	10	39
2472.31.010	M10	4	22	3	3	10	39
2472.31.012	M12	6	28	4	4	12	53
2472.31.016	M16	7.5	32	5	5	45	100
2472.31.020	M20	10	40	7	6	52	125

Material:
Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards. Removable with hexagon socket screw key or slotted screwdriver.

Spring plunger, with spring loaded pin, with slot, standard spring force

2472.21.



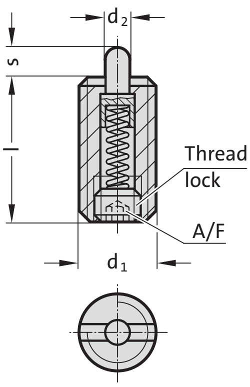
Material:
Sleeve: Free machining steel, burnished
Pin: Delrin white (POM)
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards. Removable with hexagon socket screw key or slotted screwdriver.

2472.21. Spring plunger, with spring loaded pin, with slot, standard spring force

Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.21.004	M4	1.5	15	1.5	1.3	4.5	16
2472.21.005	M5	2.4	18	2.3	1.5	6	19
2472.21.006	M6	2.7	20	2.5	2	6	19
2472.21.008	M8	3.5	22	3	2.5	10	39
2472.21.010	M10	4	22	3	3	10	39
2472.21.012	M12	6	28	4	4	12	53
2472.21.016	M16	7.5	32	5	5	45	100

2472.22.



Material:
Sleeve: Nirosta 1.4305
Pin: Delrin white (POM)
Spring: Nirosta

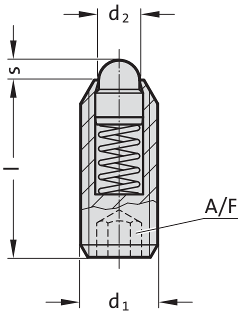
Note:
For locking and for pressing upwards or downwards. Removable with hexagon socket screw key or slotted screwdriver.

2472.22. Spring plunger, with spring loaded pin, with slot, standard spring force

Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.22.004	M4	1.5	15	1.5	1.3	4.5	16
2472.22.005	M5	2.4	18	2.3	1.5	6	19
2472.22.006	M6	2.7	20	2.5	2	6	19
2472.22.008	M8	3.5	22	3	2.5	10	39
2472.22.010	M10	4	22	3	3	10	39
2472.22.012	M12	6	28	4	4	12	53
2472.22.016	M16	7.5	32	5	5	45	100

Spring plunger, with spring loaded pin, with hexagon socket, standard spring force

2472.03.



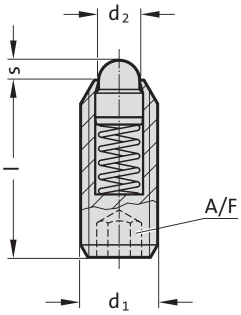
2472.03. Spring plunger, with spring loaded pin, with hexagon socket, standard spring force

Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.03.004	M4	1.8	12	1.5	2	4.5	12.5
2472.03.005	M5	2.4	14	2	2.5	5	13
2472.03.006	M6	2.7	15	2	3	6	17
2472.03.008	M8	3.8	18	2	4	16	33
2472.03.010	M10	4.5	23	2.5	5	19	42
2472.03.012	M12	6	26	3.5	6	22	57
2472.03.016	M16	8.5	33	4.5	8	38	78
2472.03.020	M20	10	43	6.5	10	39	81
2472.03.024	M24	13	48	8	12	72	155

Material:
Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C

2472.33.



2472.33. Spring plunger, with spring loaded pin, with hexagon socket, standard spring force

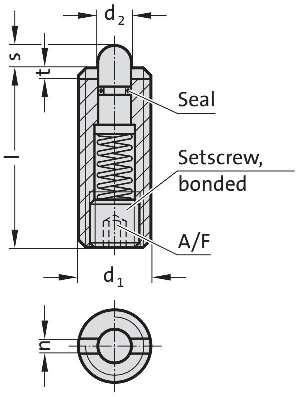
Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.33.004	M4	1.8	12	1.5	2	4.5	12.5
2472.33.005	M5	2.4	14	2	2.5	5	13
2472.33.006	M6	2.7	15	2	3	6	17
2472.33.008	M8	3.8	18	2	4	16	33
2472.33.010	M10	4.5	23	2.5	5	19	42
2472.33.012	M12	6	26	3.5	6	22	57
2472.33.016	M16	8.5	33	4.5	8	38	78
2472.33.020	M20	10	43	6.5	10	39	81
2472.33.024	M24	13	48	8	12	72	155

Material:
Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

Hinweis:
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C

Spring plunger, with spring loaded pin and seal, with hexagon socket, standard spring force

2472.07.



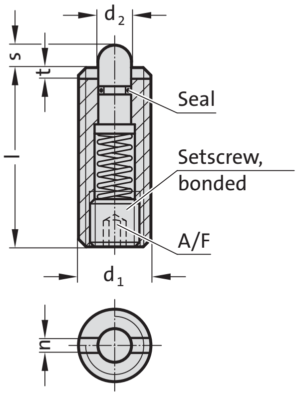
Material:
Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards. The seal prevents the ingress of liquids into the forcing pin. Assembly and dismantling using hexagon socket key and slotted screwdriver.
Temperature operating range: –30°C up to 80°C

2472.07. Spring plunger, with spring loaded pin and seal, with hexagon socket, standard spring force

Order No	d_1	d_2	l	n	s	t	A/F	Spring force [N] initial	Spring force [N] final
2472.07.008	M8	3.8	26	1.5	3	1.4	2.5	9	24
2472.07.010	M10	4	28	1.5	3.5	1.4	3	15	30
2472.07.012	M12	6	35	2.7	4	2	4	24	50
2472.07.016	M16	7.5	40	3.2	5	2.5	5	36	58

2472.37.



Material:
Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

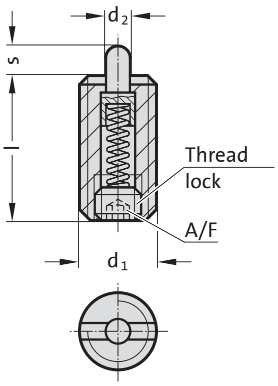
Note:
For locking and for pressing upwards or downwards. The seal prevents the ingress of liquids into the forcing pin. Assembly and dismantling using hexagon socket key and slotted screwdriver.
Temperature operating range: –30°C up to 80°C

2472.37. Spring plunger, with spring loaded pin and seal, with hexagon socket, standard spring force

Order No	d_1	d_2	l	n	s	t	A/F	Spring force [N] initial	Spring force [N] final
2472.37.008	M8	3.8	26	1.5	3	1.4	2.5	9	24
2472.37.010	M10	4	28	1.5	3.5	1.4	3	15	30
2472.37.012	M12	6	35	2.7	4	2	4	24	50
2472.37.016	M16	7.5	40	3.2	5	2.5	5	36	58

Spring plunger, with spring loaded pin, with slot, increased spring force
Spring plunger, with spring loaded pin and seal, with hexagon socket, increased spring force

2472.02.



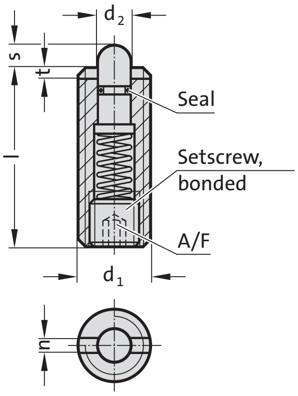
2472.02. Spring plunger, with spring loaded pin, with slot, increased spring force

Order No	d_1	d_2	A/F	l	s	Spring force [N] initial	Spring force [N] final
2472.02.005	M5	2.4	1.5	18	2.3	11	40
2472.02.006	M6	2.7	2	20	2.5	15	43
2472.02.008	M8	3.5	2.5	22	3	20	75
2472.02.010	M10	4	3	22	3	20	75
2472.02.012	M12	6	4	28	4	45	120
2472.02.016	M16	7.5	5	32	5	64	160
2472.02.020	M20	10	6	40	7	75	195
2472.02.024	M24	12	8	52	10	75	245

Material:
Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards. Removable with hexagon socket screw key or slotted screwdriver.
Identification of increased spring force by two longitudinal marks on the sleeve.

2472.08.



2472.08. Spring plunger, with spring loaded pin and seal, with hexagon socket, increased spring force

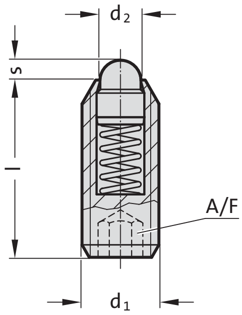
Order No	d_1	d_2	l	n	s	t	A/F	Spring force [N] initial	Spring force [N] final
2472.08.008	M8	3.8	26	1.5	3	1.4	2.5	17	39
2472.08.010	M10	4	28	1.5	3.5	1.4	3	22	43
2472.08.012	M12	6	35	2.7	4	2	4	40	80
2472.08.016	M16	7.5	40	3.2	5	2.5	5	44	113

Material:
Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards. The seal prevents the ingress of liquids into the forcing pin. Assembly and dismantling using hexagon socket key and slotted screwdriver.
Temperature operating range: –30°C up to 80°C
Identification of increased spring force by two longitudinal marks on the sleeve.

Spring plunger, with spring loaded pin, with hexagon socket, increased spring force

2472.04.



Material:

Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

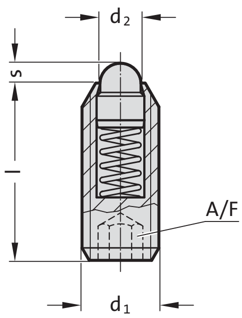
Note:

For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

2472.04. Spring plunger, with spring loaded pin, with hexagon socket, increased spring force

Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.04.006	M6	2.7	15	2	3	11	25
2472.04.008	M8	3.8	18	2	4	23	59
2472.04.010	M10	4.5	23	2.5	5	20	54
2472.04.012	M12	6	26	3.5	6	38	96
2472.04.016	M16	8.5	33	4.5	8	50	100
2472.04.020	M20	10	43	6.5	10	52	133
2472.04.024	M24	13	48	8	12	91	223

2472.34.



Material:

Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

Note:

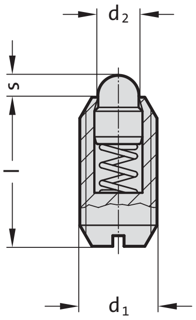
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

2472.34. Spring plunger, with spring loaded pin, with hexagon socket, increased spring force

Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.34.006	M6	2.7	15	2	3	11	25
2472.34.008	M8	3.8	18	2	4	23	59
2472.34.010	M10	4.5	23	2.5	5	20	54
2472.34.012	M12	6	26	3.5	6	38	96
2472.34.016	M16	8.5	33	4.5	8	50	100
2472.34.020	M20	10	43	6.5	10	52	133
2472.34.024	M24	13	48	8	12	91	223

Spring plunger, with spring loaded pin, with slot, standard spring force

2472.05.



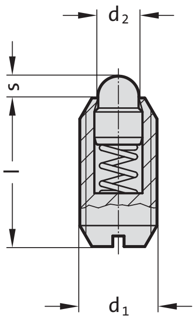
2472.05. Spring plunger, with spring loaded pin, with slot, standard spring force

Order No	d_1	d_2	l	s	Spring force [N] initial	Spring force [N] final
2472.05.004	4	1.8	9	1.5	4.5	12.5
2472.05.005	5	2.4	12	2	5	13
2472.05.006	6	2.7	14	2	6	17
2472.05.008	8	3.8	16	2	16	33
2472.05.010	10	4.5	19	2.5	19	42
2472.05.012	12	6.2	22	3.5	22	57
2472.05.016	16	8.5	24	4.5	38	78
2472.05.020	20	10	30	6.5	39	81
2472.05.024	24	13	34	8	72	155

Material:
Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C

2472.35.



2472.35. Spring plunger, with spring loaded pin, with slot, standard spring force

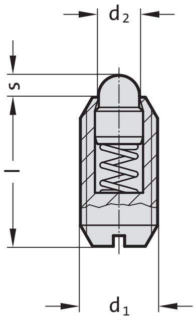
Order No	d_1	d_2	l	s	Spring force [N] initial	Spring force [N] final
2472.35.004	4	1.8	9	1.5	4.5	12.5
2472.35.005	5	2.4	12	2	5	13
2472.35.006	6	2.7	14	2	6	17
2472.35.008	8	3.8	16	2	16	33
2472.35.010	10	4.5	19	2.5	19	42
2472.35.012	12	6.2	22	3.5	22	57
2472.35.016	16	8.5	24	4.5	38	78
2472.35.020	20	10	30	6.5	39	81
2472.35.024	24	13	34	8	72	155

Material:
Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C

Spring plunger, with spring loaded pin, with slot, increased spring force

2472.06.



Material:

Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

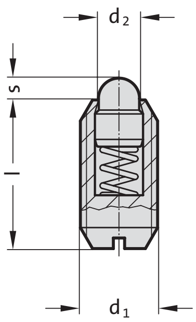
Note:

For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

2472.06. Spring plunger, with spring loaded pin, with slot, increased spring force

Order No	d_1	d_2	l	s	Spring force [N] initial	Spring force [N] final
2472.06.006	M6	2.7	14	2	11	25
2472.06.008	M8	3.8	16	2	23	59
2472.06.010	M10	4.5	19	2.5	20	54
2472.06.012	M12	6.2	22	3.5	38	96
2472.06.016	M16	8.5	24	4.5	50	100
2472.06.020	M20	10	30	6.5	52	133
2472.06.024	M24	13	34	8	91	223

2472.36.



Material:

Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

Note:

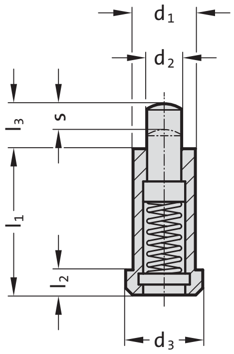
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

2472.36. Spring plunger, with spring loaded pin, with slot, increased spring force

Order No	d_1	d_2	l	s	Spring force [N] initial	Spring force [N] final
2472.36.006	M6	2.7	14	2	11	25
2472.36.008	M8	3.8	16	2	23	59
2472.36.010	M10	4.5	19	2.5	20	54
2472.36.012	M12	6.2	22	3.5	38	96
2472.36.016	M16	8.5	24	4.5	50	100
2472.36.020	M20	10	30	6.5	52	133
2472.36.024	M24	13	34	8	91	223

Spring plunger, with spring loaded pin, straight version, with collar
Spring plunger, with spring loaded ball, straight version

2473.01.



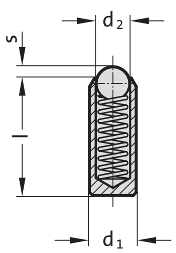
2473.01. Spring plunger, with spring loaded pin, straight version, with collar

Order No	d_1	d_2	d_3	l_1	l_2	l_3	s	Spring force [N] initial	Spring force [N] final
2473.01.006	6	2.7	8	20	3.2	6	3.5	10	22
2473.01.008	8	3.9	10	24	3.2	8	4.5	30	88
2473.01.010	10	5.9	13	30	4	10	5.5	42	110
2473.01.012	12	7.9	16	36	5	12	6.5	50	130

Material:
Sleeve: Free machining steel, burnished
Pin: Steel, case hardened, burnished
Spring: Nirosta

Note:
For use in toolmaking as forcing pins and spring loaded limit stops. Neither the threaded cartridge nor any of its components can escape from the mounting.
Temperature operating range: max. 250 °C

2473.02.



2473.02. Spring plunger, with spring loaded ball, straight version

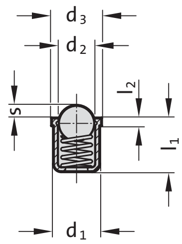
Order No	d_1	d_2	l	s	Spring force [N] initial	Spring force [N] final
2473.02.030	3	2	7	0.65	4.5	7.5
2473.02.035	3.5	2.5	9	0.8	6	14.5
2473.02.040	4	3	11	0.9	8	14
2473.02.045	4.5	3.2	12	0.95	9.5	16.5
2473.02.050	5	3.5	13	1	11	18
2473.02.055	5.5	4	14	1.2	15.5	25
2473.02.060	6	4.5	15	1.5	18	31

Material:
Sleeve: Nirosta 1.4305
Ball: Nirosta hardened
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250 °C

Spring plunger, with spring loaded ball, straight version, with collar

2475.01.



Material:

Sleeve: Delrin blue (POM)
Ball: Delrin white (POM)
Spring: Nirosta

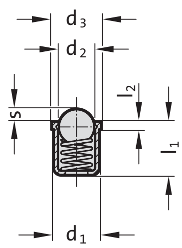
Note:

For locking and for pressing upwards or downwards.
Temperature operating range: –30°C to +50°C

2475.01. Spring plunger, with spring loaded ball, straight version, with collar

Order No	d_1	d_2	d_3	l_1	l_2	s	Spring force [N] initial	Spring force [N] final
2475.01.004	4	3	4.6	5	1	0.8	2.5	6.5
2475.01.005	5	4	5.6	6	1	1	6	9.4
2475.01.006	6	5	6.5	7	1	1.6	6.5	13
2475.01.008	8	6.5	8.5	9	1	1.9	8	18
2475.01.010	10	8	11	13.5	1.5	2.4	12	23
2475.01.012	12	10	13	16	1.5	3.3	13	25

2475.02.



Material:

Sleeve: Delrin blue (POM)
Ball: Nirosta, hardened
Spring: Nirosta

Note:

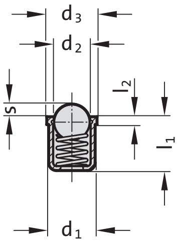
For locking and for pressing upwards or downwards.
Temperature operating range: –30°C to +50°C

2475.02. Spring plunger, with spring loaded ball, straight version, with collar

Order No	d_1	d_2	d_3	l_1	l_2	s	Spring force [N] initial	Spring force [N] final
2475.02.004	4	3	4.6	5	1	0.8	2.5	6.5
2475.02.005	5	4	5.6	6	1	1	6	9.4
2475.02.006	6	5	6.5	7	1	1.6	6.5	13
2475.02.008	8	6.5	8.5	9	1	1.9	8	18
2475.02.010	10	8	11	13.5	1.5	2.4	12	23
2475.02.012	12	10	13	16	1.5	3.3	13	25

Spring plunger, with spring loaded ball, straight version, with collar

2475.03.



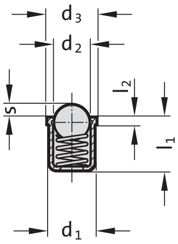
2475.03. Spring plunger, with spring loaded ball, straight version, with collar

Order No	d_1	d_2	d_3	l_1	l_2	s	Spring force [N] initial	Spring force [N] final
2475.03.004	4	3	4.5	5	1	0.8	3	6
2475.03.005	5	4	5.5	6	1	1	4	6.5
2475.03.006	6	5	6.5	7	1	1.6	6	11.5
2475.03.008	8	6.5	8.5	9	1	1.9	8	12.5

Material:
Sleeve: Brass
Ball: Nirosta hardened
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C

2475.04.



2475.04. Spring plunger, with spring loaded ball, straight version, with collar

Order No	d_1	d_2	d_3	l_1	l_2	s	Spring force [N] initial	Spring force [N] final
2475.04.004	4	3	4.6	5	0.9	1	2.5	6
2475.04.005	5	4	5.6	6	0.9	1.4	3	6.5
2475.04.006	6	5	6.5	7	1	1.8	5.5	11.5
2475.04.008	8	6.5	8.5	9	1.1	2.4	7	12.5
2475.04.010	10	8.5	11	13.5	1.7	3.3	8.5	18.5
2475.04.012	12	10	13	16	2.3	4	12	26.5

Material:
Sleeve: Nirosta 1.4303
Ball: Nirosta hardened
Spring: Nirosta

Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C

Accessories for Spring Plungers

2470.10.11
Insertion Tool
for 2470.10.

2470.12.010.017
Insertion Tool
for 2479. and 3479.

2472.11.003 up to 2472.11.020
Thrust pad driver
for 2472.01./.02.

Order No	for thread
2472.11.003	M 3
2472.11.004	M 4
2472.11.005	M 5
2472.11.006	M 6
2472.11.008	M 8
2472.11.010	M 10
2472.11.012	M 12
2472.11.016	M 16
2472.11.020	M 20

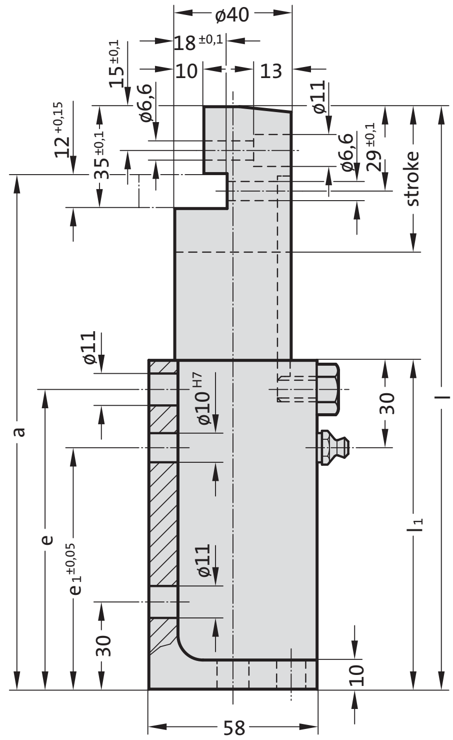
2472.11.024
Thrust pad driver
for 2472.01./.02.

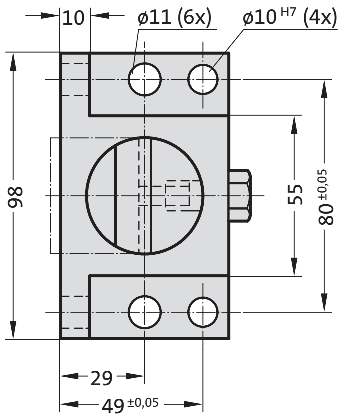
Order No	for thread
2472.11.024	M 24

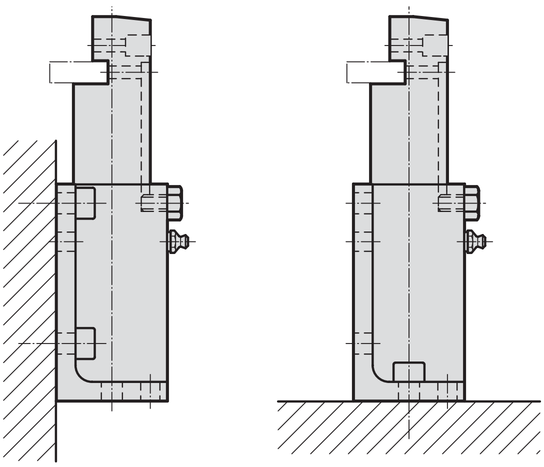
Stripping unit, Stock lifter, Lifting unit, Spring ram

Stripping unit, wall and bottom mounting

2477. .1.01





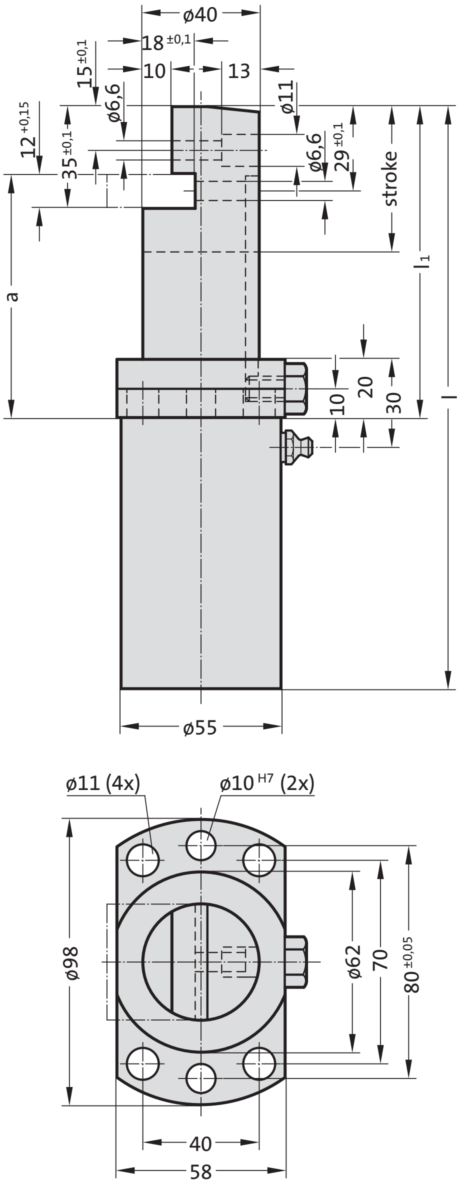


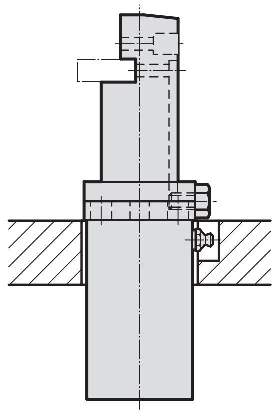
2477. .1.01 Stripping unit, wall and bottom mounting

Order No	Stroke	Initial spring force [daN]	l	l_1	a	e	e_1
2477.050.00050.1.01	50	50	200	113	177	103	83
2477.050.00100.1.01	50	100	200	113	177	103	83
2477.050.00150.1.01	50	150	200	113	177	103	83
2477.050.00200.1.01	50	200	200	113	177	103	83
2477.080.00050.1.01	80	50	260	143	237	133	113
2477.080.00100.1.01	80	100	260	143	237	133	113
2477.080.00150.1.01	80	150	260	143	237	133	113
2477.080.00200.1.01	80	200	260	143	237	133	113

Stripping unit, flanged mounting

2477. .1.02





2477. .1.02 Stripping unit, flanged mounting

Order No	Stroke	Initial spring force [daN]	l	l_1	a
2477.050.00050.1.02	50	50	200	107	84
2477.050.00100.1.02	50	100	200	107	84
2477.050.00150.1.02	50	150	200	107	84
2477.050.00200.1.02	50	200	200	107	84
2477.080.00050.1.02	80	50	260	137	114
2477.080.00100.1.02	80	100	260	137	114
2477.080.00150.1.02	80	150	260	137	114
2477.080.00200.1.02	80	200	260	137	114

Stock lifter

2478.10.
Stock lifter

Order No*	Stroke$_{max.}$	l$_{min.}$	l
2478.10. □□□□□.025	25	121	146
2478.10. □□□□□.050	50	146	196
2478.10. □□□□□.080	80	176	256
2478.10. □□□□□.100	100	196	296
2478.10. □□□□□.125	125	221	346
2478.10. □□□□□.150	150	246	396
2478.10. □□□□□.163	163	259	422
2478.10. □□□□□.175	175	271	446
2478.10. □□□□□.200	200	296	496
2478.10. □□□□□.210	210	306	516

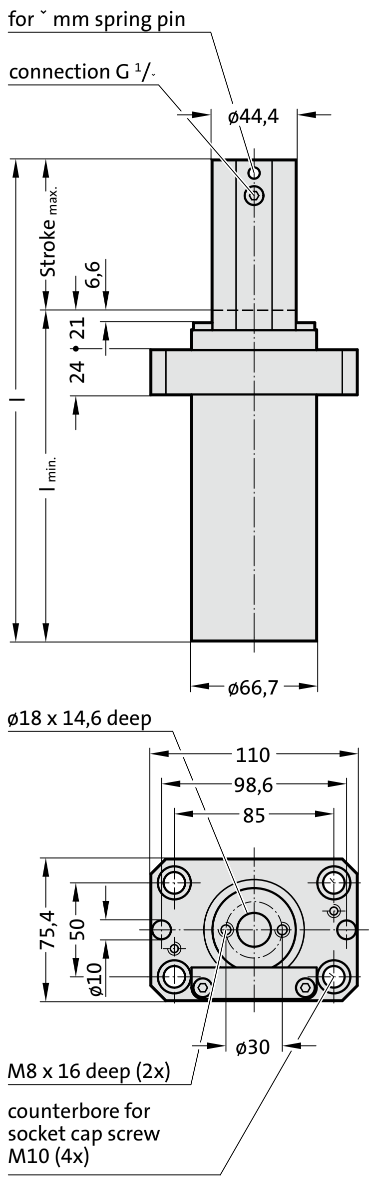
*complete with initial spring force

Spring force marking:

Initial spring force [daN] - Pressure [bar]

.00050. - 28
.00100. - 56
.00150. - 84
.00200. - 113
.00250. - 141
.00320. - 180

2478.10.

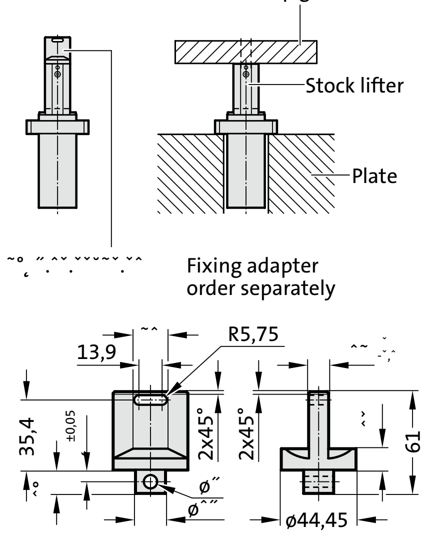


Description:

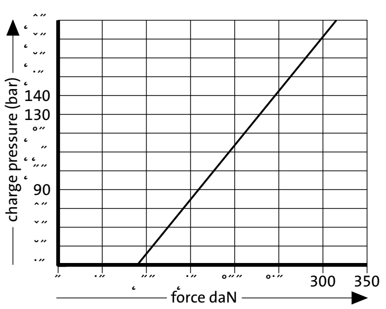
All component lifters in the various gas spring classes are of the same design and the different spring forces are achieved solely by means of different gas pressures.
The pressure can be topped up or reduced via the piston rod.

Note:

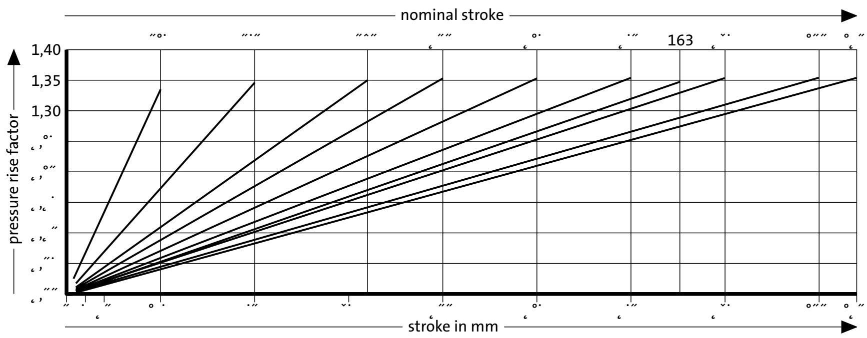
Pressure medium: Nitrogen - N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0,3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1,6 m/s
Order No for spare parts kit: 2478.10.00320
Spring forces as per spring diagram.
Upon customers request, also available unfilled, Order No 2478.10.00000....



Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Stock lifter

Description:

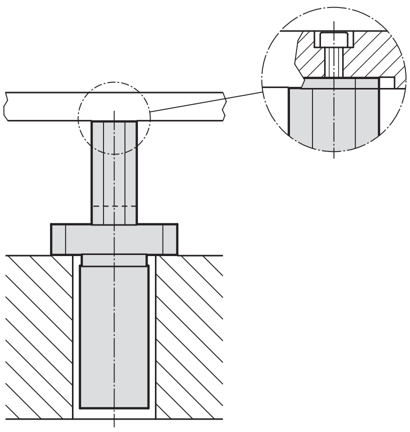
The cylinder base can be used for topping up and reducing gas pressure and for inter-connection arrangements.

Note:

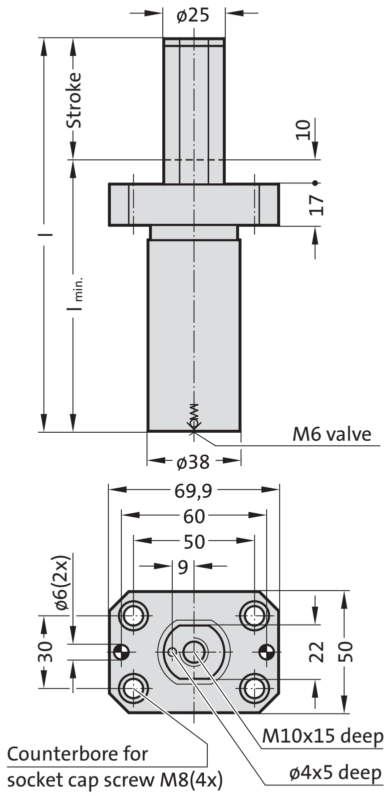
Stocklifters are equipped with a "PowerLine" 2487.12.00170. gas spring with no option for wear compensation, so complete replacement is required.

Initial spring force: 170 daN
Pressure medium: Nitrogen – N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0,3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1,6 m/s
Max. usable stroke: 100%

Spring forces as per spring diagram.



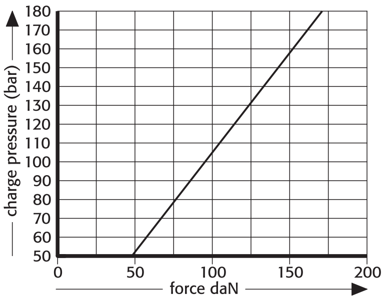
2478.30. . 1



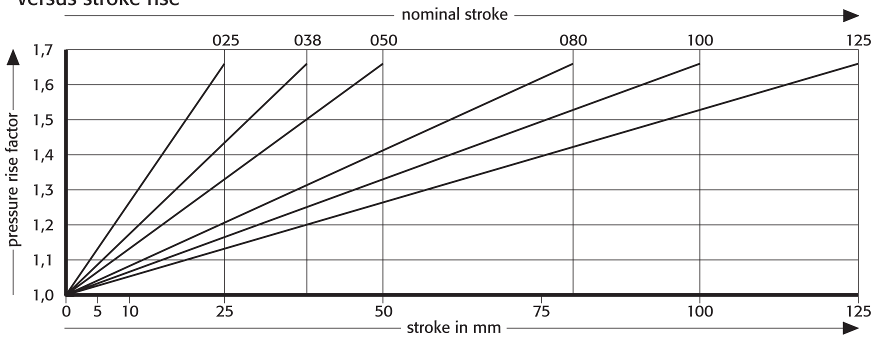
2478.30. .1
Stock lifter

Order No	Stroke$_{max.}$	l$_{min.}$	l
2478.30.00170.025.1	25	87	112
2478.30.00170.038.1	38	100	138
2478.30.00170.050.1	50	112	162
2478.30.00170.080.1	80	145	225
2478.30.00170.100.1	100	165	265
2478.30.00170.125.1	125	190	315

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



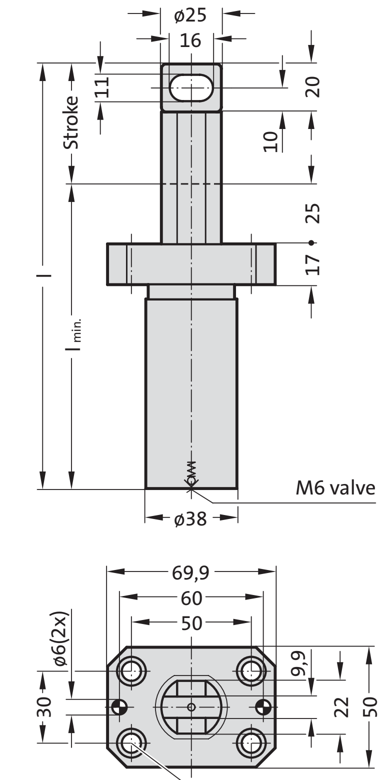
Pressure rise factor accounts for displacement but not external influences!

Stock lifter with attachment lug

2478.30. .2
Stock lifter with attachment lug

Order No	Stroke$_{max.}$	$l_{min.}$	l
2478.30.00170.025.2	25	102	127
2478.30.00170.038.2	38	115	153
2478.30.00170.050.2	50	127	177
2478.30.00170.080.2	80	160	240
2478.30.00170.100.2	100	180	280
2478.30.00170.125.2	125	205	330

2478.30. .2

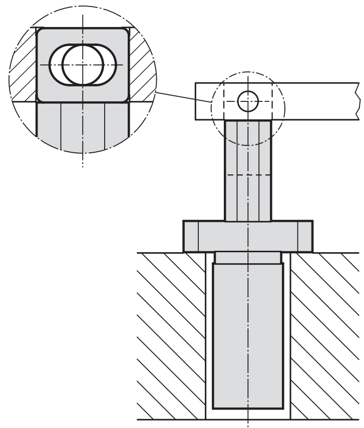


Description:
The cylinder base can be used for topping up and reducing gas pressure and for interconnection arrangements.

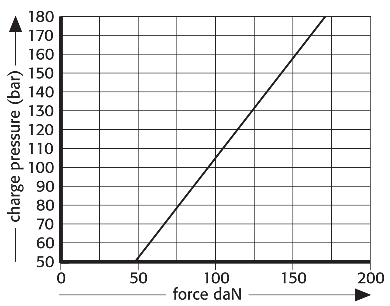
Note:
Stocklifters are equipped with a "PowerLine" 2487.12.00170. gas spring with no option for wear compensation, so complete replacement is required.

Initial spring force: 170 daN
Pressure medium: Nitrogen – N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0,3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1,6 m/s
Max. usable stroke: 100%

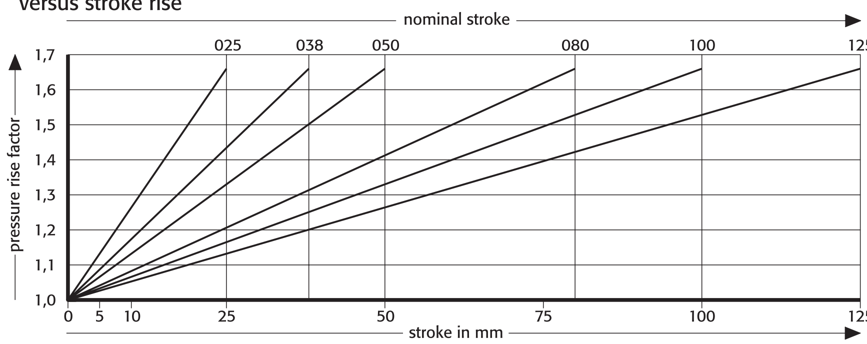
Spring forces as per spring diagram.



Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

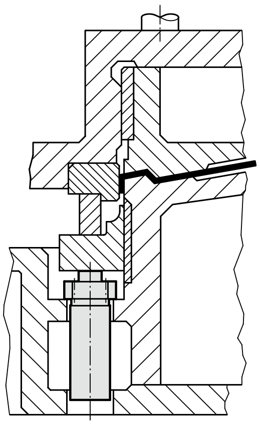
Stripper

Description:
The stripper is used for stripping 2478.30.00170.3 of sheet metal parts after the forming operation (eg folding functions). Gas refill, reduce and composite assembly are possible over the cylinder tube sheet.

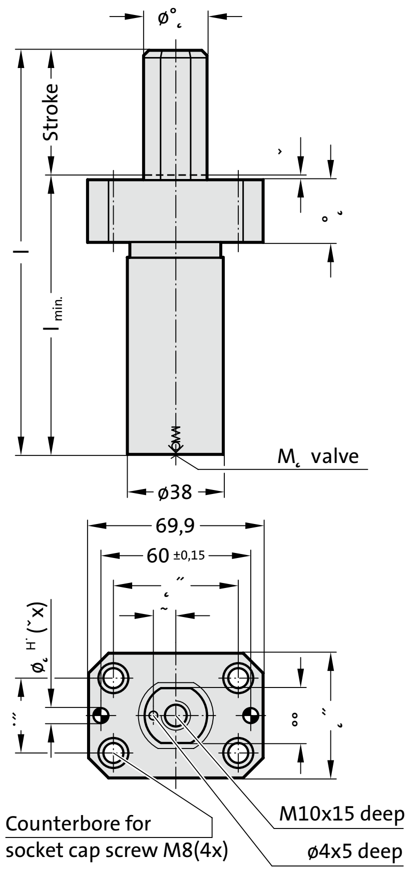
Note:
Strippers are equipped with a “Power Line” 2487.12.00170. gas spring with no option for wear compensation, so complete replacement is required.

Initial spring force: 170 daN
Pressure medium: Nitrogen - N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature force increase: ± 0,3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1,6 m/s
Max. usable stroke: 100%

Spring forces as per spring diagram.



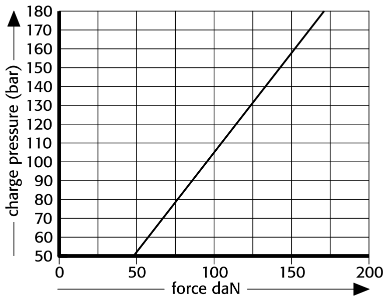
2478.30. .3



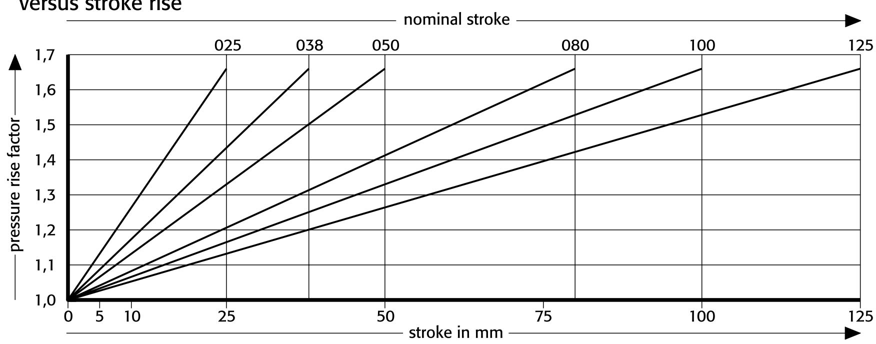
2478.30. .3
Stripper

Order No	Stroke$_{max.}$	l$_{min.}$	l
2478.30.00170.025.3	25	87	112
2478.30.00170.038.3	38	100	138
2478.30.00170.050.3	50	112	162
2478.30.00170.080.3	80	145	225
2478.30.00170.100.3	100	165	265
2478.30.00170.125.3	125	190	315

Initial spring force versus charge pressure



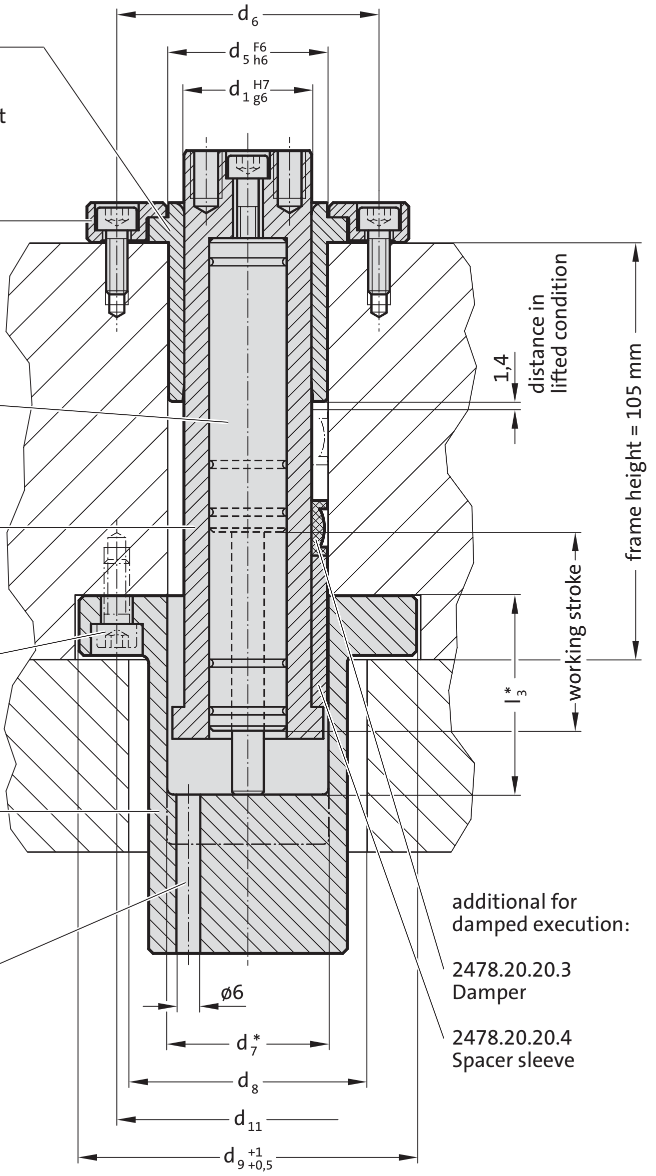
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Lifting unit (not damped/damped) to Mercedes-Benz

2478.20.20.



* to be provided by the customer

Note:

Frame height = 105 mm

Depending on the frame height and the installation type of the sleeve 2478.20.20.2. (l_3 - tapped bore in the frame or cut-out in the cast), the countersink varies for the determination of the lifting path.

Size 2* - type, damped

Maximum lifting path 66 mm
Lifting path 66 mm; Distance height 0 mm
Lifting path 30 mm; Distance height 36 mm

Size 3* - type, damped

Maximum lifting path 80 mm
Lifting path 80 mm; Distance height 47 mm
Lifting path 70 mm; Distance height 57 mm

In order to maintain the clearance of 1.4 mm in a raised state (dampener to bushing), a distance sleeve is to be used between the damper and guide post flange.

* Distance height determined at the customer (deliver length: 61 mm).

2478.20.20. Lifting unit (not damped/damped) to Mercedes-Benz

Size	working stroke	working stroke, damped	d_1	d_5	d_6	d_7*	d_8	d_9	d_{11}	l_3*
1	5 - 35	–	32	40	66	40	60	85	67	-
2	40 - 70	30 - 66	32	40	66	40	60	85	67	-
3	75 - 115	70 - 80	32	40	66	40	60	85	67	-

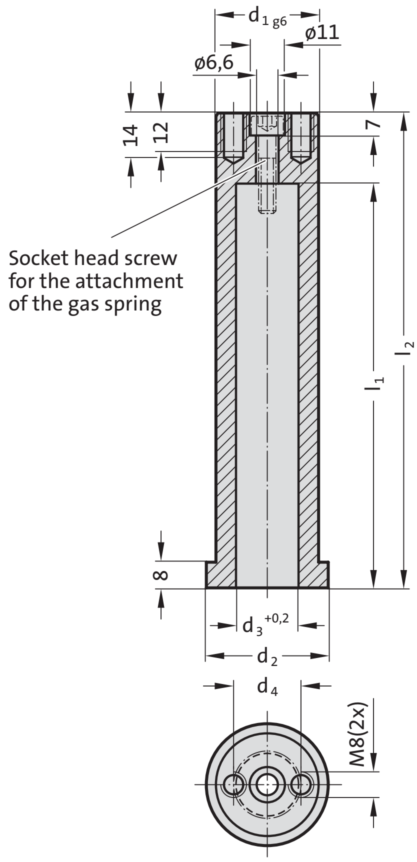
* to be provided by the customer

The lifting unit must be ordered in three sizes with the respective order numbers of the individual parts:

Size	1	2	3
Guide Pillar	2478.20.20.1.01	2478.20.20.1.02	2478.20.20.1.03
Sleeve	–	2478.20.20.2.02	2478.20.20.2.03
Guide bush	2082.70.032	2082.70.032	2082.70.032
Gas spring	2482.74.00090.038	2482.74.00090.080.1	2482.74.00090.125
Holding piece (2x) incl. socket head screw M6x16 DIN EN ISO 4762	2072.45.10	2072.45.10	2072.45.10
additional for damped execution:			
Damper	–	2478.20.20.3	2478.20.20.3
Spacer sleeve	–	2478.20.20.4	2478.20.20.4

Guide pillar for lifting unit to Mercedes-Benz

2478.20.20.1.



Material:

Steel, surface hardened
induction hardened 60 + 3 HRC
Hardness penetration depth > 1.8 mm

Note:

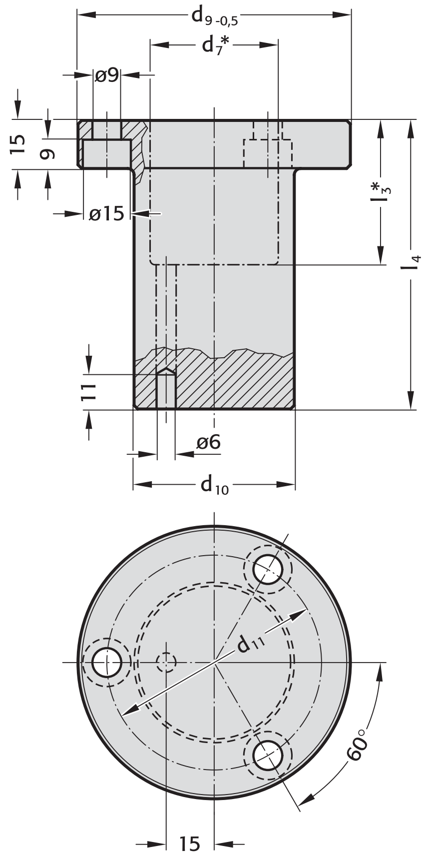
The socket head screw for the attachment of the gas spring is included with delivery.

2478.20.20.1. Guide pillar for lifting unit to Mercedes-Benz

Order No	Size	d_1	d_2	d_3	d_4	l_1	l_2
2478.20.20.1.01	1	32	38	19.5	21	81	113
2478.20.20.1.02	2	32	38	19.5	21	126	148
2478.20.20.1.03	3	32	38	19.5	21	176	208

Sleeve for lifting unit to Mercedes-Benz

2478.20.20.2.



Material:
Steel

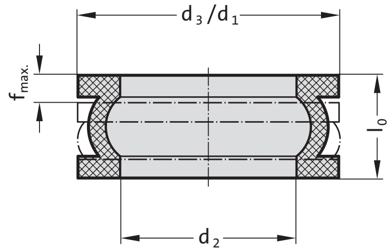
Note:
The sleeve is supplied without countersink. Integrating countersink d_7 (∅40) x l_3 (*to be provided by the customer) determines the lifting path. The drain hole is pre-drilled as a blind hole with a ∅ of 6 mm and must also be modified.

2478.20.20.2. Sleeve for lifting unit to Mercedes-Benz

Order No	Size	d_9	d_{10}	d_{11}	l_4
2478.20.20.2.02	2	85	50	67	90
2478.20.20.2.03	3	85	50	67	150

Damper for lifting units to Mercedes-Benz

2478.20.20.3



Description:

The damper element made of co-polyester elastomer is used in the jacking units in progressive dies in the automotive and white goods industry. Increasing stresses on screws and bolts are reduced by the low stress dampers. Reduced noise emission is also an additional positive side-effect. Two-ply dampers can be used depending on the mass or stroke.

Benefits:
- High absorption of force and energy
- Slight settlement
- Long service life and high level of operating safety
- Noise reduction
- High degree of effectiveness

Material:

Co-Polyester-Elastomer
Available in 55 Shore-D hardness levels.

Technical data:
Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

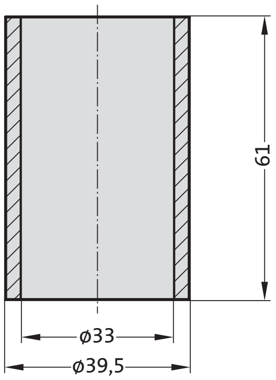
2478.20.20.3 Damper for lifting units to Mercedes-Benz

Order No	d_1	d_2	d_3	l_0	$f_{max.}$ in mm	W_3 in Nm/stroke*
2478.20.20.3	39.5	32.2	39.6	12.6	3.6	4

*Total energy per stroke

Spacer sleeve for lifting units to Mercedes-Benz

2478.20.20.4



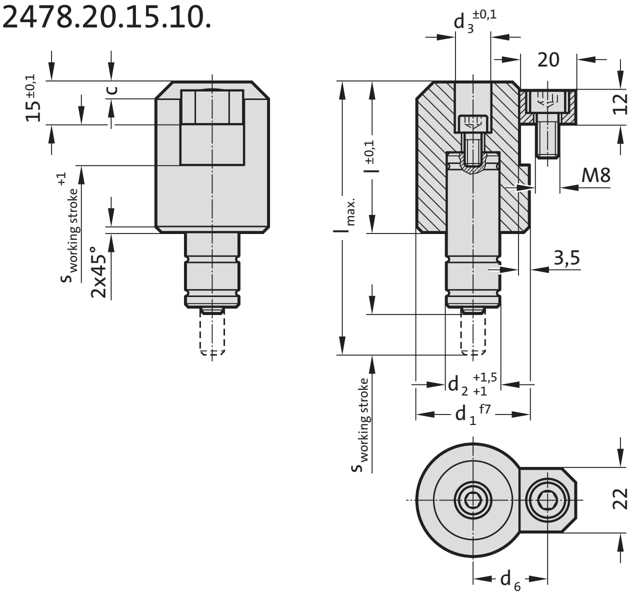
Material:
Steel, hardened

Note:
Height adjustment according to lifting path while using lifting unit
2478.20.20.

2478.20.20.4 Spacer sleeve for lifting units to Mercedes-Benz

Lifter, round with pilot pin hole to BMW standard

2478.20.15.10.



Execution:

Assembly consisting of:

- Lifter
- Gas spring
  – ∅ 19 mm (1) = 2482.74.00090.
  Spring force 90 daN
  or
  – ∅ 25 mm (2) = 2480.21.00200.
  Spring force 200 daN
- Screw clamp,
  incl. Socket head screw M8 × 16 to ISO 4762
- Socket head screw M6 × 12 to ISO 4762

Note:

*$s_{working\ stroke}$ suitable = max. allowable spring stroke minus 10 % stroke reserve of nominal stroke length,
from stroke of 50 mm only max. 5 mm.

on request, gas spring with a lower spring force available.

2478.20.15.10. Lifter, round with pilot pin hole to BMW Standard

			d_1	28	28	30	30	35	35	40	40	40	40	40	50	50	50	50
			d_2	19	19	19	19	25	25	19	19	19	25	25	19	19	25	25
			d_3	10.5	12.5	10.5	12.5	12.5	16.5	10.5	12.5	16.5	12.5	16.5	12.5	16.5	12.5	16.5
			d_6	20.5	20.5	21.5	21.5	24	24	26.5	26.5	26.5	26.5	26.5	31.5	31.5	31.5	31.5
			c	4x45°	4x45°	5x45°	5x45°	5x45°	5x45°	6x45°	6x45°	6x45°	6x45°	6x45°	8x45°	8x45°	8x45°	8x45°
l	$l_{max.}$	*$s_{working\ stroke}$	Stroke Order No (Part 3)								(Part 2)							
49	87	9	009	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
53.5	97	13.5	014	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
62.5	117	22.5	023	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
74	143	34	034	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
85	167	45	045	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
98.5	197	58.5	059	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
115	230	75	075	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
135	270	95	095	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.
160	320	120	120	.111.	.112.	.121.	.122.	.232.	.233.	.141.	.142.	.143.	.242.	.243.	.152.	.153.	.252.	.253.

Ordering Code (example):

Order No: Part 1 Part 2 Part 3

2 4 7 8 . 2 0 . 1 5 . 1 0 . 1 5 3 . 0 0 9

$s_{working\ stroke}$ = Stroke - Order-No

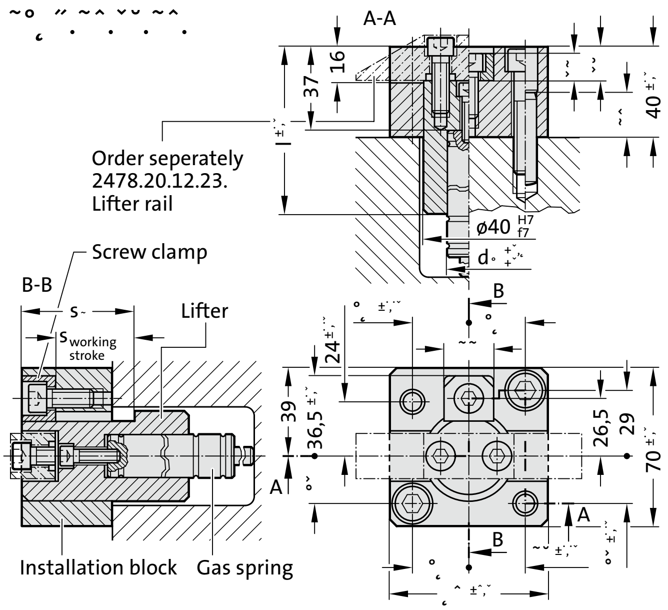
d_3 = Order-No
10.5 mm = (1)
12.5 mm = (2)
16.5 mm = (3)

d_1 = Order-No
28 mm = (1)
30 mm = (2)
35 mm = (3)
40 mm = (4)
50 mm = (5)

d_2 – Gas spring = Order-No
∅ 19 mm – 2482.74.00090. = (1)
∅ 25 mm – 2480.21.00200. = (2)

Assembly (lifter with pilot pin hole)
to BMW Standard
lifter, round with pilot pin hole

Lifter unit with installation block according to BMW standard



Material:
Steel

Execution:
Lifter unit with installation block comprises:

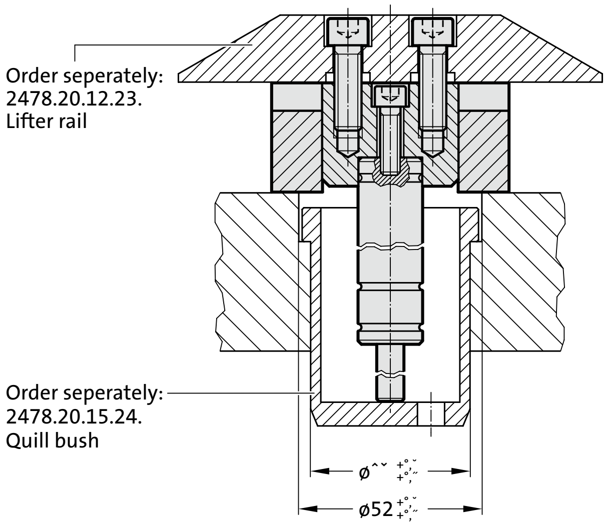
- Installation block
- Lifter
- Screw clamp
- Gas spring 2482.74.00090. or 2480.21.00200.
- Socket cap screw according to ISO 4762
  M6 × 20 (1x), M8 × 20 (1x), M8 × 25 (2x), M10 × 45 (2x)
- Dowel pin according to ISO 8735 ∅ 10 × 40 (2x)

Note:
Order separately (see installation example)

- 2478.20.15.23.: Lifter rail
- 2478.20.15.24.: Holding sleeve

On request, gas spring with a lower spring force available.

Mounting example

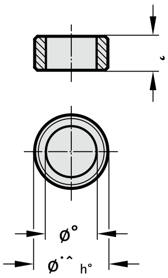


2478.20.15.20. Lifter unit with installation block according to BMW standard

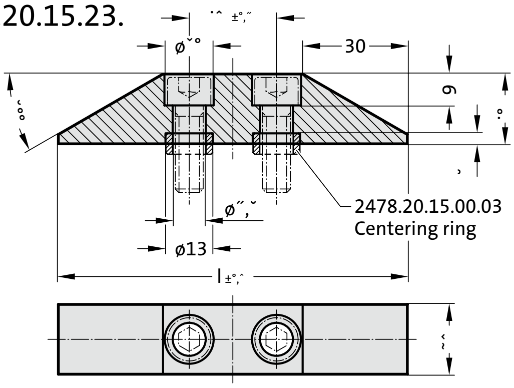
Order No	d_2	l	$s_{working\ stroke}$	s_1	Gas spring
2478.20.15.20.14.009	19	49	9	25	2482.74.00090.010.2
2478.20.15.20.14.014	19	53.5	13.5	29.5	2482.74.00090.015.2
2478.20.15.20.14.023	19	62.5	22.5	38.5	2482.74.00090.025.2
2478.20.15.20.14.034	19	74	34	50	2482.74.00090.038.2
2478.20.15.20.14.045	19	85	45	61	2482.74.00090.050.2
2478.20.15.20.14.059	19	98.5	58.5	74.5	2482.74.00090.063.2
2478.20.15.20.14.075	19	115	75	91	2482.74.00090.080.2
2478.20.15.20.14.095	19	135	95	111	2482.74.00090.100.2
2478.20.15.20.14.120	19	160	120	136	2482.74.00090.125.2
2478.20.15.20.24.009	25	49	9	25	2480.21.00200.010
2478.20.15.20.24.014	25	53.5	13.5	29.5	2480.21.00200.015
2478.20.15.20.24.023	25	62.5	22.5	38.5	2480.21.00200.025
2478.20.15.20.24.034	25	74	34	50	2480.21.00200.038
2478.20.15.20.24.045	25	85	45	61	2480.21.00200.050
2478.20.15.20.24.059	25	98.5	58.5	74.5	2480.21.00200.063
2478.20.15.20.24.075	25	115	75	91	2480.21.00200.080
2478.20.15.20.24.095	25	135	95	111	2480.21.00200.100
2478.20.15.20.24.120	25	160	120	136	2480.21.00200.125

Lifter rail for lifter units to BMW standard
Holding sleeve for lifter units to BMW standard

2478.20.15.00.03
Centrierring
(Order-No. for reordering)



2478.20.15.23.



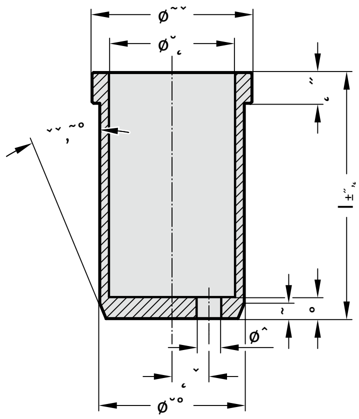
Material:
Steel

Note:
Delivery without screws and centring rings.

Screws and centring rings are already included in the scope of delivery for the lifter units 2478.20.15.20./30./40.

2478.20.15.23. Lifter rail to BMW

Order No	l
2478.20.15.23.2020.100	100
2478.20.15.23.2020.125	125
2478.20.15.23.2020.150	150
2478.20.15.23.2020.175	175
2478.20.15.23.2020.200	200
2478.20.15.23.2020.250	250
2478.20.15.23.2020.300	300
2478.20.15.23.2020.350	350
2478.20.15.23.2020.400	400
2478.20.15.23.2020.450	450
2478.20.15.23.2020.500	500
2478.20.15.23.2020.550	550
2478.20.15.23.2020.600	600



Material:
Steel

Note:
Holding sleeve 2478.20.15.24. can only be used for lifter 2478.20.15.20./30./40. ∅ 40 mm.

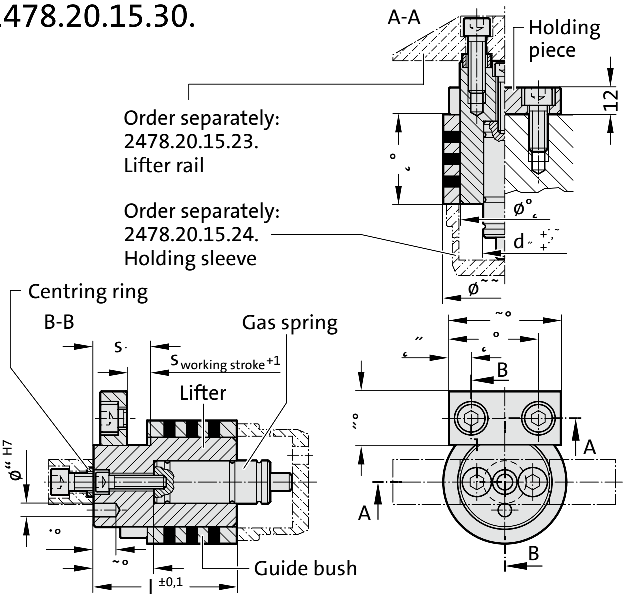
This is required when the panel is not thick enough (see installation example 2478.20.15.20./30./40.).

2478.20.15.24. Holding sleeve to BMW

Order No	l
2478.20.15.24.04.030	30
2478.20.15.24.04.040	40
2478.20.15.24.04.050	50
2478.20.15.24.04.060	60
2478.20.15.24.04.070	70
2478.20.15.24.04.080	80
2478.20.15.24.04.090	90
2478.20.15.24.04.100	100
2478.20.15.24.04.110	110
2478.20.15.24.04.120	120
2478.20.15.24.04.130	130
2478.20.15.24.04.140	140
2478.20.15.24.04.150	150
2478.20.15.24.04.160	160
2478.20.15.24.04.170	170
2478.20.15.24.04.180	180
2478.20.15.24.04.190	190
2478.20.15.24.04.200	200

Universal lifter unit, according to BMW standard

2478.20.15.30.

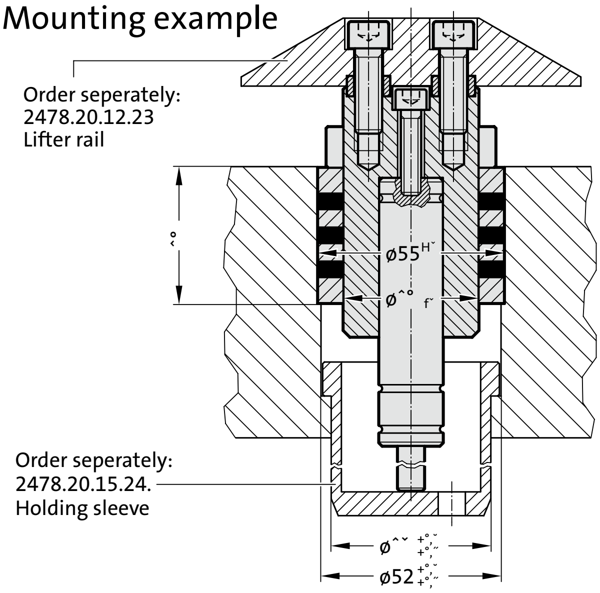


Material:
Steel

Execution:
Universal lifter unit comprises:
- Lifter
- Screw clamp
- Centring rings
- Guide bush
- Gas spring 2482.74.00090. or 2480.21.00200.
- Socket cap screw according to ISO 4762 M6 × 25 (1x), M8 × 20 (2x), M8 × 25 (2x)

Note:
Order separately (see installation example)
- 2478.20.15.23.: Lifter rail
- 2478.20.15.24.: Holding sleeve

Mounting example

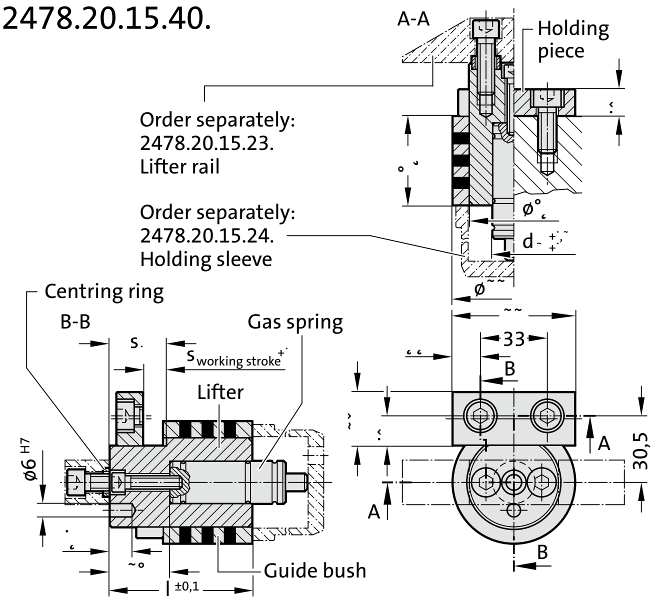


2478.20.15.30. Universal lifter unit, according to BMW standard

Order No	d_2	L	$s_{working\ stroke}$	s_1	Gas spring
2478.20.15.30.14.009	19	64	9	25	2482.74.00090.010.2
2478.20.15.30.14.014	19	68.5	13.5	29.5	2482.74.00090.015.2
2478.20.15.30.14.023	19	77.5	22.5	38.5	2482.74.00090.025.2
2478.20.15.30.14.034	19	89	34	50	2482.74.00090.038.2
2478.20.15.30.14.045	19	100	45	63	2482.74.00090.050.2
2478.20.15.30.14.059	19	113.5	58.5	74.5	2482.74.00090.063.2
2478.20.15.30.14.075	19	130	75	91	2482.74.00090.080.2
2478.20.15.30.14.095	19	150	95	111	2482.74.00090.100.2
2478.20.15.30.14.120	19	175	120	136	2482.74.00090.125.2
2478.20.15.30.24.009	25	64	9	25	2480.21.00200.010
2478.20.15.30.24.014	25	68.5	13.5	29.5	2480.21.00200.015
2478.20.15.30.24.023	25	77.5	22.5	38.5	2480.21.00200.025
2478.20.15.30.24.034	25	89	34	50	2480.21.00200.038
2478.20.15.30.24.045	25	100	45	63	2480.21.00200.050
2478.20.15.30.24.059	25	113.5	58.5	74.5	2480.21.00200.063
2478.20.15.30.24.075	25	130	75	91	2480.21.00200.080
2478.20.15.30.24.095	25	150	95	111	2480.21.00200.100
2478.20.15.30.24.120	25	175	120	136	2480.21.00200.125

Universal lifter unit, according to BMW standard

2478.20.15.40.

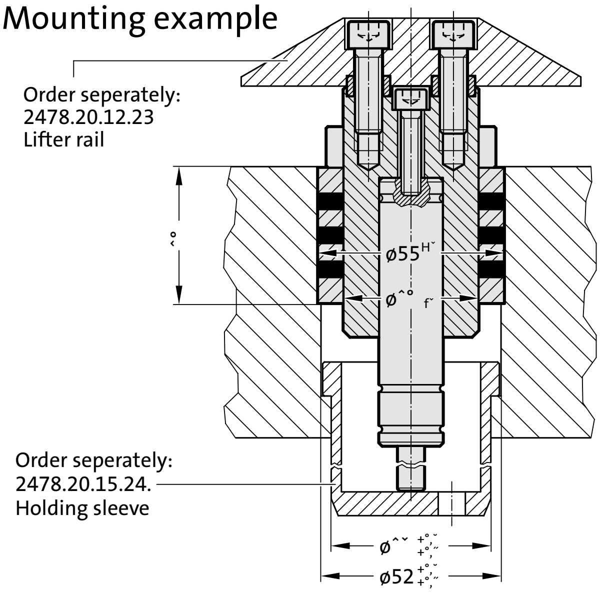


Material:
Steel

Execution:
Universal lifter unit comprises:
- Lifter
- Screw clamp
- Centring rings
- Guide bush
- Gas spring 2482.74.00090. or 2480.21.00200.
- Socket cap screw according to ISO 4762
  M6 × 25 (1x), M8 × 25 (2x), M10 × 20 (2x)

Note:
Order separately (see installation example)
- 2478.20.15.23.: Lifter rail
- 2478.20.15.24.: Holding sleeve

Mounting example

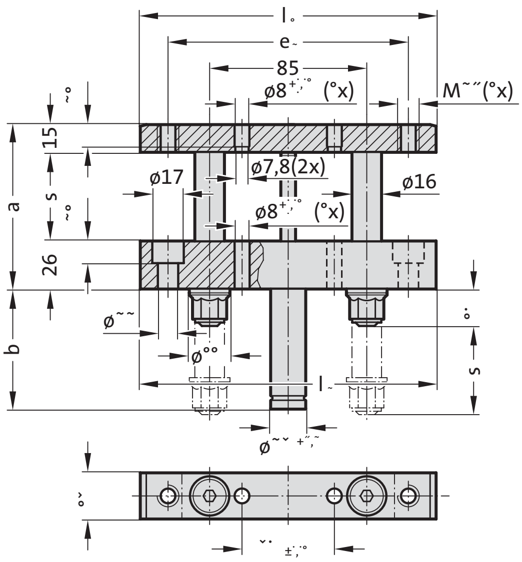


2478.20.15.40. Universal lifter unit, according to BMW standard

Order No	d_2	l	$s_{working\ stroke}$	s_1	Gas spring
2478.20.15.40.14.009	19	64	9	25	2482.74.00090.010.2
2478.20.15.40.24.009	25	64	9	25	2480.21.00200.010
2478.20.15.40.14.14	19	68.5	13.5	29.5	2482.74.00090.015.2
2478.20.15.40.24.14	25	68.5	13.5	29.5	2480.21.00200.015
2478.20.15.40.14.23	19	77.5	22.5	38.5	2482.74.00090.025.2
2478.20.15.40.24.23	25	77.5	22.5	38.5	2480.21.00200.025
2478.20.15.40.14.034	19	89	34	50	2482.74.00090.038.2
2478.20.15.40.24.034	25	89	34	50	2480.21.00200.038
2478.20.15.40.14.040	19	100	40	56	2482.74.00090.050.2
2478.20.15.40.24.040	25	100	40	56	2480.21.00200.050
2478.20.15.40.14.045	19	100	45	61	2482.74.00090.050.2
2478.20.15.40.24.045	25	100	45	61	2480.21.00200.050
2478.20.15.40.14.050	19	113.5	50	66	2482.74.00090.063.2
2478.20.15.40.24.050	25	113.5	50	66	2480.21.00200.063
2478.20.15.40.14.054	19	113.5	54	70	2482.74.00090.063.2
2478.20.15.40.24.054	25	113.5	54	70	2480.21.00200.063
2478.20.15.40.14.59	19	113.5	58.5	74.5	2482.74.00090.063.2
2478.20.15.40.24.59	25	113.5	58.5	74.5	2480.21.00200.063
2478.20.15.40.14.065	19	130	65	81	2482.74.00090.080.2
2478.20.15.40.24.065	25	130	65	81	2480.21.00200.080
2478.20.15.40.14.070	19	130	70	86	2482.74.00090.080.2
2478.20.15.40.24.070	25	130	70	86	2480.21.00200.080
2478.20.15.40.14.075	19	130	75	91	2482.74.00090.080.2
2478.20.15.40.24.075	25	130	75	91	2480.21.00200.080
2478.20.15.40.14.080	19	150	80	96	2482.74.00090.100.2
2478.20.15.40.24.080	25	150	80	96	2480.21.00200.100
2478.20.15.40.14.085	19	150	85	101	2482.74.00090.100.2
2478.20.15.40.24.085	25	150	85	101	2480.21.00200.100
2478.20.15.40.14.090	19	150	90	106	2482.74.00090.100.2
2478.20.15.40.24.090	25	150	90	106	2480.21.00200.100
2478.20.15.40.14.095	19	150	95	111	2482.74.00090.100.2
2478.20.15.40.24.095	25	150	95	111	2480.21.00200.100
2478.20.15.40.14.100	19	175	100	116	2482.74.00090.125.2
2478.20.15.40.24.100	25	175	100	116	2480.21.00200.125
2478.20.15.40.14.105	19	175	105	121	2482.74.00090.125.2
2478.20.15.40.24.105	25	175	105	121	2480.21.00200.125
2478.20.15.40.14.110	19	175	110	126	2482.74.00090.125.2
2478.20.15.40.24.110	25	175	110	126	2480.21.00200.125
2478.20.15.40.14.115	19	175	115	131	2482.74.00090.125.2
2478.20.15.40.24.115	25	175	115	131	2480.21.00200.125
2478.20.15.40.14.120	19	175	120	136	2482.74.00090.125.2
2478.20.15.40.24.120	25	175	120	136	2480.21.00200.125

Lifter unit with pillar guidance

2478.25.00090.



Description:

Filling pressure regulation and a composite arrangement are possible using the cylinder tube base. To attach the strip guide on the lifter rail, use the provided threads. We recommend designing the strip guide for a maximum material width of +0.4 mm (0.2 mm for each side) (View X). When several lifter units are used, only one unit per piece should be pinned in order to prevent redundancy.

Note:

The lifter unit is equipped with gas spring type 2482.74.00090, which cannot be repaired in case of wear and must therefore be exchanged completely.

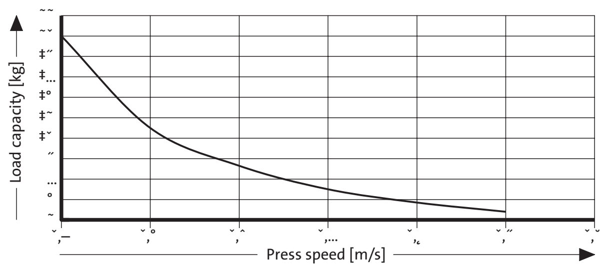
Initial spring force: 90 daN
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 40 to 100 (at 20°C)
Max. piston speed: see diagram
Max. usable stroke: 95%

Spring forces as per spring diagram in Chapter F - 2482.74.

2478.25.00090. Lifter unit with pillar guidance

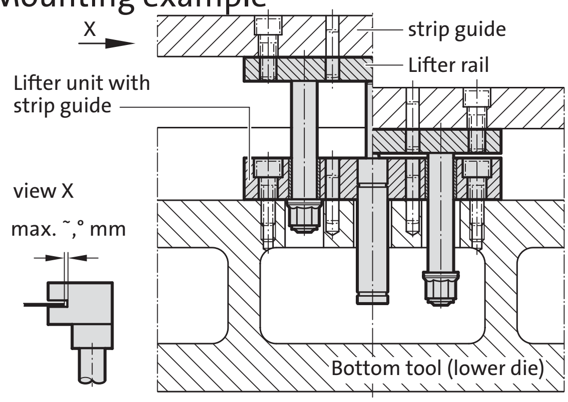
Order No	s Stroke max.	a	b	l_1	l_2	e_1	Spring force [daN] initial	Spring force [daN] final	Gas spring
2478.25.00090.025	23	64	40	160	115	-	90	130	2482.74.00090.025.2
2478.25.00090.038	36	77	53	160	160	130	90	120	2482.74.00090.038.2
2478.25.00090.050	48	89	65	160	160	130	90	120	2482.74.00090.050.2
2478.25.00090.063	61.5	102.5	81.5	160	160	130	90	120	2482.74.00090.063.2
2478.25.00090.080	78	119	98	160	160	130	90	120	2482.74.00090.080.2
2478.25.00090.100	98	139	118	160	160	130	90	120	2482.74.00090.100.2
2478.25.00090.125	123	164	143	160	160	130	90	120	2482.74.00090.125.2
2478.25.00090.150	148	189	168	160	160	130	90	120	2482.74.00090.150.2

Max. load per lifter unit**



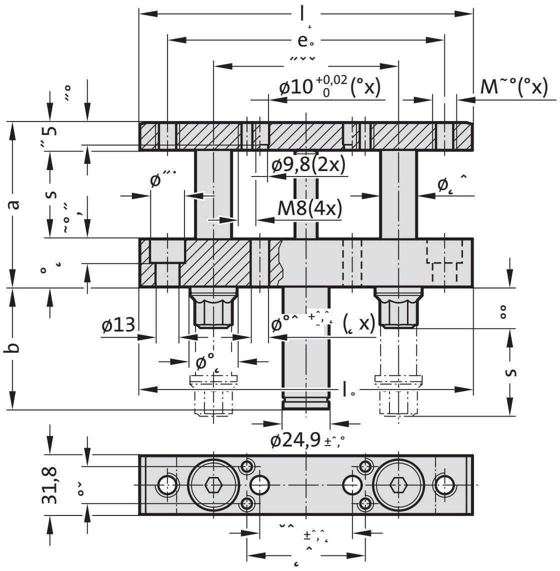
** Only recommended load capacity (per lifter unit) depending on the press speed. Provide an external stop in case of higher loads.

Mounting example



Lifter unit with pillar guidance

2478.25.00200.



Description:
Filling pressure regulation and a composite arrangement are possible using the cylinder tube base. To attach the strip guide on the lifter rail, use the provided threads. We recommend designing the strip guide for a maximum material width of +0.4 mm (0.2 mm for each side) (View X). When several lifter units are used, only one unit per piece should be pinned in order to prevent redundancy.

Note:
The lifter unit is equipped with gas spring type 2480.21.00200.

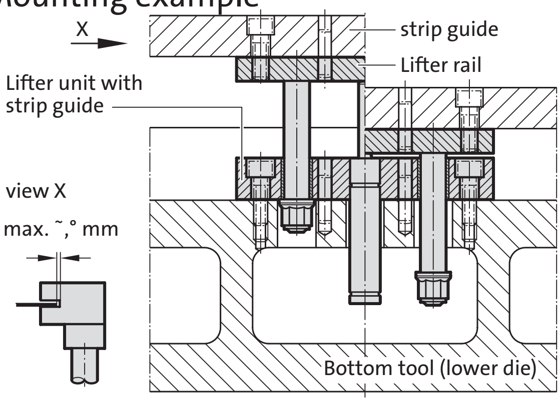
Initial spring force: 200 daN
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 80 to 100 (at 20°C)
Max. piston speed: see diagram
Max. usable stroke: 95%

Order No for spare parts kit: 2480.21.00150
Spring forces as per spring diagram in Chapter F - 2480.21.

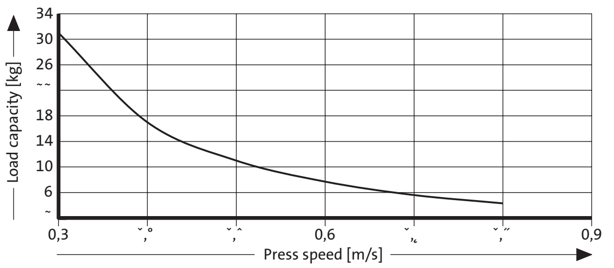
2478.25.00200. Lifter unit with pillar guidance

Order No	s Stroke max.	a	b	l_1	l_2	e_1	Spring force [daN] initial	Spring force [daN] final	Gas spring
2478.25.00200.025	23	64	41	180	140	-	200	308	2480.21.00200.025
2478.25.00200.038	36	77	54	180	180	150	200	309	2480.21.00200.038
2478.25.00200.050	48	89	66	180	180	150	200	309	2480.21.00200.050
2478.25.00200.063	61.5	102.5	82.5	180	180	150	200	302	2480.21.00200.063
2478.25.00200.080	78	119	99	180	180	150	200	304	2480.21.00200.080
2478.25.00200.100	98	139	119	180	180	150	200	305	2480.21.00200.100
2478.25.00200.125	123	164	144	180	180	150	200	306	2480.21.00200.125
2478.25.00020.150	148	189	177	180	180	150	200	300	2480.21.00200.150
2478.25.00200.175	173	214	202	180	180	150	200	298	2480.21.00200.175
2478.25.00200.200	198	239	227	180	180	150	200	297	2480.21.00200.200

Mounting example



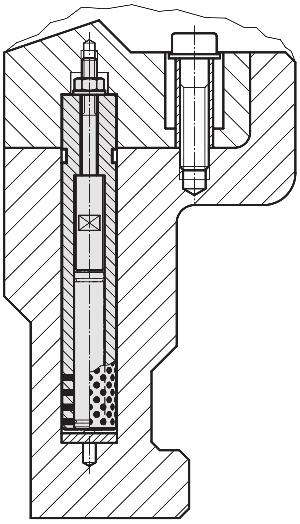
Max. load per lifter unit**



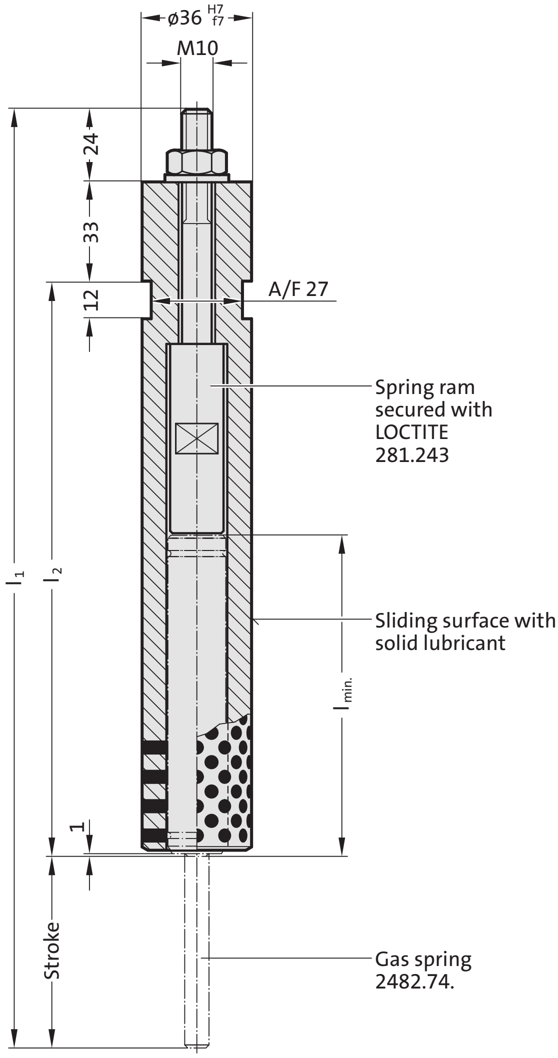
** Only recommended load capacity (per lifter unit) depending on the press speed. Provide an external stop in case of higher loads.

Spring ram with gas spring

Mounting example



2478.



Material:

C45
induction hardened 58+4 HRC
Hardness penetration depth 0,8+0,4

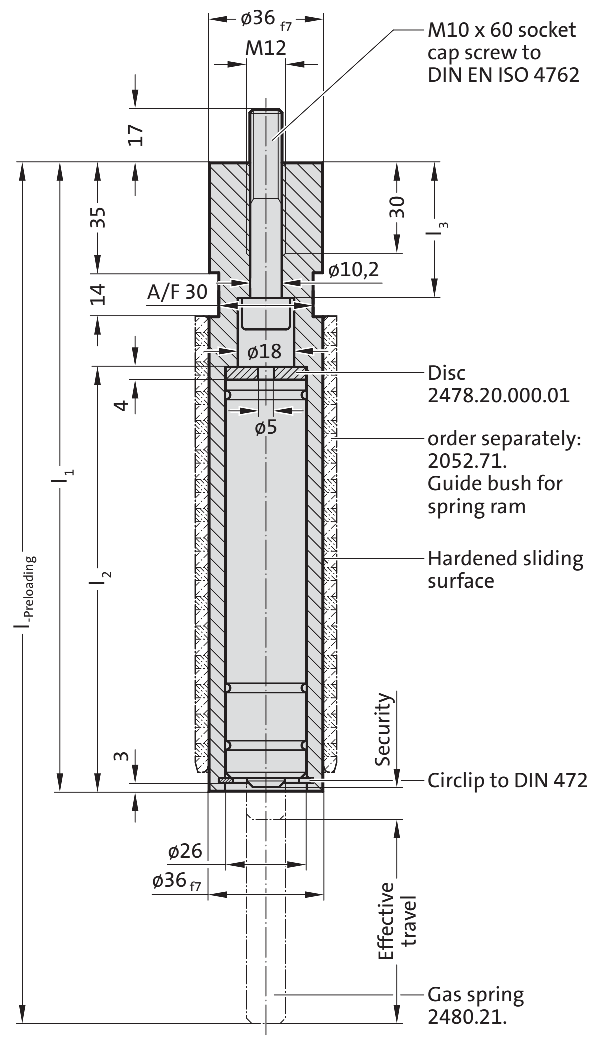
Sliding surface with solid lubricant

2478. Spring ram with gas spring

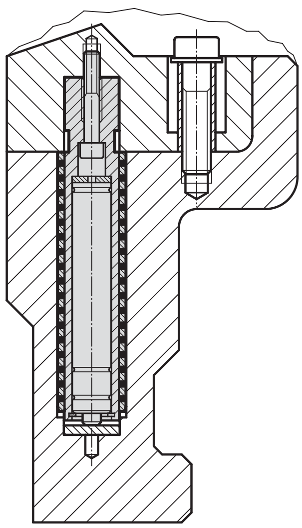
Order No	$Stroke_{max.}$	$l_{min.}$	l_1	l_2	Spring force [daN] initial	Spring force [daN] final	Gas spring
2478.050.00030.1	50	92	257	150	30	40	2482.74.00030.050.2
2478.050.00050.1	50	92	257	150	50	67	2482.74.00050.050.2
2478.050.00070.1	50	92	257	150	70	94	2482.74.00070.050.2
2478.050.00090.1	50	92	257	150	90	120	2482.74.00090.050.2
2478.063.00030.1	63	109	310	190	30	40	2482.74.00030.063.2
2478.063.00050.1	63	109	310	190	50	67	2482.74.00050.063.2
2478.063.00070.1	63	109	310	190	70	94	2482.74.00070.063.2
2478.063.00090.1	63	109	310	190	90	120	2482.74.00090.063.2
2478.080.00030.1	80	125	360	223	30	40	2482.74.00030.080.2
2478.080.00050.1	80	125	360	223	50	67	2482.74.00050.080.2
2478.080.00070.1	80	125	360	223	70	94	2482.74.00070.080.2
2478.080.00090.1	80	125	360	223	90	120	2482.74.00090.080.2

Spring ram with gas spring to VW standard

2478.20. .1



Mounting example



Material:

Spring ram: C45
induction hardened 58+4 HRCHardness penetration depth 0,8+0,4

Disc: 90MnCrV8
hardened 56+4 HRC

Note:

Use only with matching guide bush 2052.71.!

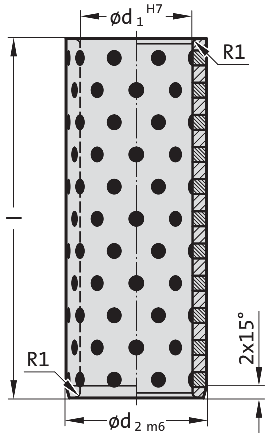
Spring bolt installed preloaded.

2478.20. .1 Spring ram with gas spring to VW standard

Order No	$Stroke_{max.}$	l	l_1	l_2	l_3	Spring force [daN] initial	Spring force [daN] final	Gas spring
2478.20.050.00050.1	50	240	182	118	42.5	50	68	2480.21.00050.063
2478.20.050.00100.1	50	240	182	118	42.5	100	137	2480.21.00100.063
2478.20.050.00150.1	50	240	182	118	42.5	150	206	2480.21.00150.063
2478.20.050.00200.1	50	240	182	118	42.5	200	275	2480.21.00200.063
2478.20.065.00050.1	65	274	200	135	43.5	50	68	2480.21.00050.080
2478.20.065.00100.1	65	274	200	135	43.5	100	137	2480.21.00100.080
2478.20.065.00150.1	65	274	200	135	43.5	150	206	2480.21.00150.080
2478.20.065.00200.1	65	274	200	135	43.5	200	275	2480.21.00200.080
2478.20.080.00050.1	80	314	220	155	43.5	50	68	2480.21.00050.100
2478.20.080.00100.1	80	314	220	155	43.5	100	137	2480.21.00100.100
2478.20.080.00150.1	80	314	220	155	43.5	150	206	2480.21.00150.100
2478.20.080.00200.1	80	314	220	155	43.5	200	275	2480.21.00200.100

Guide bush for spring ram 2478.20. .1

2052.71.



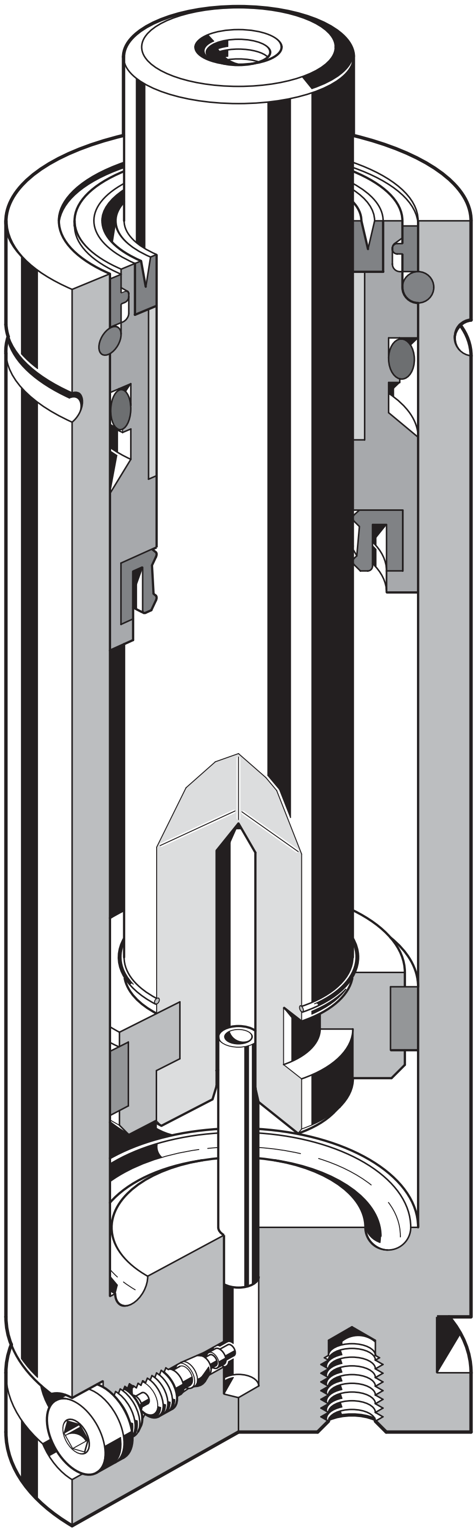
Material:
Bronze with solid lubricant, oilless lubricating

Note:
Recommended locating bore for bonding G7.

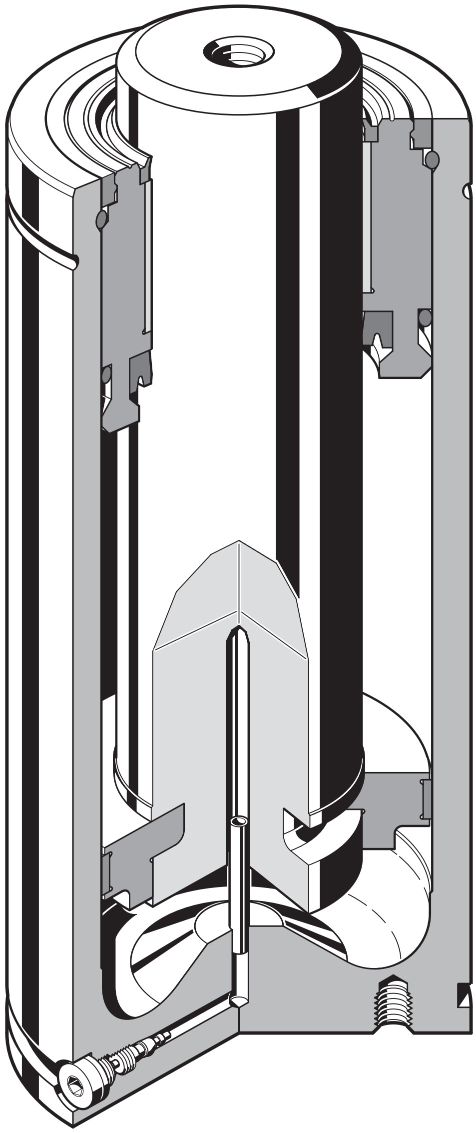
2052.71. Guide bush for spring ram 2478.20. .1

Order No	d_1	d_2	l
2052.71.036.045.115	36	45	115
2052.71.036.045.145	36	45	145
2052.71.036.045.170	36	45	170

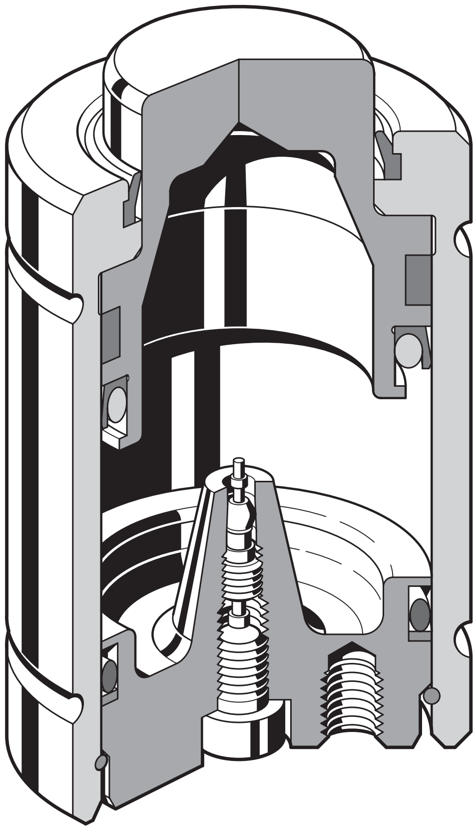
Nitrogen Gas springs



2480.12.



2480.13.



2490.

FIBRO Gas springs

The extensive range of FIBRO Gas springs constitutes an ideal supplement to and expansion of the traditional programmes of spring elements such als helical springs, disc springs and elastomer units. With their minimal space requirement, Gas springs close a gap where ever the accent is on accomodation of the utmot force component within a minimum of space – or where exceedingly large travel is demanded: FIBRO Gas springs take care of both demands, even in combination.

Their self-contained nitrogen charge makes FIBRO Gas springs completely autonomous devices. Feeder pipes or storage vessel are not required.

Monitoring of charge pressure, however, is necessary in certain special cases. Suitable equipment for in-situ pressure control can be found in the Accessories Section.

As long as all mounting detail is laid out with due circumspection, removal and installation of the units presents no problems whatsoever.

Instructions are included with every delivery of Gas springs.

Application examples see at the end of chapter F.

Functioning

The pressure medium is a commercially available, environment-friendly nitrogen. FIBRO Gas springs have a standard charge pressure of max. 150 bar (180 bar). Depending on spring size and type, this pressure offers initial force ratings of 2 daN to 20,000 daN.

Pressure Build-Up

In operation the piston rod enters the spring space whose volume is progressively reduced. The resulting pressure rise can be plotted on the Gas Spring Diagram as a multiplication factor. The spring force is the product of initial force times that pressure-rise factor and can therefore be calculated easily.

Working temperature

The spring temperature should not exceed +80 °C.

Charge pressure

Modification of charge pressure allows variation of the force rating and can be predetermined from the spring Diagram.

Installation

FIBRO Gas springs can be used in any installation position. Whether or not external forces act on them when at rest is of no consequence.

APPROVED PED 2014/68/EU

All FIBRO Gas springs meet the requirements of the Pressure Equipment Directive 2014/68/EU .

The Pressure Equipment Directive (2014/68/EU) has been r atified by the European Parliament and the Council of Europe. The requirements of the Pressure Equipment Directive came into force throughout the EU on 29 May 2002.

The directive defines pressure equipment as vessels, pipework, safety devices and pressure accessories. In terms of the Directive a vessel is a casing which is designed and manufactured to contain fluids under pressure.

It follows from this definition that nitrogen Gas springs of all sizes are deemed to be pressure vessels and must in this respect comply with the Pressure Equipment Directive (2014/68/EU) from 29 May 2002.

Maintenance

FIBRO Gas springs were disigned for maintenancefree continual operation. It is recommended to oil the piston rod lightly from time to time.

Guide- and sealing elements can be exchanged easily and expediciously. They are available as a kit. Each kit comes with detailed instructions for maintenance of FIBRO Gas springs.

Attention

When safety functions are triggered (overstroke, return stroke, or overpressure protection), the gas pressure springs can no longer be repaired!

Warning

FIBRO Gas springs may be charged only with commercial Grade 5.0 nitrogen gas.

Accessories

The accessories range for Gas springs comprises fastening devices, charge- and control units, screw connections for these, and connecting lines for compound installations.

FIBRO is not liable if fittings that are not original FIBRO fittings or fastening, accessory, and attachment parts that are not released by FIBRO are used.

Warning signs

These are available on request. The signs should be affixed near the springs in as prominent a position as possible.

WARNING
This tool is equipped with
__ Gas Springs with a max. pressure of
150 or 180 bar, depending on spring type.
Working pressure _____ bar.
Read maintenance instructions before working on gas springs.
FIBRO
Business Area Standard Parts
D-74851 Hassmersheim · Postfach 1120
T +49 (0) 6266-73-0* · **F** +49 (0) 6266-73-237

Size 35 x50 mm

Language	Order No
german	2480.00.035.050.1
english	2480.00.035.050.2
french	2480.00.035.050.3
italian	2480.00.035.050.4
spanish	2480.00.035.050.5
polish	2480.00.035.050.PL
czech	2480.00.035.050.CZ
turkish	2480.00.035.050.TR
chinese	2480.00.035.050.CN

WARNING
This tool is equipped with ___ Gas Springs with a
max. pressure of 150 or 180 bar, depending on spring type.

No. pcs.	spring type	fill.press./bar	force/daN
1 ___			
2 ___			
3 ___			
4 ___			
5 ___			

Read maintenance instructions **before** working on gas springs.
FIBRO
Business Area Standard Parts
D-74851 Hassmersheim · Postfach 1120
T +49 (0) 6266-73-0* · **F** +49 (0) 6266-73-237

Size 75 x105 mm

Language	Order No
german	2480.00.075.105.1
english	2480.00.075.105.2
french	2480.00.075.105.3
italian	2480.00.075.105.4
spanish	2480.00.075.105.5
polish	2480.00.075.105.PL
czech	2480.00.075.105. CZ
turkish	2480.00.075.105. TR
chinese	2480.00.075.105. CN

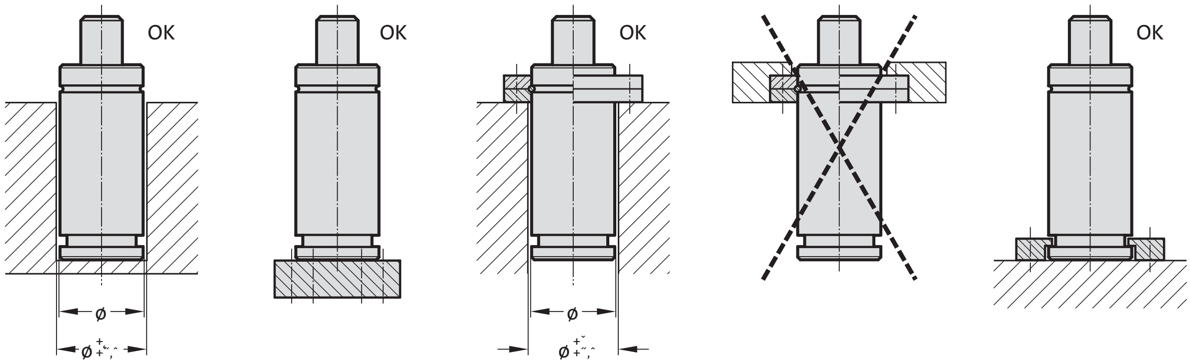
Size 110x1 50 mm

Language	Order No
german	2480.00.110.150.1
english	2480.00.110.150.2
french	2480.00.110.150.3
italian	2480.00.110.150.4
spanish	2480.00.110.150.5
polish	2480.00.110.150.PL
czech	2480.00.110.150. CZ
turkish	2480.00.110.150. TR
chinese	2480.00.110.150. CN

Mounting directions for gas springs

Mounting examples

Below are the various gas spring mounting possibilities, which differ from model to model.

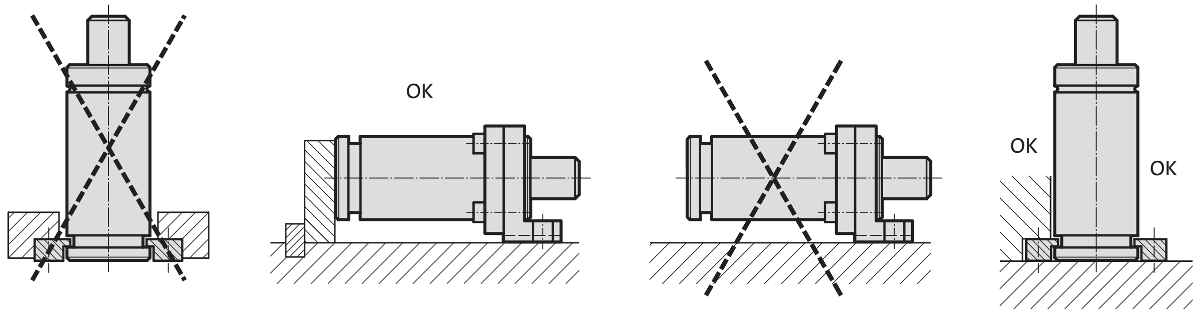


Installed loos in the bore.

Screw mounted at tha base with 2480.011.

Fixed with 2480.055./057./058./064.

Fixed with 2480.007./008.



Fixed with 2480.007./008.

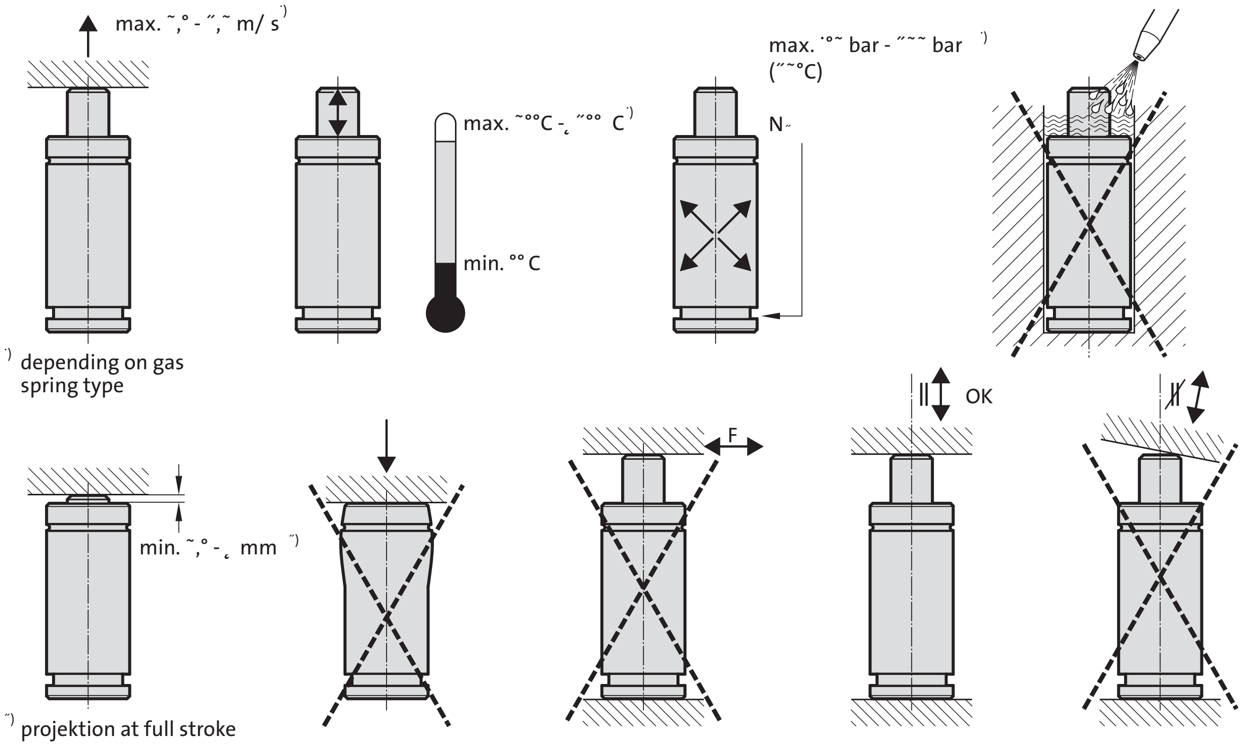
Fixed with 2480.044./045./047.

Fixed with 2480.022.

Mounting directions for gas springs

To achieve the best possible service-life and safety from the gas spring,
the directions below must be followed.

Mounting instructions



*) depending on gas spring type

**) projektion at full stroke

- Secure the gas spring to the tool/machine whenever possible, using the threaded hole(s) in the base of the gas spring or a suitable flange. Never exceed the maximum torque values for the threads in the base of the gas spring: (M6 = 10 Nm; M8 = 24 Nm; M10 = 45 Nm; M12 = 80 Nm)
- The threaded hole in the piston rod top should not be used for mounting purposes. It is only to be used when carrying and servicing the gas spring.
- Do not use the gas spring in such a way that the piston rod is realised freely from its compressed position, as this could cause internal damage to the gas spring.
- Make sure the gas spring is mounted parallel to the direction of the compression stroke.
- Ensure the contact surface of the piston rod top is perpendicular to the direction of the compression stroke and is sufficiently hardened.
- The gas spring should not be subjected to the side loads.
- Protect the piston rod against mechanical damage and contact with fluids.
- We do not recommend the last 5 mm or 10% o f the nominal stroke be utilised.
- The maximum charging pressure (at 20°C) must not be exceeded as it may effect the safety of the product.
- Exceeding the gas spring's recommended operating temperature will shorten the service-life of the gas spring.
- The entire contact surface of the piston rod / piston should be used.
- Do not remove bottom 2480./2497.00.20. from spring until all gas pressure has been discharged.

FIBRO-Gas Springs – The Safer Choice
Optimum safety for tools and operators

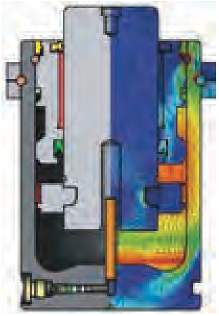
At FIBRO, safety and reliability are paramount. Particularly when it comes to our gas springs. With their unique range of safety features, FIBRO gas springs are the safest on the market.

FIBRO safety features [1)]

PED approval for 2 million strokes

FIBRO gas springs are developed, manufactured and tested for a minimum of 2 million* full strokes in accordance with DGRL 2014/68/EU. The springs deliver this full performance at the maximum permissible limits in terms of filling pressure and operating temperature - even when combined with any of the various mounting types available.

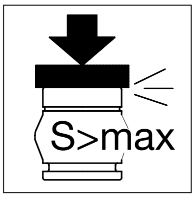
* Calculation value for durability



The benefit for you:

▶ **Guaranteed safety and reliability for the entire service life of the spring**

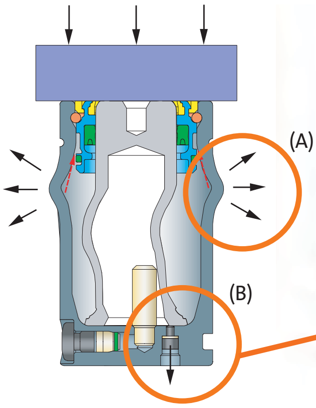
Repair kits and qualified training sessions available through FIBRO Service offer increased effectiveness and process reliability.



Overstroke protection

Conventional gas springs can burst in the event of an over-extended stroke. If this happens, parts flying around can become dangerous projectiles.

FIBRO gas springs are different:
in the event of an overstroke and depending on the spring type the patented protection system will ensure that either the cylinder wall of the gas spring is deformed in a predefined manner (A) or the piston rod destroys a rupture bolt in the floor of the cylinder (B), thereby allowing the gas to escape into the atmosphere.

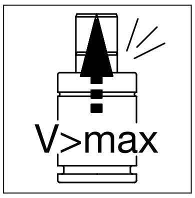


The benefit for you:

▶ **No risk of parts flying around in the event of an overstroke**

Possible causes of triggering:

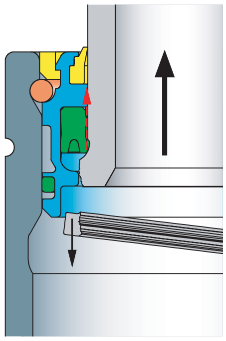
Lack of stroke limitations in the tool/machine and placing the piston rods under a load (e.g. sheet-metal holder, slide reset, etc.), double sheet, incorrect installation position, etc.



Return stroke protection

A particularly dangerous situation can arise with conventional gas springs if tool components become jammed and the pressure on the compressed piston rod is then abruptly released: in this case, the piston rod is then fired out of the cylinder like a missile.

FIBRO gas springs are different:
special guides and a patented safety stop in the piston rods ensure your safety. If the speed is too high during the return stroke, the collar on the piston rod will automatically break. The integrated safety stop then destroys the seal, which allows the gas to escape into the atmosphere and the gas spring to become depressurised.

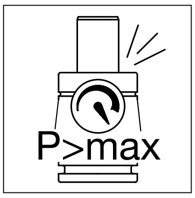


The benefit for you:

▶ **No risk of a piston rod firing out if the return stroke is too fast**

Possible causes of triggering:

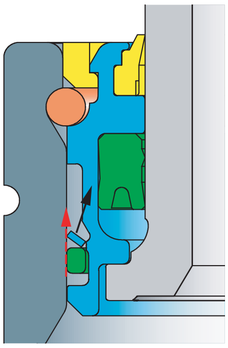
Sudden loosening of jammed components, such as sheet-metal holder, slide, ejector, scraper function, etc.



Overpressure protection

Conventional gas springs can burst if the internal pressure rises above a maximum permitted value. If this happens, parts flying around can become dangerous projectiles.

FIBRO gas springs are different:
if the pressure rises above the maximum permitted value, the safety collar on the sealing set is automatically destroyed. The gas then escapes into the atmosphere and the gas spring is depressurised.



The benefit for you:

▶ **No risk of bursting parts in the event of overpressure**

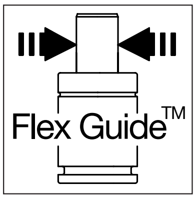
Possible causes of triggering:

Incorrect filling (max. filling pressure 150 or 180 bar, nitrogen), infeed of liquid operating material, etc.

After a protection function is triggered, the spring cannot be repaired and can no longer be used. It must be replaced completely.

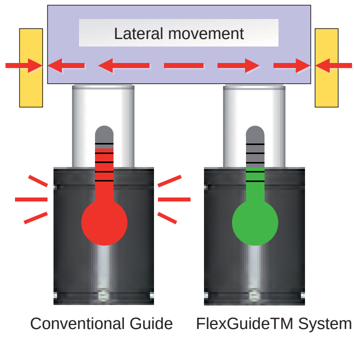
[1)] The safety features mentioned here have been implemented – with few exceptions – on all FIBRO gas springs.
Please refer to the relevant data sheets to check the current safety equipment which is provided with the gas spring you are interested in, or contact FIBRO GmbH directly for more information.

FIBRO reliability features



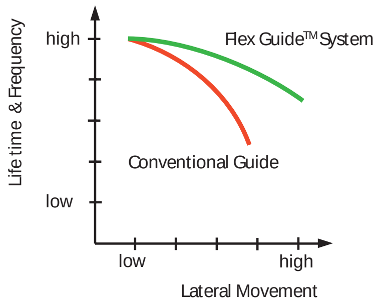
Flexible guides: The Flex Guide™ System

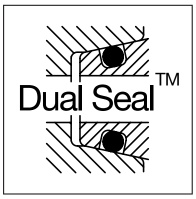
The Flex Guide™ System is a flexible guide in the gas spring which absorbs lateral movements of the piston rod. It minimises friction and lowers the operating temperature.



The benefits for you:

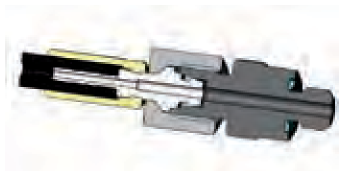
- ▶ **Extended service life**
- ▶ **Increased stroke frequency, i.e. more strokes per minute**





Safe hose connections: The Dual Seal™ System

The FIBRO Dual Seal™ System combines a metal seal with a soft elastomer seal. On hose connection systems, the system provides two leak-tight connections and prevents rotation.

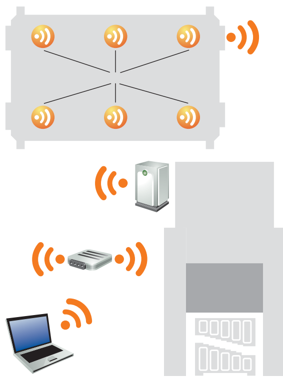


The benefits for you:

- ▶ **Leak-tight connection, even under vibrations**
- ▶ **High process reliability**
- ▶ **Minimised tool down time**
- ▶ **Simple installation thanks to anti-rotation function**

Wireless monitoring:
The Wireless Pressure Monitoring (WPM) System

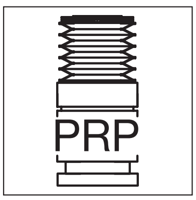
The optional Wireless Pressure Monitoring System (WPM) (patent pending) wirelessly monitors the pressure and temperature of FIBRO gas springs. Before a defective part is produced, the press operator receives a message from the WPM and can take appropriate action.



The benefits for you:

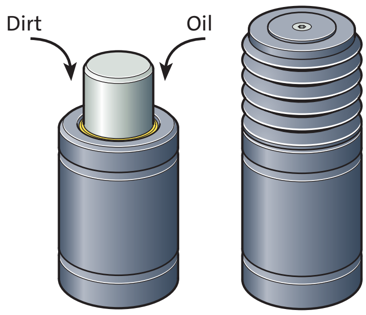
- ▶ **Preventative quality assurance**
- ▶ **High process reliability**
- ▶ **Minimised tool down time**
- ▶ **Reduced maintenance and costs**

Potential faults are individually displayed. As a result, service intervals can be extended.
Maintenance and repair costs are reduced.



Protected piston rods: FIBRO Concertina Shrouds

The FIBRO Piston Rod Protection (patented) reliably protects the piston rods in gas springs against dirt, oil and emulsion. In this way, the system prevents damage to the piston rod surface and leaks at internal seals.



The benefits for you:

- ▶ **Significantly longer service life for gas springs under harsh operating conditions**

FIBRO

Gas springs
Synopsis

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No

Gas springs, Ejector pin units

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No
5	M16x1,5	10 - 125	65 - 295	VDI		2479.030.00005.
10	M16x1,5	10 - 125	65 - 295	VDI		2479.030.00010.
20	M16x1,5	10 - 125	65 - 295	VDI		2479.030.00020.
40	M16x1,5	10 - 125	65 - 295	VDI		2479.030.00040.
4	M16x2	10 - 125	65 - 295	VDI		2479.031.00004.
5	M16x2	10 - 125	65 - 295	VDI		2479.031.00005.
10	M16x2	10 - 125	65 - 295	VDI		2479.031.00010.
20	M16x2	10 - 125	65 - 295	VDI		2479.031.00020.
40	M16x2	10 - 125	65 - 295	VDI		2479.031.00040.
20	M24x1,5	10 - 125	65 - 295	VDI		2479.032.00020.
40	M24x1,5	10 - 125	65 - 295	VDI		2479.032.00040.
80	M24x1,5	10 - 125	65 - 295	VDI		2479.032.00080.
170	M24x1,5	10 - 125	65 - 295	VDI		2479.032.00170.
20	M24x1,5	10 - 125	65 - 295	WDX		2479.034.00020.
40	M24x1,5	10 - 125	65 - 295	WDX		2479.034.00040.
80	M24x1,5	10 - 125	65 - 295	WDX		2479.034.00080.
170	M24x1,5	10 - 125	65 - 295	WDX		2479.034.00170.

Gas springs, small dimensions

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No
13	12	7 - 125	56 - 295			2482.72.00013.
25	12	7 - 125	56 - 295			2482.72.00025.
38	12	7 - 125	56 - 295			2482.72.00038.
50	12	7 - 125	56 - 295			2482.72.00050.
18	15	7 - 125	56 - 295			2482.73.00018.1
35	15	7 - 125	56 - 295			2482.73.00035.1
50	15	7 - 125	56 - 295			2482.73.00050.1
70	15	7 - 125	56 - 295			2482.73.00070.1
30	19	7 - 125	56 - 295	VDI, ISO		2482.74.00030.2
50	19	7 - 125	56 - 295	VDI, ISO		2482.74.00050.2
70	19	7 - 125	56 - 295	VDI, ISO		2482.74.00070.2
90	19	7 - 125	56 - 295	VDI, ISO		2482.74.00090.2
50	24,9	10 - 125	62 - 295	VDI, ISO		2480.21.00050.
100	24,9	10 - 125	62 - 295	VDI, ISO		2480.21.00100.
150	24,9	10 - 125	62 - 295	VDI, ISO		2480.21.00150.
200	24,9	10 - 125	62 - 295	VDI, ISO		2480.21.00200.
50	32	10 - 125	70 - 300	VDI, ISO		2480.22.00050.1
100	32	10 - 125	70 - 300	VDI, ISO		2480.22.00100.1
150	32	10 - 125	70 - 300	VDI, ISO		2480.22.00150.1
200	32	10 - 125	70 - 300	VDI, ISO		2480.22.00200.1
	24,9	10 - 125	62 - 295			2480.23.

Standard-Gas springs

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No
250	38	10 - 125	70 - 300	VDI, ISO		2480.13.00250.
500	45,2	10 - 160	105 - 405	VDI, ISO		2480.13.00500.
750	50,2	13 - 300	120,4 - 695	VDI, ISO		2480.13.00750.
1500	75,2	13 - 300	135 - 710	VDI, ISO		2480.12.01500.
3000	95,2	13 - 300	145 - 720	VDI, ISO		2480.13.03000.
5000	120,2	25 - 300	190 - 740	VDI, ISO		2480.13.05000.
7500	150,2	25 - 300	205 - 755	VDI, ISO		2480.13.07500.
10000	195	25 - 300	210 - 760	VDI, ISO		2480.12.10000.

Standard-Gas springs – HEAVY DUTY

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No
750	45,2	13 - 200	111 - 485			2488.13.00750
1000	50,2	13 - 300	121 - 695	VDI, ISO		2488.13.01000.
1500	63,2	13 - 300	121 - 695			2488.13.01500
2400	75,2	25 - 300	160 - 710	VDI, ISO		2488.13.02400.
4200	95,2	25 - 300	170 - 720	VDI, ISO		2488.13.04200.
6600	120,2	25 - 300	190 - 740	VDI, ISO		2488.13.06600.
9500	150,2	25 - 300	205 - 755	VDI, ISO		2488.13.09500.
20000	195	25 - 300	210 - 760			2488.13.20000

Gas springs with through bore passage

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No
270	38	16 - 80	108 - 236			2496.12.00270.
490	50,2	16 - 80	112 - 240			2496.12.00490.
1060	75,2	16 - 100	122 - 290			2496.12.01060.

Gas springs
Synopsis

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No

Gas springs with increased spring force – POWer LINe

170	19	7 - 125	44 - 285	VDI, ISO		2487.12.00170.
320	24,9	7 - 125	44 - 285	ISO		2487.12.00320.
350	32	10 - 125	50 - 280	VDI, ISO		2487.12.00350.
500	38	10 - 125	50 - 280	VDI, ISO		2487.12.00500.
750	45,2	10 - 125	52 - 282	VDI, ISO		2487.12.00750.
1000	50,2	13 - 125	64 - 288	VDI, ISO		2487.12.01000.
1500	63,2	13 - 125	70 - 294	VDI, ISO		2487.12.01500.
2400	75,2	16 - 125	77 - 295	VDI, ISO		2487.12.02400.
4200	95,2	16 - 125	90 - 308	VDI, ISO		2487.12.04200.
6600	120,2	16 - 125	100 - 318	VDI, ISO		2487.12.06600.
9500	150,2	19 - 125	116 - 328	VDI, ISO		2487.12.09500.
20000	195	19 - 125	148 - 360			2487.12.20000.

Gas springs CX, Compact Xtreme

500	32	10 - 80	75 - 225			2497.12.00500.
1000	38	10 - 80	75 - 240			2497.12.01000.
1900	50,2	10 - 80	80 - 245			2497.12.01900.

Compact-Gas springs

420	24,9	6 - 50	56 - 195			2490.14.00420.
750	32	6 - 50	63 - 195			2490.14.00750.
1000	38	6 - 50	61 - 230			2490.14.01000.
1800	50,2	6 - 65	66 - 271			2490.14.01800.
3000	63,2	10 - 65	85 - 256			2490.14.03000.
4700	75,2	10 - 65	80 - 273			2490.14.04700.
7500	95,2	10 - 65	90 - 279			2490.14.07500.
11800	120,2	10 - 65	100 - 320			2490.14.11800.
18300	150,2	10 - 65	110 - 323			2490.14.18300.

Gas springs low build height

500	45,2	6 - 125	62 - 300			2485.12.00500.
750	50,2	6 - 125	62 - 300			2485.12.00750.
1500	75,2	25 - 100	110 - 260			2485.12.01500.

»Speed Control ™«, Gas springs, SPC, cushioned

750	75,2	125 - 300	360 -710			2486.12.00750.
1500	95,2	125 - 300	370 -720			2486.12.01500.
3000	120,2	125 - 300	390 -740			2486.12.03000.
5000	150,2	125 - 300	405 -755			2486.12.05000.

Gas springs, DS, for Die Separation

3000	95,2	80 - 300	280 - 720			2486.22.03000.
5000	120,2	80 - 300	300 - 740			2486.22.05000.
7500	150,2	80 - 300	315 - 755			2486.22.07500.

Gas springs to w DX standard/r equest your catalogue

Gas springs, threaded

50 - 200	M28×1,5	10 - 125	62 - 292		external thread	2480.32.00050.-00200.
250	M38×1,5	13 - 100	75,4 - 250		external thread	2480.32.00250.
250	38	13 - 100	75,4 - 250		with male fixing thread	2480.82.00250.
1000	50,2	13 - 125	64 - 288		with male fixing thread	2487.82.01000.
15	M28×1,5	125	292		with hexagonal flange	2480.33.00015.125
50	M28×1,5	125	292		with hexagonal flange	2480.33.00050.125
100	M28×1,5	125	292		with hexagonal flange	2480.33.00100.125
150	M28×1,5	125	292		with hexagonal flange	2480.33.00150.125
200	M28×1,5	125	292		with hexagonal flange	2480.33.00200.125

Gas springs for working temperatures up to 120° C

Gas springs
Synopsis

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No

LCF Gas springs, damped

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No
750	50,2	13 - 300	120,4 - 695			2484.13.00750.
1500	75,2	25 - 300	160 - 710			2484.12.01500.
3000	95,2	25 - 300	170 - 720			2484.13.03000.
5000	120,2	25 - 300	190 - 740			2484.13.05000.
7500	150,2	25 - 300	205 - 755			2484.13.07500.

Controllable Gas springs / Request your catalogue 2489.

Air Springs, to VW standard / Request your catalogue 2491.

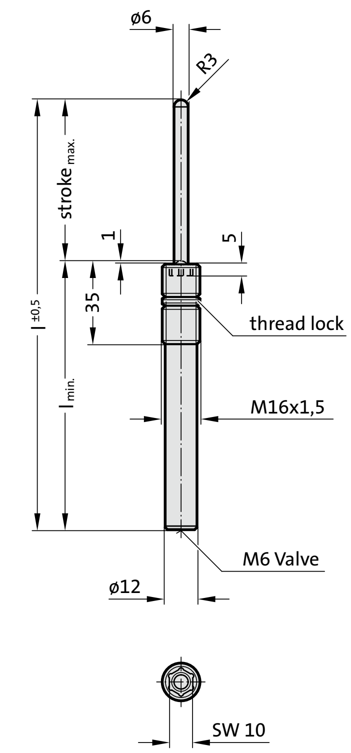
Manifold system / Request your catalogue 2495.

Composite plates / Request your catalogue 2494.

Gas springs (Spring plungers)

Gas spring (Spring plunger), with hexagon socket, VDI 3004

2479.030.



V>max

P>max

Description:

Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.12.010.017).

Note:

Worn gas springs cannot be repaired, they have to be replaced completely.

Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 6 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 100 (at 20°C)
Max. piston speed: 1.6 m/s

Upon customers request, also available unfilled, Order No 2479.030.00000...., Colour: black

[2] Hexagon nut order supplementary: 2479.004.016.15 (M16 x 1,5)

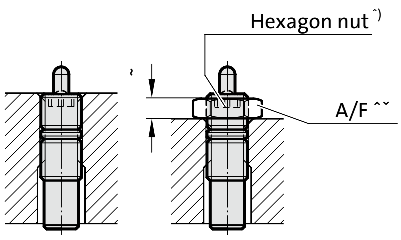
2479.030. Gas spring (Spring plunger), with hexagon socket, VDI 3004

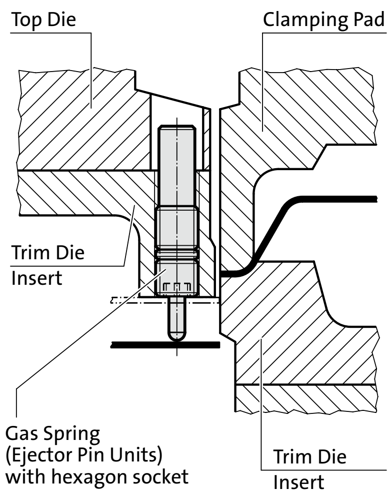
Spring type:				.00005.		.00010.		.00020.		.00040.	
Order No*	$Stroke_{max.}$	l	$l_{min.}$	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]
2479.030.□□□□□.010	10	65	55	6	10.3	11	19	21	36.1	42	73
2479.030.□□□□□.020	20	85	65	6	9.4	11	17.2	21	32.8	42	66.1
2479.030.□□□□□.030	30	105	75	6	9.1	11	16.7	21	31.9	42	64.5
2479.030.□□□□□.040	40	125	85	6	9	11	16.5	21	31.5	42	63.7
2479.030.□□□□□.050	50	145	95	6	9.6	11	17.6	21	33.6	42	67.7
2479.030.□□□□□.060	60	165	105	6	9.4	11	17.3	21	33	42	66.5
2479.030.□□□□□.070	70	185	115	6	9.3	11	17	21	32.5	42	65.7
2479.030.□□□□□.080	80	205	125	6	9.2	11	16.8	21	32.1	42	65.1
2479.030.□□□□□.100	100	245	145	6	9.1	11	16	21	31.9	42	64.3
2479.030.□□□□□.125	125	295	170	6	9	11	16.5	21	31.5	42	63.8

complete with spring type

Spring force marking:

Spring type - Pressure [bar] - Colour:
.00005. - 20 - green
.00010. - 40 - blue
.00020. - 75 - red
.00040. - 150 - yellow





Gas spring (Spring plunger), with hexagon socket, VDI 3004

Description:

Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.12.010.017).

Note:

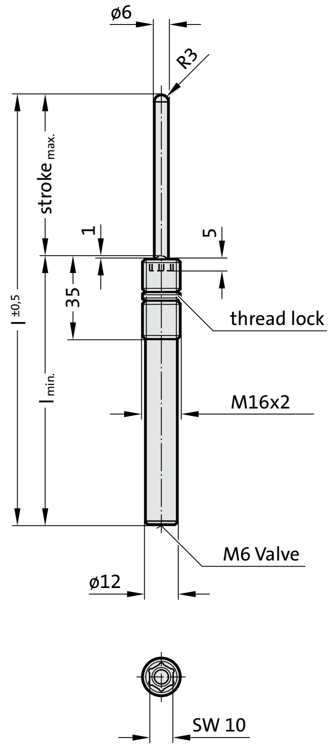
Worn gas springs cannot be repaired, they have to be replaced completely.

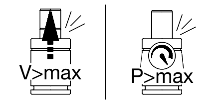
Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 6 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 100 (at 20°C)
Max. piston speed: 1.6 m/s

Upon customers request, also available unfilled, Order No 2479.031.00000...., Colour: black

[2] Hexagon nut order supplementary: 2479.004.016.20 (M16 x 2)

2479.031.





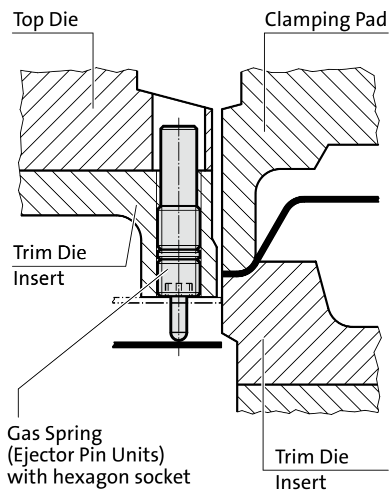
2479.031. Gas spring (Spring plunger), with hexagon socket, VDI 3004

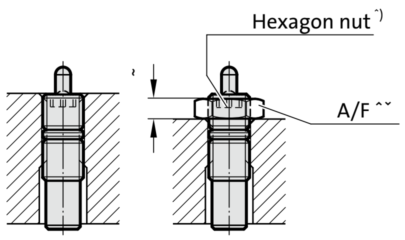
Spring type:				.00004.		.00005.		.00010.		.00020.		.00040.	
Order No*	$Stroke_{max.}$	l	$l_{min.}$	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]
2479.031.□□□□□.010	10	65	55	3.4	6	6	10.3	11	19	21	36.1	42	73
2479.031.□□□□□.020	20	85	65	3.4	5.2	6	9.4	11	17.2	21	32.8	42	66.1
2479.031.□□□□□.030	30	105	75	3.4	5.2	6	9.1	11	16.7	21	31.9	42	64.5
2479.031.□□□□□.040	40	125	85	3.4	5.2	6	9	11	16.5	21	31.5	42	63.7
2479.031.□□□□□.050	50	145	95	3.4	5.4	6	9.6	11	17.6	21	33.6	42	67.7
2479.031.□□□□□.060	60	165	105	3.4	5.4	6	9.4	11	17.3	21	33	42	66.5
2479.031.□□□□□.070	70	185	115	3.4	5.4	6	9.3	11	17	21	32.5	42	65.7
2479.031.□□□□□.080	80	205	125	3.4	5.2	6	9.2	11	16.8	21	32.1	42	65.1
2479.031.□□□□□.100	100	245	145	3.4	5.2	6	9.1	11	16	21	31.9	42	64.3
2479.031.□□□□□.125	125	295	170	3.4	5.2	6	9	11	16.5	21	31.5	42	63.8

*complete with spring type

Spring force marking:

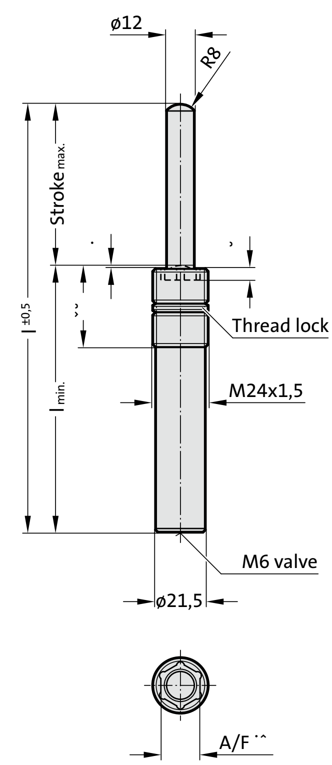
Spring type - Pressure [bar] - Colour:
.00004. - 12 - violet
.00005. - 20 - green
.00010. - 40 - blue
.00020. - 75 - red
.00040. - 150 - yellow





Gas spring (Spring plunger), with hexagon socket, VDI 3004

2479.032.



V>max

Description:
Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.12.010.017).

Note:
Worn gas springs cannot be repaired, they have to be replaced completely.

Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 20 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 100 (at 20°C)
Max. piston speed: 1.6 m/s

Upon customers request, also available unfilled, Order No 2479.032.00000...., Colour: black

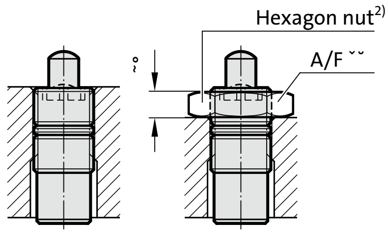
2) Hexagon nut order supplementary: 2479.004.024.15

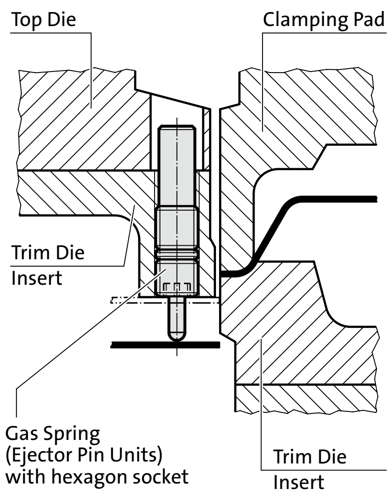
2479.032. Gas spring (Spring plunger), with hexagon socket, VDI 3004

Spring type:				.00020.		.00040.		.00080.		.00170.	
Order No*	$Stroke_{max.}$	l	$l_{min.}$	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]
2479.032.□□□□□.010	10	65	55	23	33.1	45	64.8	85	122.4	170	244.8
2479.032.□□□□□.020	20	85	65	23	36.3	45	71.1	85	134.3	170	256.6
2479.032.□□□□□.030	30	105	75	23	38.2	45	74.7	85	141.1	170	282.2
2479.032.□□□□□.040	40	125	85	23	39.3	45	46.9	85	145.4	170	290.7
2479.032.□□□□□.050	50	145	95	23	42.5	45	83.2	85	157.3	170	314.5
2479.032.□□□□□.060	60	165	105	23	42.5	45	83.2	85	157.3	170	314.5
2479.032.□□□□□.070	70	185	115	23	42.8	45	83.7	85	158.1	170	316.2
2479.032.□□□□□.080	80	205	125	23	42.8	45	83.7	85	158.1	170	316.2
2479.032.□□□□□.100	100	245	145	23	43	45	84.1	85	159	170	318
2479.032.□□□□□.125	125	295	170	23	43	45	84.1	85	159	170	318

*complete with spring type

Spring force marking:
Spring type - Pressure [bar] - Colour:
.00020. - 20 - green
.00040. - 40 - blue
.00080. - 75 - red
.00170. - 150 - yellow





Gas spring (Spring plunger), to WDX

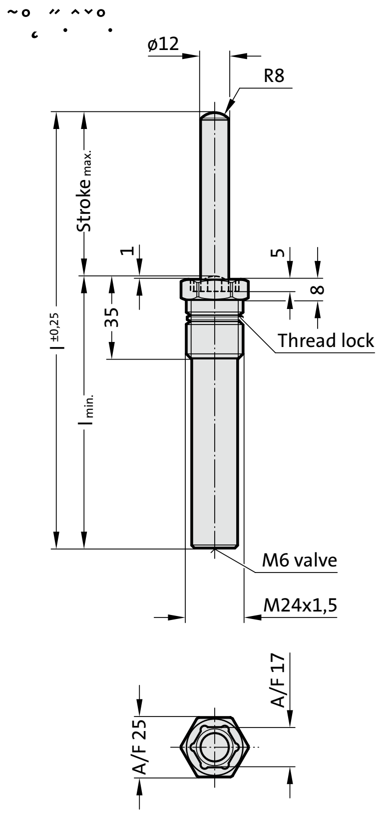
Description:
Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.12.010.017).

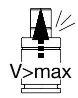
Note:
Worn gas springs cannot be repaired, they have to be replaced completely.

Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 20 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 30 to 80 (at 20°C)
Max. piston speed: 1.6 m/s

Attention!
Different colour coding for spring force used in WDX standard

Upon customers request, also available unfilled, Order No 2479.034.00000...., Colour: black



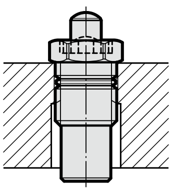


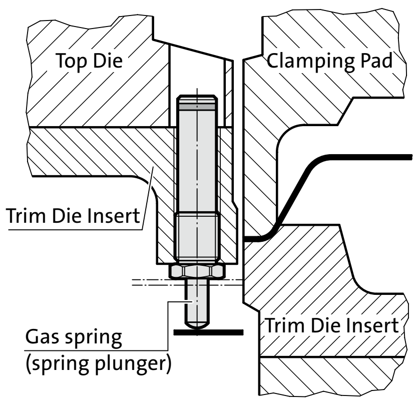
2479.034. Gas spring (Spring plunger), to WDX

Spring type:				.00020.		.00040.		.00080.		.00170.	
Order No*	$Stroke_{max.}$	l	$l_{min.}$	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]	$F_{initial}$ [daN]	F_{final} [daN]
2479.034.□□□□□.010	10	65	55	23	32.5	45	65	85	122	170	243.5
2479.034.□□□□□.016	16	77	61	23	36.6	45	73.3	85	137.4	170	274.8
2479.034.□□□□□.020	20	85	65	23	36	45	72	85	134.5	170	268
2479.034.□□□□□.025	25	95	70	23	38.9	45	77.8	85	145.9	170	291.8
2479.034.□□□□□.030	30	105	75	23	37.5	45	75	85	141	170	281.5
2479.034.□□□□□.038	38	121	83	23	40.7	45	81.4	85	152.7	170	305.4
2479.034.□□□□□.040	40	125	85	23	38.5	45	77	85	144.5	170	289
2479.034.□□□□□.050	50	145	95	23	42	45	83.5	85	156.5	170	313
2479.034.□□□□□.060	60	165	105	23	42	45	84	85	157	170	314
2479.034.□□□□□.070	70	185	115	23	42	45	84	85	157.5	170	315
2479.034.□□□□□.080	80	205	125	23	42	45	84	85	159	170	315.5
2479.034.□□□□□.100	100	245	145	23	42	45	84.5	85	158	170	316.5
2479.034.□□□□□.125	125	295	170	23	42	45	84.5	85	158.5	170	317

*complete with spring type

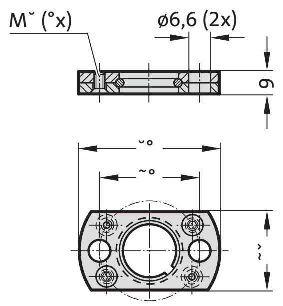
Spring force marking:
Spring type - Pressure [bar] - Colour:
.00020. - 20 - green
.00040. - 40 - blue
.00080. - 75 - red
.00170. - 150 - yellow





Gas spring, small dimension, low force

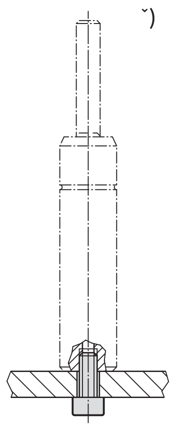
Gas spring, small dimension, low force
Mounting variations

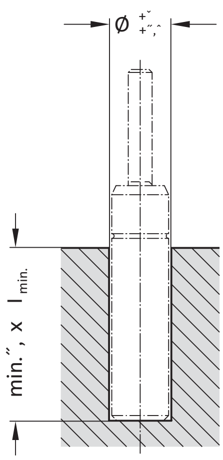


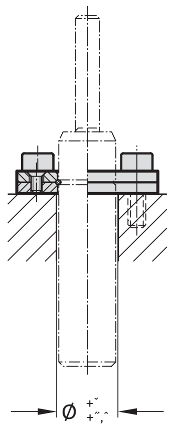
Note:

1) Fixing at bottom thread only recommanded for stroke length up to 25 mm.

Mounting examples:







Gas spring, small dimension and low force

Description:

The gas springs are colour-coded according to the spring force rating ranges 13-25-38-50 daN.

All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Gas can be added or reduced from below.

Note:

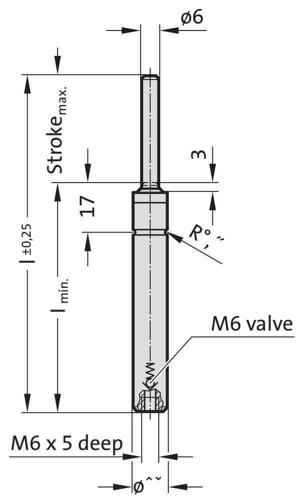
Worn gas springs cannot be repaired, they have to be replaced completely.

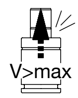
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 20 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

Spring forces as per spring diagram.

Upon customers request, also available unfilled, Order No 2482.72.00000...., Colour: black

2482.72.



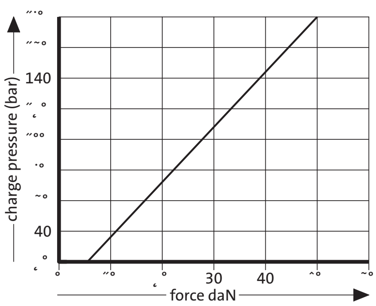


2482.72. Gas spring, small dimension and low force

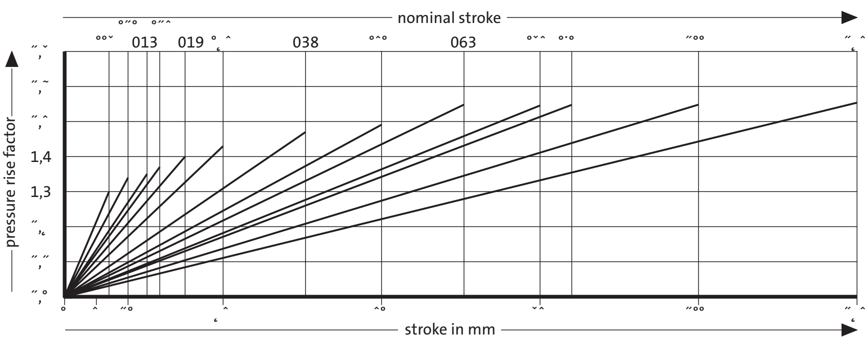
Order No*	Stroke max.	l	l min.
2482.72. □□□□□.007	7	56	49
2482.72. □□□□□.010	10	62	52
2482.72. □□□□□.013	12.7	67.4	54.7
2482.72. □□□□□.015	15	72	57
2482.72. □□□□□.019	19	80	61
2482.72. □□□□□.025	25	92	67
2482.72. □□□□□.038	38	118	80
2482.72. □□□□□.050	50	142	92
2482.72. □□□□□.063	63.5	172	108.5
2482.72. □□□□□.075	75	195	120
2482.72. □□□□□.080	80	205	125
2482.72. □□□□□.100	100	245	145
2482.72. □□□□□.125	125	295	170

*complete with initial spring force
Spring force marking: Initial spring force [daN] - Pressure [bar] - Colour:
.00013. - 45 - green
.00025. - 90 - blue
.00038. - 135 - red
.00050. - 180 - yellow

Initial spring force versus charge pressure

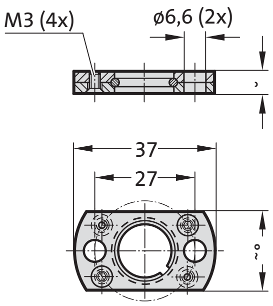


Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

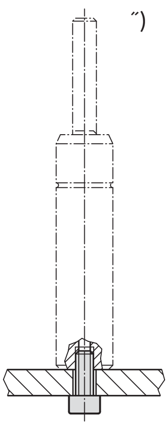
Gas spring, small dimension, low force
Mounting variations

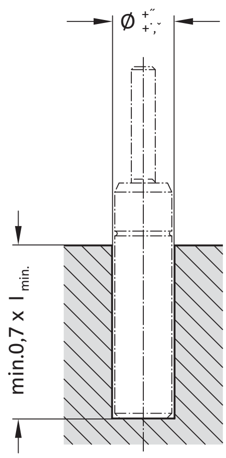


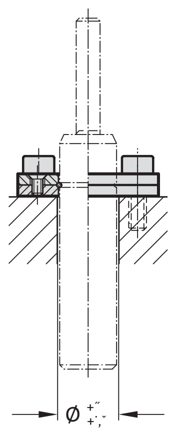
Note:

1) Fixing at bottom thread only recommanded for stroke length up to 25 mm.

Mounting examples:







Gas spring, small dimension and low force

Description:

The gas springs are colour-coded according to the spring force rating ranges 18-35-50-70 daN.

All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Gas can be added or reduced from below.

Note:

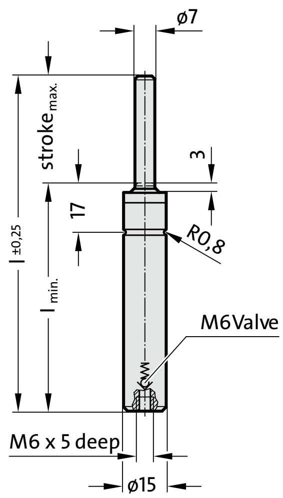
Worn gas springs cannot be repaired, they have to be replaced completely.

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 20 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 100 to 150 (at 20°C)
Max. piston speed: 1.6 m/s

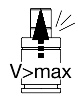
Spring forces as per spring diagram.

Upon customers request, also available unfilled, Order No 2482.73.00000. 1,
Colour: black

2482.73. .1



APPROVED PED 2014/68/EU

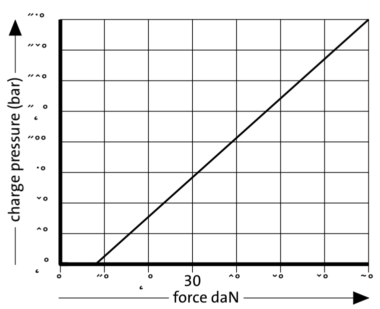


2482.73. .1 Gas spring, small dimension and low force

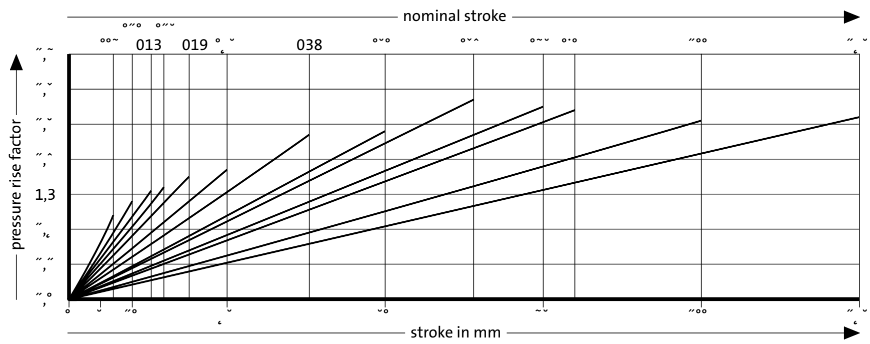
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2482.73. □□□□□.007.1	7	56	49
2482.73. □□□□□.010.1	10	62	52
2482.73. □□□□□.013.1	12.7	67.4	54.7
2482.73. □□□□□.015.1	15	72	57
2482.73. □□□□□.019.1	19	80	61
2482.73. □□□□□.025.1	25	92	67
2482.73. □□□□□.038.1	38.1	118.2	80.1
2482.73. □□□□□.050.1	50	142	92
2482.73. □□□□□.063.1	63.5	172	108.5
2482.73. □□□□□.075.1	75	195	120
2482.73. □□□□□.080.1	80	205	125
2482.73. □□□□□.100.1	100	245	145
2482.73. □□□□□.125.1	125	295	170

*complete with initial spring force
Spring force marking: Initial spring force [daN] - Pressure [bar] - Colour:
.00018. - 45 - green
.00035. - 90 - blue
.00050. - 135 - red
.00070. - 180 - yellow

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise

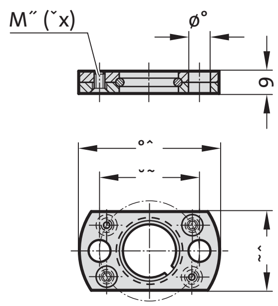


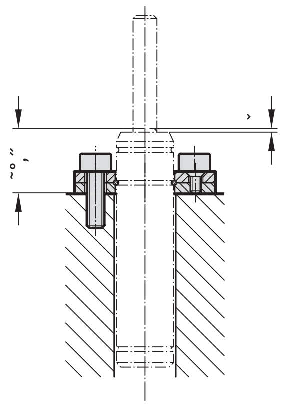
Pressure rise factor accounts for displacement but not external influences!

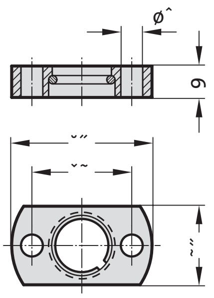
Gas spring, small dimension, low force
Mounting variations

Note:

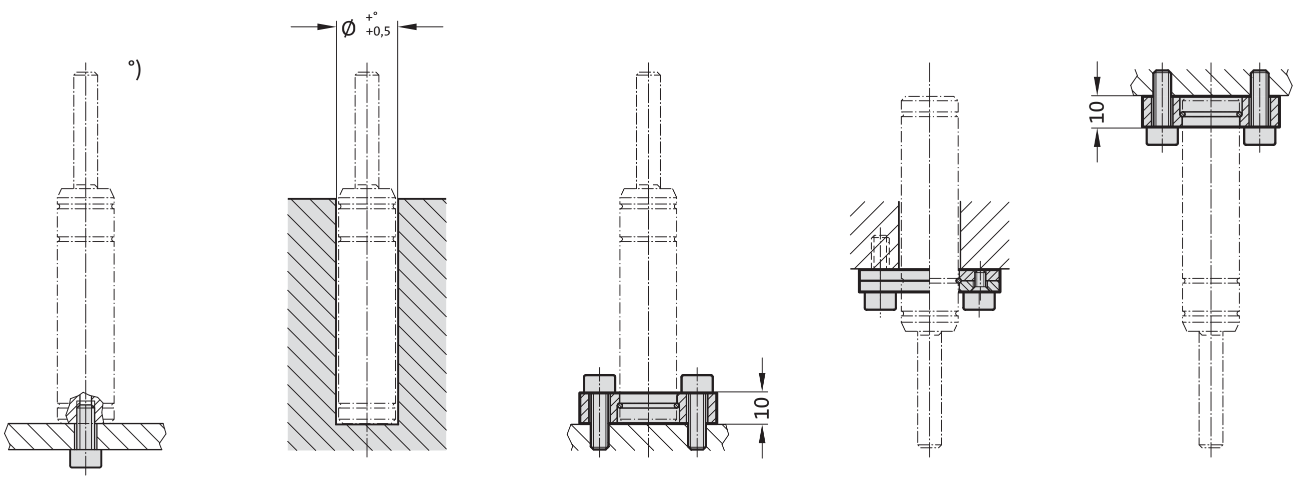
1) Fixing at bottom thread only recommanded for stroke length up to 25 mm.







Mounting examples:



Gas spring, small dimension and low force

Description:
The gas springs are colour-coded according to the spring force rating ranges 30-50-70-90 daN.

All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Gas can be added or reduced from below.

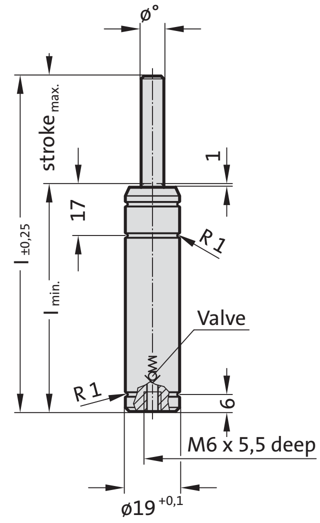
Note:
Worn gas springs cannot be repaired, they have to be replaced completely.

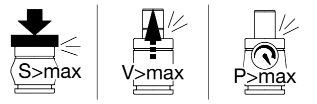
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 100 to 150 (at 20°C)
Max. piston speed: 1.6 m/s

Spring forces as per spring diagram.

Upon customers request, also available unfilled, Order No 2482.74.00000. ... .2, Colour: black

2482.74. .2



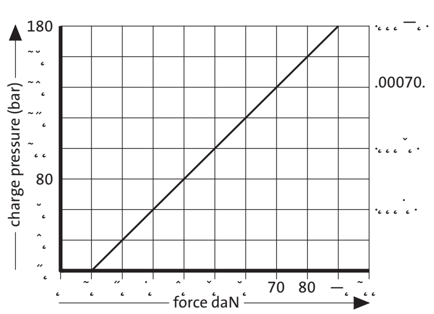


2482.74. .2 Gas spring, small dimension and low force

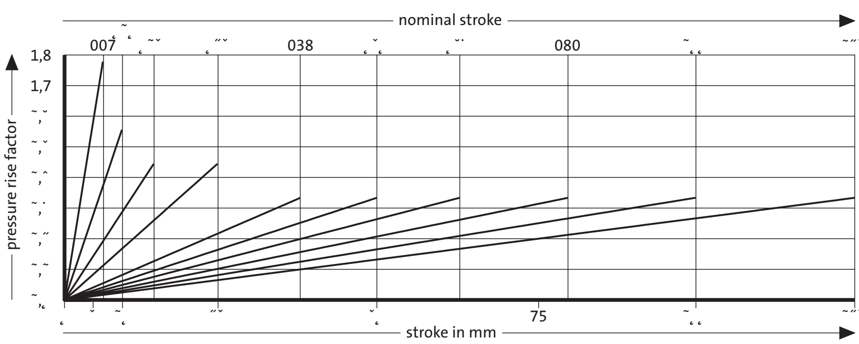
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2482.74. □□□□□.007.2	7	56	49
2482.74. □□□□□.010.2	10	62	52
2482.74. □□□□□.015.2	15	72	57
2482.74. □□□□□.025.2	25	92	67
2482.74. □□□□□.038.2	38.1	118.2	80.1
2482.74. □□□□□.050.2	50	142	92
2482.74. □□□□□.063.2	63.5	172	108.5
2482.74. □□□□□.080.2	80	205	125
2482.74. □□□□□.100.2	100	245	145
2482.74. □□□□□.125.2	125	295	170

*complete with initial spring force
Spring force marking:
Initial spring force [daN] - Pressure [bar] - Colour:
.00030. - 60 - green
.00050. - 100 - blue
.00070. - 140 - red
.00090. - 180 - yellow

Initial spring force versus charge pressure



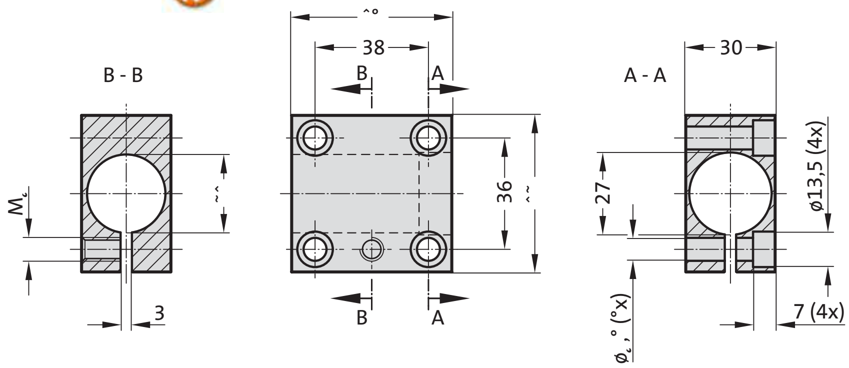
Spring force Diagram displacement versus stroke rise

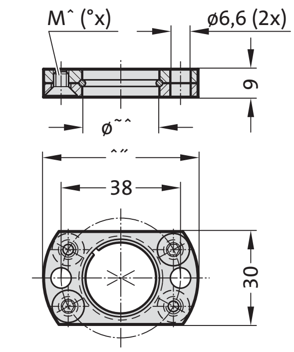


Pressure rise factor accounts for displacement but not external influences!

Gas spring, small dimension, low force
Mounting variations

2480.053.00150

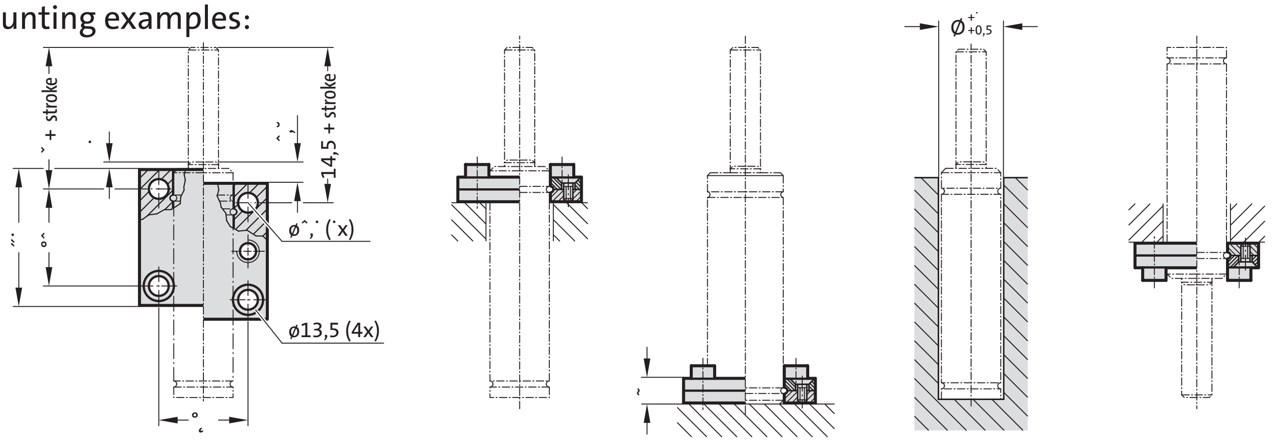




Note:

2) Attention:
The spring force must be absorbed by the stop surface.

Mounting examples:



Gas spring, small dimension and low force

Description:

The gas springs are colour-coded according to the spring force rating ranges 50–100–150–200 daN.

All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Do take into consideration the colour-coded pressure rating during repair work and recharging.

Note:

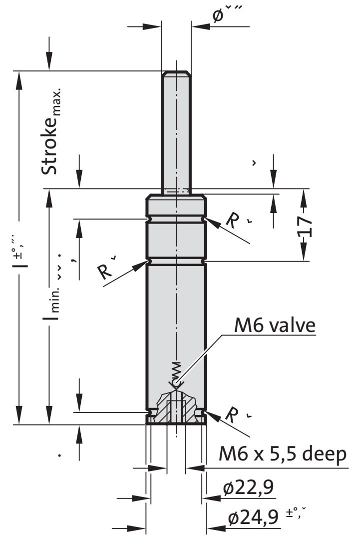
Order No for spare parts kit: 2480.21.00150

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

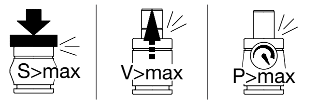
Spring forces as per spring diagram.

Upon customers request, also available unfilled, Order No 2480.21.00000...., Colour: black

2480.21.



PED 2014/68/EU VDI ISO

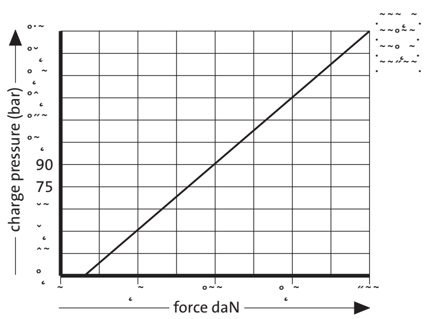


2480.21. Gas spring, small dimension and low force

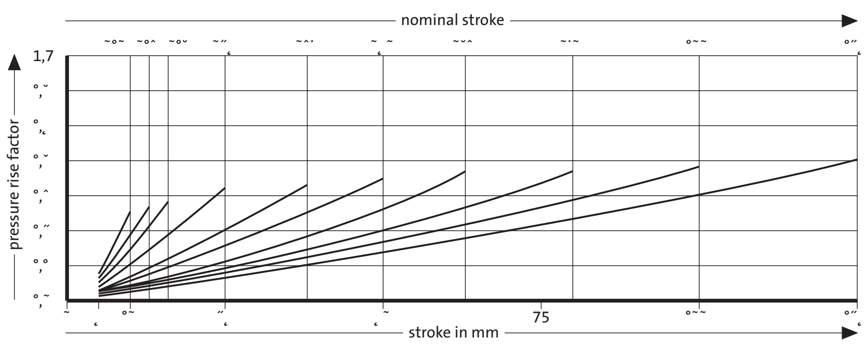
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2480.21. □□□□□.010	10	62	52
2480.21. □□□□□.013	12.7	67.4	54.7
2480.21. □□□□□.015	15	72	57
2480.21. □□□□□.016	16	74	58
2480.21. □□□□□.025	25	92	67
2480.21. □□□□□.038	38.1	118.2	80.1
2480.21. □□□□□.050	50	142	92
2480.21. □□□□□.063	63.5	172	108.5
2480.21. □□□□□.080	80	205	125
2480.21. □□□□□.100	100	245	145
2480.21. □□□□□.125	125	295	170

*complete with initial spring force
Spring force marking:
Initial spring force [daN] - Pressure [bar] - Colour:
.00050. - 45 - green
.00100. - 90 - blue
.00150. - 135 - red
.00200. - 180 - yellow

Initial spring force versus charge pressure

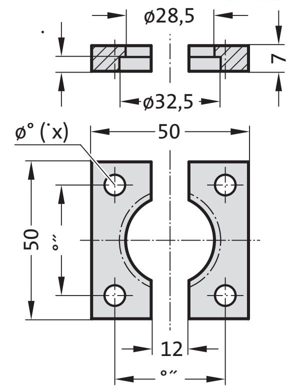


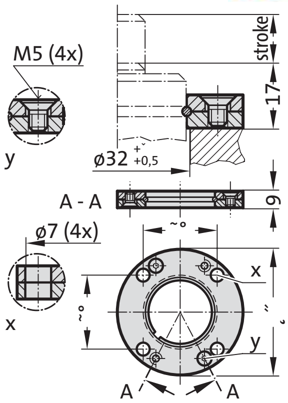
Spring force Diagram displacement versus stroke rise

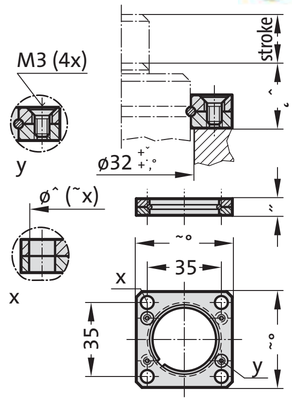


Pressure rise factor accounts for displacement but not external influences!

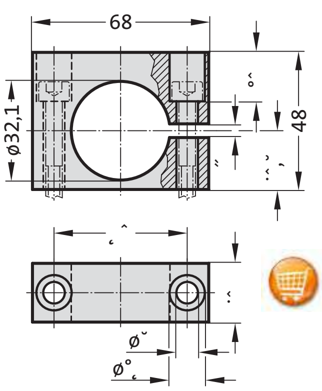
Gas spring, small dimension and low force
Mounting variations

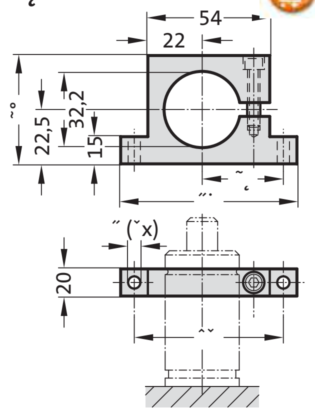






2480.044.03.00150 [2]

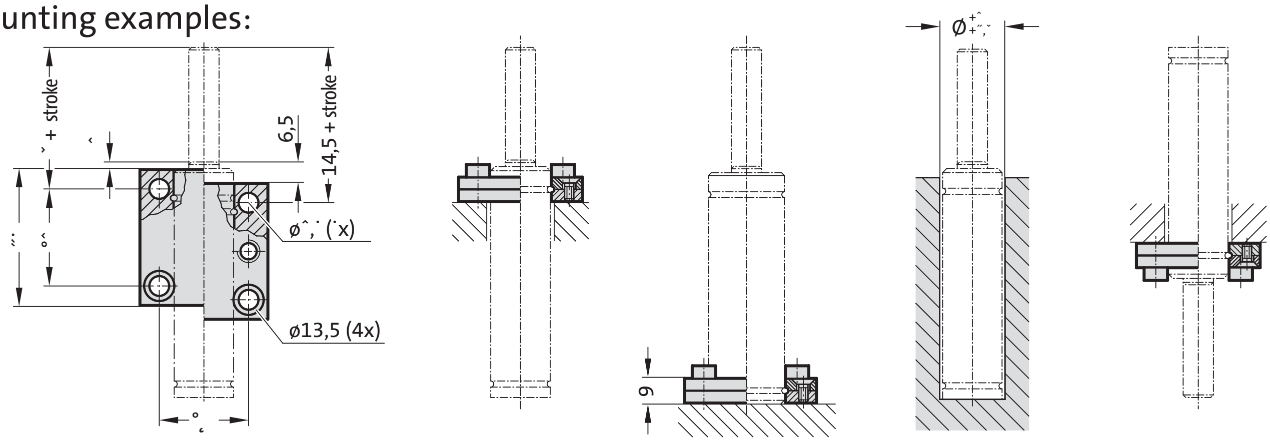




Note:

[2] Attention:
The spring force must be absorbed by the stop surface.

Mounting examples:



Gas spring, small dimension and low force

Description:
The gas springs are colour-coded according to the spring force rating ranges 50–100–150–200 daN.

All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Do take into consideration the colour-coded pressure rating during repair work and recharging.

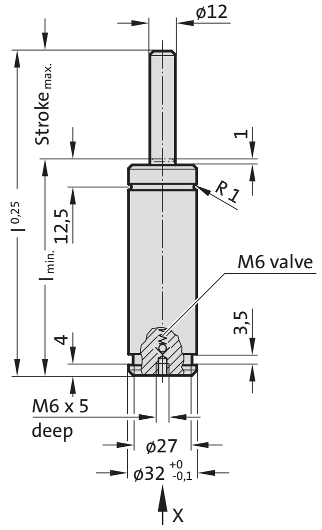
Note:
Order No for spare parts kit: 2480.21.00150

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

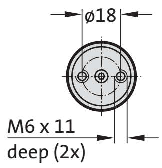
Spring forces as per spring diagram.

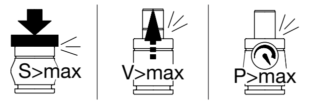
Upon customers request, also available unfilled, Order No 2480.22.00000...., Colour: black

2480.22. .1



View X - Gas spring



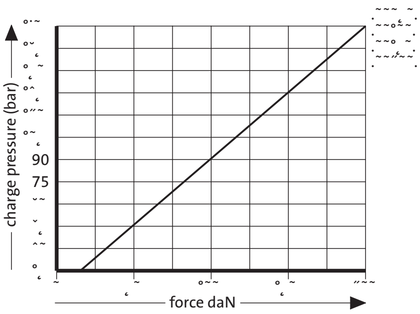


2480.22. .1 Gas spring, small dimension and low force

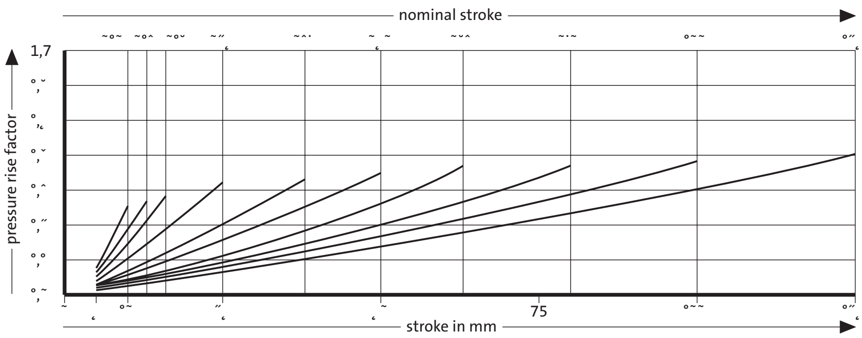
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2480.22.□□□□□.010.1	10	70	60
2480.22.□□□□□.013.1	12.7	75.4	62.7
2480.22.□□□□□.016.1	16	82	66
2480.22.□□□□□.025.1	25	100	75
2480.22.□□□□□.038.1	38.1	126.2	88.1
2480.22.□□□□□.050.1	50	150	100
2480.22.□□□□□.063.1	63.5	177	113.5
2480.22.□□□□□.080.1	80	210	130
2480.22.□□□□□.100.1	100	250	150
2480.22.□□□□□.125.1	125	300	175

*complete with initial spring force
Spring force marking:
Initial spring force [daN] - Pressure [bar] - Colour:
.00050. - 45 - green
.00100. - 90 - blue
.00150. - 135 - red
.00200. - 180 - yellow

Initial spring force versus charge pressure



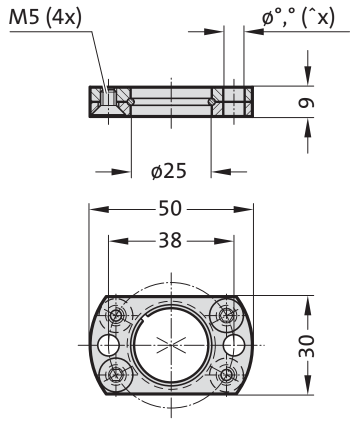
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas spring, small dimension, low force
Mounting variations

2480.051.00150



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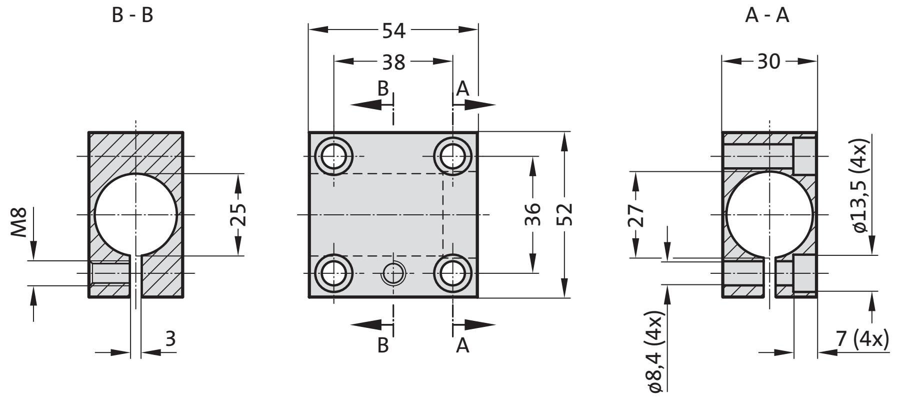
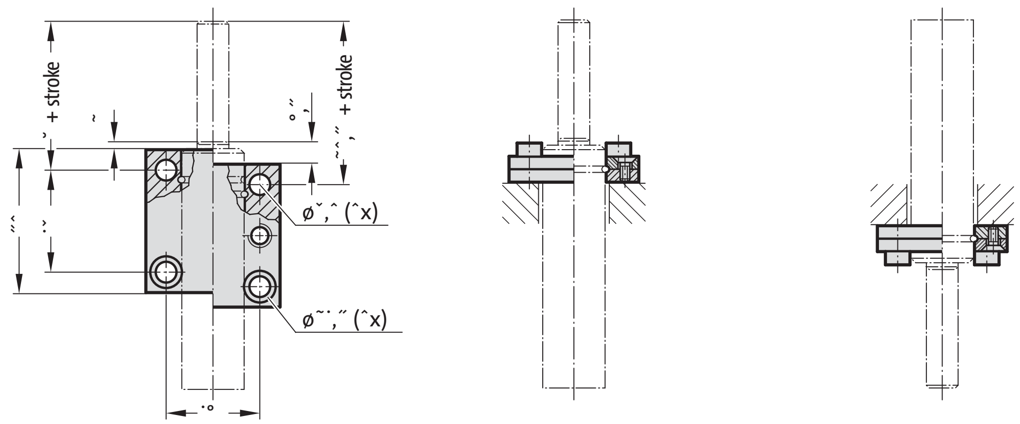


Note:

Only gas spring with a stroke of 25 mm or greater can be attached using the upper groove.
Only gas spring with a stroke of 38,1 mm or greater can be attached using the lower groove.

Mounting examples:



Gas spring, small dimension and low force

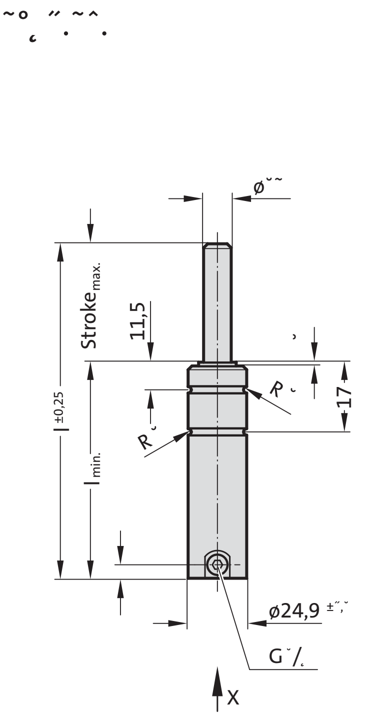
Description:
Gas spring will be delivered unfilled and can only be used in a permanent connection (valveless).

Note:
Initial spring force at 180 bar = 200 daN

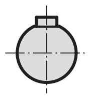
Order No for spare parts kit: 2480.21.00150

Pressure medium: Nitrogen - N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C bis +80°C
Temerature related force increase: ± 0,3%/°C
Max. recommended extensions per minute: ca. 80 to 100 (at 20°C)
Max. piston speed: 1,6 m/s

Spring forces as per spring diagram.



View X

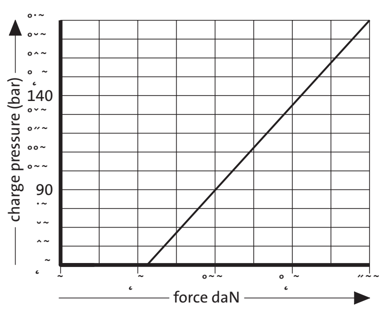


S>max
V>max
P>max

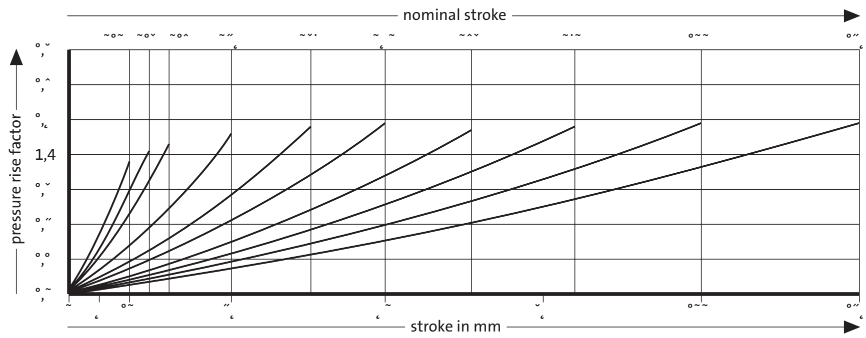
2480.23.
Gas spring, small dimension and low force

Order No	Stroke max.	l min.	l
2480.23.00000.010	10	52	62
2480.23.00000.013	12.7	54.7	67.4
2480.23.00000.016	16	58	74
2480.23.00000.025	25	67	92
2480.23.00000.038	38.1	80.1	118.2
2480.23.00000.050	50	92	142
2480.23.00000.063	63.5	108.5	172
2480.23.00000.080	80	125	205
2480.23.00000.100	100	145	245
2480.23.00000.125	125	170	295

Initial spring force versus charge pressure



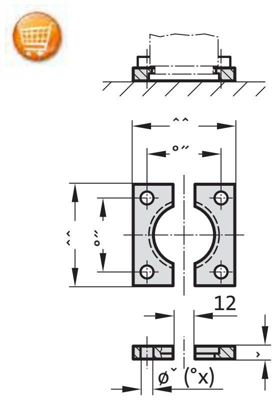
Spring force Diagram displacement versus stroke rise

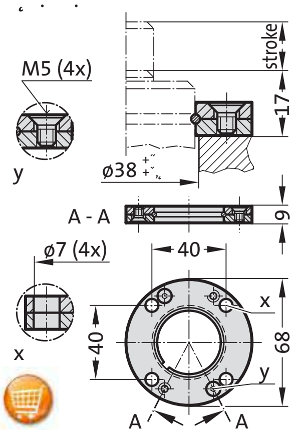


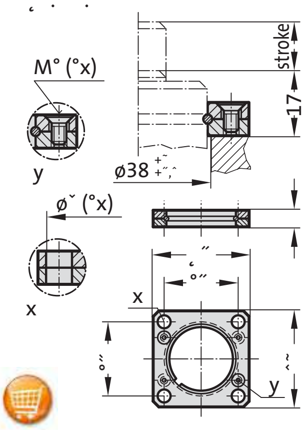
Pressure rise factor accounts for displacement but not external influences!

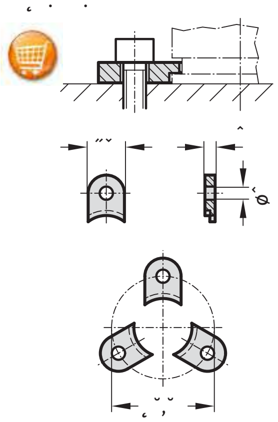
Gas springs Standard

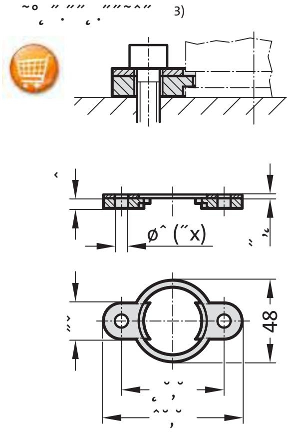
Gas Spring, Standard
Mounting variations



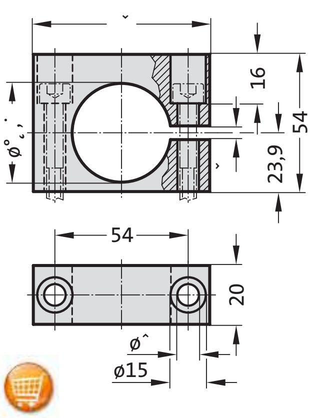


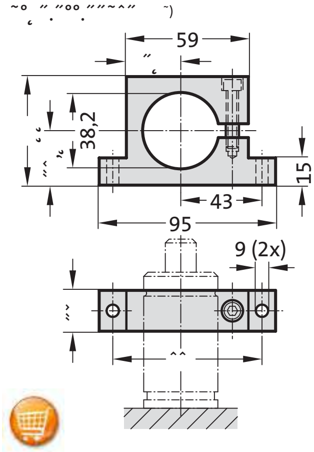




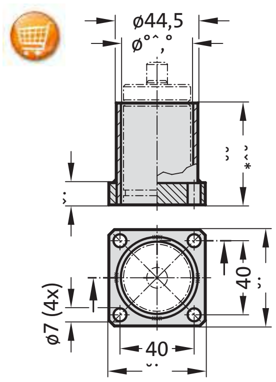


2480.044.03.00250





2480.010.00250.055
2480.010.00250.095*



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

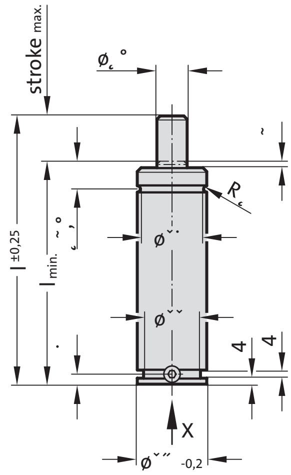
Gas spring, Standard

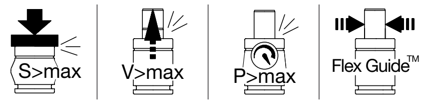
Note:
Initial spring force at 150 bar = 250 daN

Order No for spare parts kit: 2480.13.00250

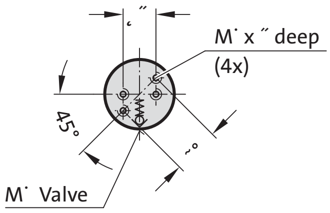
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2480.13.00250.





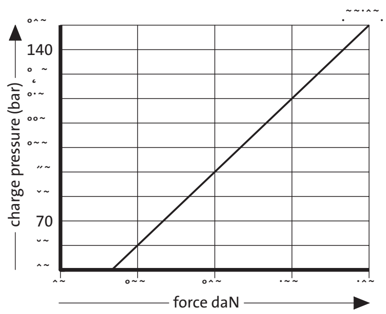
View X



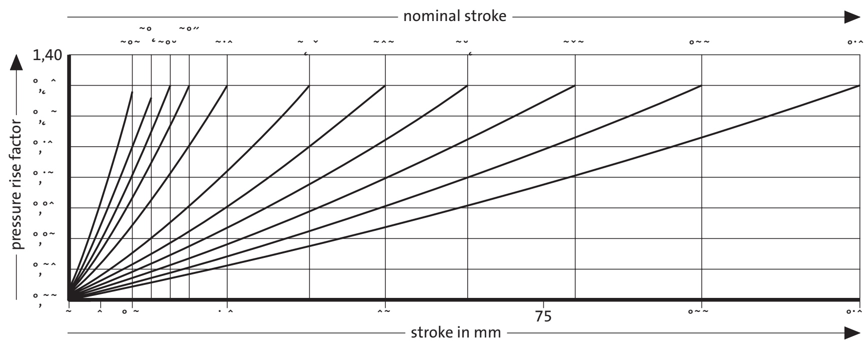
2480.13.00250.
Gas spring, Standard

Order No	Stroke$_{max.}$	l$_{min.}$	l
2480.13.00250.010	10	60	70
2480.13.00250.013	12.7	62.7	75.4
2480.13.00250.016	16	66	82
2480.13.00250.019	19	69	88
2480.13.00250.025	25	75	100
2480.13.00250.038	38.1	88.1	126.2
2480.13.00250.050	50	100	150
2480.13.00250.063	63.5	113.5	177
2480.13.00250.080	80	130	210
2480.13.00250.100	100	150	250
2480.13.00250.125	125	175	300

Initial spring force
versus charge pressure

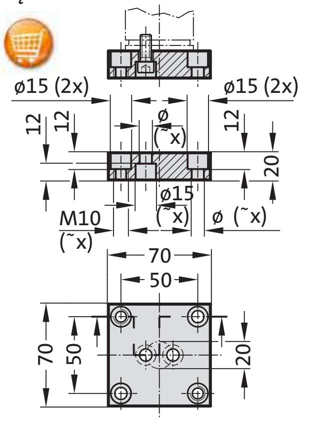


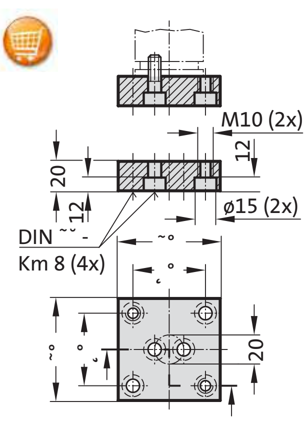
Spring force Diagram displacement versus stroke rise

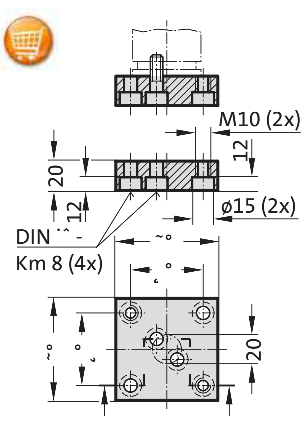


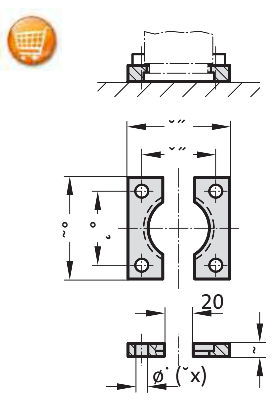
Pressure rise factor accounts for displacement but not external influences!

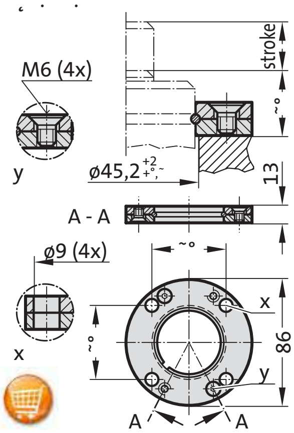
Gas Spring, Standard
Mounting variations

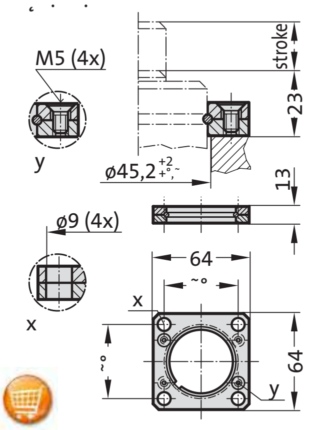


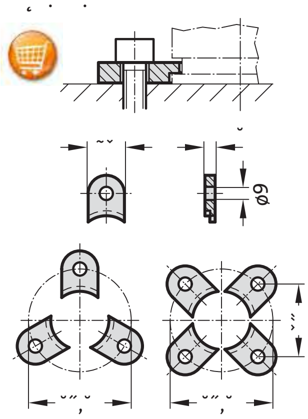


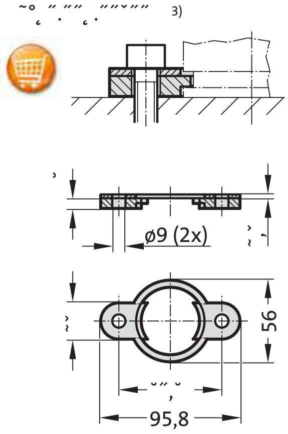




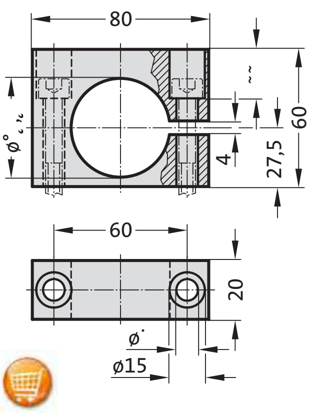


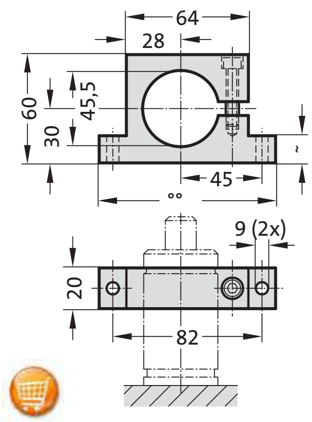




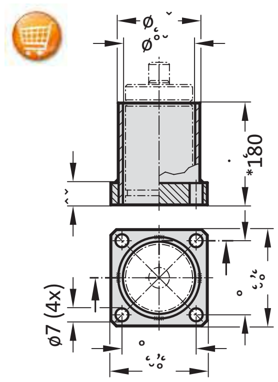


2480.044.03.00500

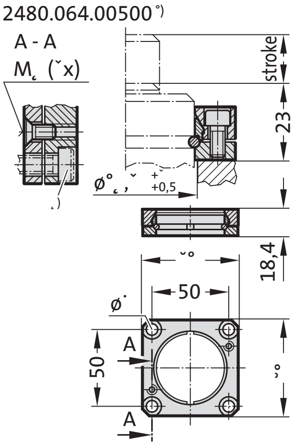




2480.010.00500.095 3)
2480.010.00500.180* 3)



2480.064.00500



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

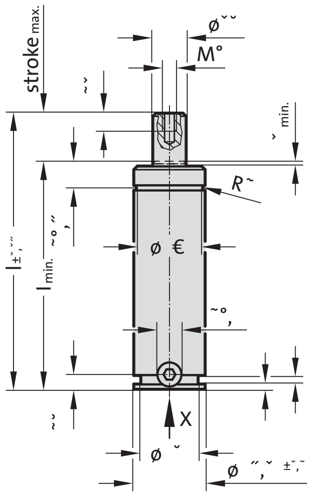
Gas spring, Standard

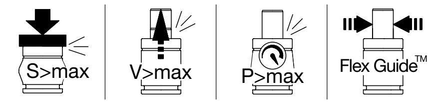
Note:
Initial spring force at 150 bar = 470 daN

Order No for spare parts kit: 2480.13.00500

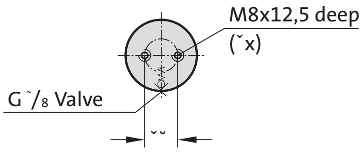
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 40 to 80 (at 20°C)
Max. piston speed: 1.6 m/s

2480.13.00500.





View X

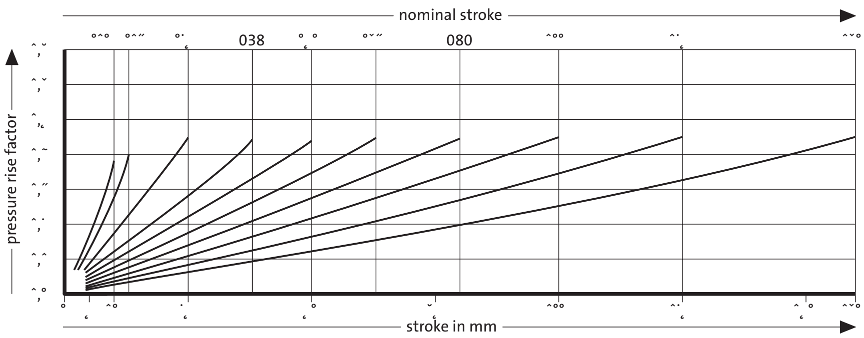


2480.13.00500.
Gas spring, Standard

Order No	Stroke max.	l min.	l
2480.13.00500.010	10	95	105
2480.13.00500.013	12.7	97.7	110.4
2480.13.00500.025	25	110	135
2480.13.00500.038	38.1	123.1	161.2
2480.13.00500.050	50	135	185
2480.13.00500.063	63.5	148.5	212
2480.13.00500.080	80	165	245
2480.13.00500.100	100	185	285
2480.13.00500.125	125	210	335
2480.13.00500.160	160	245	405

Initial spring force versus charge pressure

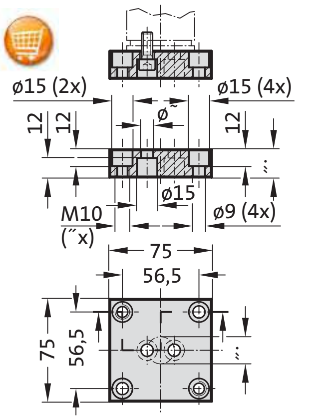
Spring force Diagram displacement versus stroke rise

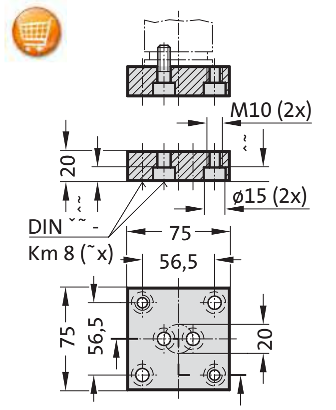


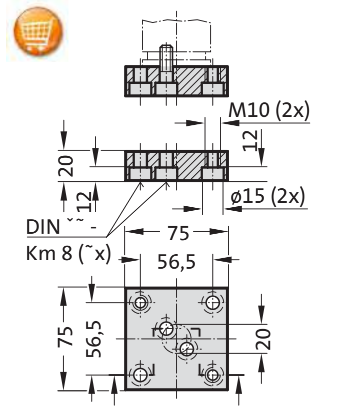
Pressure rise factor accounts for displacement but not external influences!

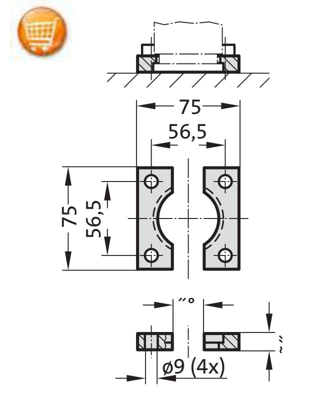
Gas Spring, Standard
Mounting variations

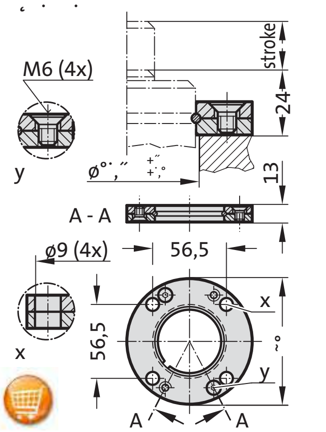
2480.011.00750.3

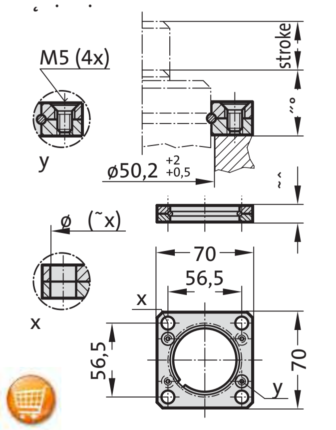


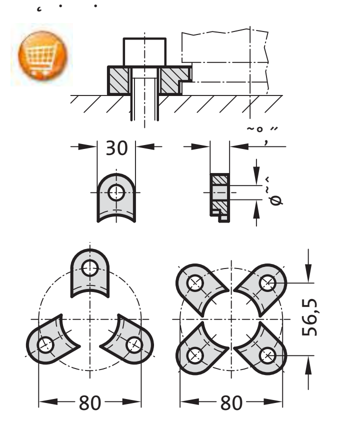




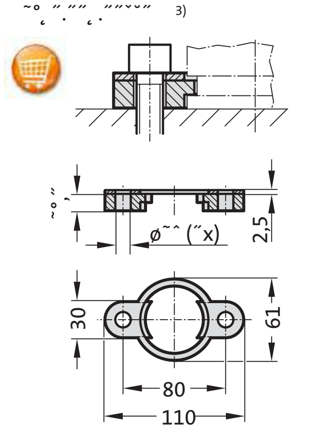




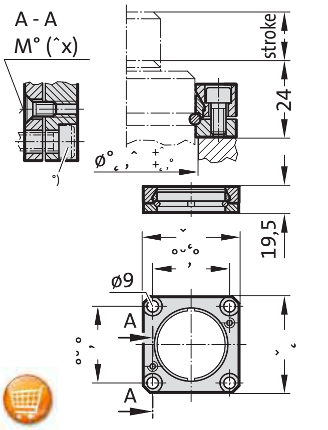


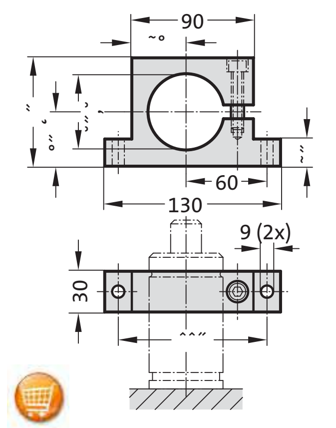


3)

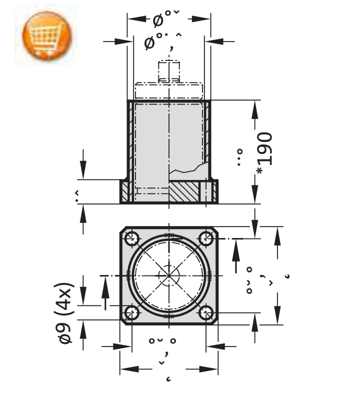


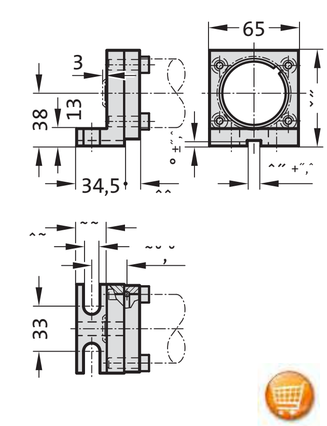
2480.064.00750 4)

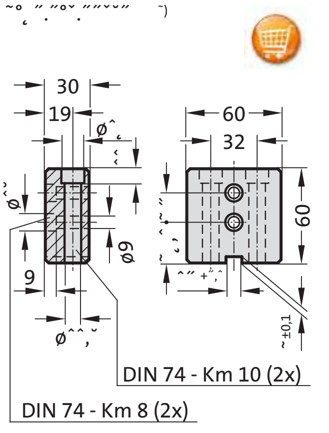




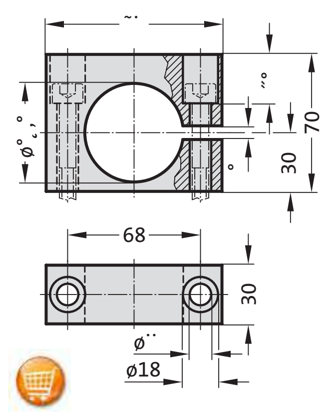
2480.010.00750.115 3)
2480.010.00750.190* 3)







2480.044.03.00750



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring, Standard

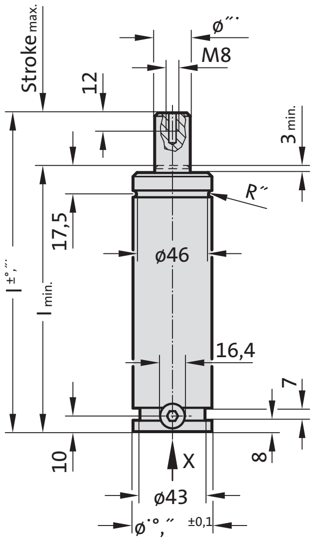
Note:
Initial spring force at 150 bar = 750 daN

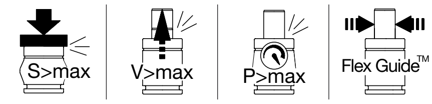
Order No for spare parts kit: 2480.13.00750
Order No for spare parts kit: to Renault standard EM24.54.700 2480.13.00750.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.13.00750. .R

1) Special stroke lengths
Not for gas springs to Renault Standard EM24.54.700.

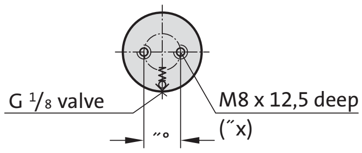
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.13.00750.





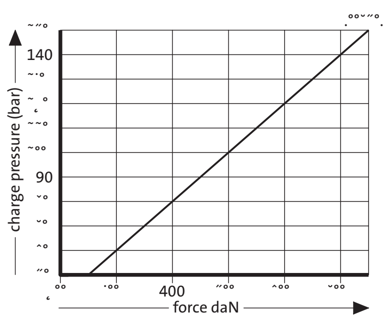
View X - Gas spring



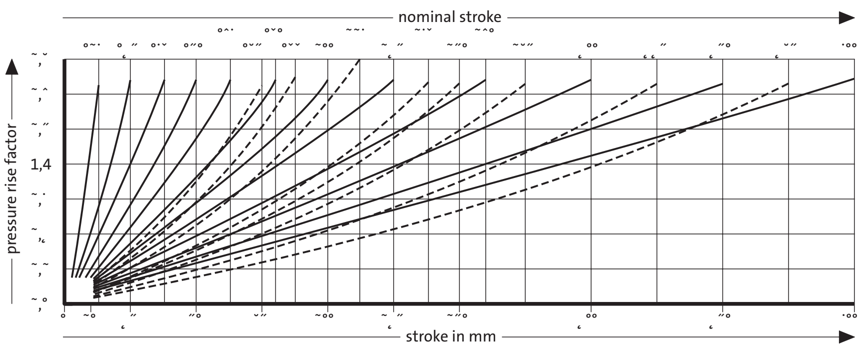
2480.13.00750.
Gas spring, Standard

Order No		Stroke max.	l min.	l
2480.13.00750.013		12.7	107.7	120.4
2480.13.00750.025		25	120	145
2480.13.00750.038		38.1	133.1	171.2
2480.13.00750.050		50	145	195
2480.13.00750.063		63.5	158.5	222
2480.13.00750.075	1)	75	170	245
2480.13.00750.080		80	175	255
2480.13.00750.088	1)	87.5	182.5	270
2480.13.00750.100		100	195	295
2480.13.00750.113	1)	112.5	207.5	320
2480.13.00750.125		125	220	345
2480.13.00750.138	1)	137.5	232.5	370
2480.13.00750.150	1)	150	245	395
2480.13.00750.160		160	255	415
2480.13.00750.175	1)	175	270	445
2480.13.00750.200		200	295	495
2480.13.00750.225	1)	225	320	545
2480.13.00750.250		250	345	595
2480.13.00750.275		275	370	645
2480.13.00750.300		300	395	695

Initial spring force versus charge pressure

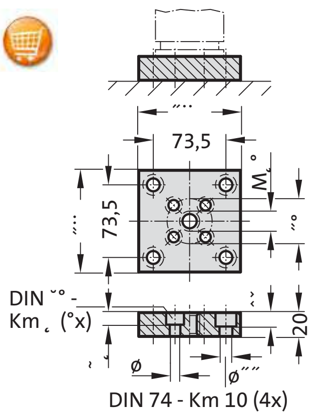


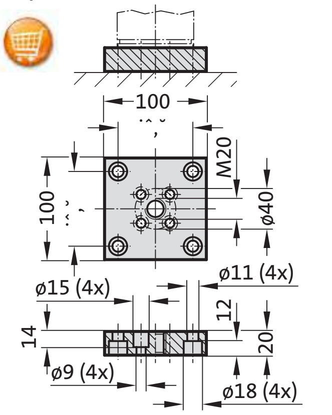
Spring force Diagram displacement versus stroke rise

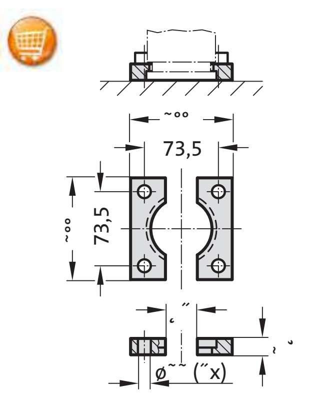


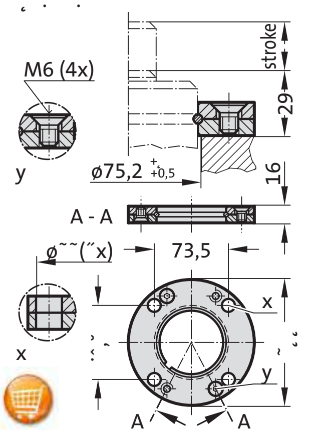
Pressure rise factor accounts for displacement but not external influences!

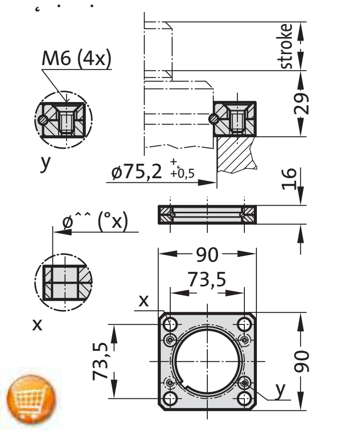
Gas Spring, Standard
Mounting variations

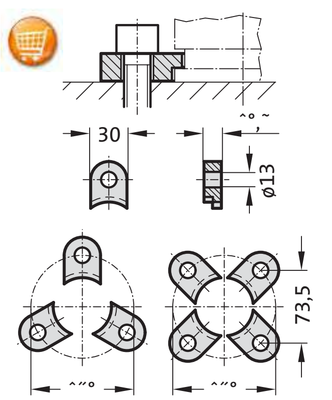


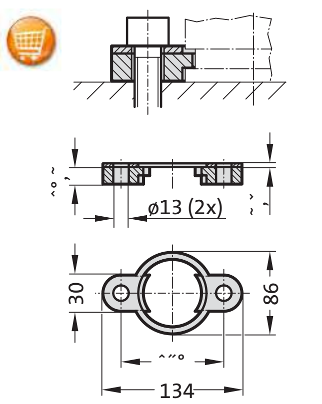




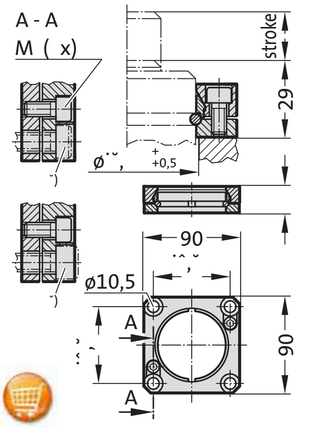


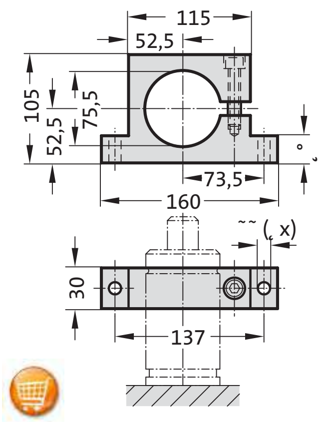




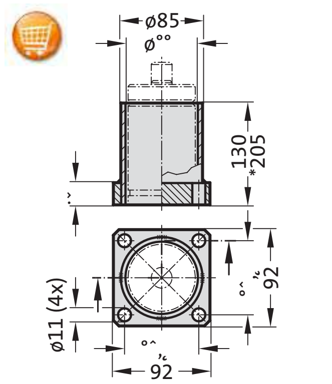


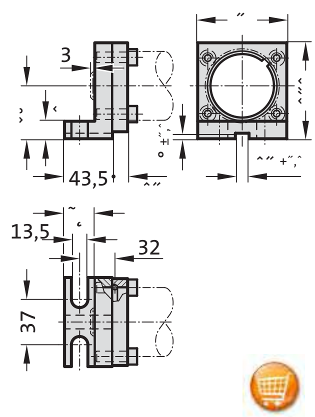
2480.064.01500

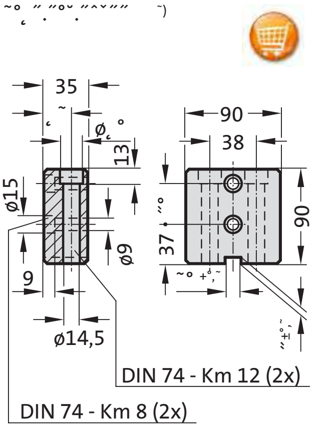




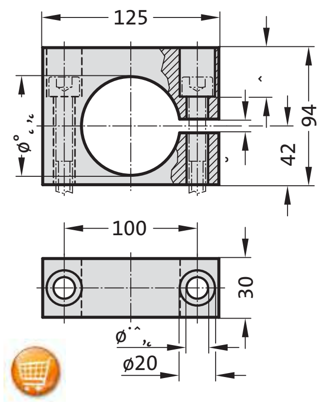
2480.010.01500.130
2480.010.01500.205*







2480.044.03.01500



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring, Standard

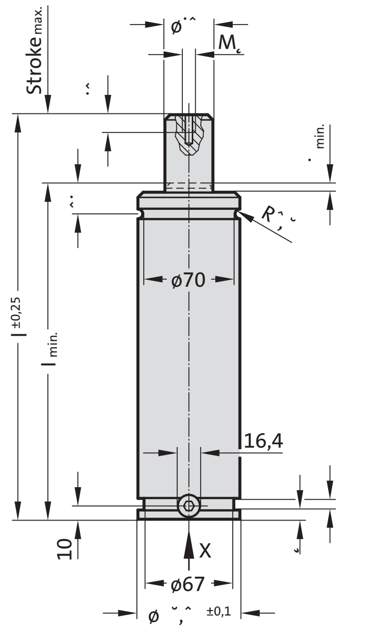
Note:
Initial spring force at 150 bar = 1500 daN

Order No for spare parts kit: 2480.12.01500
Order No for spare parts kit: to Renault standard EM24.54.700 2480.12.01500.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.12.01500. .R

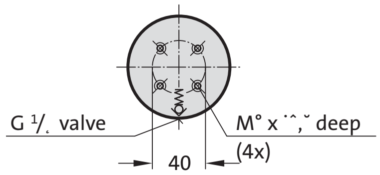
1) Special stroke lengths
Not for gas springs to Renault Standard EM24.54.700.

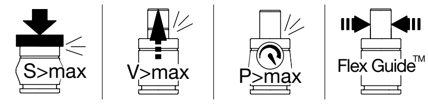
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.12.01500.



View X - Gas spring

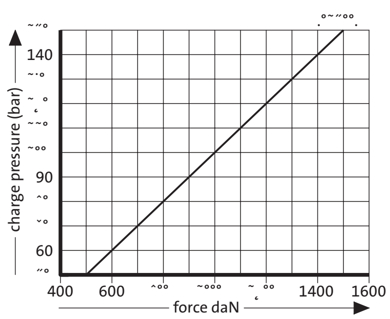




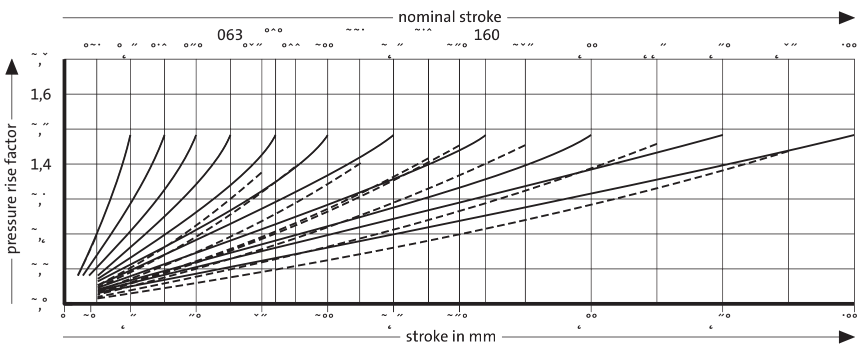
2480.12.01500.
Gas spring, Standard

Order No		Stroke$_{max.}$	l$_{min.}$	l
2480.12.01500.013	1)	12.7	122.3	135
2480.12.01500.025		25	135	160
2480.12.01500.038		38.1	148.1	186.2
2480.12.01500.050		50	160	210
2480.12.01500.063		63.5	173.5	237
2480.12.01500.075	1)	75	185	260
2480.12.01500.080		80	190	270
2480.12.01500.088	1)	87.5	197.5	285
2480.12.01500.100		100	210	310
2480.12.01500.113	1)	112.5	222.5	335
2480.12.01500.125		125	235	360
2480.12.01500.138	1)	137.5	247.5	385
2480.12.01500.150	1)	150	260	410
2480.12.01500.160		160	270	430
2480.12.01500.175	1)	175	285	460
2480.12.01500.200		200	310	510
2480.12.01500.225	1)	225	335	560
2480.12.01500.250		250	360	610
2480.12.01500.275		275	385	660
2480.12.01500.300		300	410	710

Initial spring force versus charge pressure

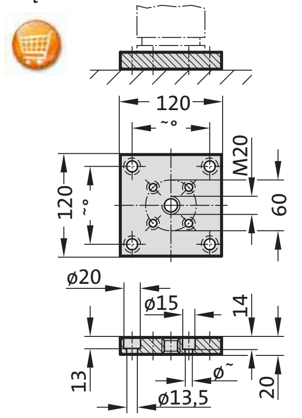


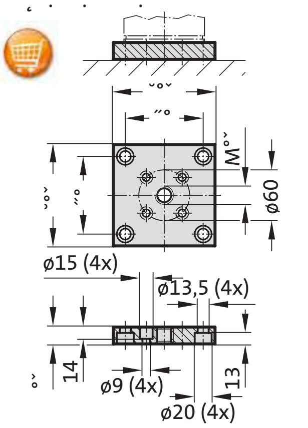
Spring force Diagram displacement versus stroke rise

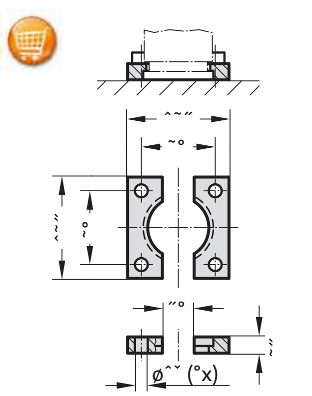


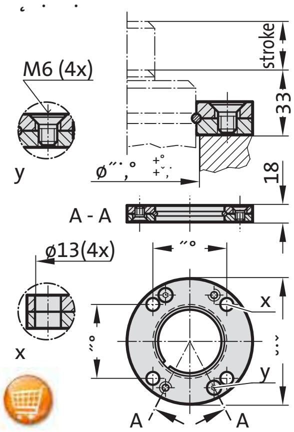
Pressure rise factor accounts for displacement but not external influences!

Gas Spring, Standard
Mounting variations

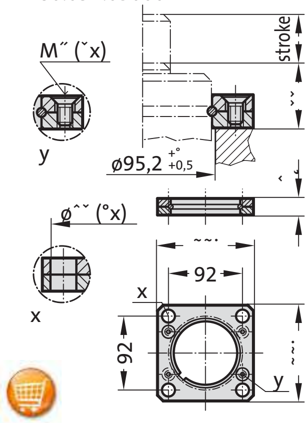








2480.057.03000



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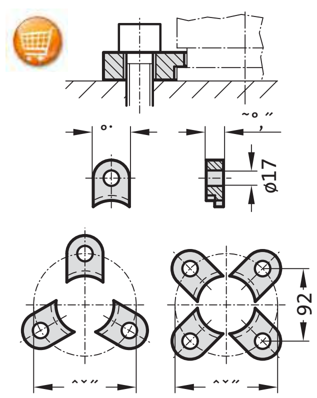
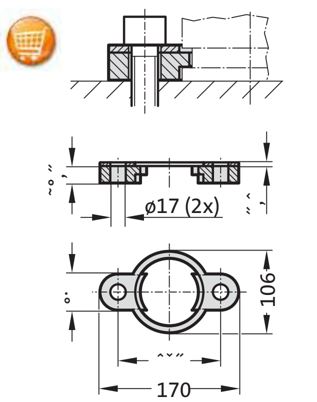
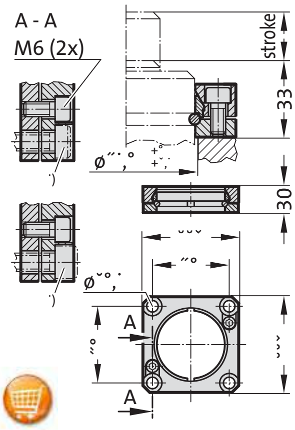
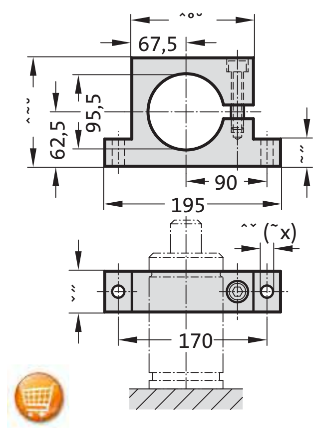


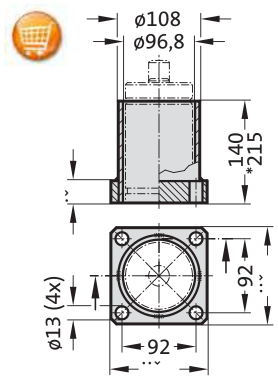


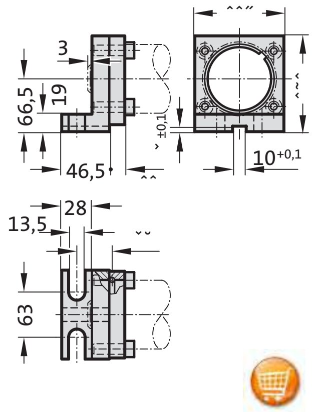
2480.064.03000 ⁾





2480.010.03000.140 ⁾
2480.010.03000.215* ⁾





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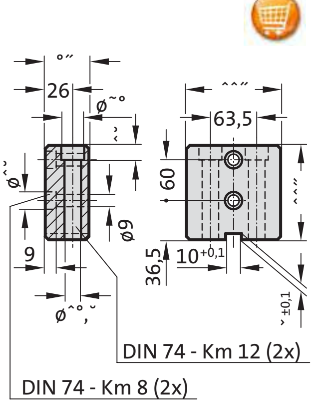
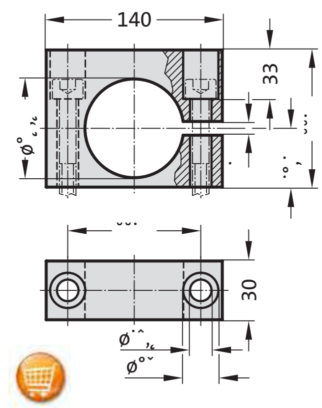


2480.044.03.03000 ⁾



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

subject to alterations

Gas spring, Standard

Note:

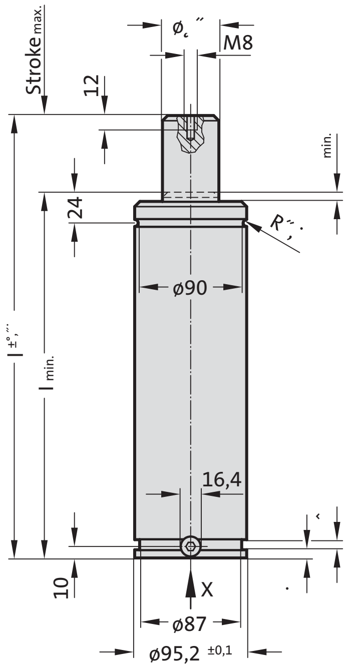
Initial spring force at 150 bar = 3000 daN

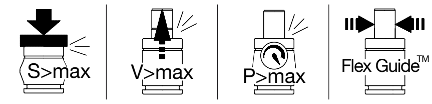
Order No for spare parts kit: 2480.13.03000
Order No for spare parts kit: to Renault standard EM24.54.700 2480.13.03000.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.13.03000. .R

1) Special stroke lengths
Not for gas springs to Renault Standard EM24.54.700.

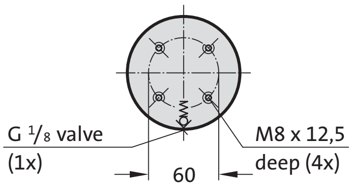
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.13.03000.





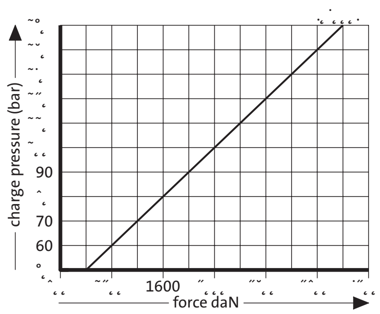
View X - Gas spring



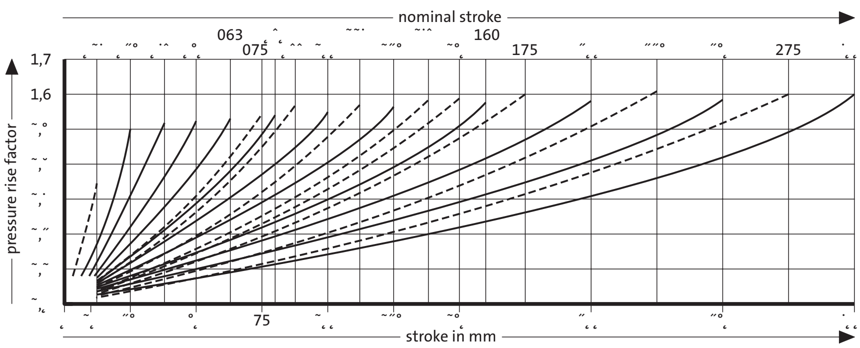
2480.13.03000.
Gas spring, Standard

Order No		Stroke max.	l min.	l
2480.13.03000.013	1)	12.7	132.3	145
2480.13.03000.025		25	145	170
2480.13.03000.038		38.1	158.1	196.2
2480.13.03000.050		50	170	220
2480.13.03000.063		63.5	183.5	247
2480.13.03000.075	1)	75	195	270
2480.13.03000.080		80	200	280
2480.13.03000.088.1	1)	87.5	207.5	295
2480.13.03000.100		100	220	320
2480.13.03000.113	1)	112.5	232.5	345
2480.13.03000.125		125	245	370
2480.13.03000.138	1)	137.5	257.5	395
2480.13.03000.150	1)	150	270	420
2480.13.03000.160		160	280	440
2480.13.03000.175	1)	175	295	470
2480.13.03000.200		200	320	520
2480.13.03000.225	1)	225	345	570
2480.13.03000.250		250	370	620
2480.13.03000.275	1)	275	395	670
2480.13.03000.300		300	420	720

Initial spring force versus charge pressure

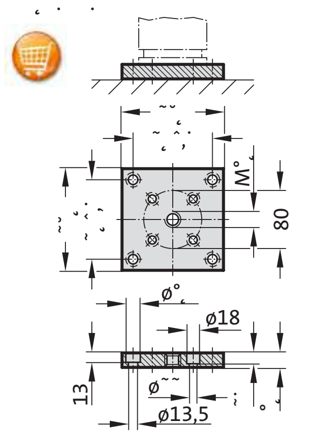


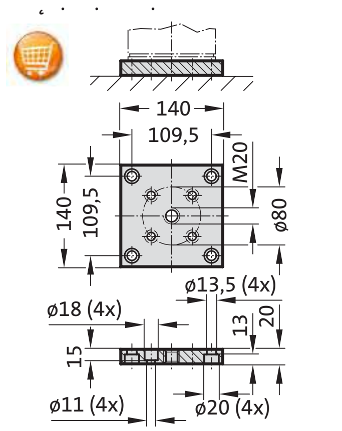
Spring force Diagram displacement versus stroke rise

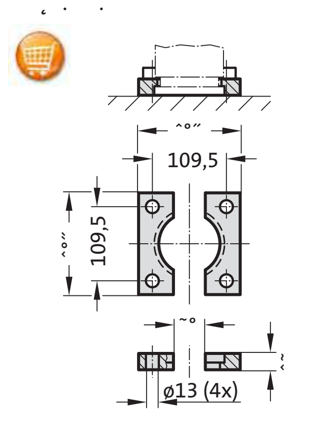


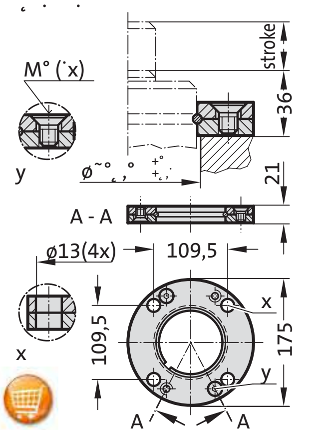
Pressure rise factor accounts for displacement but not external influences!

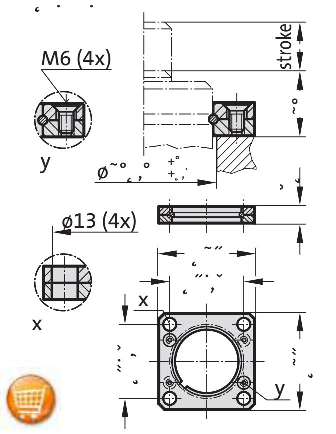
Gas Spring, Standard
Mounting variations

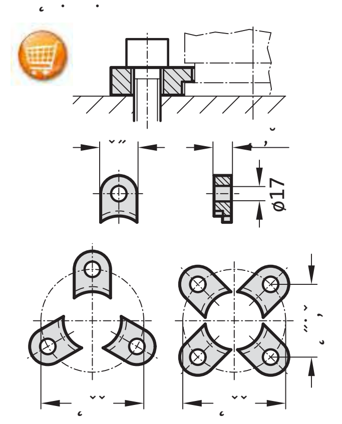


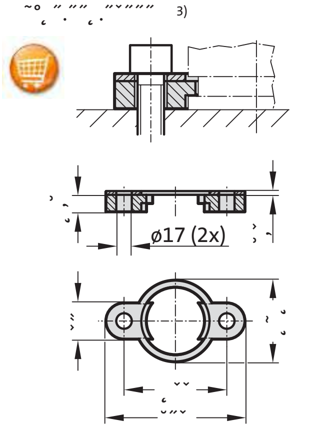




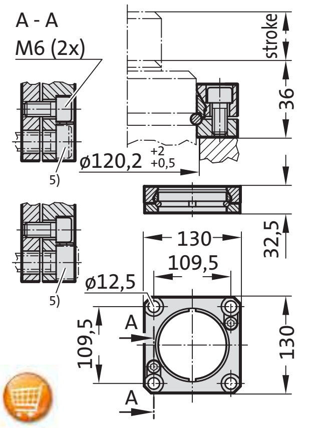


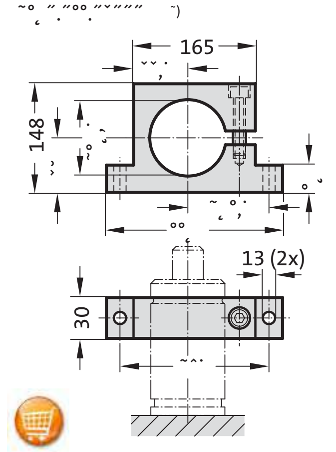




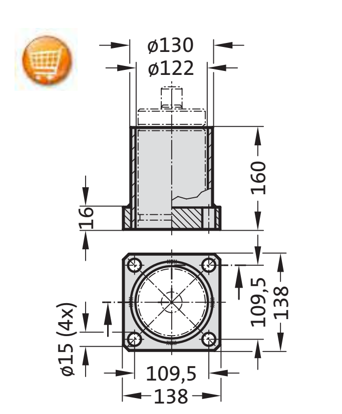


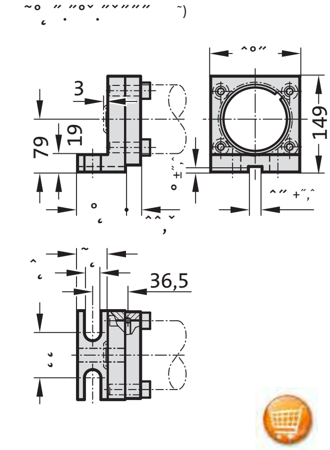
2480.064.05000 [5]

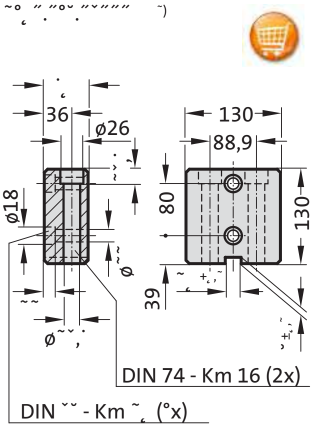




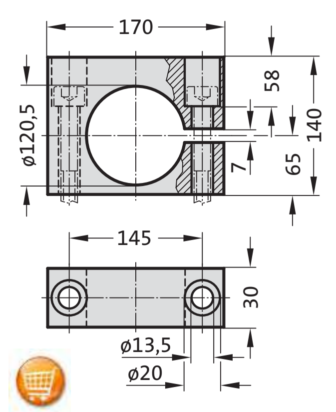
2480.010.05000.160 [3]







2480.044.03.05000 [2]



Note:

2) Attention: The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

subject to alterations

Gas spring, Standard

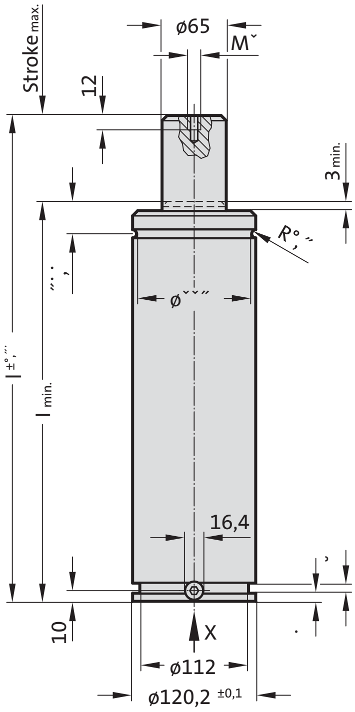
Note:
Initial spring force at 150 bar = 5000 daN

Order No for spare parts kit: 2480.13.05000
Order No for spare parts kit: to Renault standard EM24.54.700 2480.13.05000.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.13.05000. .R

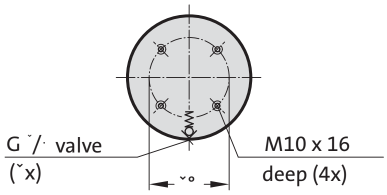
1) Special stroke lengths
Not for gas springs to Renault Standard EM24.54.700.

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.13.05000.



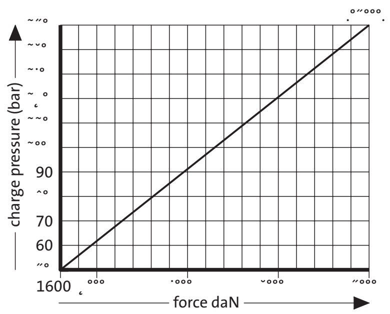
View X - Gas spring



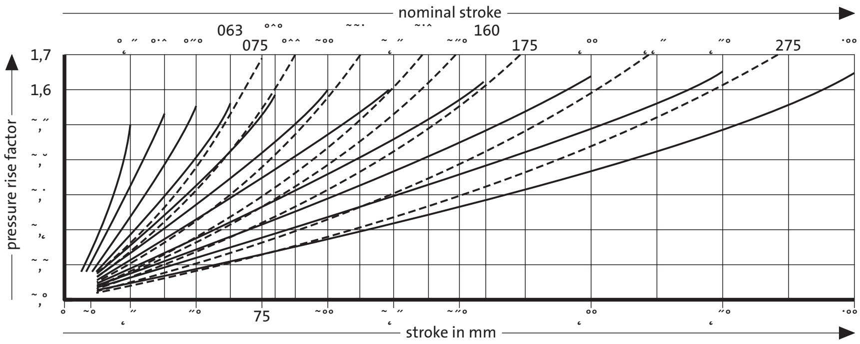
2480.13.05000.
Gas spring, Standard

Order No		Stroke max.	l min.	l
2480.13.05000.025		25	165	190
2480.13.05000.038		38.1	178.1	216.2
2480.13.05000.050		50	190	240
2480.13.05000.063		63.5	203.5	267
2480.13.05000.075	1)	75	215	290
2480.13.05000.080		80	220	300
2480.13.05000.088	1)	87.5	227.5	315
2480.13.05000.100		100	240	340
2480.13.05000.113	1)	112.5	252.5	365
2480.13.05000.125		125	265	390
2480.13.05000.138	1)	137.5	277.5	415
2480.13.05000.150	1)	150	290	440
2480.13.05000.160		160	300	460
2480.13.05000.175	1)	175	315	490
2480.13.05000.200		200	340	540
2480.13.05000.225	1)	225	365	590
2480.13.05000.250		250	390	640
2480.13.05000.275	1)	275	415	690
2480.13.05000.300		300	440	740

Initial spring force versus charge pressure

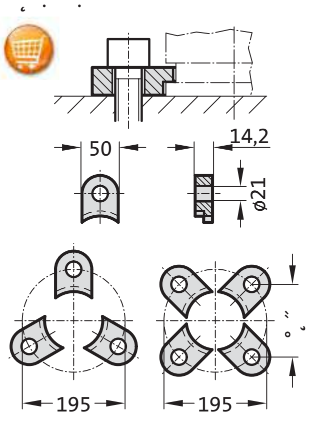


Spring force Diagram displacement versus stroke rise

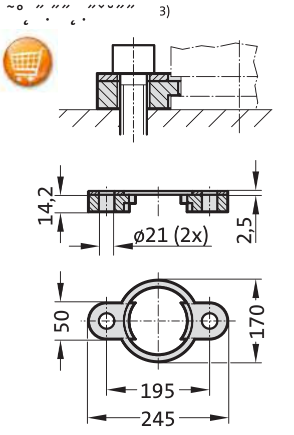


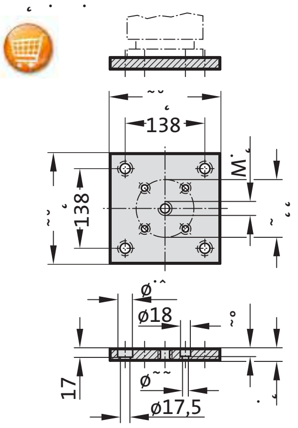
Pressure rise factor accounts for displacement but not external influences!

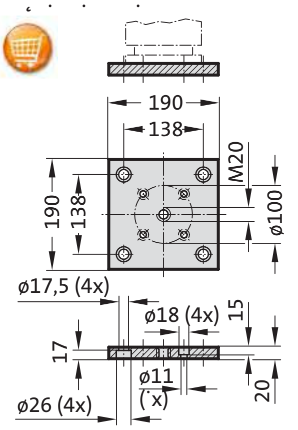
Gas spring, Standard
Mounting variations



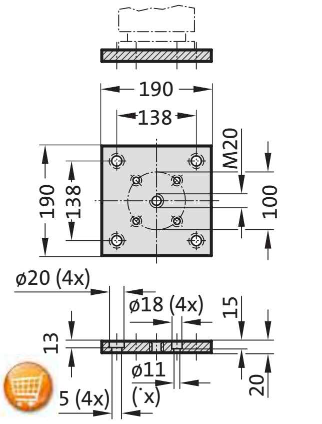
3)



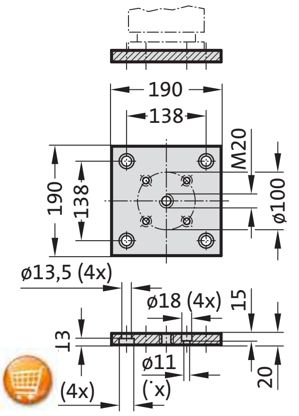


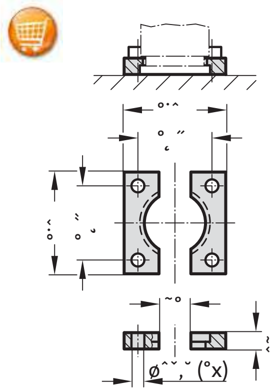


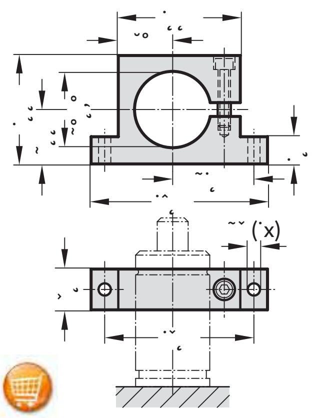
2480.011.03.07500



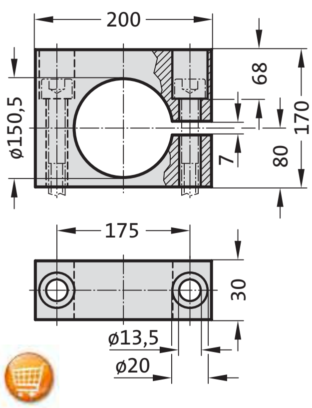
2480.011.03.07500.2

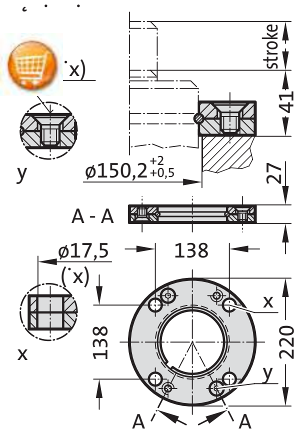


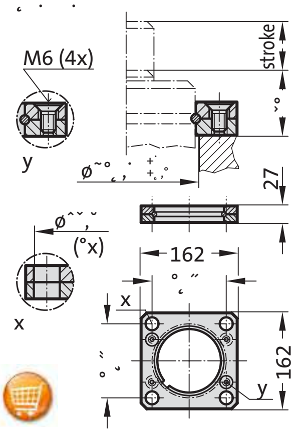




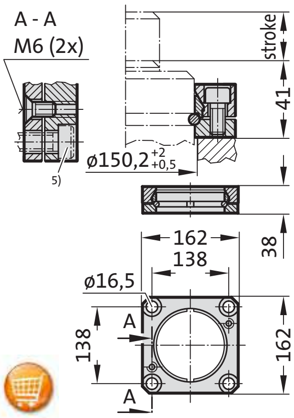
2480.044.03.07500 2)







2480.064.07500



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexa-gonal socket (compact head recommended).

Gas spring, Standard

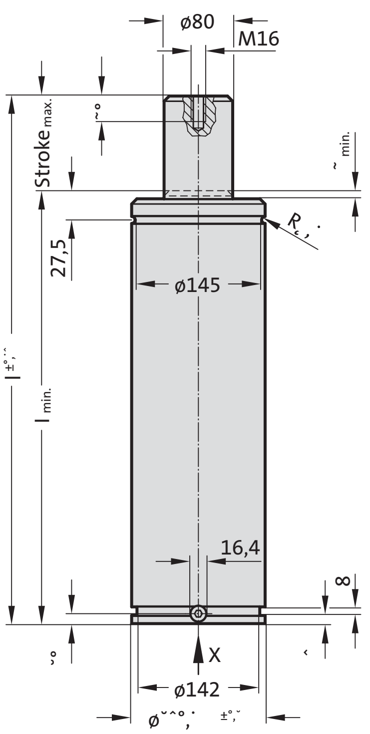
Note:
Initial spring force at 150 bar = 7500 daN

Order No for spare parts kit: 2480.13.07500
Order No for spare parts kit: to Renault standard EM24.54.700 2480.13.07500.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.13.07500. .R

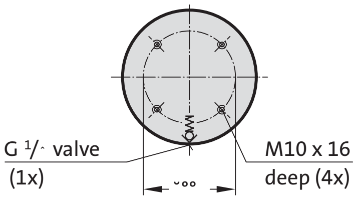
1) Special stroke lengths
Not for gas springs to Renault Standard EM24.54.700.

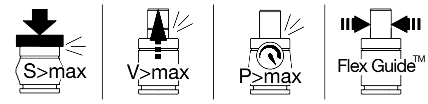
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.13.07500.



View X - Gas spring

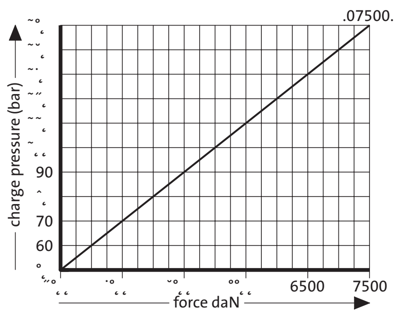




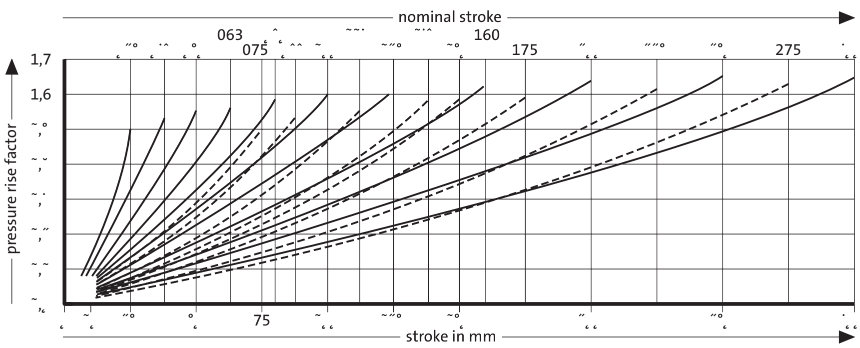
2480.13.07500.
Gas spring, Standard

Order No		Stroke$_{max.}$	l$_{min.}$	l
2480.13.07500.025		25	180	205
2480.13.07500.038		38.1	193.1	231.2
2480.13.07500.050		50	205	255
2480.13.07500.063		63.5	218.5	282
2480.13.07500.075	1)	75	230	305
2480.13.07500.080		80	235	315
2480.13.07500.088	1)	87.5	242.5	330
2480.13.07500.100		100	255	355
2480.13.07500.113	1)	112.5	267.5	380
2480.13.07500.125		125	280	405
2480.13.07500.138	1)	137.5	292.5	430
2480.13.07500.150	1)	150	305	455
2480.13.07500.160		160	315	475
2480.13.07500.175	1)	175	330	505
2480.13.07500.200		200	355	555
2480.13.07500.225	1)	225	380	605
2480.13.07500.250		250	405	655
2480.13.07500.275	1)	275	430	705
2480.13.07500.300		300	455	755

Initial spring force versus charge pressure

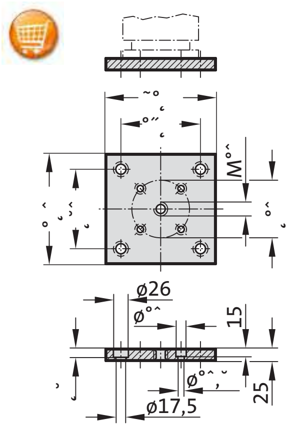


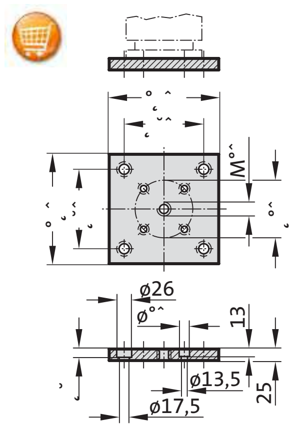
Spring force Diagram displacement versus stroke rise



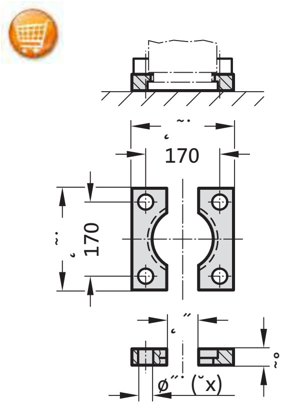
Pressure rise factor accounts for displacement but not external influences!

Gas Spring, Standard
Mounting variations

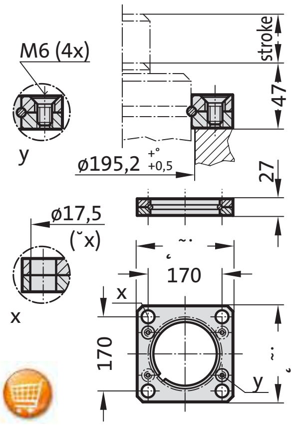


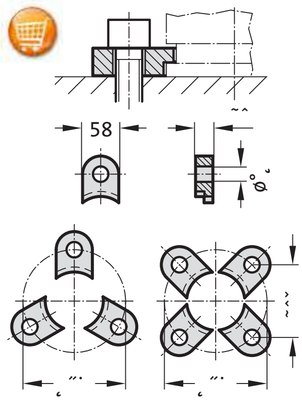


2480.022.10000



2480.057.10000





Gas spring, Standard

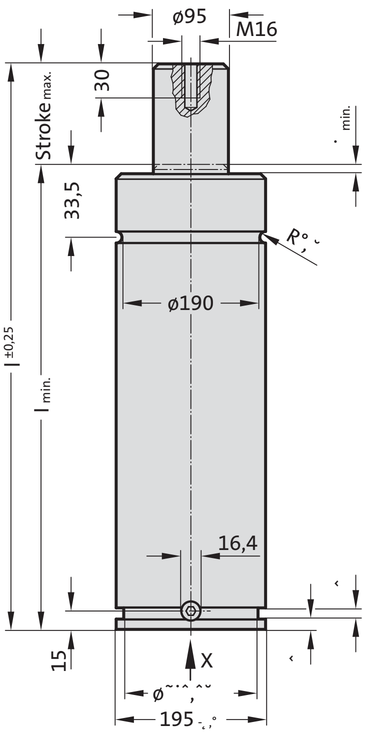
Note:

Initial spring force at 150 bar = 10000 daN

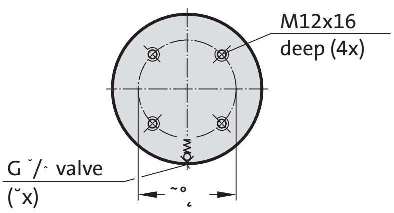
Order No for spare parts kit: 2480.12.10000
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.12.10000. .R

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

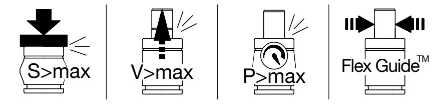
2480.12.10000.



View X - Gas spring



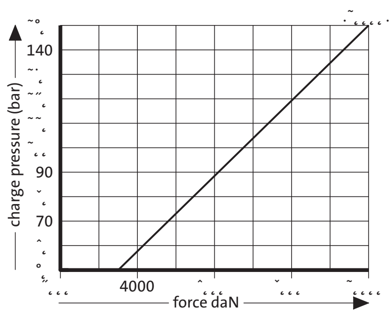
PED APPROVED 2014/68/EU VDI ISO



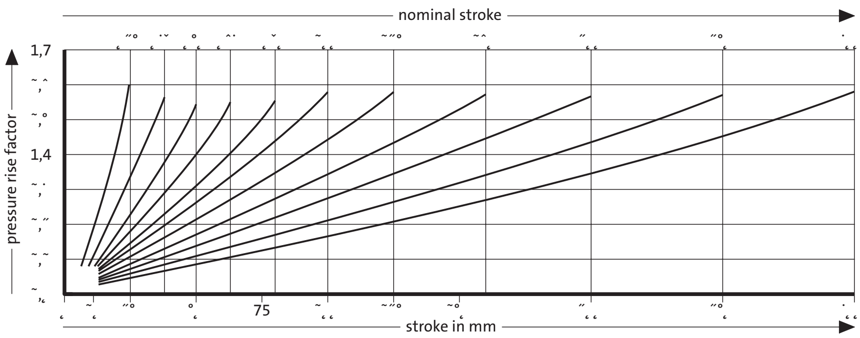
2480.12.10000.
Gas spring, Standard

Order No	Stroke max.	l min.	l
2480.12.10000.025	25	185	210
2480.12.10000.038	38.1	198.1	236.2
2480.12.10000.050	50	210	260
2480.12.10000.063	63.5	223.5	287
2480.12.10000.080	80	240	320
2480.12.10000.100	100	260	360
2480.12.10000.125	125	285	410
2480.12.10000.160	160	320	480
2480.12.10000.200	200	360	560
2480.12.10000.250	250	410	660
2480.12.10000.300	300	460	760

Initial spring force
versus charge pressure



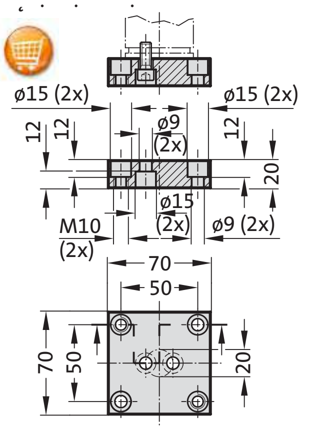
Spring force Diagram displacement versus stroke rise

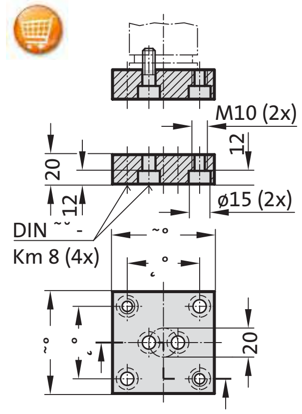


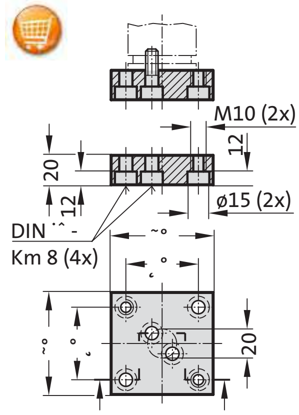
Pressure rise factor accounts for displacement but not external influences!

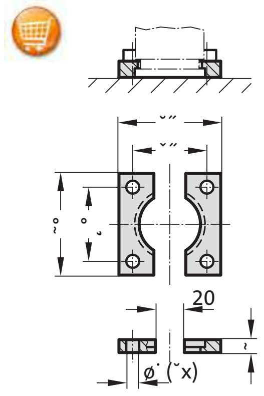
Gas springs HEAVY DUTY

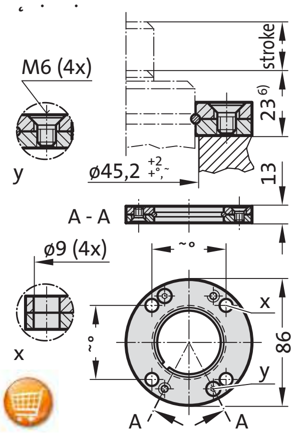
Gas Spring, HEAVY DUTY
Mounting variations

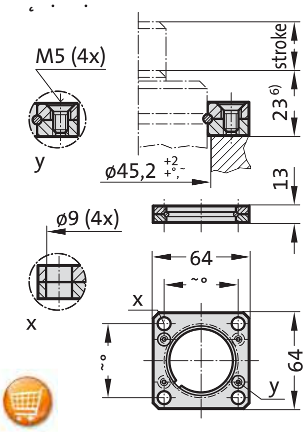


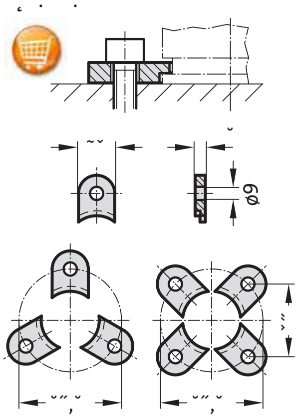


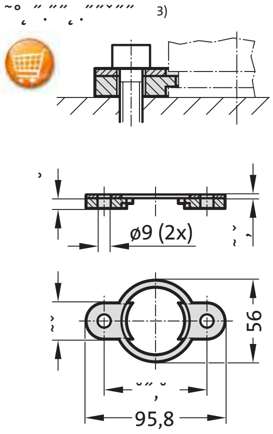




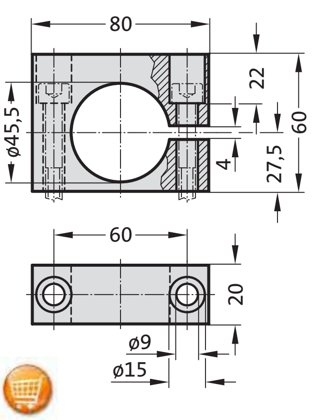


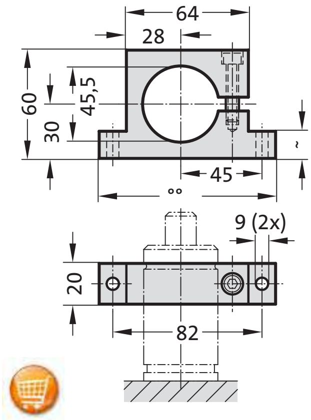




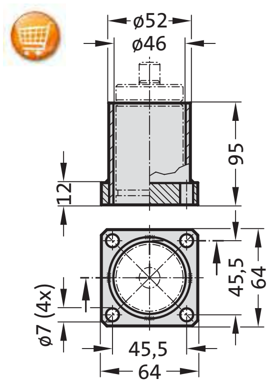


2480.044.03.00500 2)

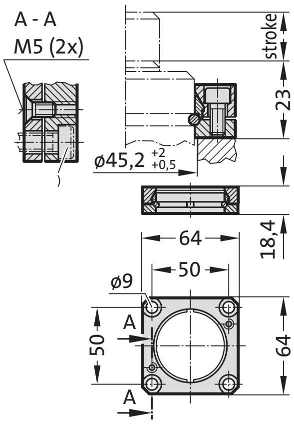




2480.010.00500.095 3)



2480.064.00500 4)



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

6) Installation height increased from 22 mm to 23 mm according to VDI 3003.

Gas spring HEAVY DUTY

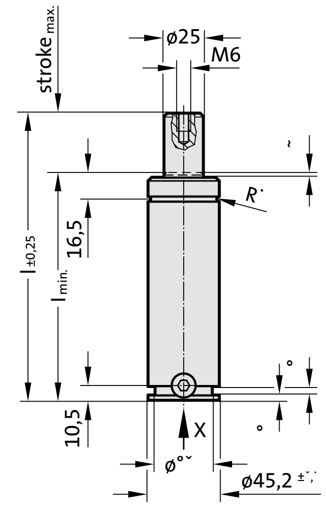
Note:

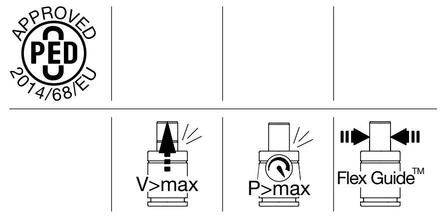
Initial spring force at 150 bar = 740 daN

Order No for spare parts kit: 2488.13.00750

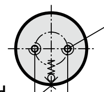
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.00750.





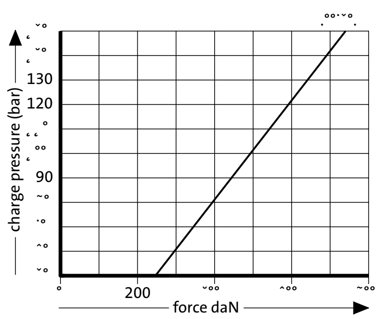
View X



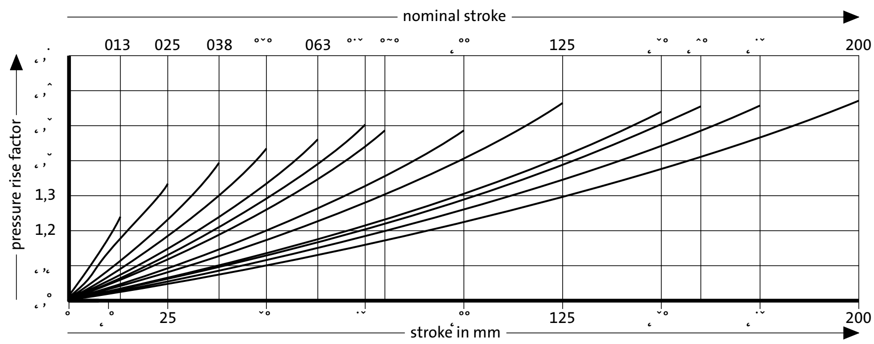
2488.13.00750.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$ (s)	l$_{min.}$	l
2488.13.00750.013	13	98	111
2488.13.00750.025	25	110	135
2488.13.00750.038	38	123	161
2488.13.00750.050	50	135	185
2488.13.00750.063	63	148	211
2488.13.00750.075	75	160	235
2488.13.00750.080	80	165	245
2488.13.00750.100	100	185	285
2488.13.00750.125	125	210	335
2488.13.00750.150	150	235	385
2488.13.00750.160	160	245	405
2488.13.00750.175	175	260	435
2488.13.00750.200	200	285	485

Initial spring force
versus charge pressure



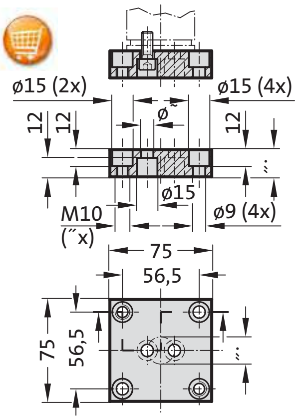
Spring force Diagram displacement versus stroke rise

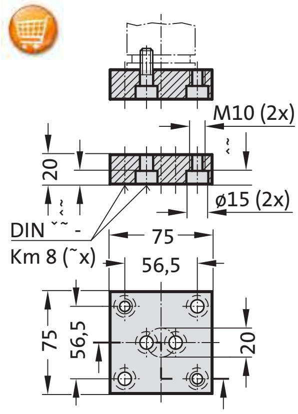


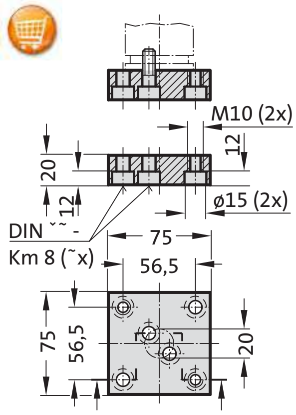
Pressure rise factor accounts for displacement but not external influences!

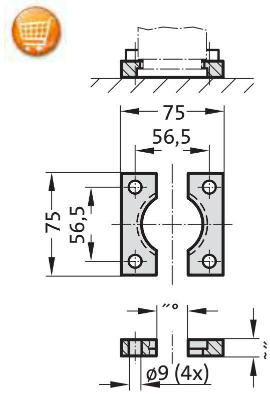
Gas spring HEAVY DUTY
Mounting variations

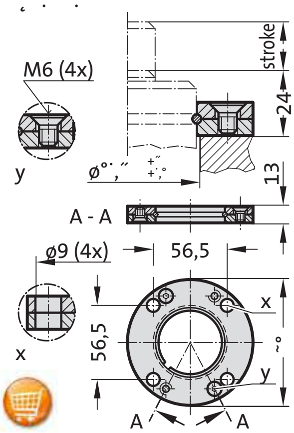
2480.011.00750.3

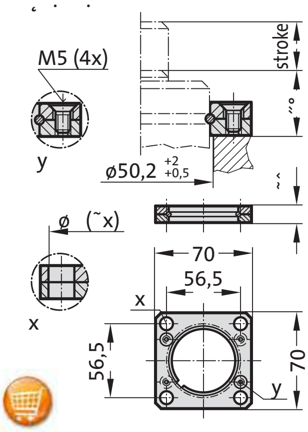


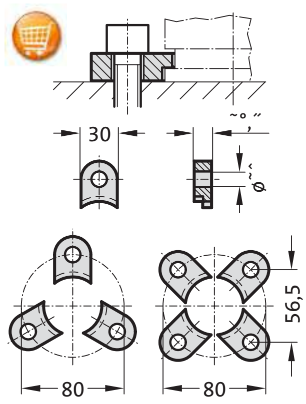


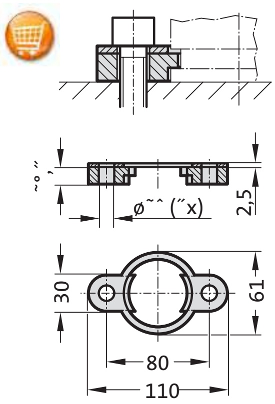




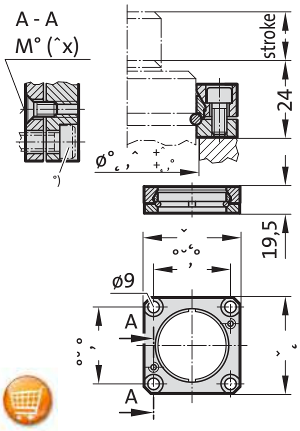


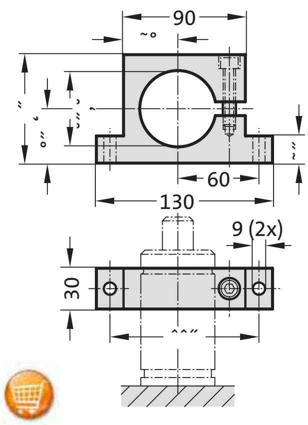




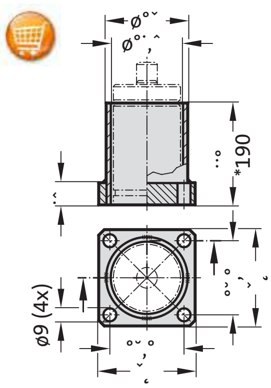


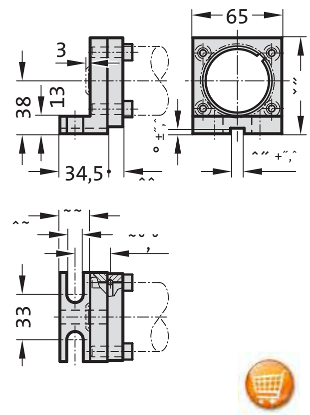
2480.064.00750 4)

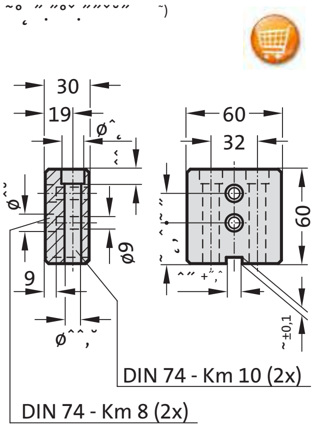




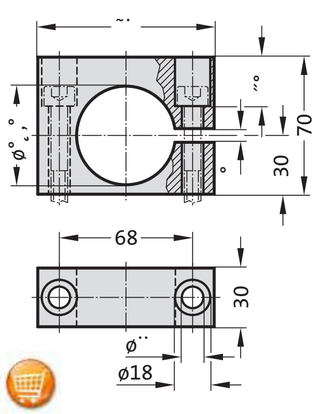
2480.010.00750.115 3)
2480.010.00750.190* 3)







2480.044.03.00750



Note:

2) Attention: The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring HEAVY DUTY

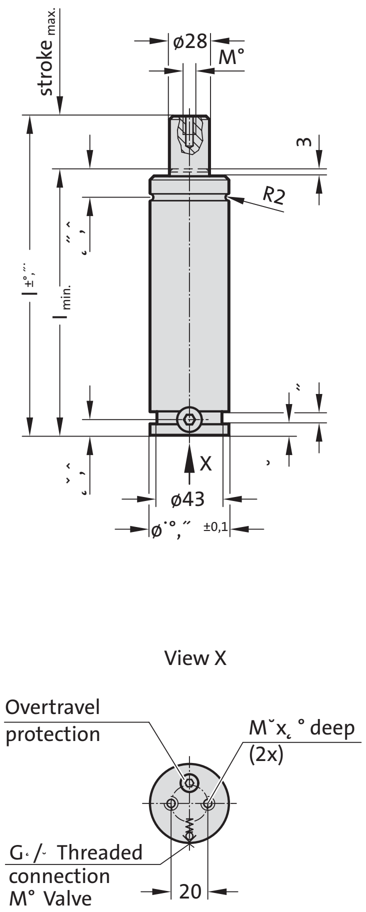
Note:

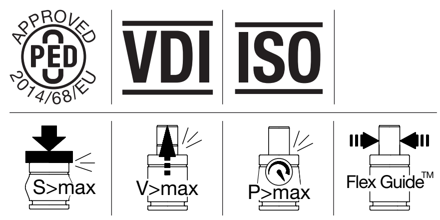
Initial spring force at 150 bar = 920 daN

Order No for spare parts kit: 2488.13.01000

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.01000.

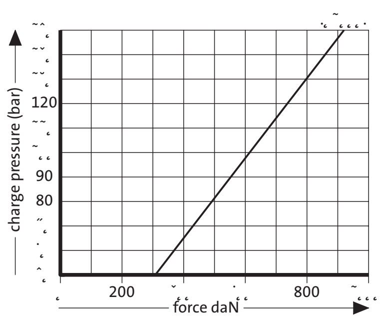




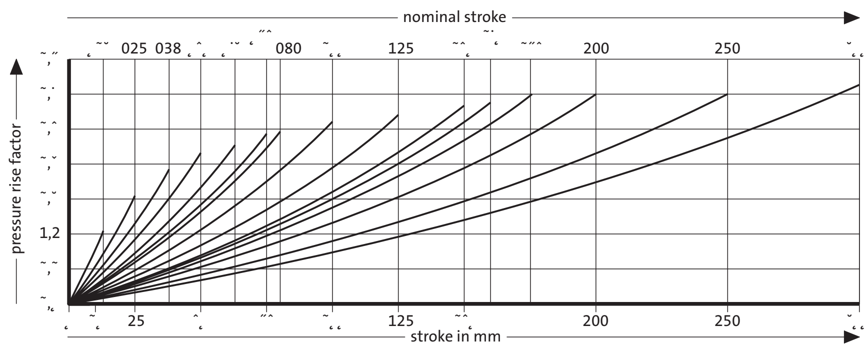
2488.13.01000.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$	l$_{min.}$	l
2488.13.01000.013	13	108	121
2488.13.01000.025	25	120	145
2488.13.01000.038	38	133	171
2488.13.01000.050	50	145	195
2488.13.01000.063	63	158	221
2488.13.01000.075	75	170	245
2488.13.01000.080	80	175	255
2488.13.01000.100	100	195	295
2488.13.01000.125	125	220	345
2488.13.01000.150	150	245	395
2488.13.01000.160	160	255	415
2488.13.01000.175	175	270	445
2488.13.01000.200	200	295	495
2488.13.01000.250	250	345	595
2488.13.01000.300	300	395	695

Initial spring force versus charge pressure



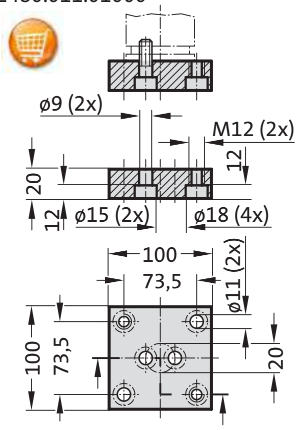
Spring force Diagram displacement versus stroke rise



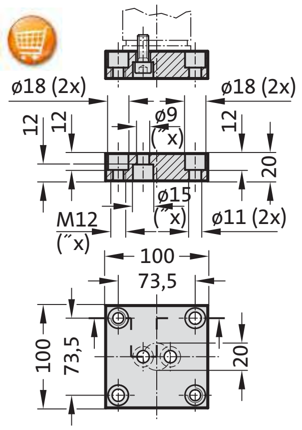
Pressure rise factor accounts for displacement but not external influences!

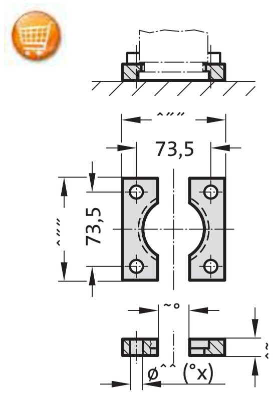
Gas spring HEAVY DUTY
Mounting variations

2480.011.01000

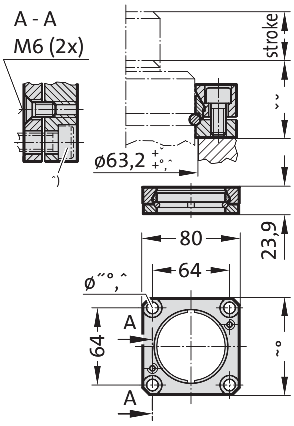


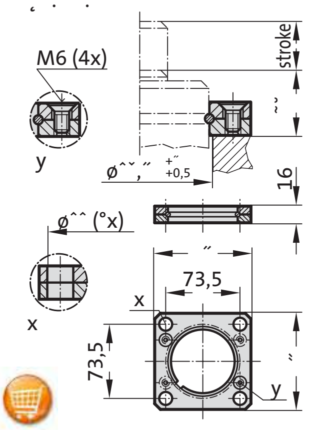
2480.011.01000.2



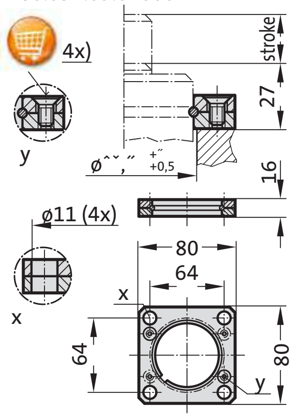


2480.064.01000

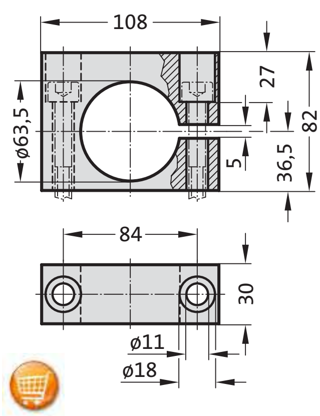




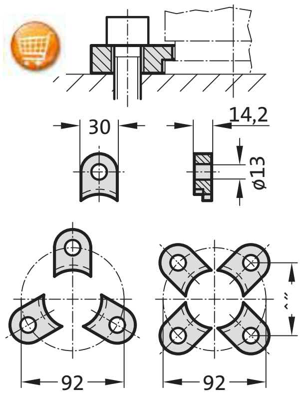
2480.057.03.01000



2480.044.03.01000



2480.007.01000



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

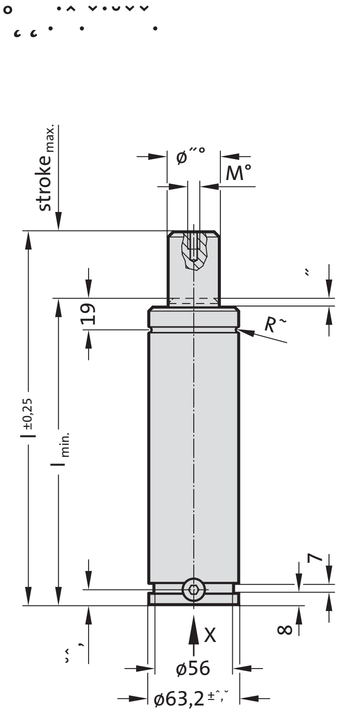
Gas spring HEAVY DUTY

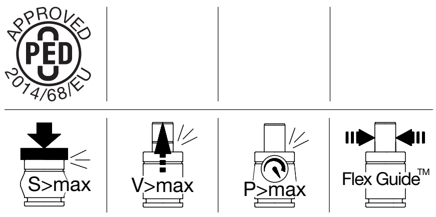
Note:

Initial spring force at 150 bar = 1500 daN

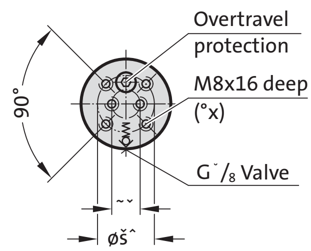
Order No for spare parts kit: 2488.13.01500

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s





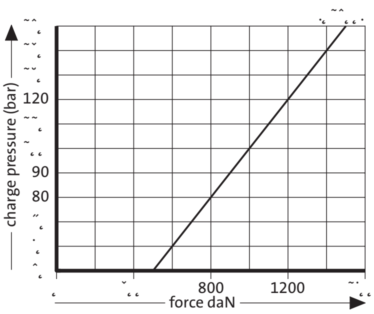
View X



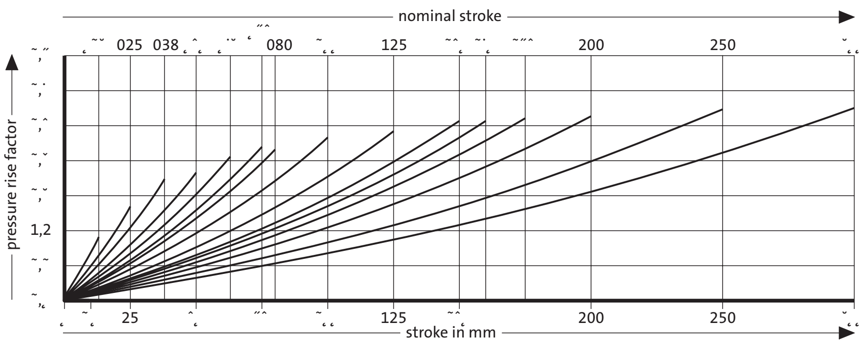
2488.13.01500.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$	l$_{min.}$	l
2488.13.01500.013	13	108	121
2488.13.01500.025	25	120	145
2488.13.01500.038	38	133	171
2488.13.01500.050	50	145	195
2488.13.01500.063	63	158	221
2488.13.01500.075	75	170	245
2488.13.01500.080	80	175	255
2488.13.01500.100	100	195	295
2488.13.01500.125	125	220	345
2488.13.01500.150	150	245	395
2488.13.01500.160	160	255	415
2488.13.01500.175	175	270	445
2488.13.01500.200	200	295	495
2488.13.01500.250	250	345	595
2488.13.01500.300	300	395	695

Initial spring force versus charge pressure

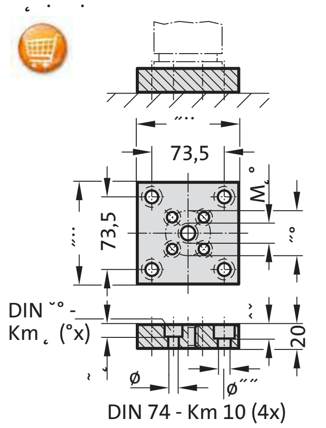


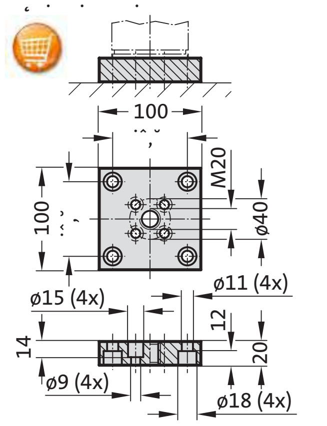
Spring force Diagram displacement versus stroke rise

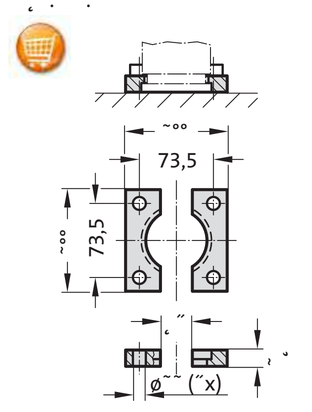


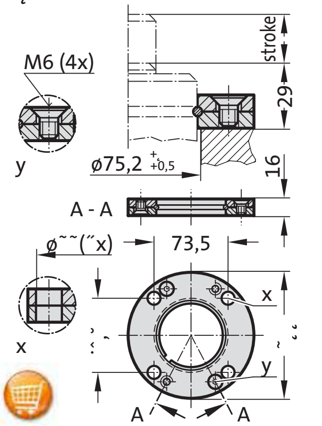
Pressure rise factor accounts for displacement but not external influences!

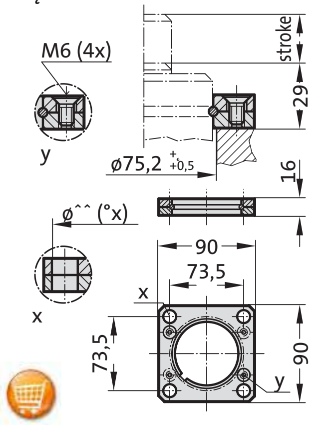
Gas Spring HEAVY DUTY
Mounting variations

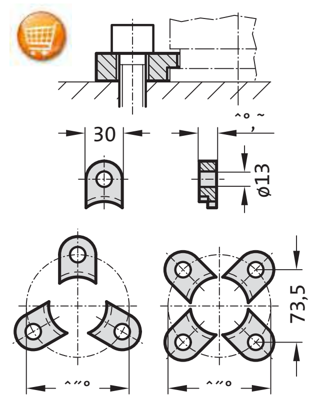












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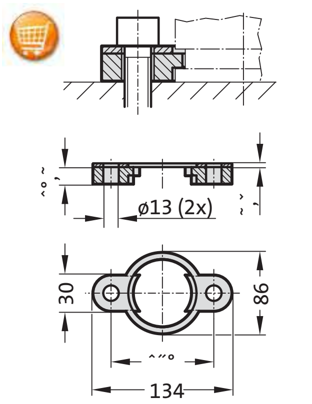
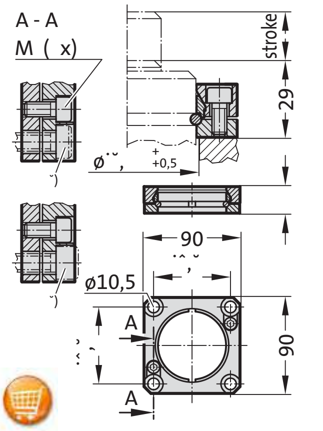
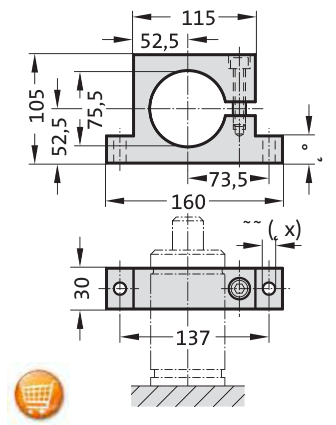
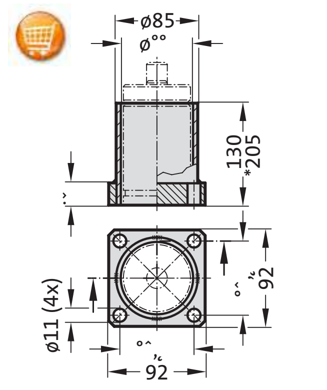


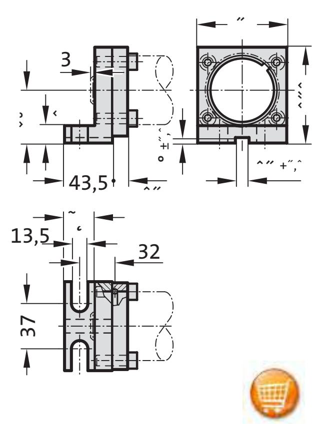
2480.064.01500

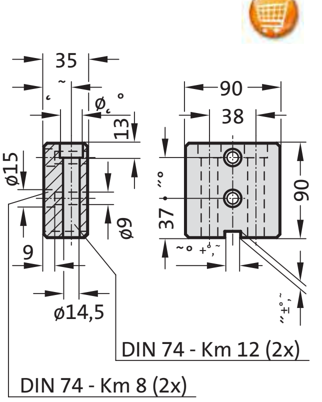




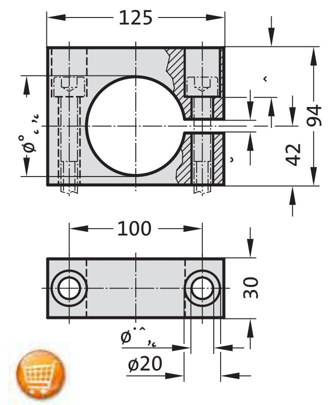
2480.010.01500.130
2480.010.01500.205*







2480.044.03.01500



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended).

Gas spring HEAVY DUTY

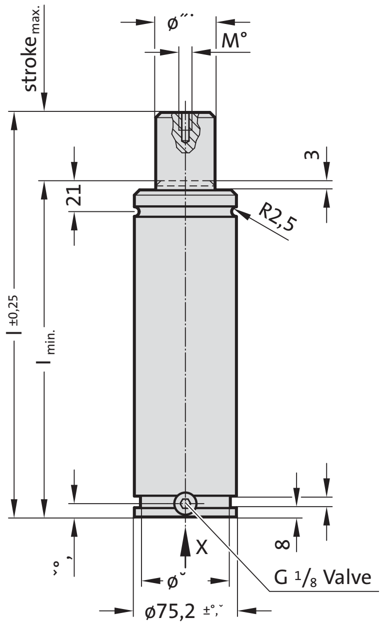
Note:

Initial spring force at 150 bar = 2400 daN

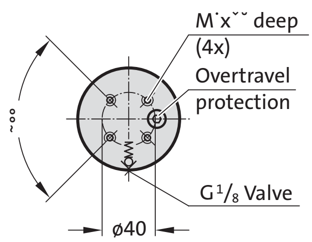
Order No for spare parts kit: 2488.13.02400

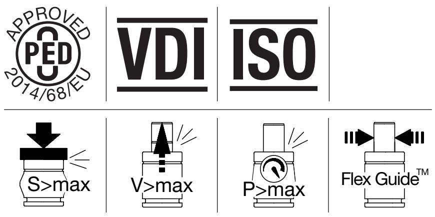
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.02400.



View X

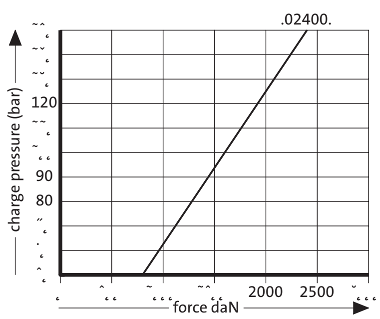




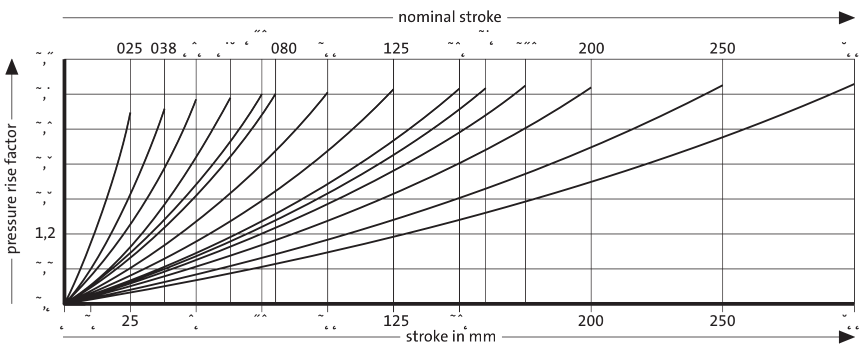
2488.13.02400.
Gas spring HEAVY DUTY

Order No	$Stroke_{max.}$	$l_{min.}$	l
2488.13.02400.025	25	135	160
2488.13.02400.038	38	148	186
2488.13.02400.050	50	160	210
2488.13.02400.063	63	173	236
2488.13.02400.075	75	185	260
2488.13.02400.080	80	190	270
2488.13.02400.100	100	210	310
2488.13.02400.125	125	235	360
2488.13.02400.150	150	260	410
2488.13.02400.160	160	270	430
2488.13.02400.175	175	285	460
2488.13.02400.200	200	310	510
2488.13.02400.250	250	360	610
2488.13.02400.300	300	410	710

Initial spring force versus charge pressure



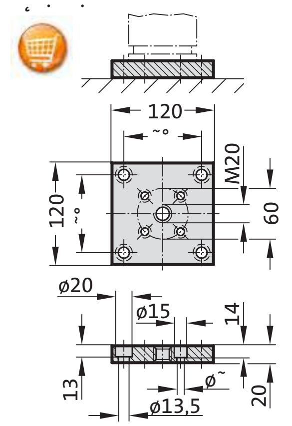
Spring force Diagram displacement versus stroke rise

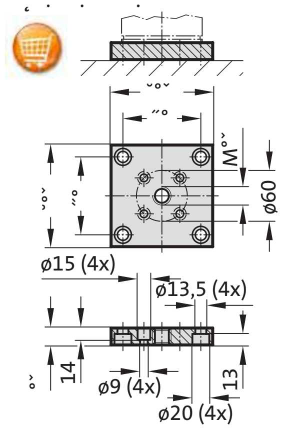


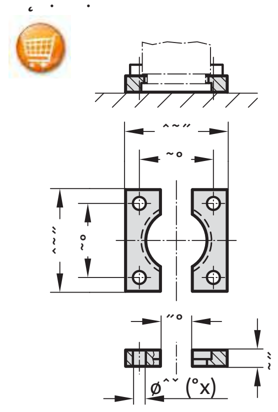
Pressure rise factor accounts for displacement but not external influences!

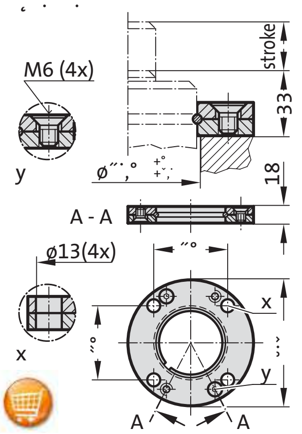
FIBRO

Gas Spring HEAVY DUTY
Mounting variations

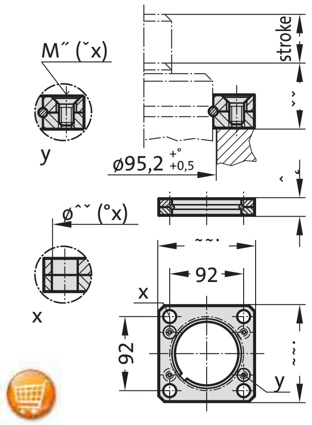




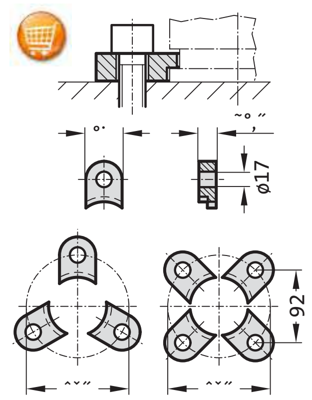


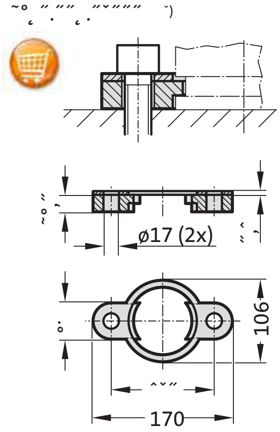


2480.057.03000

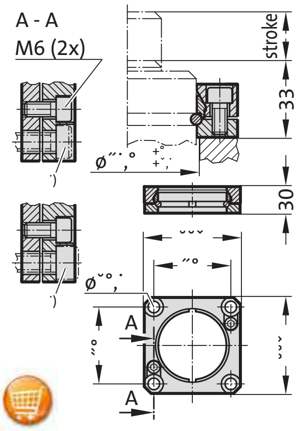


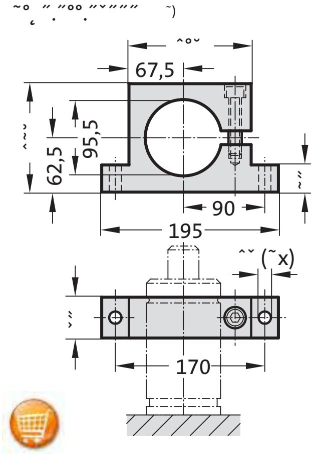
2480.007.03000



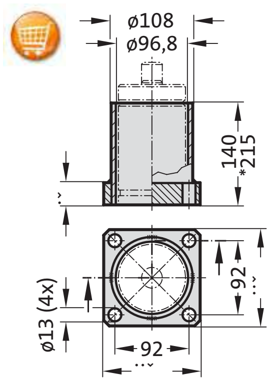


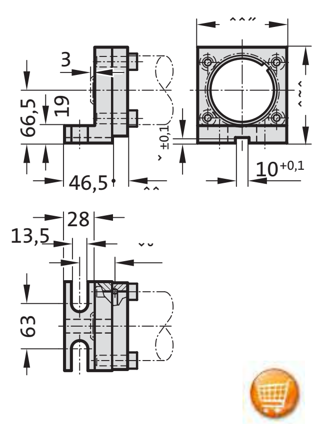
2480.064.03000 3)



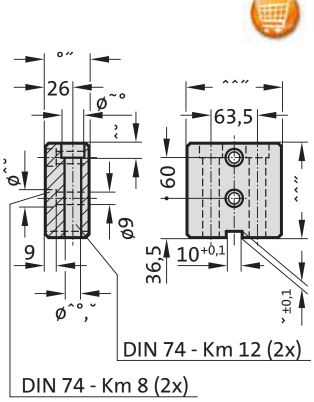


2480.010.03000.140 3)
2480.010.03000.215* 3)

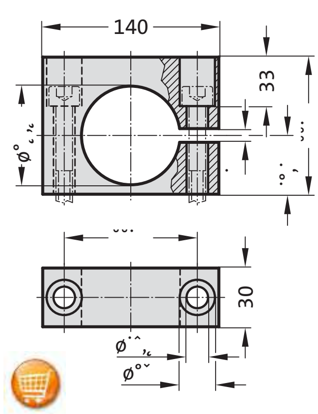




2480.047.03000 3)



2480.044.03.03000 3)



Note:

2) Attention: The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended).

subject to alterations

Gas spring HEAVY DUTY

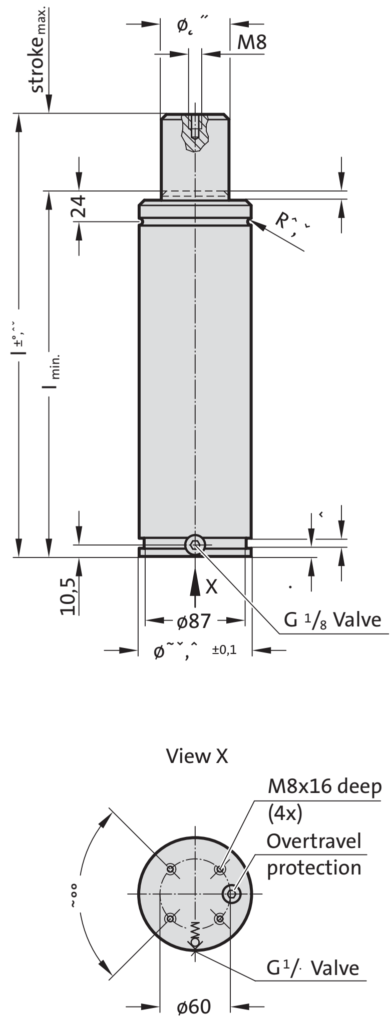
Note:

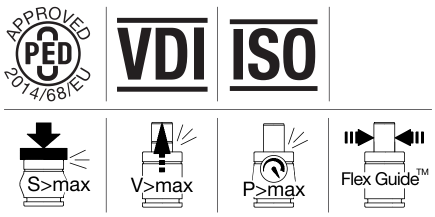
Initial spring force at 150 bar = 4200 daN

Order No for spare parts kit: 2488.13.04200

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.04200.

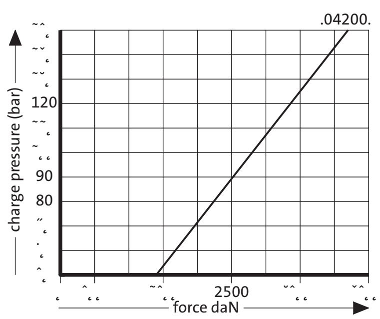




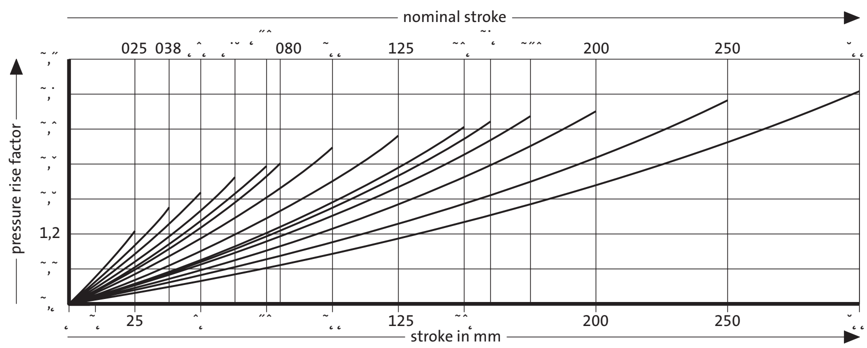
2488.13.04200.
Gas spring HEAVY DUTY

Order No	$Stroke_{max.}$	$l_{min.}$	l
2488.13.04200.025	25	145	170
2488.13.04200.038	38	158	196
2488.13.04200.050	50	170	220
2488.13.04200.063	63	183	246
2488.13.04200.075	75	195	270
2488.13.04200.080	80	200	280
2488.13.04200.100	100	220	320
2488.13.04200.125	125	245	370
2488.13.04200.150	150	270	420
2488.13.04200.160	160	280	440
2488.13.04200.175	175	295	470
2488.13.04200.200	200	320	520
2488.13.04200.250	250	370	620
2488.13.04200.300	300	420	720

Initial spring force
versus charge pressure

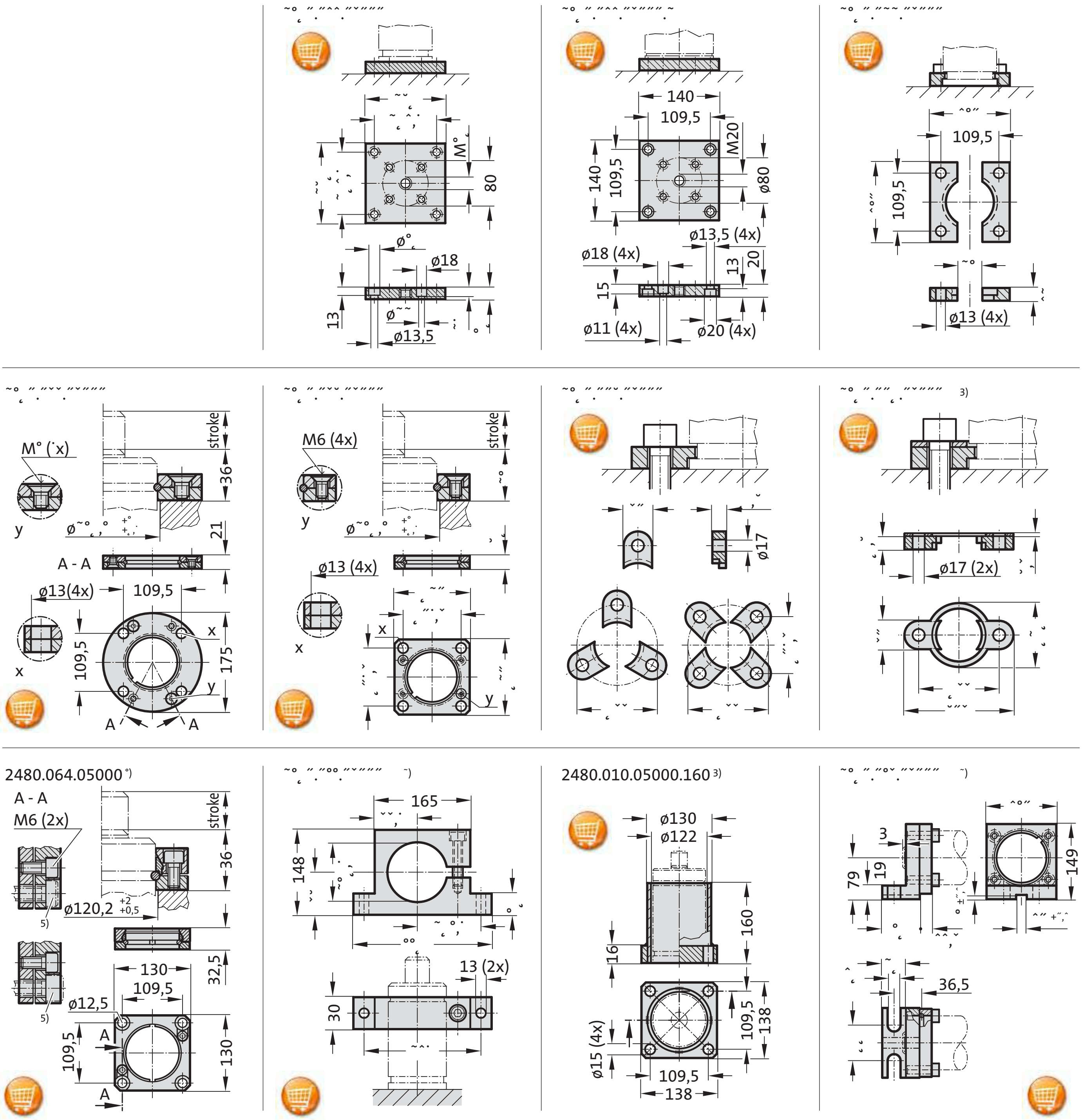


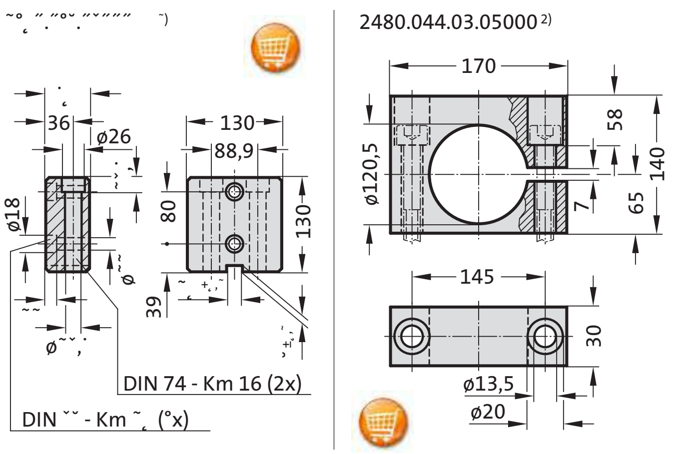
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas Spring HEAVY DUTY
Mounting variations





Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended).

Gas spring HEAVY DUTY

FIBRO

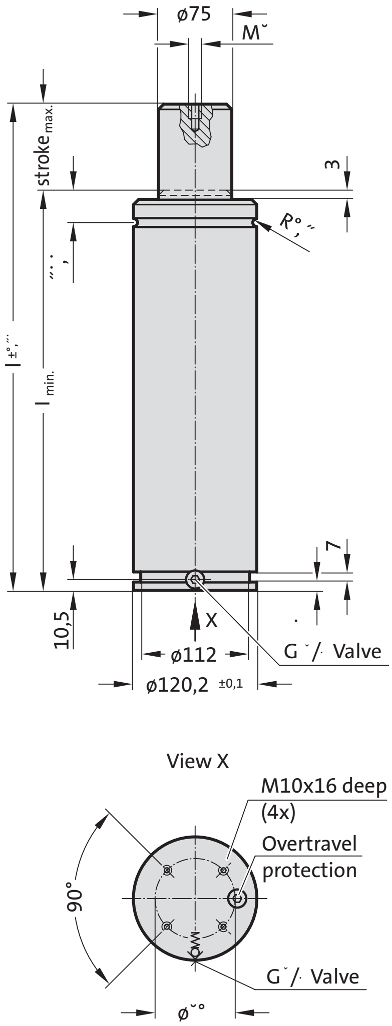
Note:

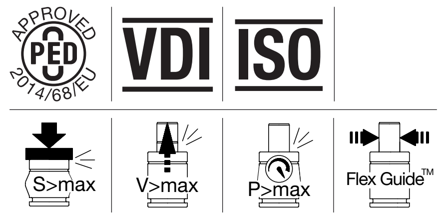
Initial spring force at 150 bar = 6600 daN

Order No for spare parts kit: 2488.13.06600

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.06600.

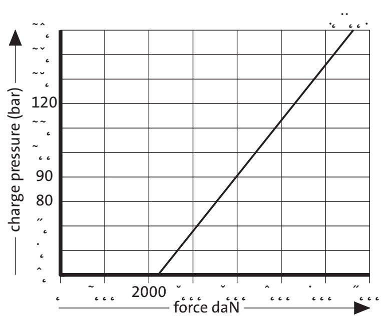




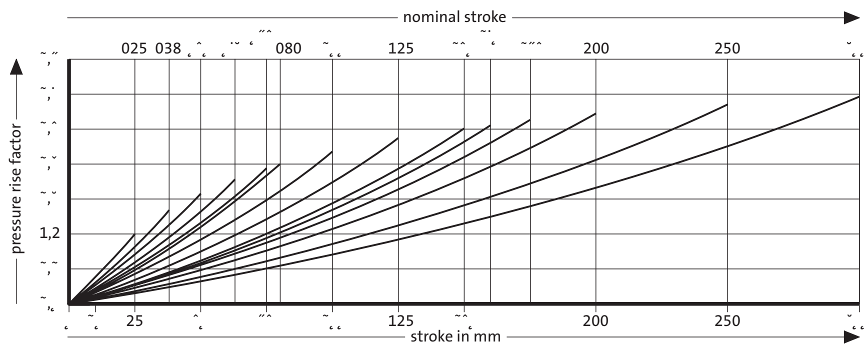
2488.13.06600.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$	l$_{min.}$	l
2488.13.06600.025	25	165	190
2488.13.06600.038	38	178	216
2488.13.06600.050	50	190	240
2488.13.06600.063	63	203	266
2488.13.06600.075	75	215	290
2488.13.06600.080	80	220	300
2488.13.06600.100	100	240	340
2488.13.06600.125	125	265	390
2488.13.06600.150	150	290	440
2488.13.06600.160	160	300	460
2488.13.06600.175	175	315	490
2488.13.06600.200	200	340	540
2488.13.06600.250	250	390	640
2488.13.06600.300	300	440	740

Initial spring force versus charge pressure

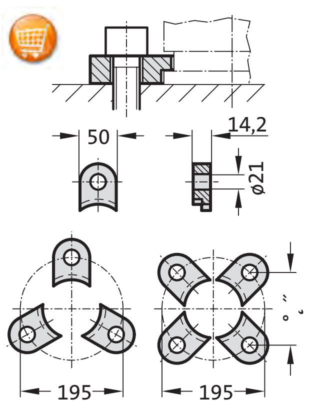


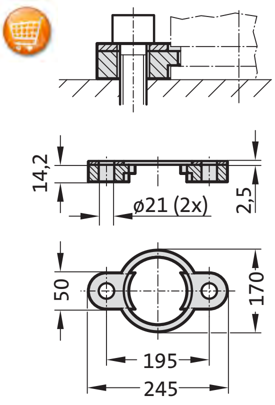
Spring force Diagram displacement versus stroke rise

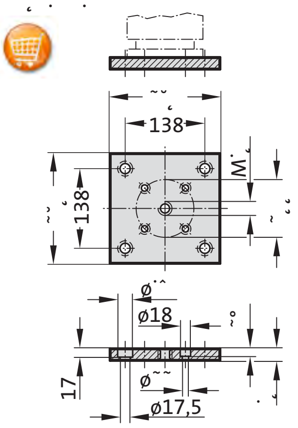


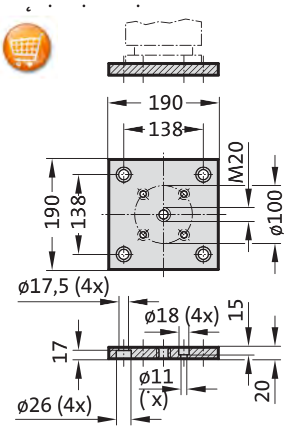
Pressure rise factor accounts for displacement but not external influences!

Gas spring HEAVY DUTY
Mounting variations

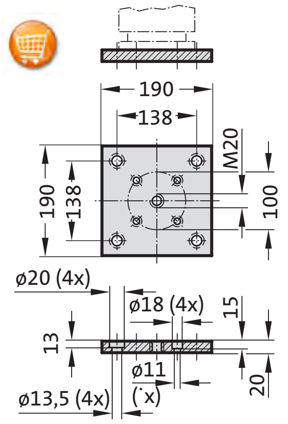




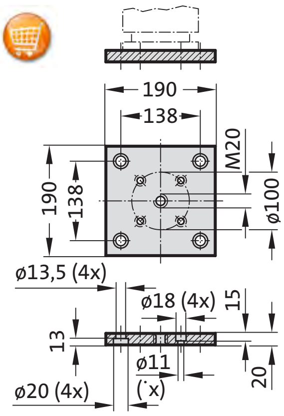


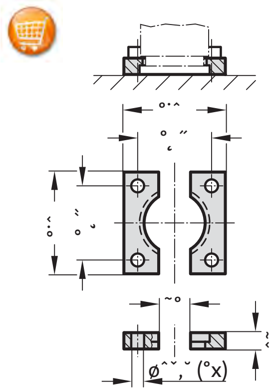


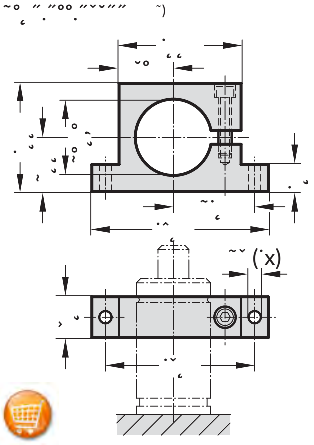
2480.011.03.07500



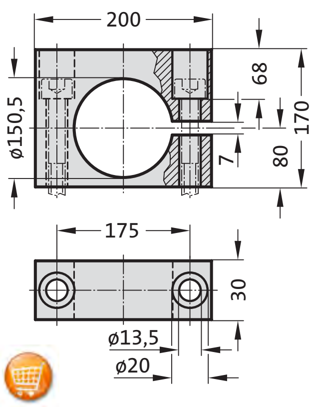
2480.011.03.07500.2

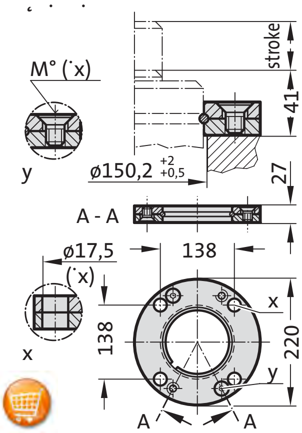


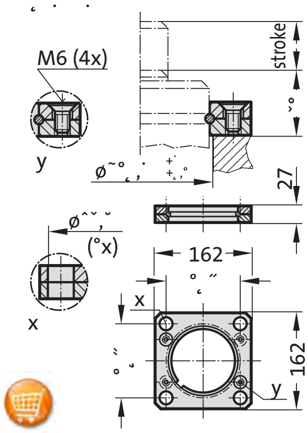




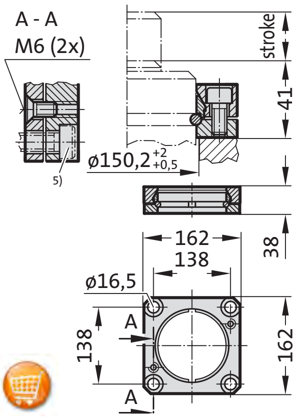
2480.044.03.07500 2)







2480.064.07500



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexa-gonal socket (compact head recommended).

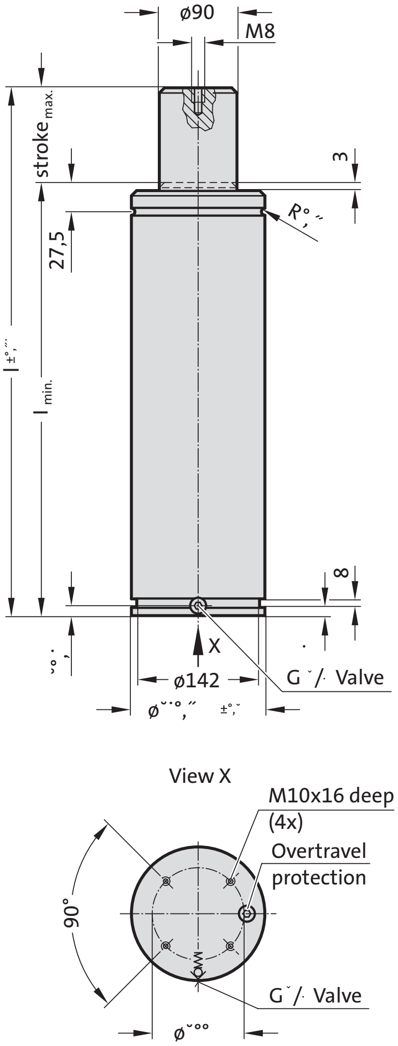
Gas spring HEAVY DUTY

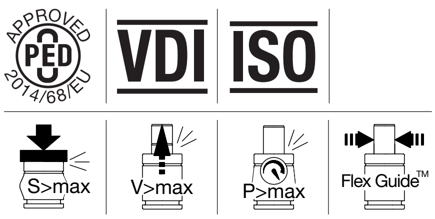
Note:
Initial spring force at 150 bar = 9500 daN

Order No for spare parts kit: 2488.13.09500

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.09500.

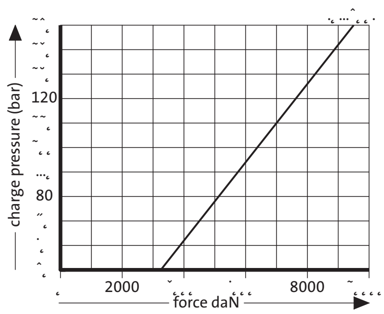




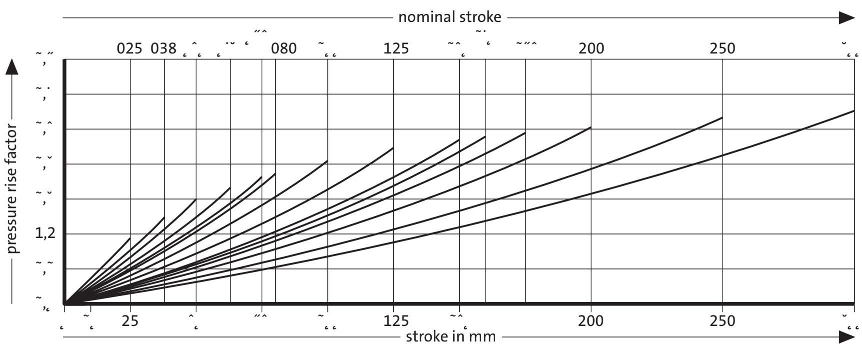
2488.13.09500.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$	l$_{min.}$	l
2488.13.09500.025	25	180	205
2488.13.09500.038	38	193	231
2488.13.09500.050	50	205	255
2488.13.09500.063	63	218	281
2488.13.09500.075	75	230	305
2488.13.09500.080	80	235	315
2488.13.09500.100	100	255	355
2488.13.09500.125	125	280	405
2488.13.09500.150	150	305	455
2488.13.09500.160	160	315	475
2488.13.09500.175	175	330	505
2488.13.09500.200	200	355	555
2488.13.09500.250	250	405	655
2488.13.09500.300	300	455	755

Initial spring force versus charge pressure

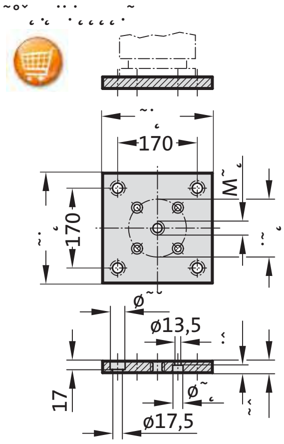


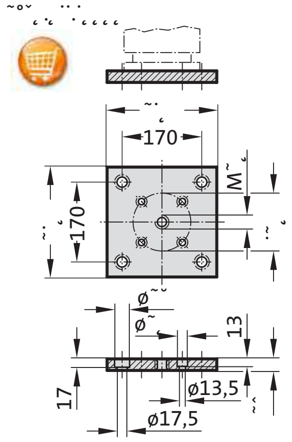
Spring force Diagram displacement versus stroke rise

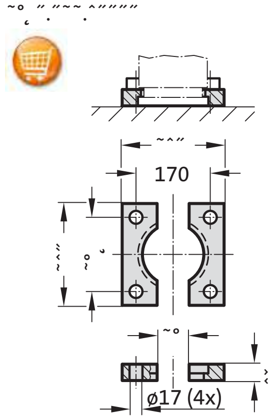


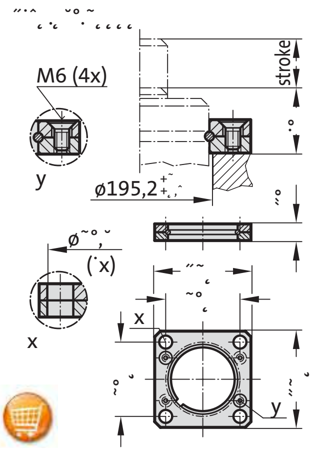
Pressure rise factor accounts for displacement but not external influences!

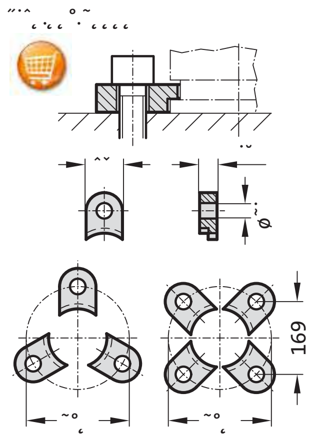
Gas spring HEAVY DUTY
Mounting variations









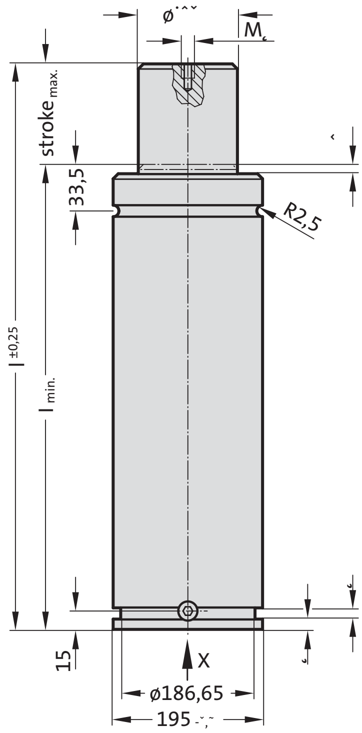


Gas spring HEAVY DUTY

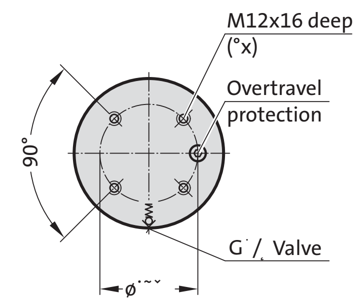
Note:
Initial spring force at 150 bar = 20000 daN

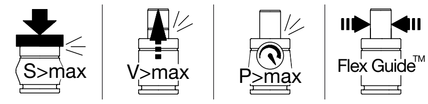
Order No for spare parts kit: 2488.13.20000

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s



View X

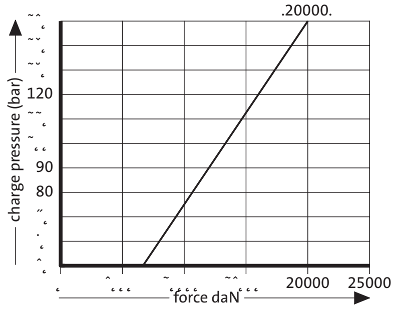




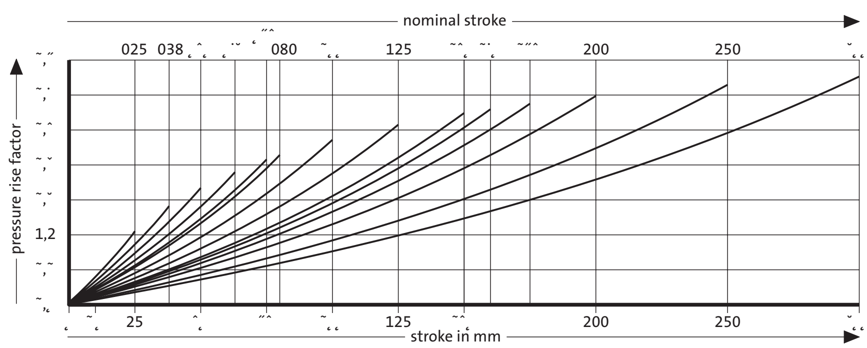
2488.13.20000.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$	l$_{min.}$	l
2488.13.20000.025	25	185	210
2488.13.20000.038	38	198	236
2488.13.20000.050	50	210	260
2488.13.20000.063	63	223	286
2488.13.20000.075	75	235	310
2488.13.20000.080	80	240	320
2488.13.20000.100	100	260	360
2488.13.20000.125	125	285	410
2488.13.20000.150	150	310	460
2488.13.20000.160	160	320	480
2488.13.20000.175	175	335	510
2488.13.20000.200	200	360	560
2488.13.20000.250	250	410	660
2488.13.20000.300	300	460	760

Initial spring force
versus charge pressure



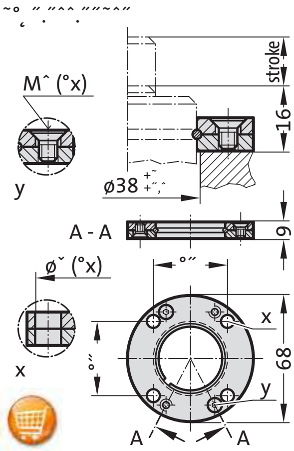
Spring force Diagram displacement versus stroke rise

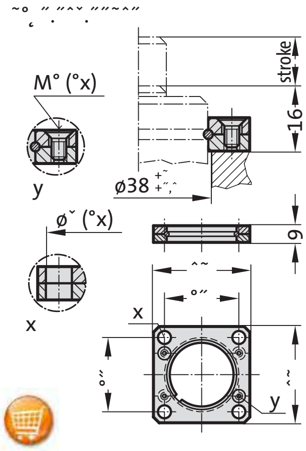


Pressure rise factor accounts for displacement but not external influences!

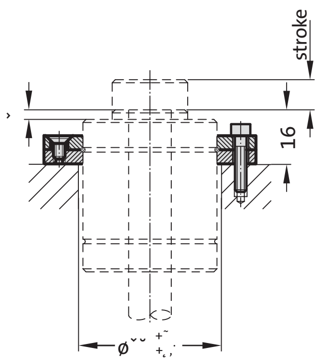
Gas springs with through bore passage

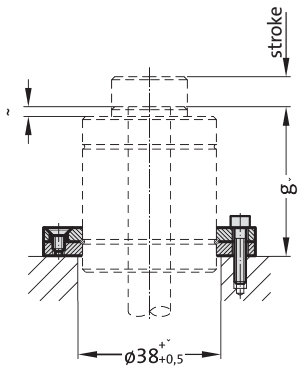
Gas Spring with through bore passage
Mounting variations

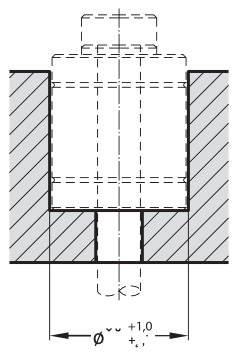




Mounting examples:







Gas spring with through bore passage

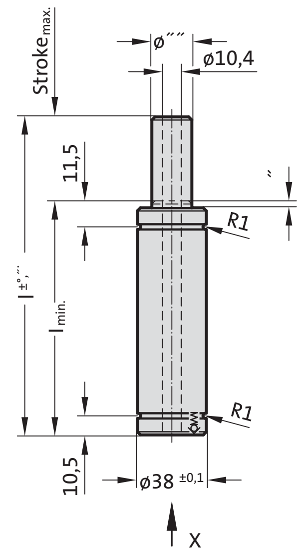
Note:

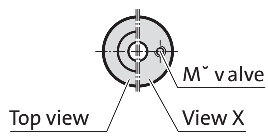
Initial spring force at 150 bar = 270 daN

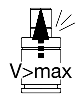
Order No for spare parts kit: 2496.12.00270

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 40 (at 20°C)
Max. piston speed: 0.5 m/s

2496.12.00270.





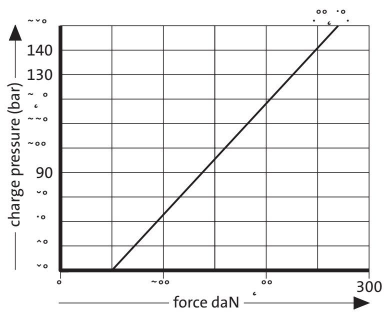


2496.12.00270.
Gas spring with through bore passage

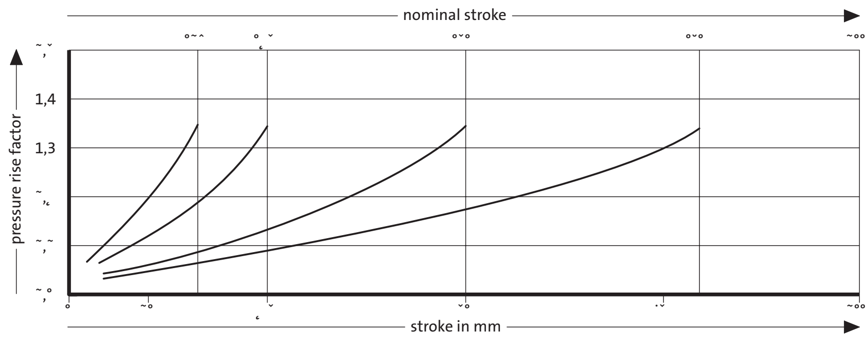
Order No	$Stroke_{max.}$	$l_{min.}$	l	g_2*
2496.12.00270.016	16	92	108	86
2496.12.00270.025	25	101	126	95
2496.12.00270.050	50	126	176	120
2496.12.00270.080	80	156	236	150

*see mounting example

Initial spring force
versus charge pressure

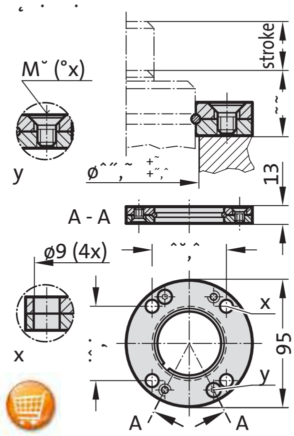


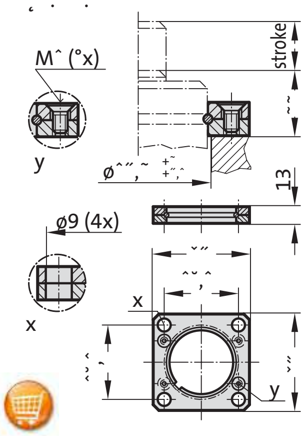
Spring force Diagram displacement versus stroke rise



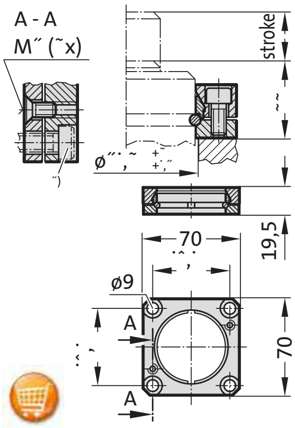
Pressure rise factor accounts for displacement but not external influences!

Gas spring with through bore passage
Mounting variations





2480.064.00750 4)

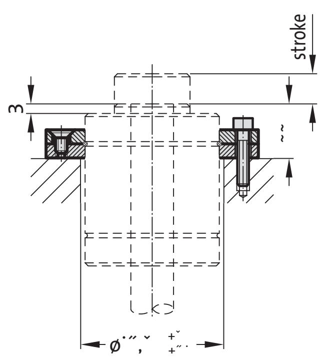


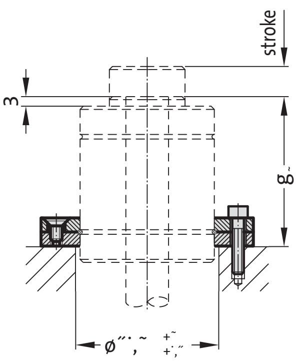
Note:

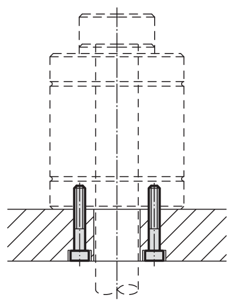
4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

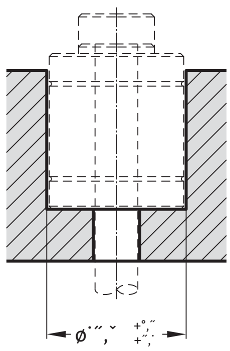
Mounting examples:







see Note!



subject to alterations

Gas spring with through bore passage

Note:

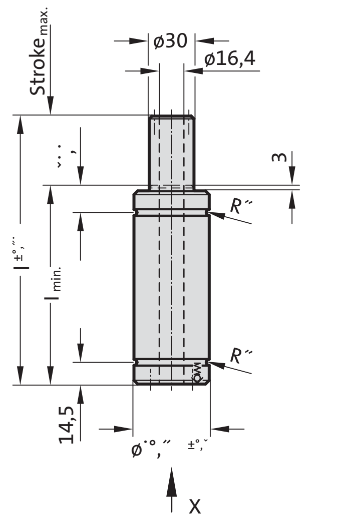
Initial spring force at 150 bar = 490 daN

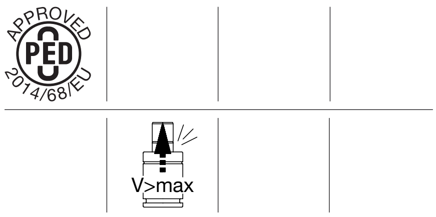
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

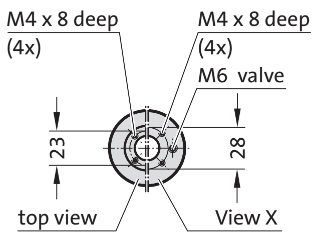
Order No for spare parts kit: 2496.12.00490

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 0.5 m/s

2496.12.00490.





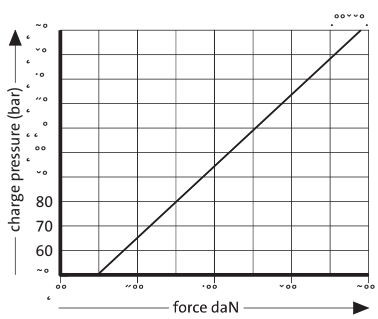


2496.12.00490.
Gas spring with through bore passage

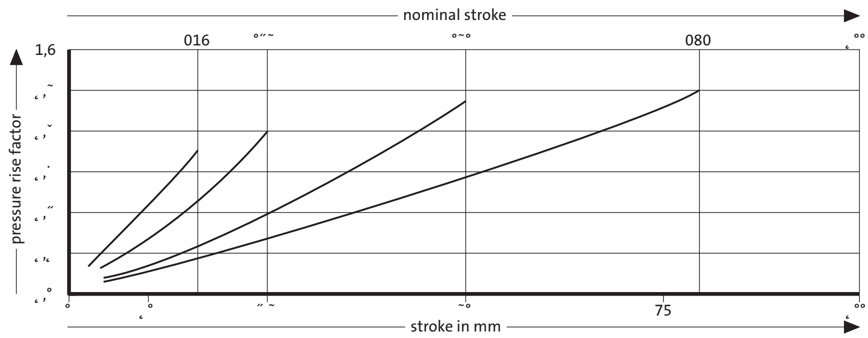
Order No	Stroke$_{max.}$	$l_{min.}$	l	g_2*
2496.12.00490.016	16	96	112	88
2496.12.00490.025	25	105	130	97
2496.12.00490.050	50	130	180	122
2496.12.00490.080	80	160	240	152

*see mounting example

Initial spring force versus charge pressure



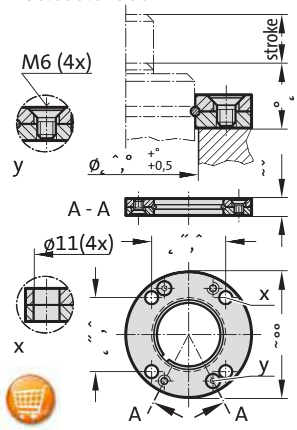
Spring force Diagram displacement versus stroke rise



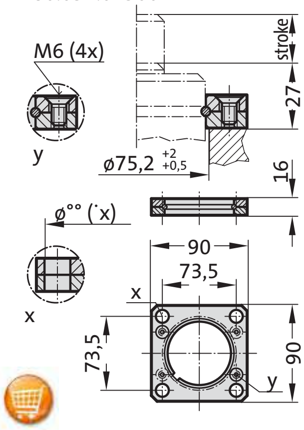
Pressure rise factor accounts for displacement but not external influences!

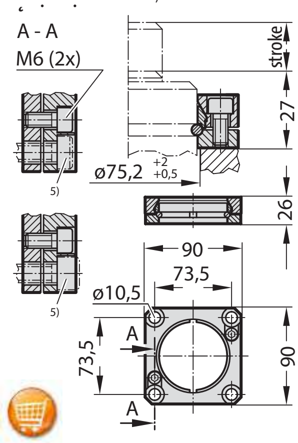
Gas Spring with through bore passage
Mounting variations

2480.055.01500



2480.057.01500



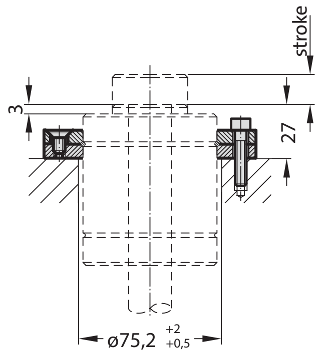


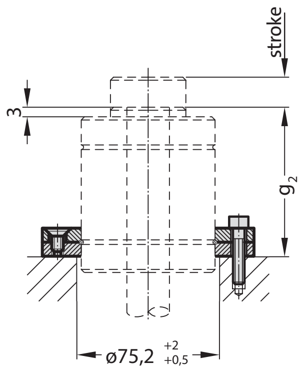
Notes:

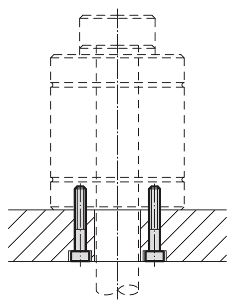
4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended).

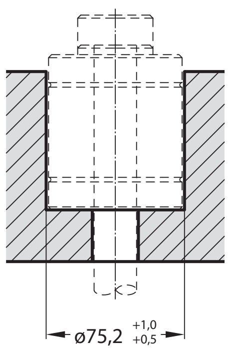
Mounting examples:







see Note!



Gas spring with through bore passage

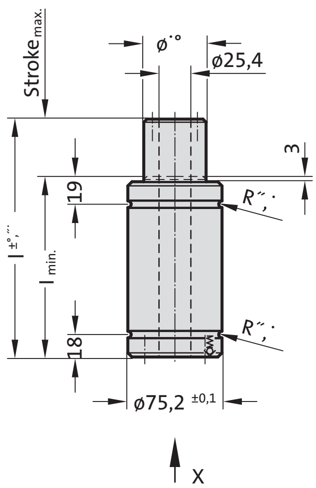
Note:
Initial spring force at 150 bar = 1060 daN

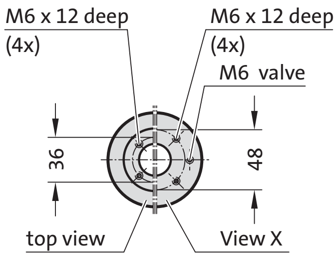
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

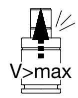
Order No for spare parts kit: 2496.12.01060

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 0.5 m/s

2496.12.01060.





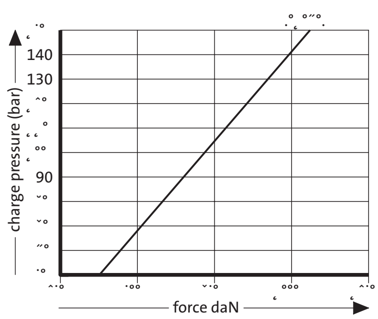


2496.12.01060.
Gas spring with through bore passage

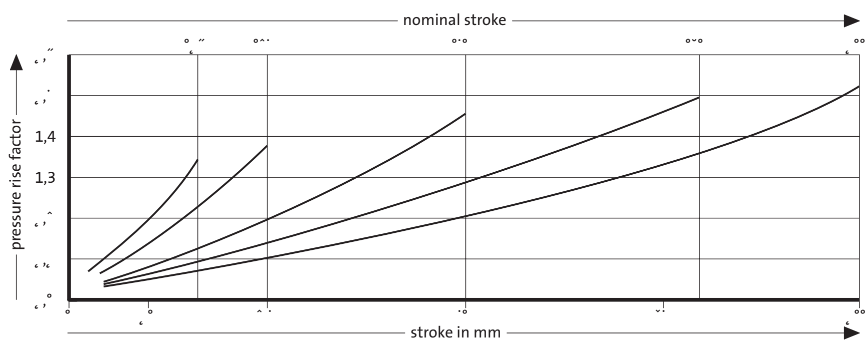
Order No	Stroke$_{max.}$	l$_{min.}$	l	g$_2$*
2496.12.01060.016	16	106	122	96
2496.12.01060.025	25	115	140	105
2496.12.01060.050	50	140	190	130
2496.12.01060.080	80	170	250	160
2496.12.01060.100	100	190	290	180

*see mounting example

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise



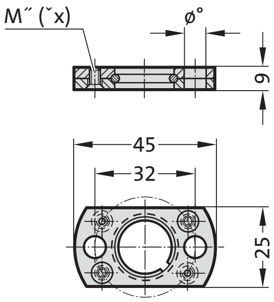
Pressure rise factor accounts for displacement but not external influences!

Gas springs with increased spring force POWER LINE

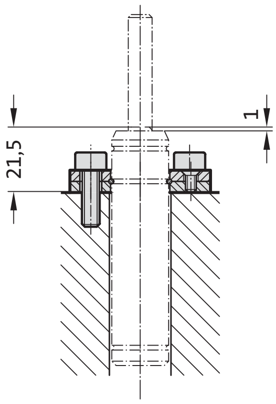
FIBRO

Gas Spring POWERLINE
Mounting variations

2480.051.03.00030



2480.051.03.00030



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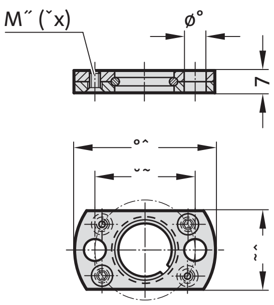
phasing out



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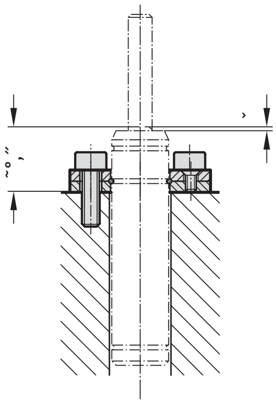
phasing out



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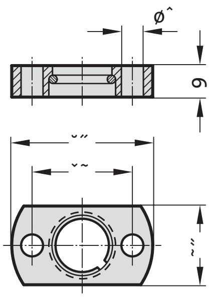
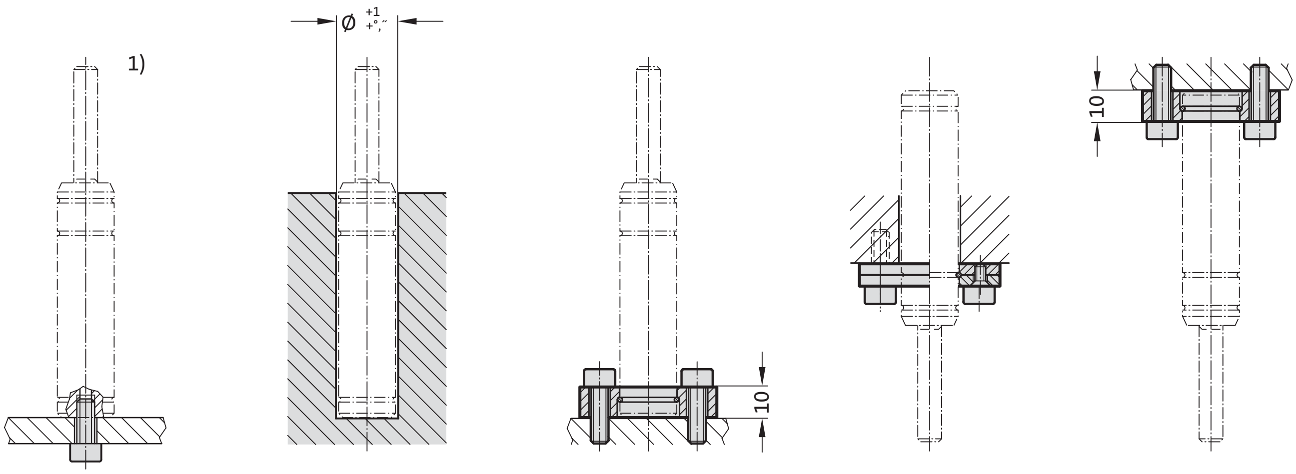


Mounting examples:



Gas spring POWERLINE

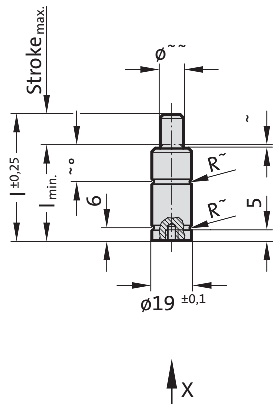
Note:
Initial spring force at 180 bar = 170 daN

Worn gas springs cannot be repaired, they have to be replaced completely.

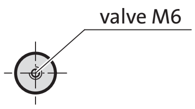
1) Fixing at bottom thread only recommanded for stroke length up to 50 mm.

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.00170.



View X



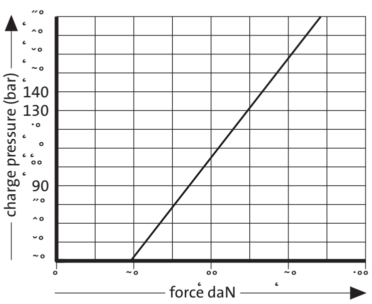
VDI ISO

S>max V>max P>max

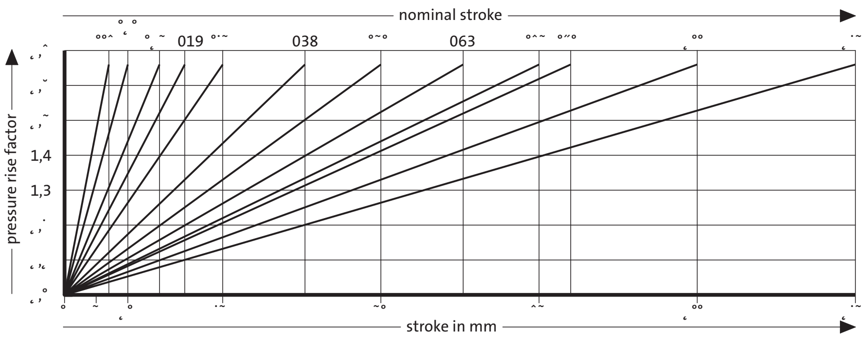
2487.12.00170.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.00170.007	7	37	44
2487.12.00170.010	10	40	50
2487.12.00170.015	15	45	60
2487.12.00170.019	19	49	68
2487.12.00170.025	25	55	80
2487.12.00170.038	38	68	106
2487.12.00170.050	50	80	130
2487.12.00170.063	63	93	156
2487.12.00170.075	75	110	185
2487.12.00170.080	80	115	195
2487.12.00170.100	100	135	235
2487.12.00170.125	125	160	285

Initial spring force versus charge pressure



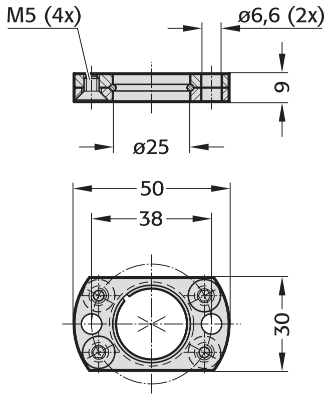
Spring force Diagram displacement versus stroke rise



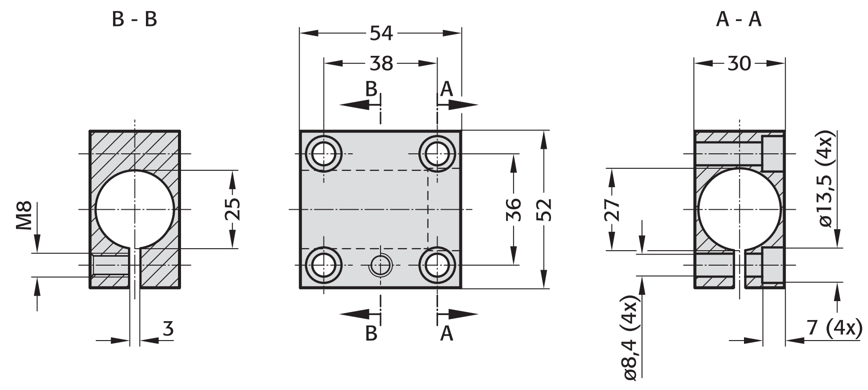
Pressure rise factor accounts for displacement but not external influences!

Gas spring POWERLINE
Mounting variations

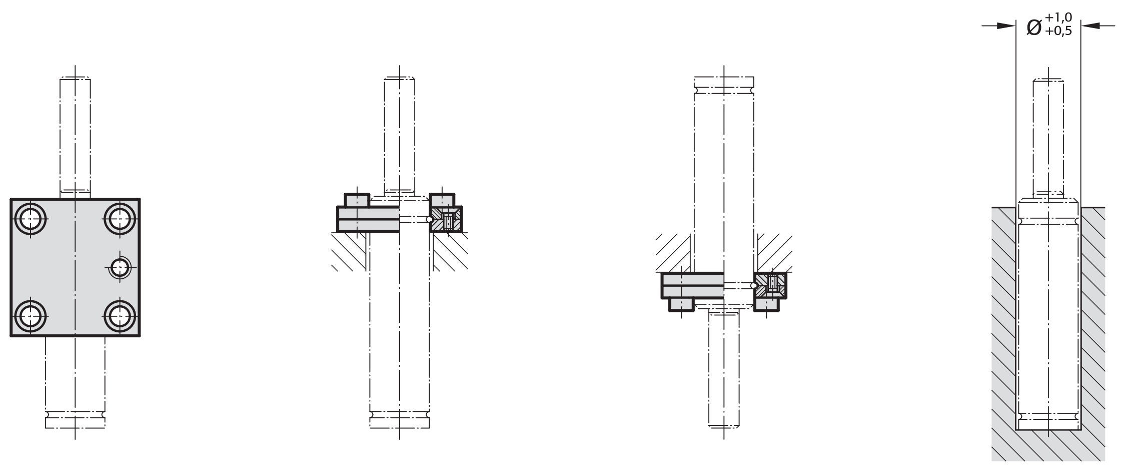
2480.051.00150



2480.053.00150



Mounting examples:



subject to alterations

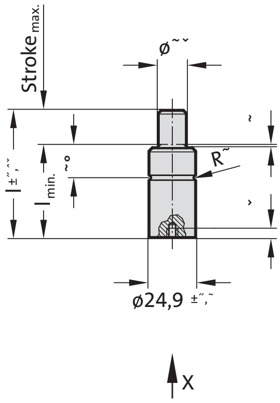
Note:

Initial spring force at 180 bar = 320 daN

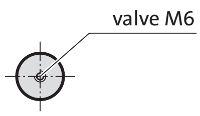
Worn gas springs cannot be repaired, they have to be replaced completely.

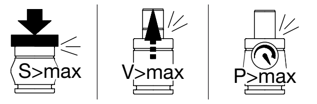
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.00320.



View X

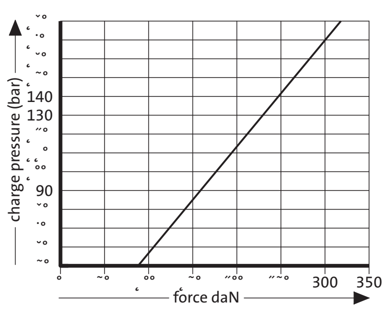




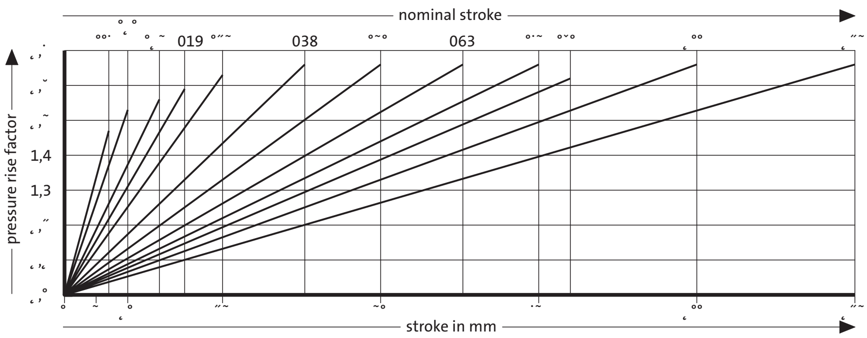
2487.12.00320.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.00320.007	7	37	44
2487.12.00320.010	10	40	50
2487.12.00320.015	15	45	60
2487.12.00320.019	19	49	68
2487.12.00320.025	25	55	80
2487.12.00320.038	38	68	106
2487.12.00320.050	50	80	130
2487.12.00320.063	63	93	156
2487.12.00320.075	75	110	185
2487.12.00320.080	80	115	195
2487.12.00320.100	100	135	235
2487.12.00320.125	125	160	285

Initial spring force versus charge pressure



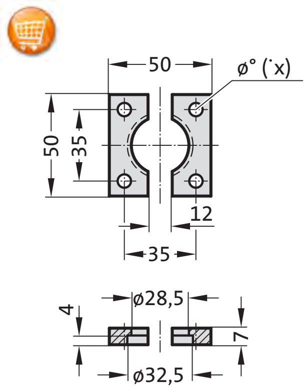
Spring force Diagram displacement versus stroke rise



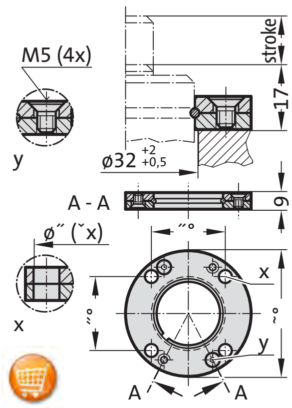
Pressure rise factor accounts for displacement but not external influences!

Gas Spring POWERLINE
Mounting variations

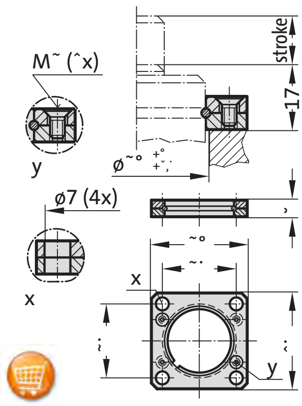
2480.022.00150



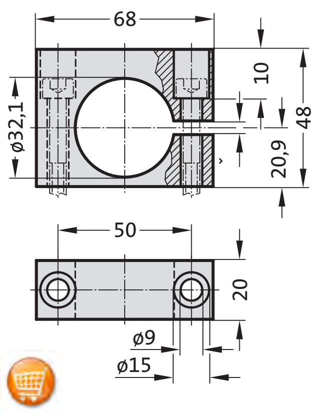
2480.055.00150



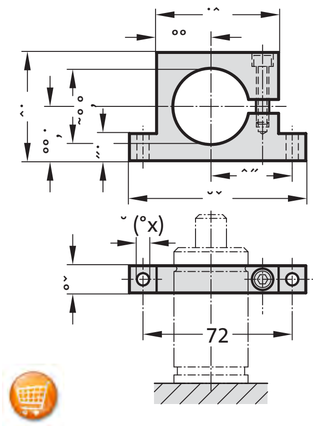
2480.057.00150



2480.044.03.00150 2)



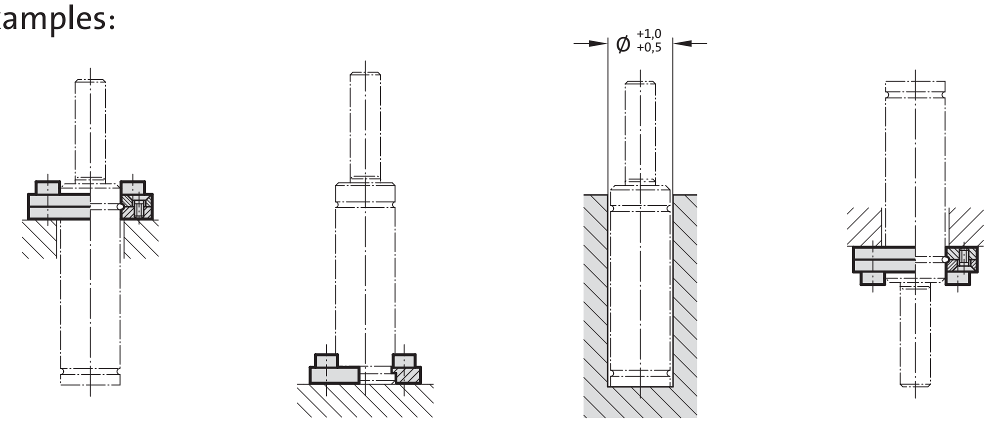
2480.044.00150 2)



Notes:

2) Attention:
The spring force must be absorbed by the stop surface.

Mounting examples:



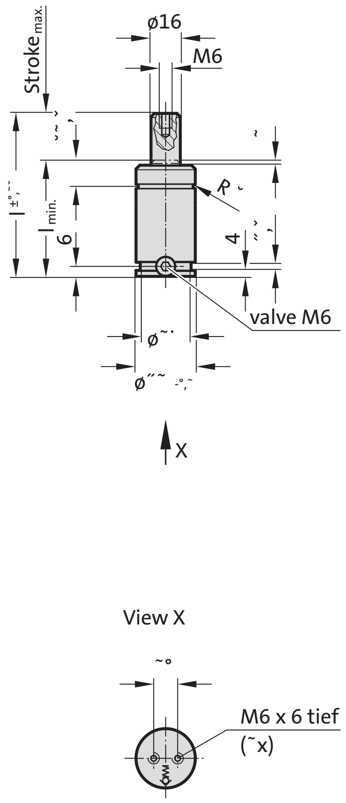
Note:

Initial spring force at 180 bar = 350 daN

Order No for spare parts kit: 2487.12.00350

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

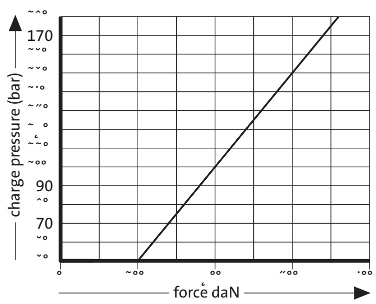
2487.12.00350.



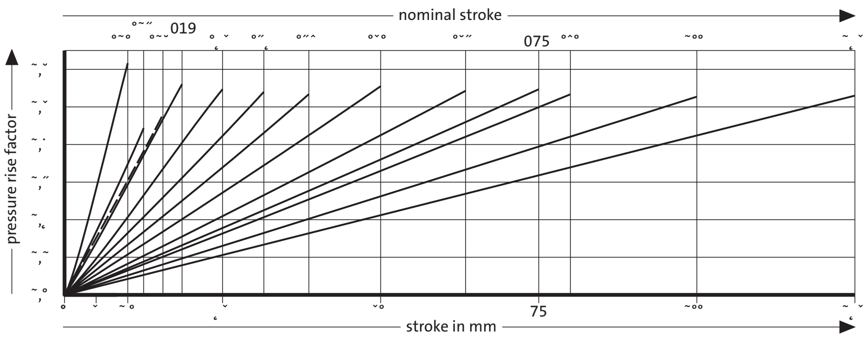
2487.12.00350.
Gas spring POWERLINE

Order No	$Stroke_{max.}$	$l_{min.}$	l
2487.12.00350.010	10	40	50
2487.12.00350.013	13	43	56
2487.12.00350.016	16	46	62
2487.12.00350.019	19	49	68
2487.12.00350.025	25	55	80
2487.12.00350.032	32	62	94
2487.12.00350.038	38	68	106
2487.12.00350.050	50	80	130
2487.12.00350.063	63	93	156
2487.12.00350.075	75	105	180
2487.12.00350.080	80	110	190
2487.12.00350.100	100	130	230
2487.12.00350.125	125	155	280

Initial spring force
versus charge pressure

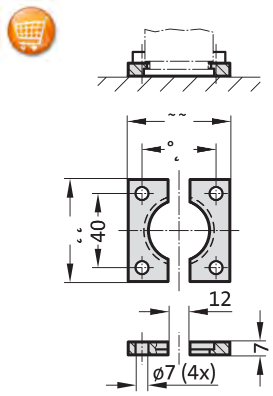


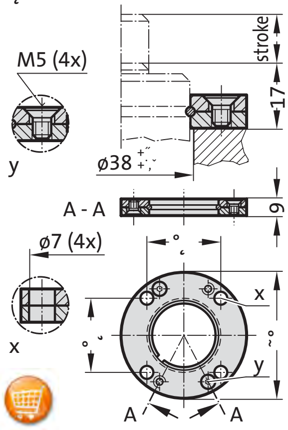
Spring force Diagram displacement versus stroke rise

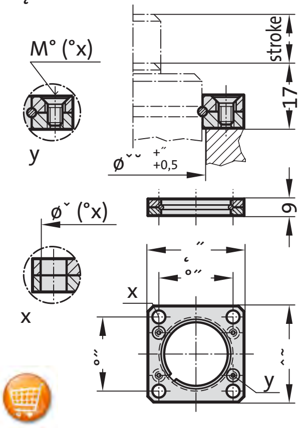


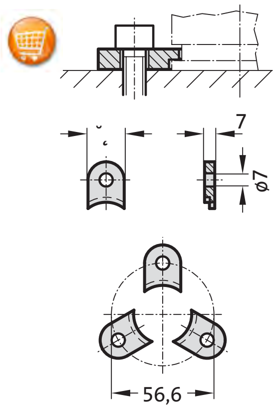
Pressure rise factor accounts for displacement but not external influences!

Gas Spring POWERLINE
Mounting variations

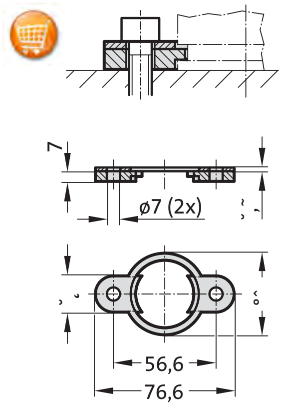




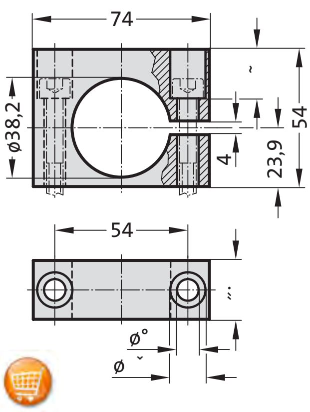


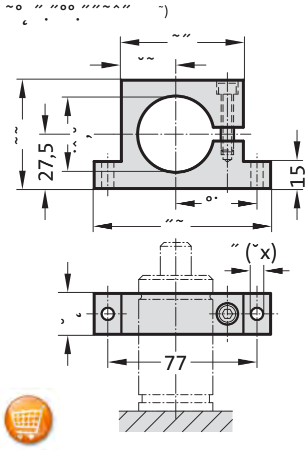


3)

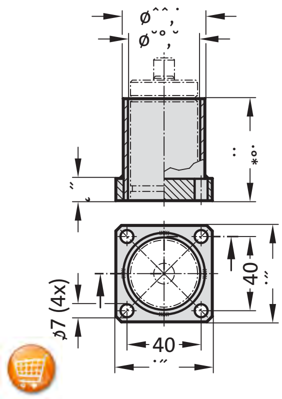


2480.044.03.00250 2)





2480.010.00250.055 2)
2480.010.00250.095* 2)



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

Gas spring POWERLINE

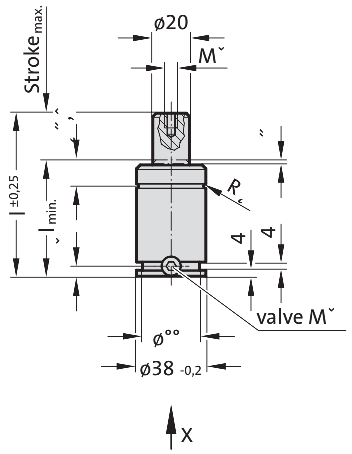
Note:

Initial spring force at 150 bar = 470 daN

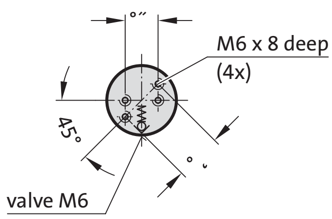
Order No for spare parts kit: 2487.12.00500

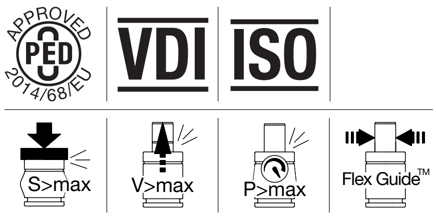
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.00500.



View X

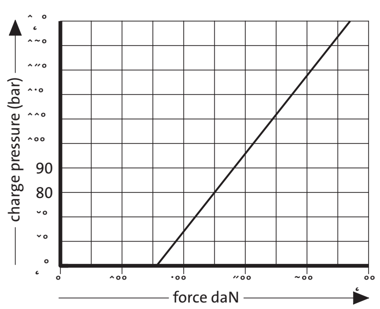




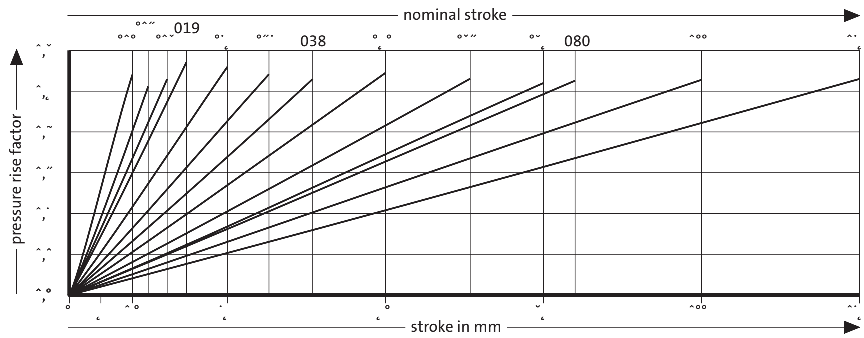
2487.12.00500.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.00500.010	10	40	50
2487.12.00500.013	13	43	56
2487.12.00500.016	16	46	62
2487.12.00500.019	19	49	68
2487.12.00500.025	25	55	80
2487.12.00500.032	32	62	94
2487.12.00500.038	38	68	106
2487.12.00500.050	50	80	130
2487.12.00500.063	63	93	156
2487.12.00500.075	75	105	180
2487.12.00500.080	80	110	190
2487.12.00500.100	100	130	230
2487.12.00500.125	125	155	280

Initial spring force
versus charge pressure

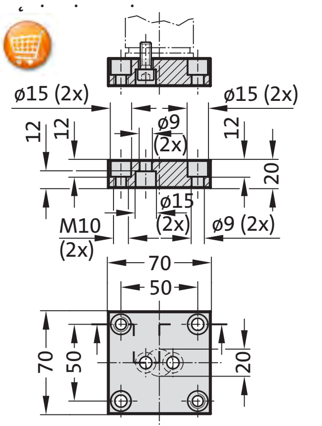


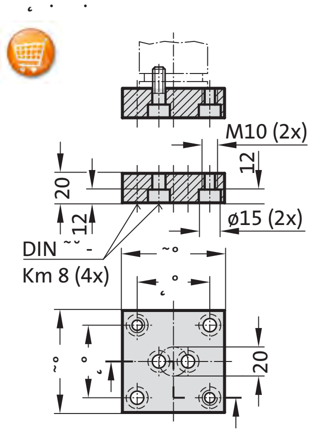
Spring force Diagram displacement versus stroke rise

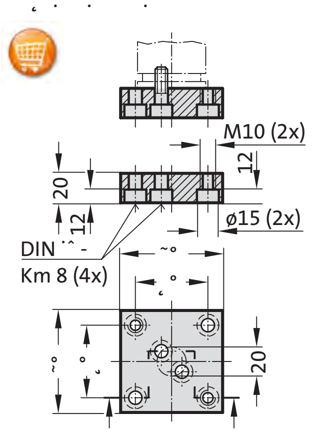


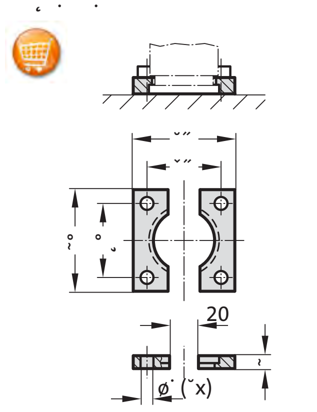
Pressure rise factor accounts for displacement but not external influences!

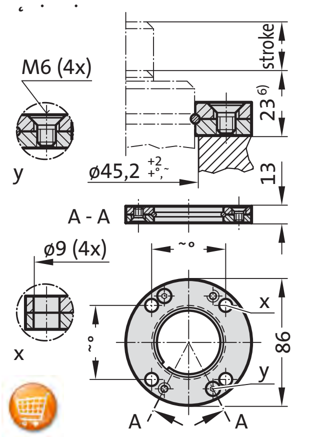
Gas spring POWERLINE
Mounting variations

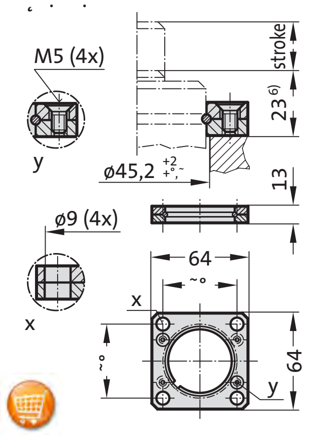


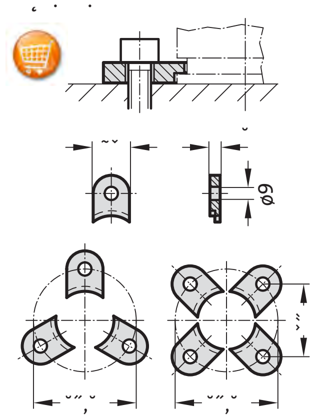


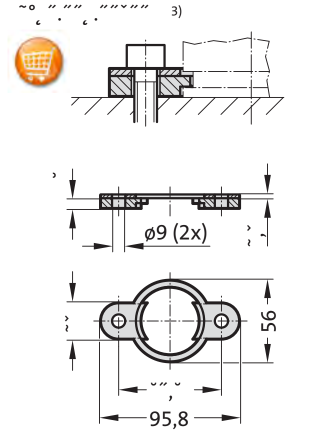




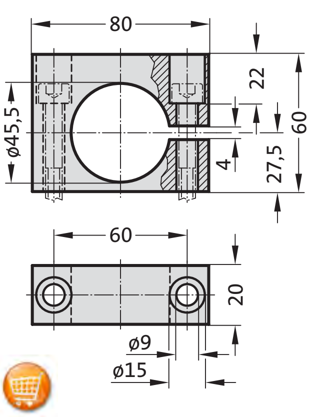


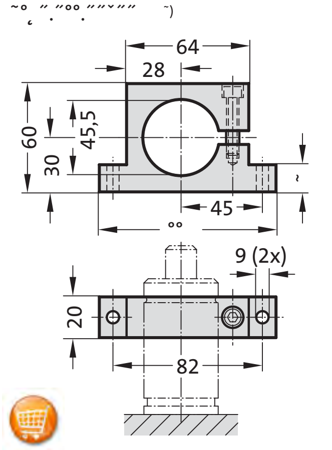




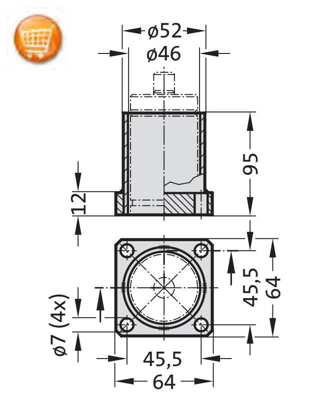


2480.044.03.00500 2)

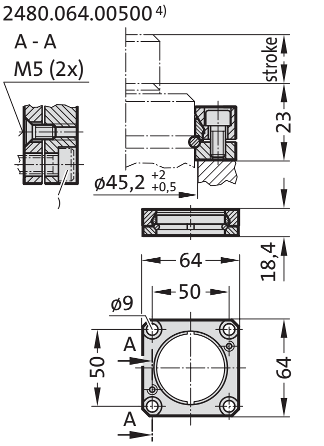




2480.010.00500.095 3)



2480.064.00500 4)



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

6) Installation height increased from 22 mm to 23 mm according to VDI 3003.

Gas spring POWERLINE

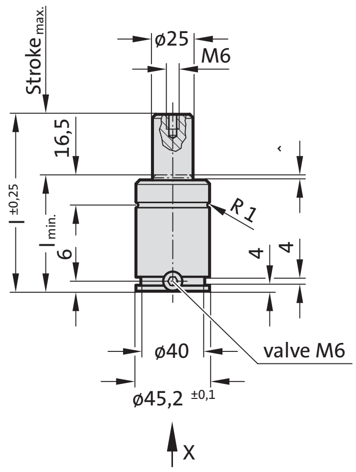
Note:

Initial spring force at 150 bar = 750 daN

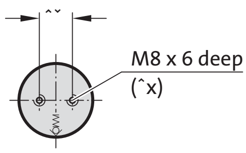
Order No for spare parts kit: 2487.12.00750

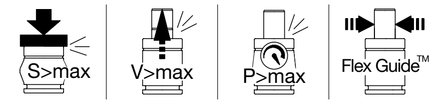
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.00750. .1



View X

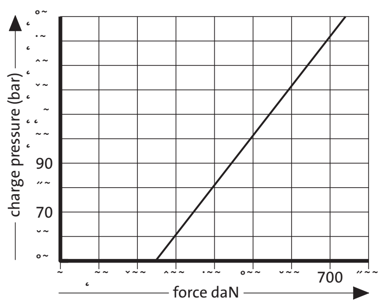




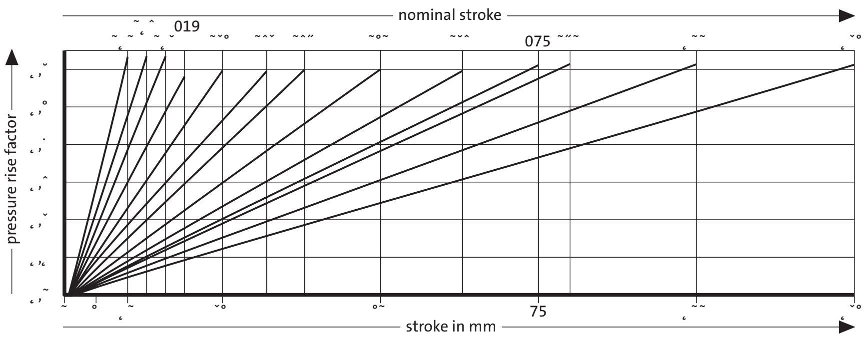
2487.12.00750. .1
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.00750.010.1	10	42	52
2487.12.00750.013.1	13	45	58
2487.12.00750.016.1	16	48	64
2487.12.00750.019.1	19	51	70
2487.12.00750.025.1	25	57	82
2487.12.00750.032.1	32	64	96
2487.12.00750.038.1	38	70	108
2487.12.00750.050.1	50	82	132
2487.12.00750.063.1	63	95	158
2487.12.00750.075.1	75	107	182
2487.12.00750.080.1	80	112	192
2487.12.00750.100.1	100	132	232
2487.12.00750.125.1	125	157	282

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise

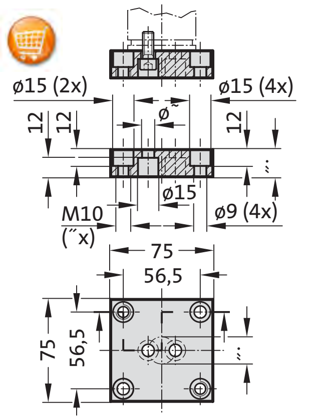


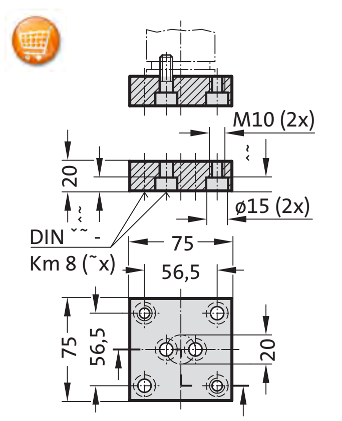
Pressure rise factor accounts for displacement but not external influences!

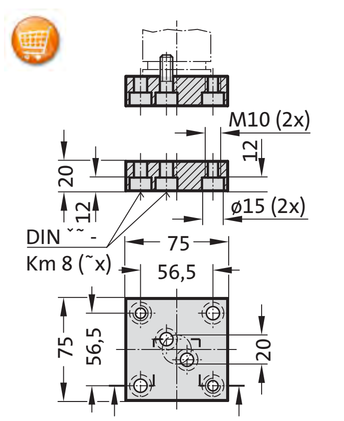
FIBRO

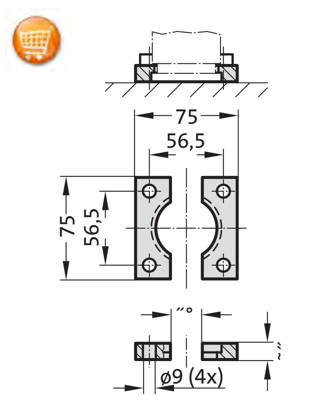
Gas Spring POWERLINE
Mounting variations

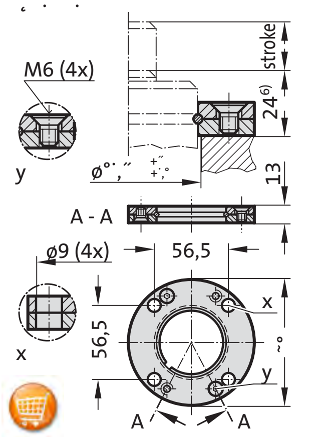
2480.011.00750.3

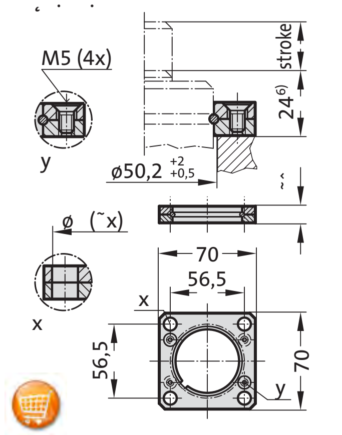


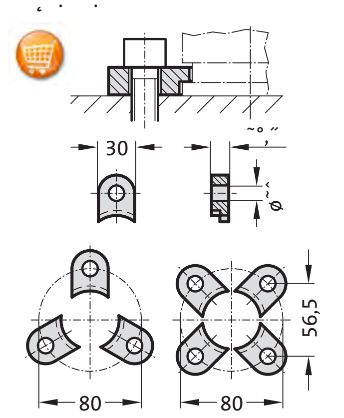












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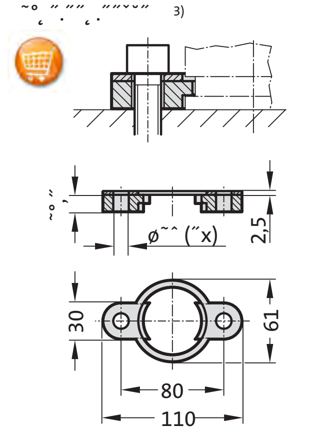
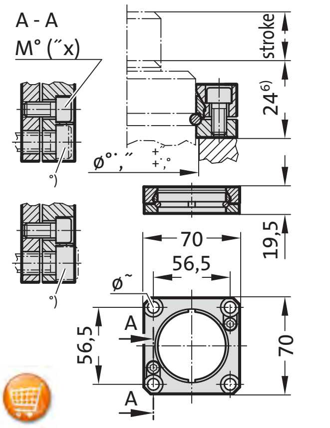
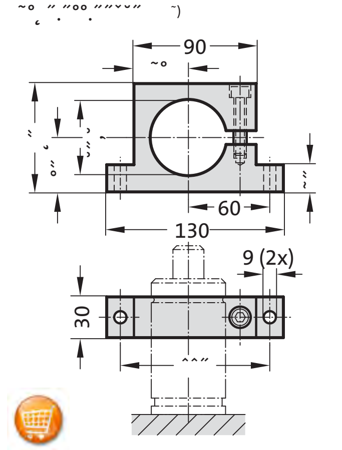
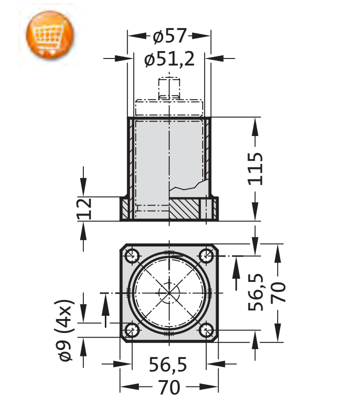


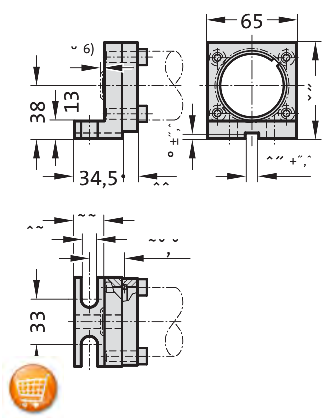
2480.064.00750

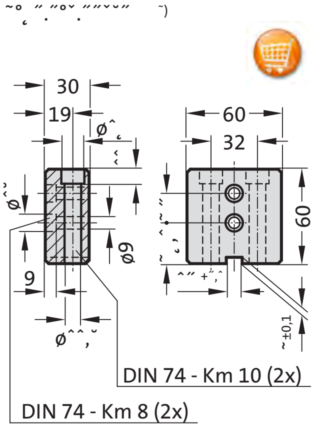




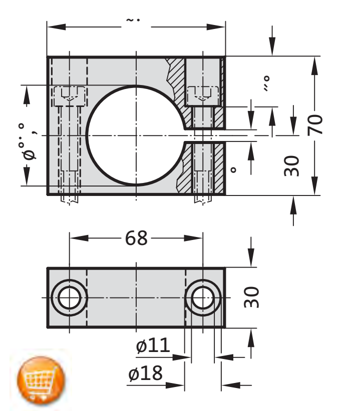
2480.010.00750.115 3)







2480.044.03.00750



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

6) Installation height increased from 22 mm to 24 mm, installation position from 3 mm to 5 mm according to VDI 3003.

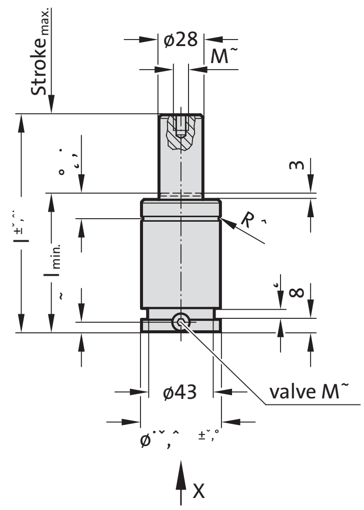
Gas spring POWERLINE

Note:
Initial spring force at 150 bar = 920 daN

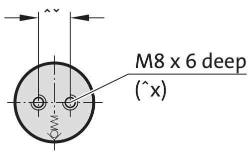
Order No for spare parts kit: 2487.12.01000

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.01000. .1



View X



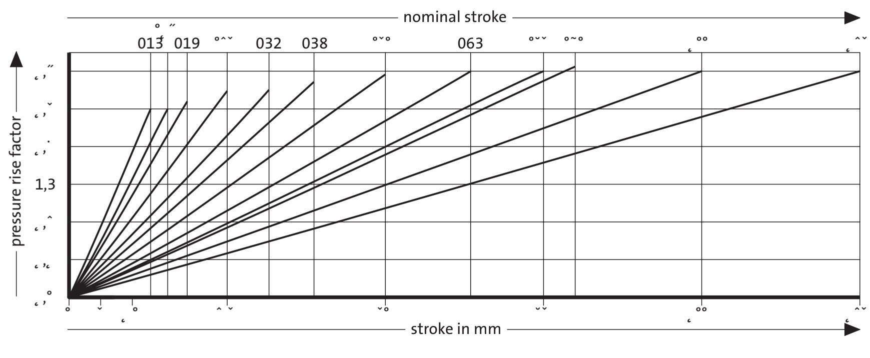
S>max
V>max
P>max
Flex Guide™

2487.12.01000. .1
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.01000.013.1	13	51	64
2487.12.01000.016.1	16	54	70
2487.12.01000.019.1	19	57	76
2487.12.01000.025.1	25	63	88
2487.12.01000.032.1	32	70	102
2487.12.01000.038.1	38	76	114
2487.12.01000.050.1	50	88	138
2487.12.01000.063.1	63	101	164
2487.12.01000.075.1	75	113	188
2487.12.01000.080.1	80	118	198
2487.12.01000.100.1	100	138	238
2487.12.01000.125.1	125	163	288

Initial spring force
versus charge pressure

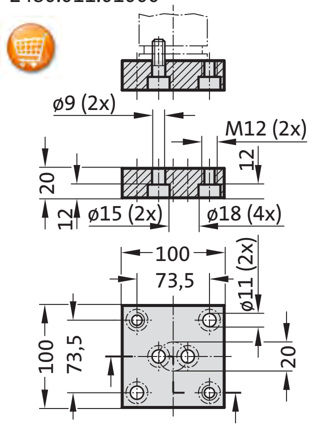
Spring force Diagram displacement versus stroke rise



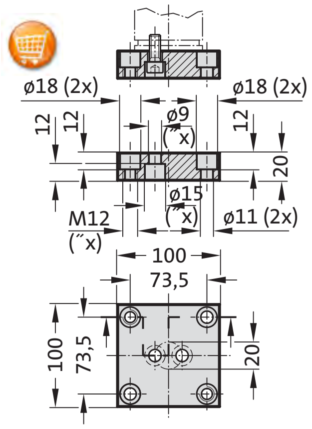
Pressure rise factor accounts for displacement but not external influences!

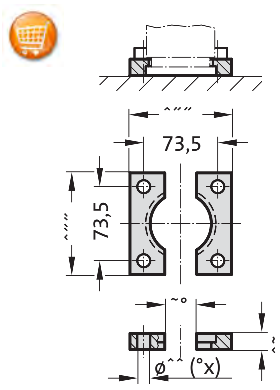
Gas spring POWERLINE
Mounting variations

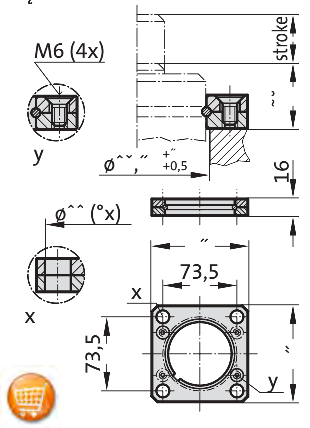
2480.011.01000



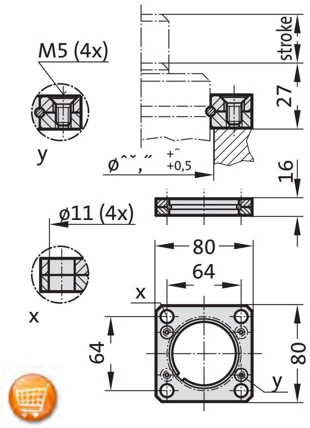
2480.011.01000.2



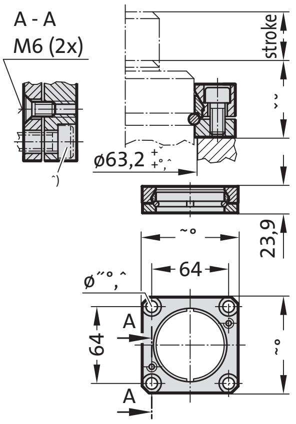




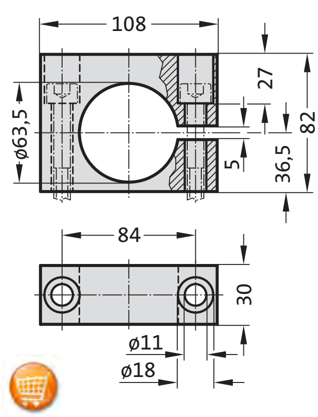
2480.057.03.01000



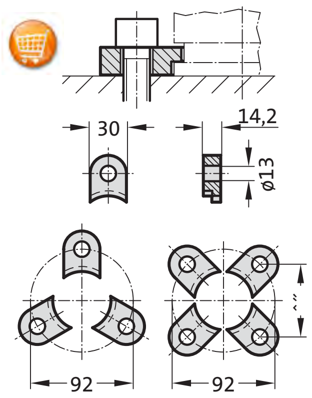
2480.064.01000



2480.044.03.01000



2480.007.01000



Note:

2) Attention: The spring force must be absorbed by the stop surface!

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

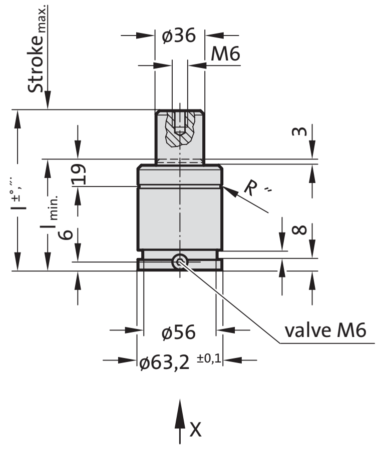
Gas spring POWERLINE

Note:
Initial spring force at 150 bar = 1500 daN

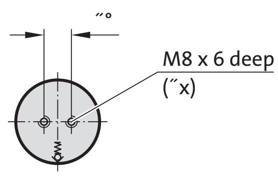
Order No for spare parts kit: 2487.12.01500

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 50 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.01500.



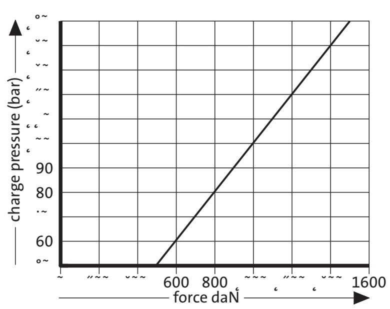
View X



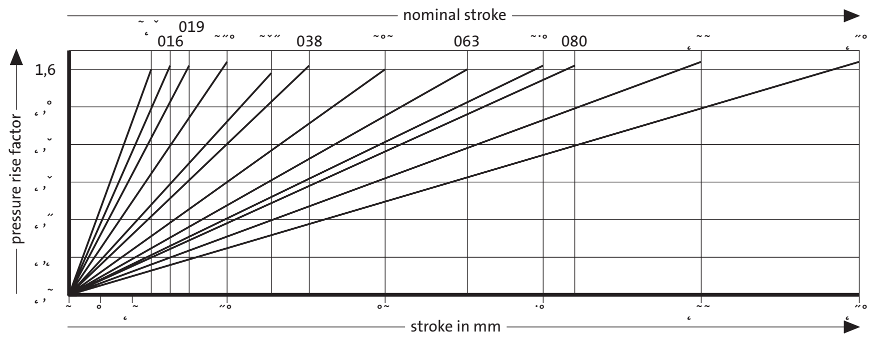
2487.12.01500.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.01500.013	13	57	70
2487.12.01500.016	16	60	76
2487.12.01500.019	19	63	82
2487.12.01500.025	25	69	94
2487.12.01500.032	32	76	108
2487.12.01500.038	38	82	120
2487.12.01500.050	50	94	144
2487.12.01500.063	63	107	170
2487.12.01500.075	75	119	194
2487.12.01500.080	80	124	204
2487.12.01500.100	100	144	244
2487.12.01500.125	125	169	294

Initial spring force
versus charge pressure

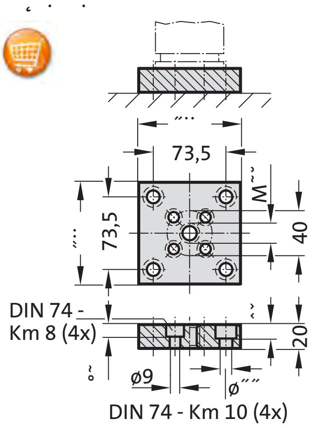


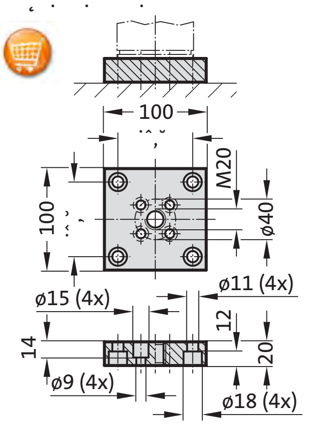
Spring force Diagram displacement versus stroke rise

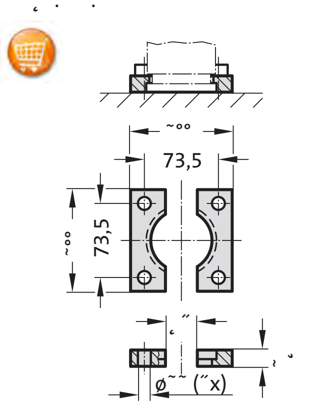


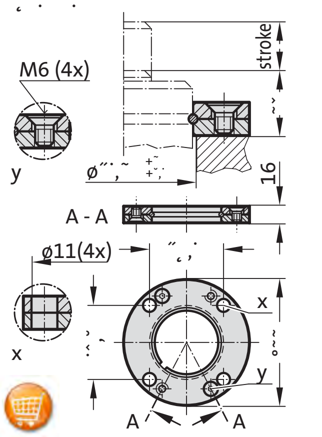
Pressure rise factor accounts for displacement but not external influences!

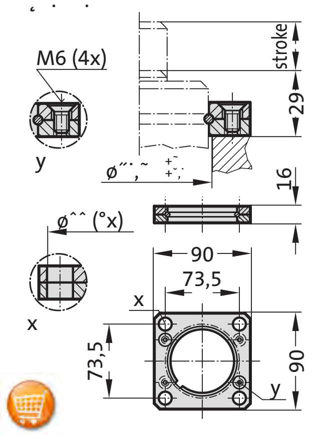
Gas Spring POWERLINE
Mounting variations

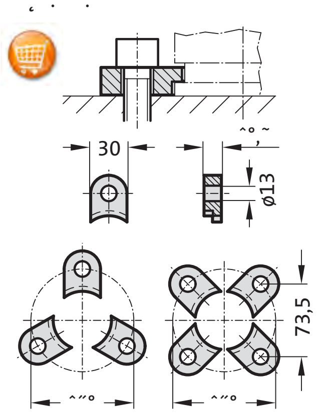


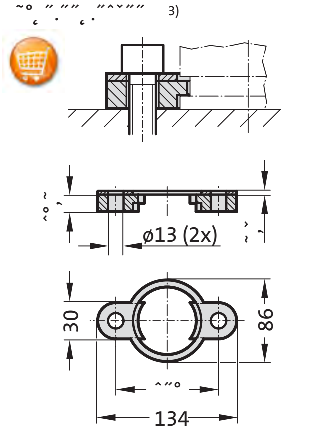




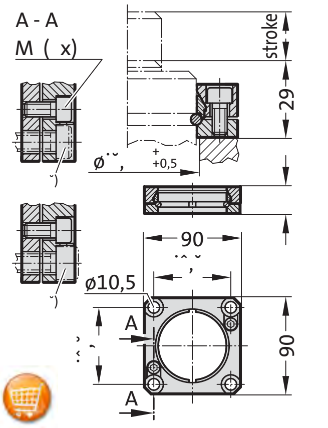


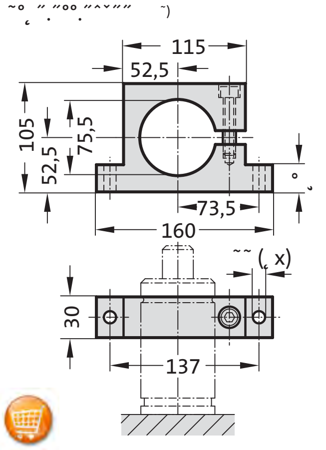




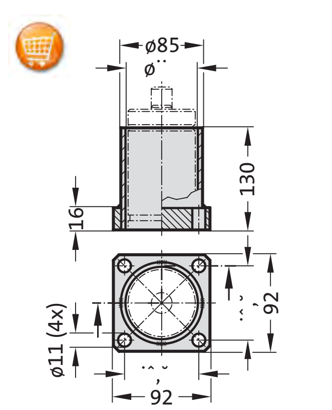


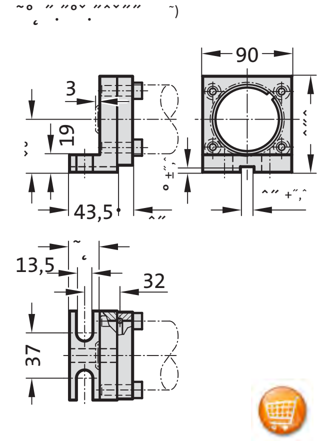
2480.064.01500

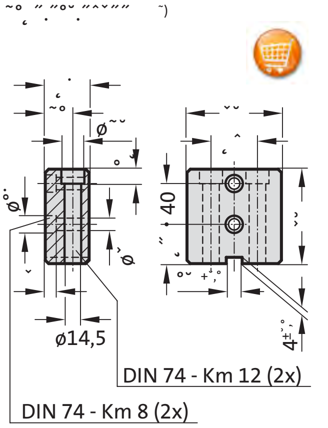




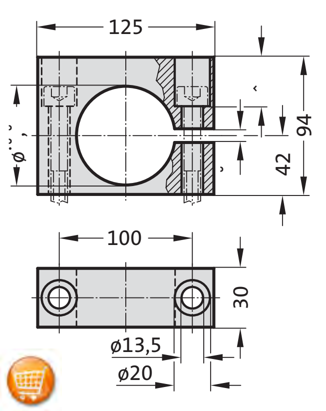
2480.010.01500.130







2480.044.03.01500



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring POWERLINE

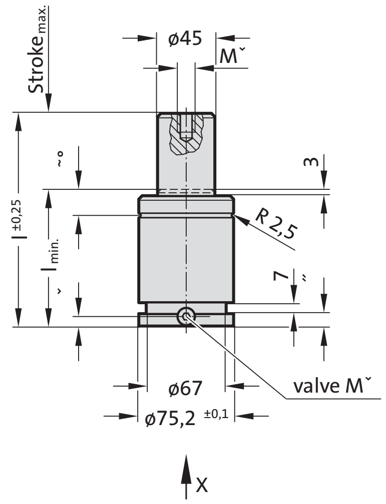
Note:

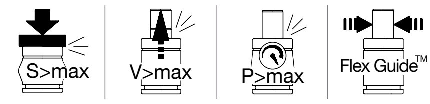
Initial spring force at 150 bar = 2400 daN

Order No for spare parts kit: 2487.12.02400

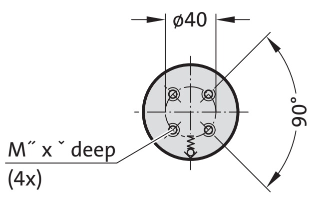
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.02400.





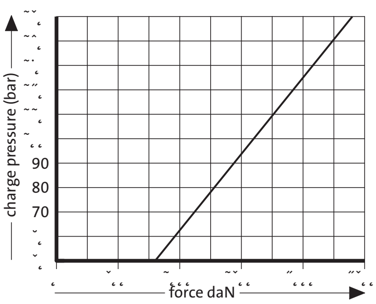
View X



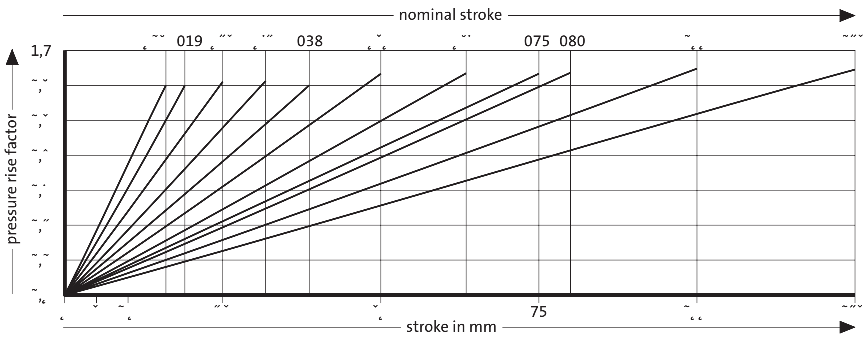
2487.12.02400.
Gas spring POWERLINE

Order No	Stroke max.	l min.	l
2487.12.02400.016	16	61	77
2487.12.02400.019	19	64	83
2487.12.02400.025	25	70	95
2487.12.02400.032	32	77	109
2487.12.02400.038	38	83	121
2487.12.02400.050	50	95	145
2487.12.02400.063	63	108	171
2487.12.02400.075	75	120	195
2487.12.02400.080	80	125	205
2487.12.02400.100	100	145	245
2487.12.02400.125	125	170	295

Initial spring force versus charge pressure

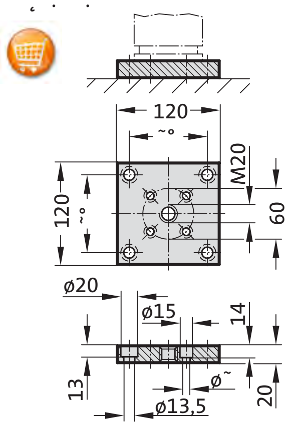


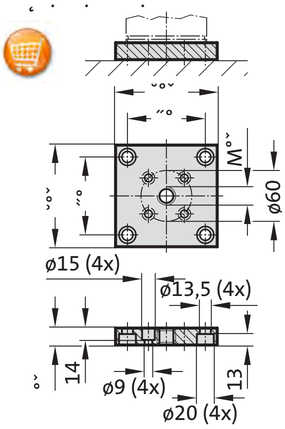
Spring force Diagram displacement versus stroke rise

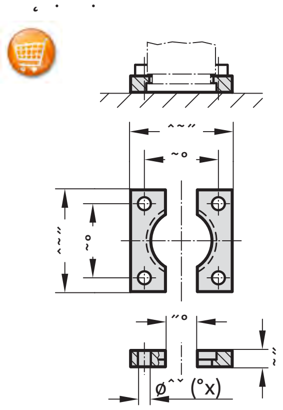


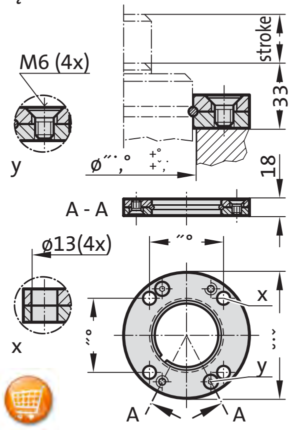
Pressure rise factor accounts for displacement but not external influences!

Gas Spring POWERLINE
Mounting variations

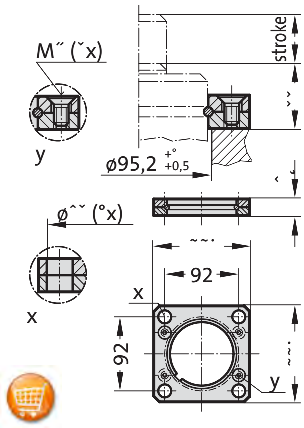




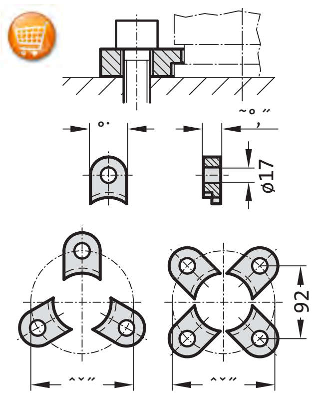


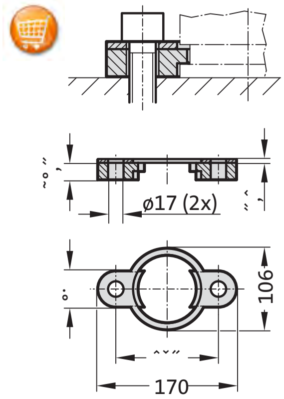


2480.057.03000

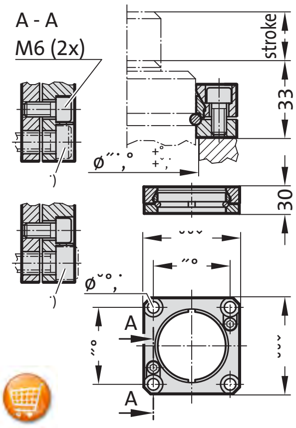


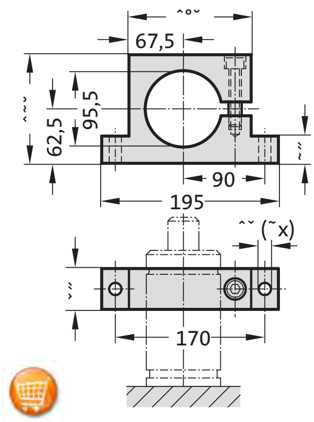
2480.007.03000



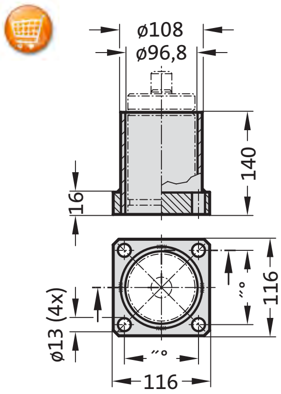


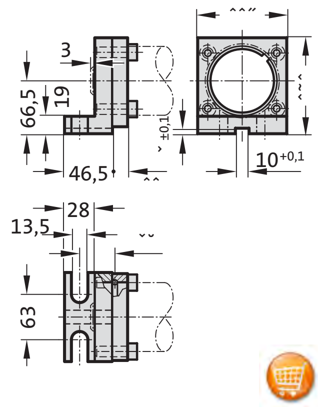
2480.064.03000



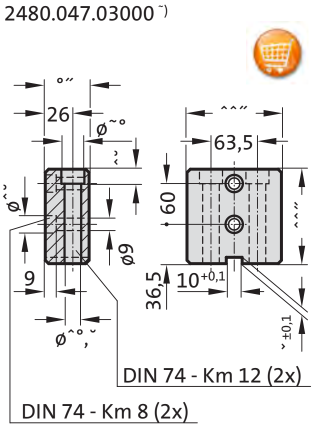


2480.010.03000.140 3)

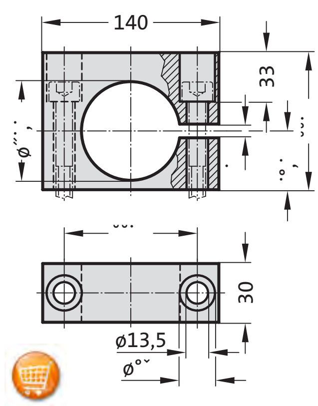




2480.047.03000



2480.044.03.03000



Note:

2) Attention: The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

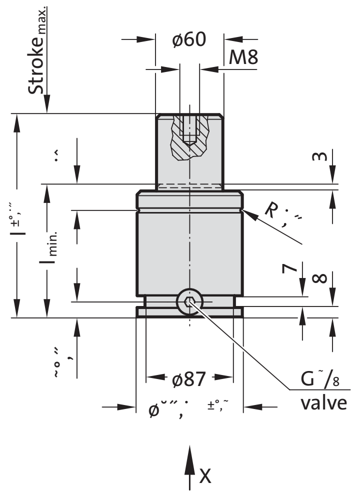
Note:

Initial spring force at 150 bar = 4200 daN

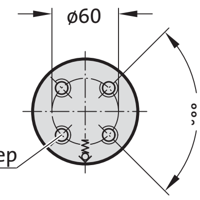
Order No for spare parts kit: 2487.12.04200

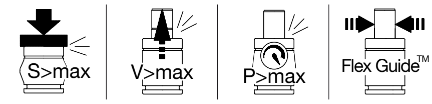
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.04200.



View X

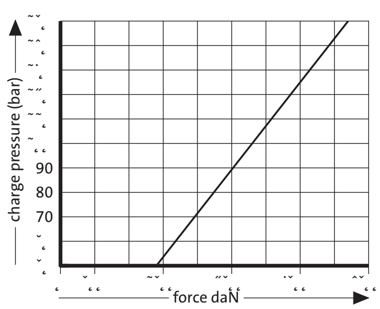




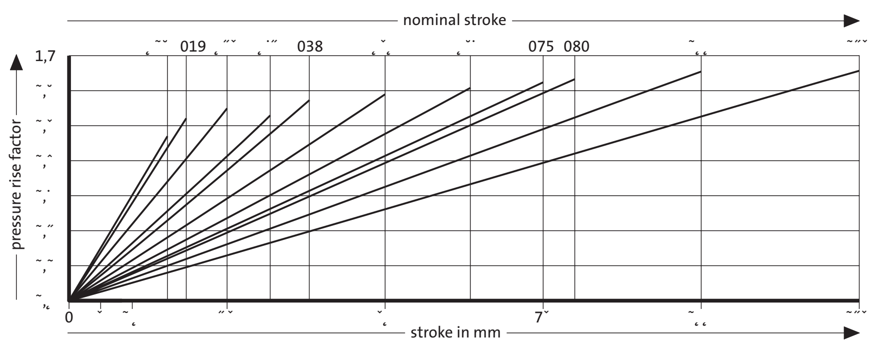
2487.12.04200.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.04200.016	16	74	90
2487.12.04200.019	19	77	96
2487.12.04200.025	25	83	108
2487.12.04200.032	32	90	122
2487.12.04200.038	38	96	134
2487.12.04200.050	50	108	158
2487.12.04200.063	63	121	184
2487.12.04200.075	75	133	208
2487.12.04200.080	80	138	218
2487.12.04200.100	100	158	258
2487.12.04200.125	125	183	308

Initial spring force
versus charge pressure

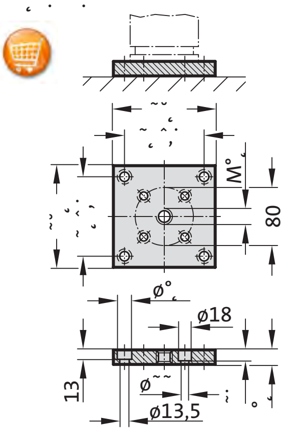


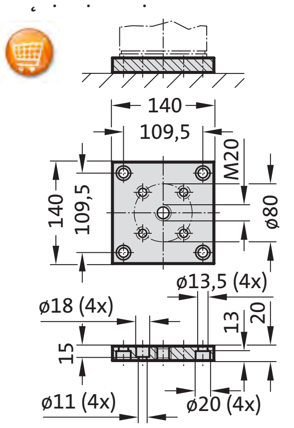
Spring force Diagram displacement versus stroke rise

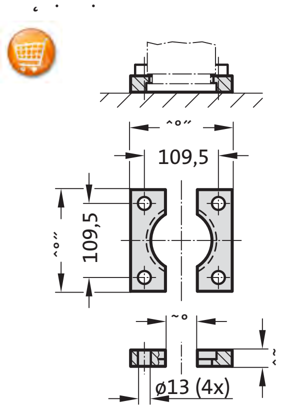


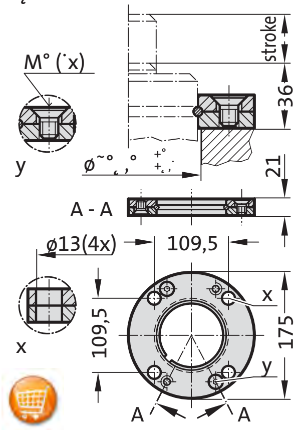
Pressure rise factor accounts for displacement but not external influences!

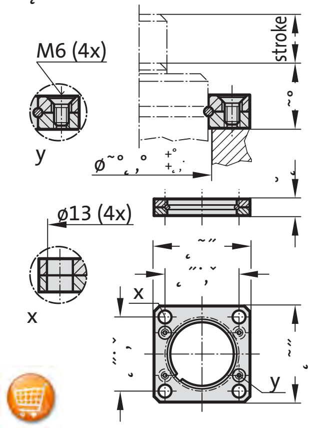
Gas Spring POWERLINE
Mounting variations

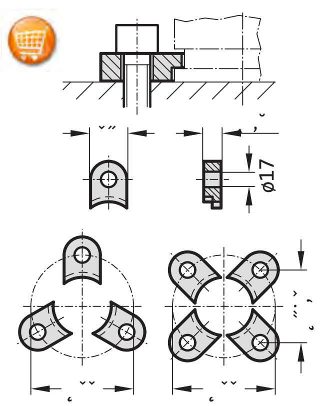


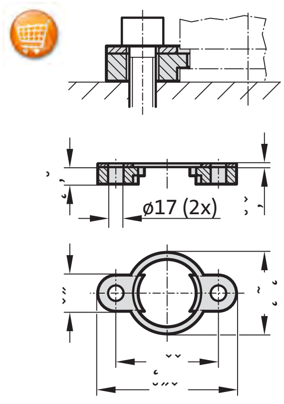




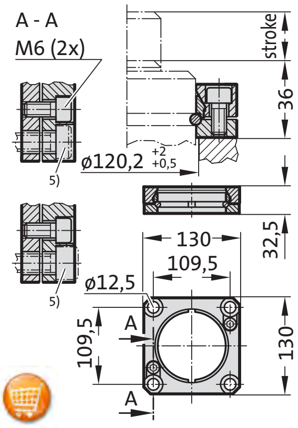


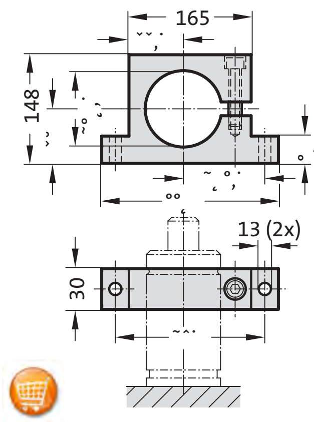




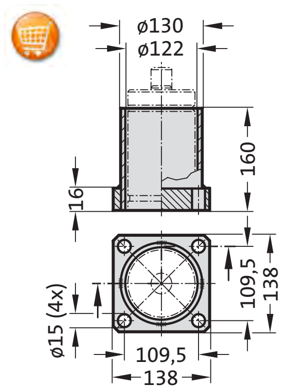


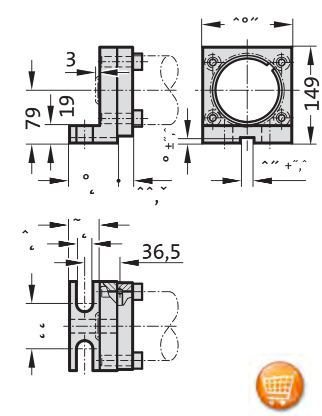
2480.064.05000

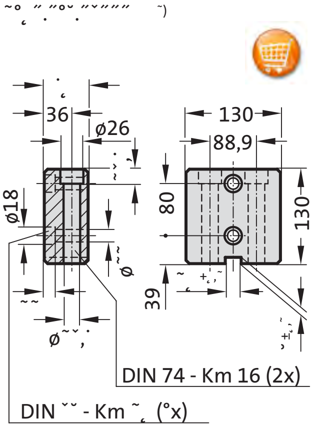




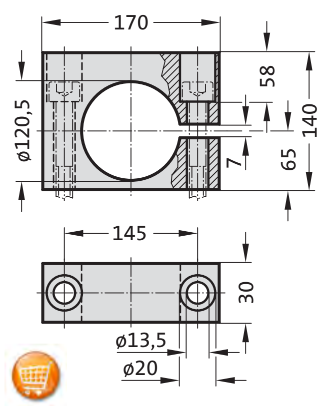
2480.010.05000.160 3)







2480.044.03.05000 2)



Note:

2) Attention: The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

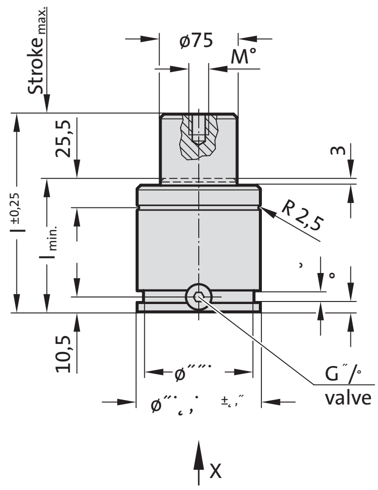
Note:

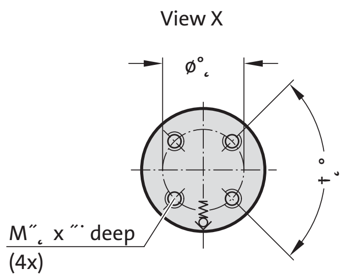
Initial spring force at 150 bar = 6630 daN

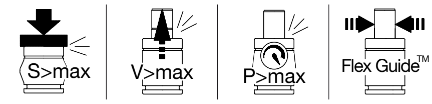
Order No for spare parts kit: 2487.12.06600

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.06600.



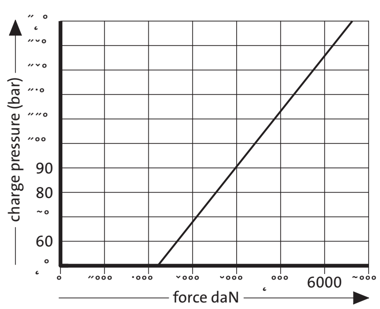




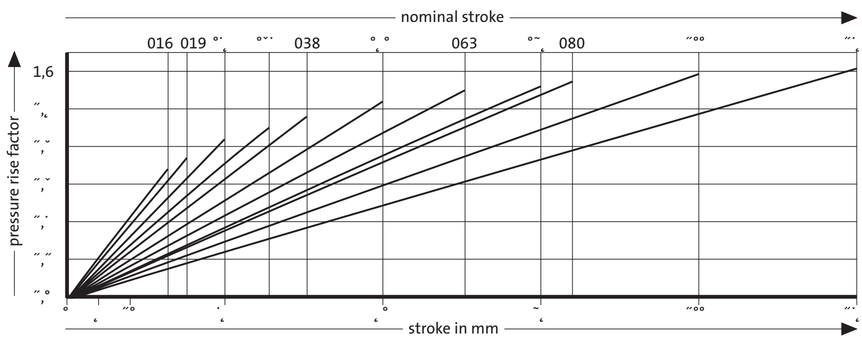
2487.12.06600.
Gas spring POWERLINE

Order No	$Stroke_{max.}$	$l_{min.}$	l
2487.12.06600.016	16	84	100
2487.12.06600.019	19	87	106
2487.12.06600.025	25	93	118
2487.12.06600.032	32	100	132
2487.12.06600.038	38	106	144
2487.12.06600.050	50	118	168
2487.12.06600.063	63	131	194
2487.12.06600.075	75	143	218
2487.12.06600.080	80	148	228
2487.12.06600.100	100	168	268
2487.12.06600.125	125	193	318

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise

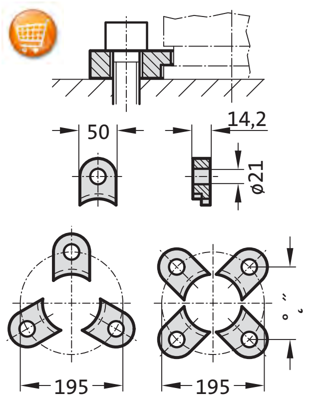


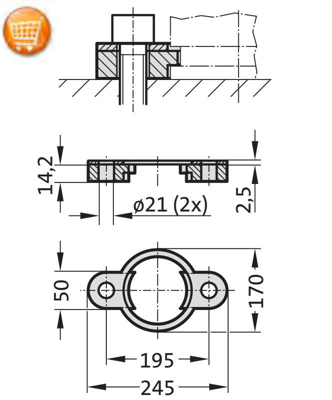
Pressure rise factor accounts for displacement but not external influences!

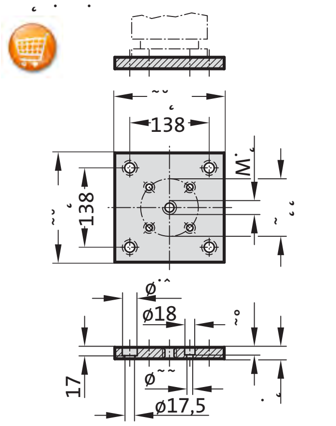
FIBRO

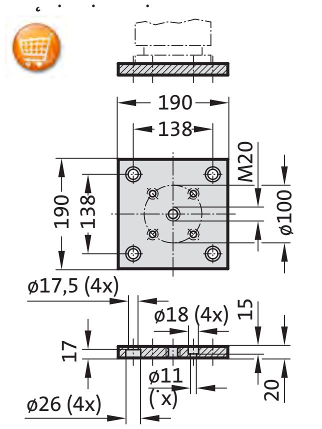
Gas spring POWERLINE
Mounting variations

3)

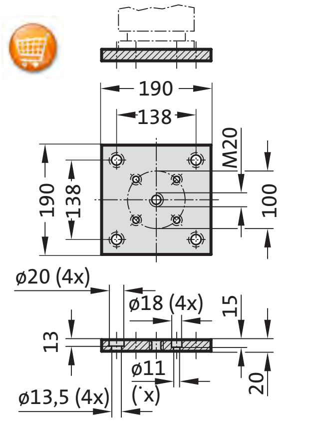








2480.011.03.07500



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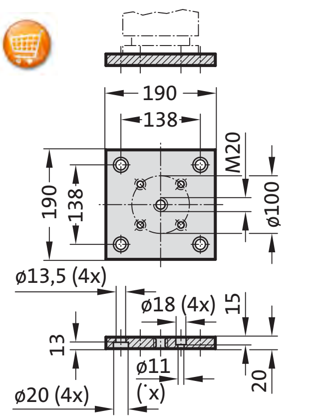
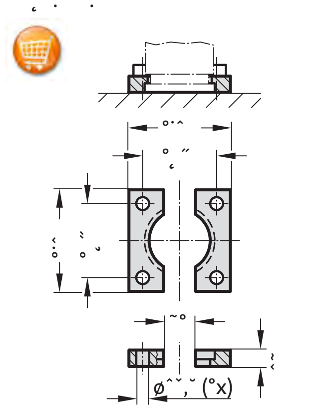
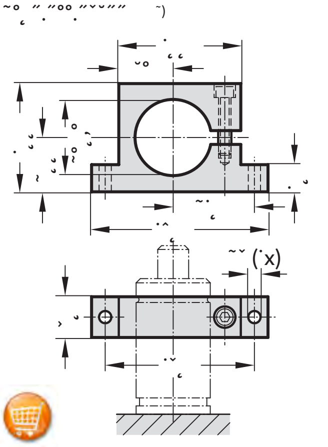
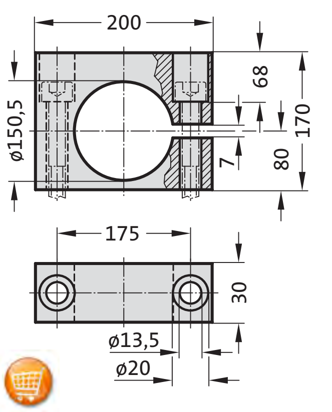
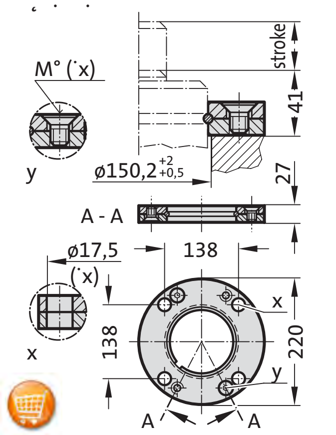


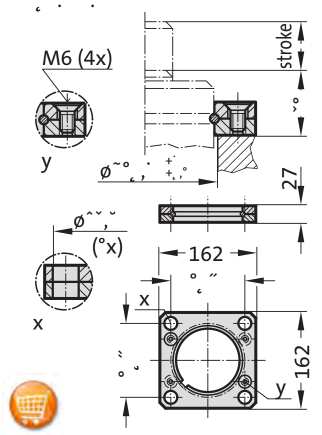




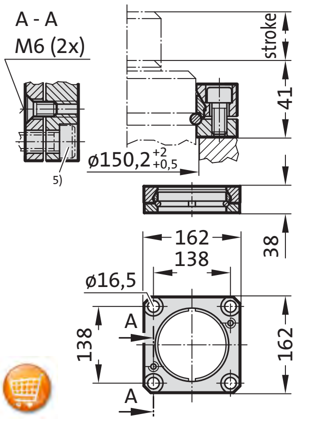
2480.044.03.07500 2)







2480.064.07500



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexa-gonal socket (compact head recommended).

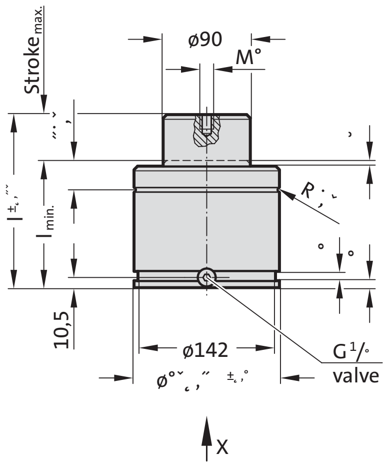
Gas spring POWERLINE

Note:
Initial spring force at 150 bar = 9500 daN

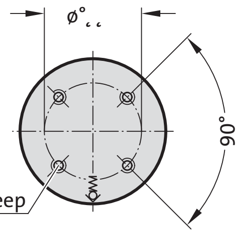
Order No for spare parts kit: 2487.12.09500

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.09500.

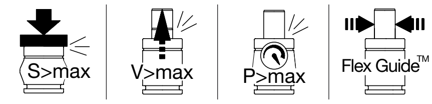


View X



M10 x 13 deep
(4x)

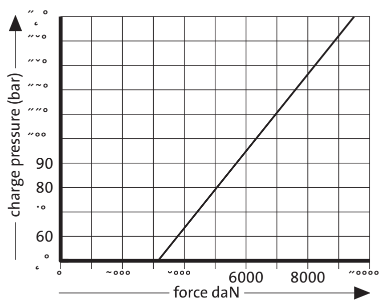
APPROVED PED 2014/68/EU | VDI | ISO



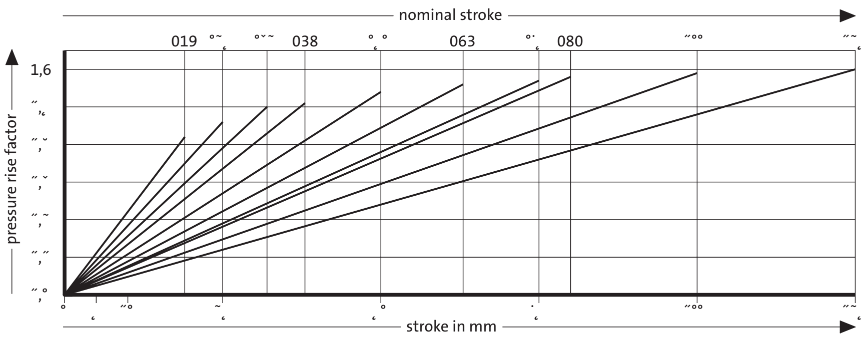
2487.12.09500.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.09500.019	19	97	116
2487.12.09500.025	25	103	128
2487.12.09500.032	32	110	142
2487.12.09500.038	38	116	154
2487.12.09500.050	50	128	178
2487.12.09500.063	63	141	204
2487.12.09500.075	75	153	228
2487.12.09500.080	80	158	238
2487.12.09500.100	100	178	278
2487.12.09500.125	125	203	328

Initial spring force
versus charge pressure

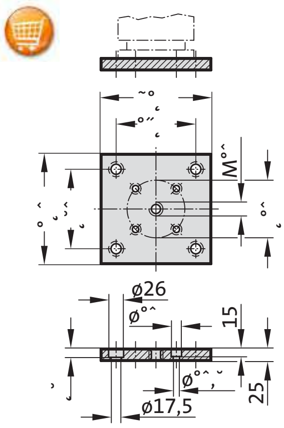


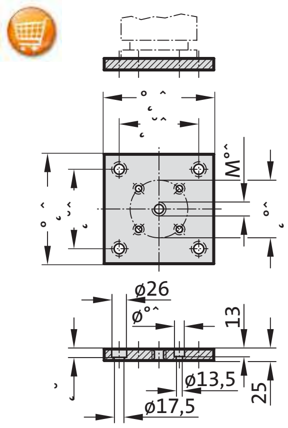
Spring force Diagram displacement versus stroke rise



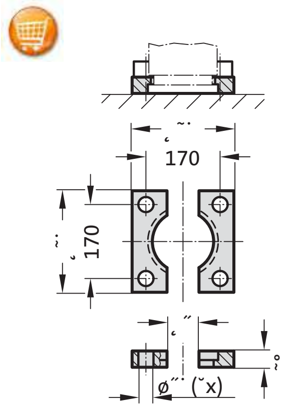
Pressure rise factor accounts for displacement but not external influences!

Gas Spring POWERLINE
Mounting variations

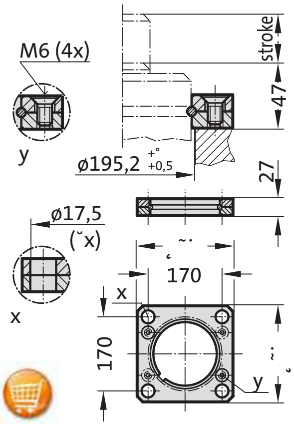


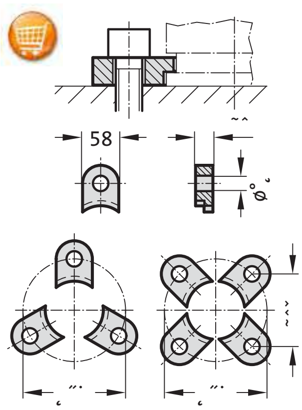


2480.022.10000



2480.057.10000





Gas spring POWERLINE

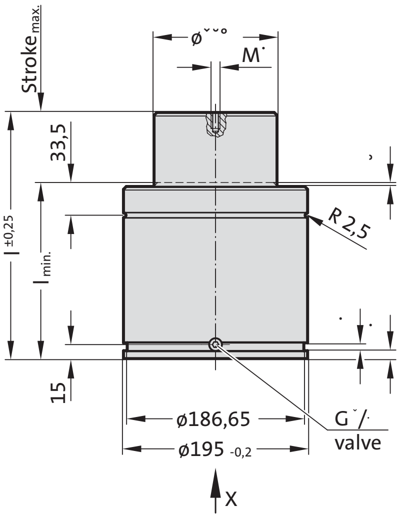
FIBRO

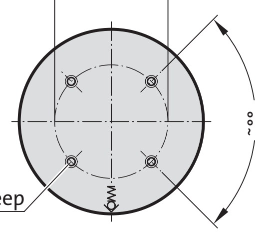
Note:
Initial spring force at 150 bar = 20000 daN

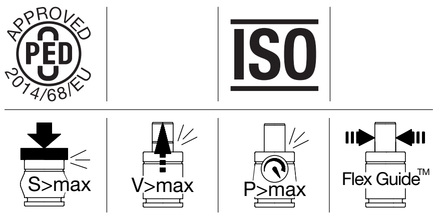
Order No for spare parts kit: 2487.12.20000

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 10 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.20000.



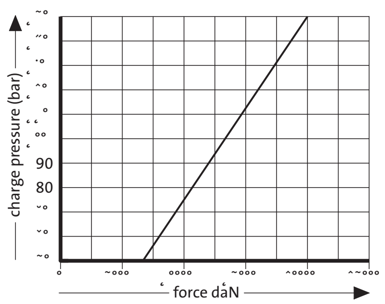




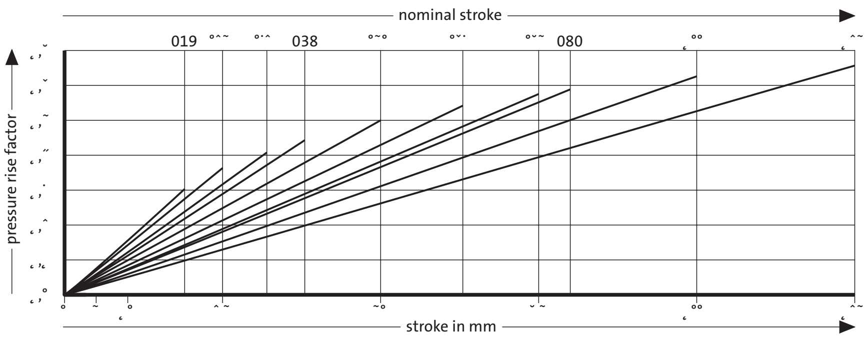
2487.12.20000.
Gas spring POWERLINE

Order No	Stroke max.	l min.	l
2487.12.20000.019	19	129	148
2487.12.20000.025	25	135	160
2487.12.20000.032	32	142	174
2487.12.20000.038	38	148	186
2487.12.20000.050	50	160	210
2487.12.20000.063	63	173	236
2487.12.20000.075	75	185	260
2487.12.20000.080	80	190	270
2487.12.20000.100	100	210	310
2487.12.20000.125	125	235	360

Initial spring force
versus charge pressure



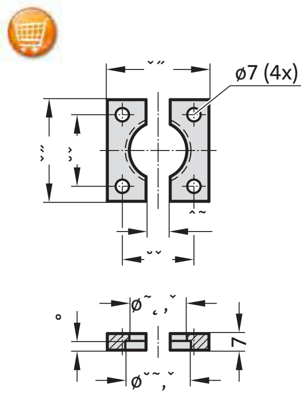
Spring force Diagram displacement versus stroke rise

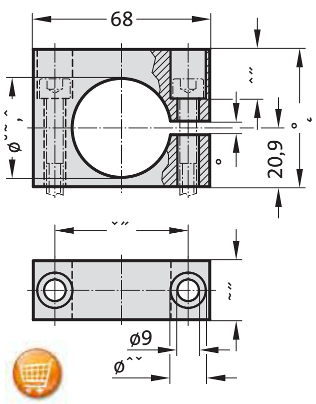


Pressure rise factor accounts for displacement but not external influences!

Gas Springs CX
Compact Xtreme

Gas Spring CX, Compact Xtreme
Mounting variations

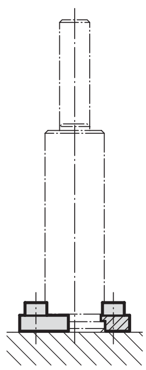


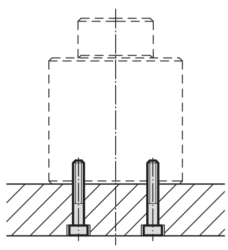


Note:

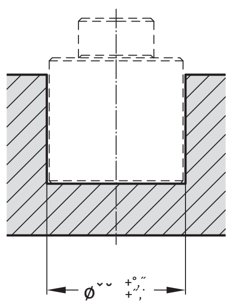
2) Attention:
The spring force must be absorbed by the stop surface!

Mounting examples:





see Note!



Gas spring CX, Compact Xtreme

Note:

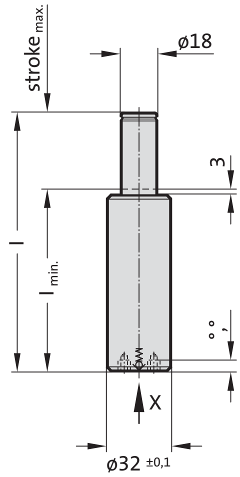
Initial spring force at 200 bar = 500 daN

Order No for spare parts kit: 2497.12.00500

* For stroke lengths over 25 mm, the gas pressure springs in the tool should be attached to the base through the threaded holes.
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

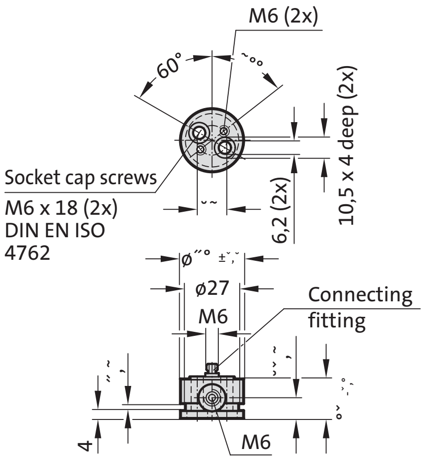
Pressure medium: Nitrogen N_2
Max. filling pressure: 200 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 70 to 200 (at 20°C)
Max. piston speed: 1.6 m/s

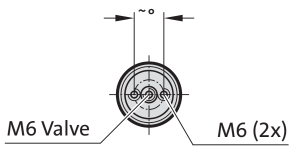
2497.12.00500.



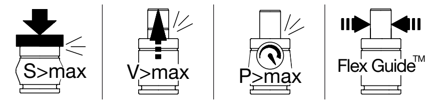
2497.00.20.00500

Adapter baseplate with connecting fitting, without valve (only for use with composite connections)





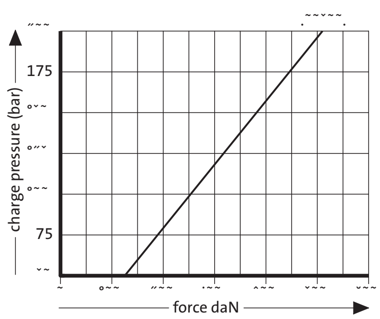
View X



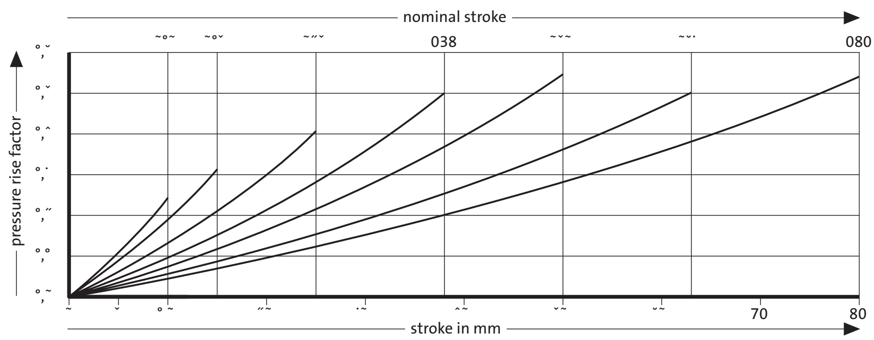
2497.12.00500.
Gas spring CX, Compact Xtreme

Order No	Stroke$_{max.}$	l$_{min.}$	l
2497.12.00500.010	10	65	75
2497.12.00500.015	15	70	85
2497.12.00500.025	25	80	105
2497.12.00500.038	38	92	130
2497.12.00500.050	50	105	155
2497.12.00500.063	63	127	190
2497.12.00500.080	80	145	225

Initial spring force versus charge pressure

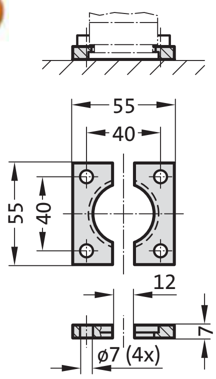


Spring force Diagram displacement versus stroke rise

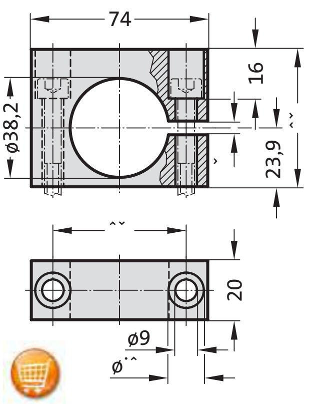


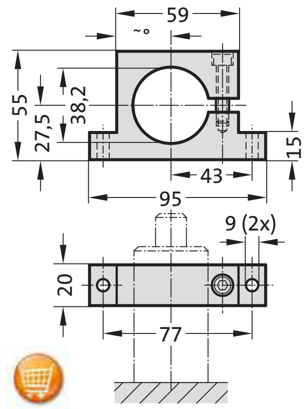
Pressure rise factor accounts for displacement but not external influences!

Gas Spring CX, Compact Xtreme
Mounting variations



2480.044.03.00250[2)]

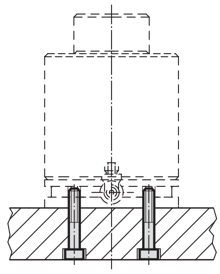




Note:

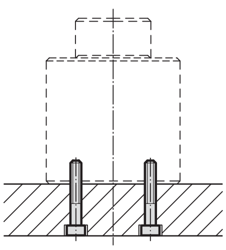
2) Attention:
The spring force must be absorbed by the stop surface!

Mounting Example:

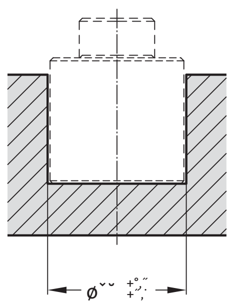


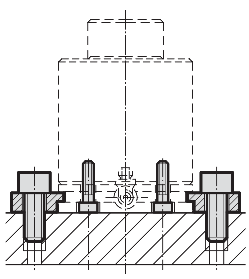
with Adapter Baseplate

Mounting examples:



see Note!





with Adapter Baseplate

Gas spring CX, Compact Xtreme

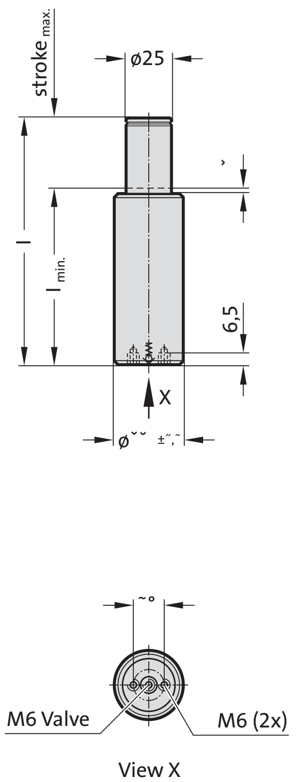
Note:
Initial spring force at 200 bar = 1000 daN

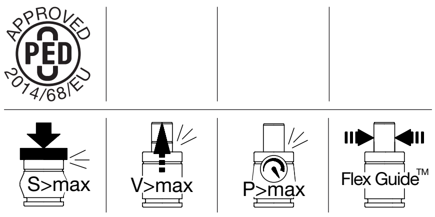
Order No for spare parts kit: 2497.12.01000

* For stroke lengths over 25 mm, the gas pressure springs in the tool should be attached to the base through the threaded holes.
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

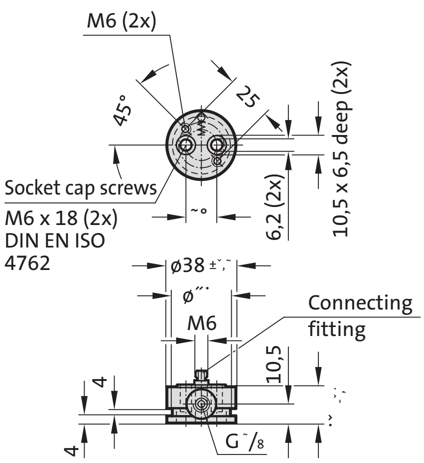
Pressure medium: Nitrogen N_2
Max. filling pressure: 200 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 70 to 200 (at 20°C)
Max. piston speed: 1.6 m/s

2497.12.01000.





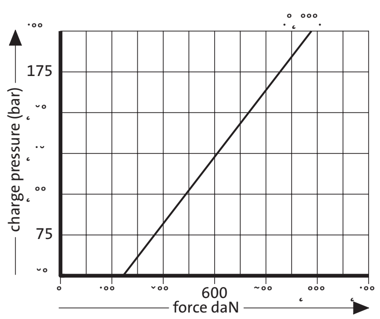
2497.00.20.01000
Adapter baseplate with connecting fitting, with valve



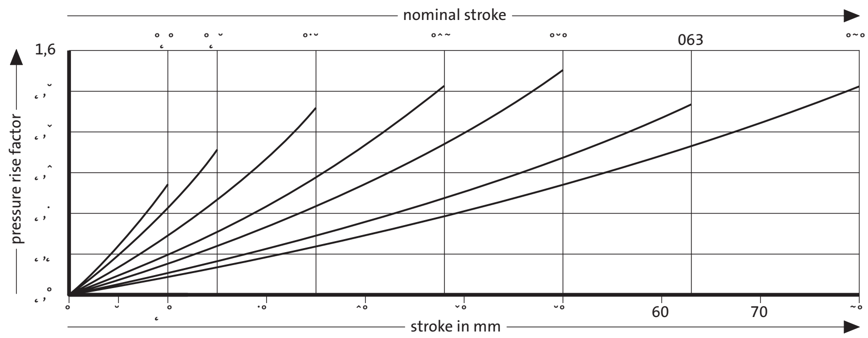
2497.12.01000.
Gas spring CX, Compact Xtreme

Order No	Stroke$_{max.}$	l$_{min.}$	l
2497.12.01000.010	10	65	75
2497.12.01000.015	15	70	85
2497.12.01000.025	25	80	105
2497.12.01000.038	38	97	135
2497.12.01000.050	50	110	160
2497.12.01000.063	63	142	205
2497.12.01000.080	80	160	240

Initial spring force versus charge pressure

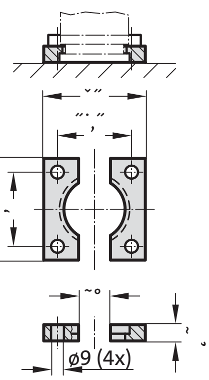


Spring force Diagram displacement versus stroke rise



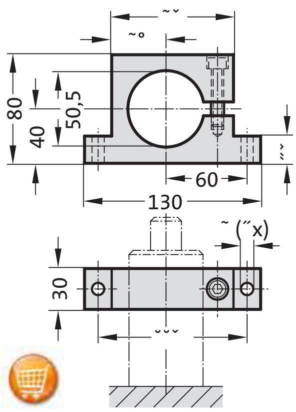
Pressure rise factor accounts for displacement but not external influences!

Gas Spring CX, Compact Xtreme
Mounting variations

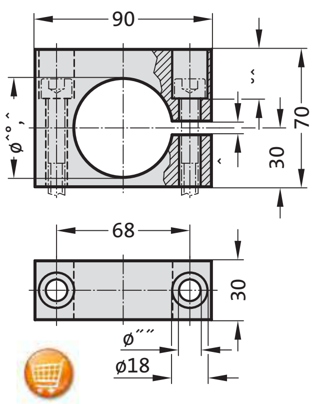


Note:

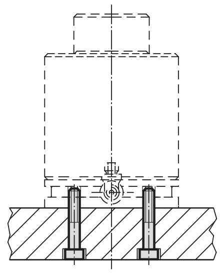
2) Attention:
The spring force must be absorbed by the stop surface!



2480.044.03.00750

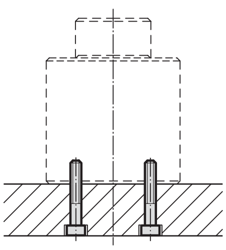


Mounting Example:

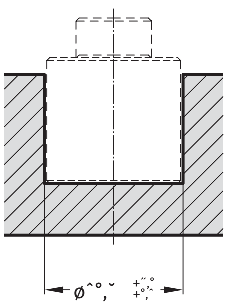


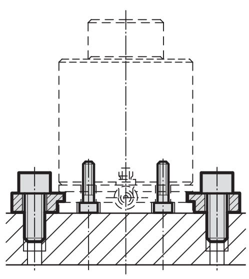
with Adapter Baseplate

Mounting examples:



see Note!





with Adapter Baseplate

Gas spring CX, Compact Xtreme

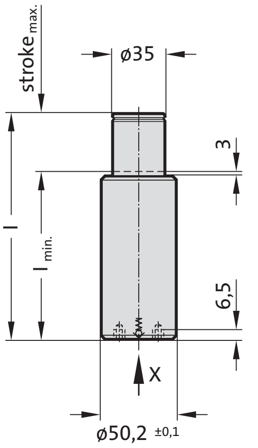
Note:
Initial spring force at 200 bar = 1900 daN

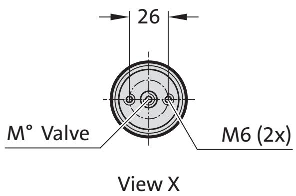
Order No for spare parts kit: 2497.12.01900

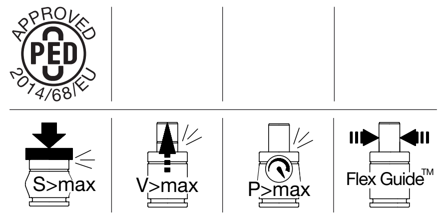
* For stroke lengths over 25 mm, the gas pressure springs in the tool should be attached to the base through the threaded holes.
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

Pressure medium: Nitrogen N_2
Max. filling pressure: 200 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 50 to 130 (at 20°C)
Max. piston speed: 1.6 m/s

2497.12.01900.

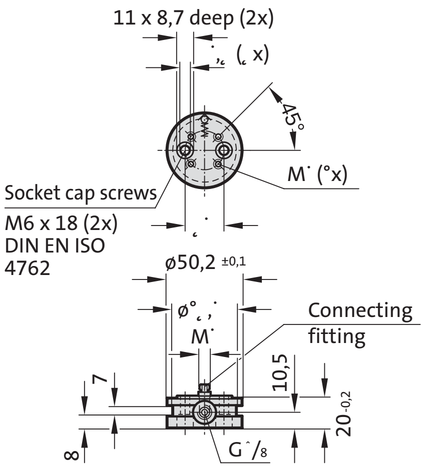






2497.00.20.01900

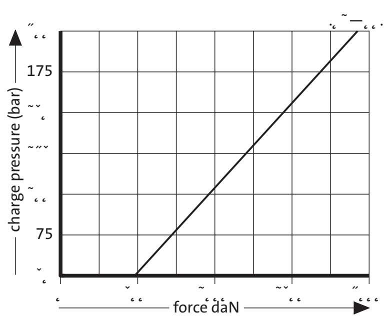
Adapter baseplate with connecting fitting, with valve



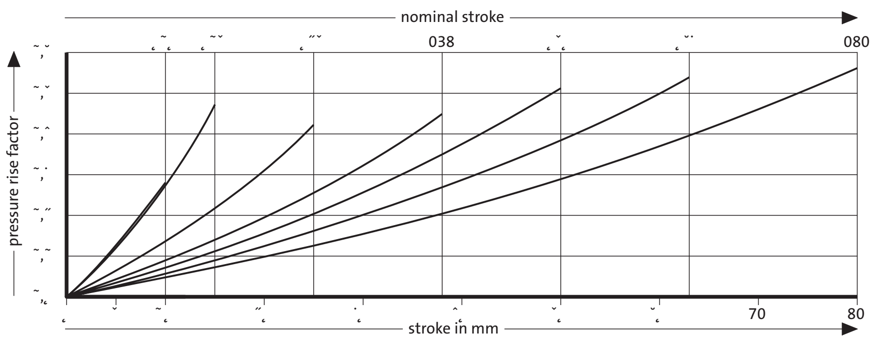
2497.12.01900.
Gas spring CX, Compact Xtreme

Order No	Stroke$_{max.}$	l$_{min.}$	l
2497.12.01900.010	10	70	80
2497.12.01900.015	15	80	95
2497.12.01900.025	25	90	115
2497.12.01900.038	38	112	150
2497.12.01900.050	50	125	175
2497.12.01900.063	63	142	205
2497.12.01900.080	80	165	245

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise

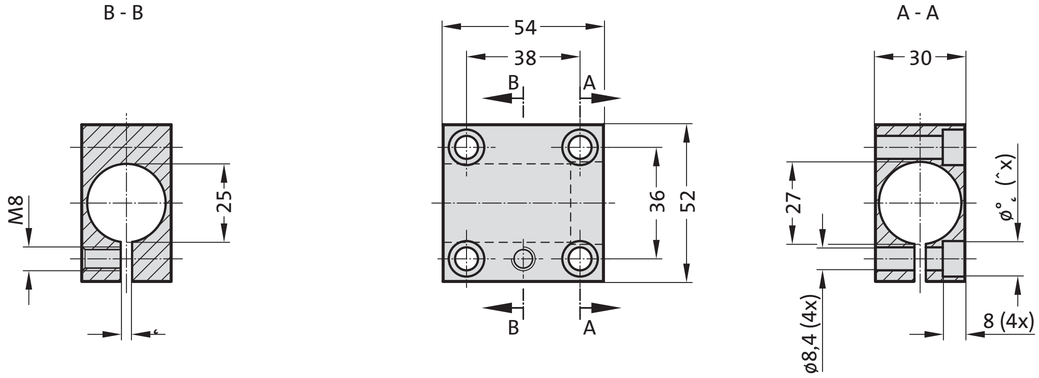


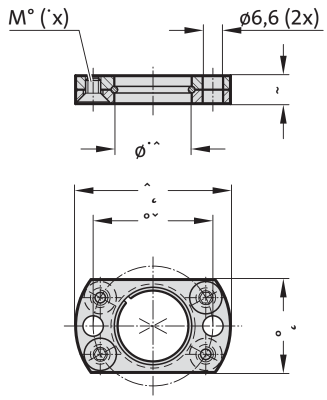
Pressure rise factor accounts for displacement but not external influences!

Compact Gas springs for small displacement and high forces

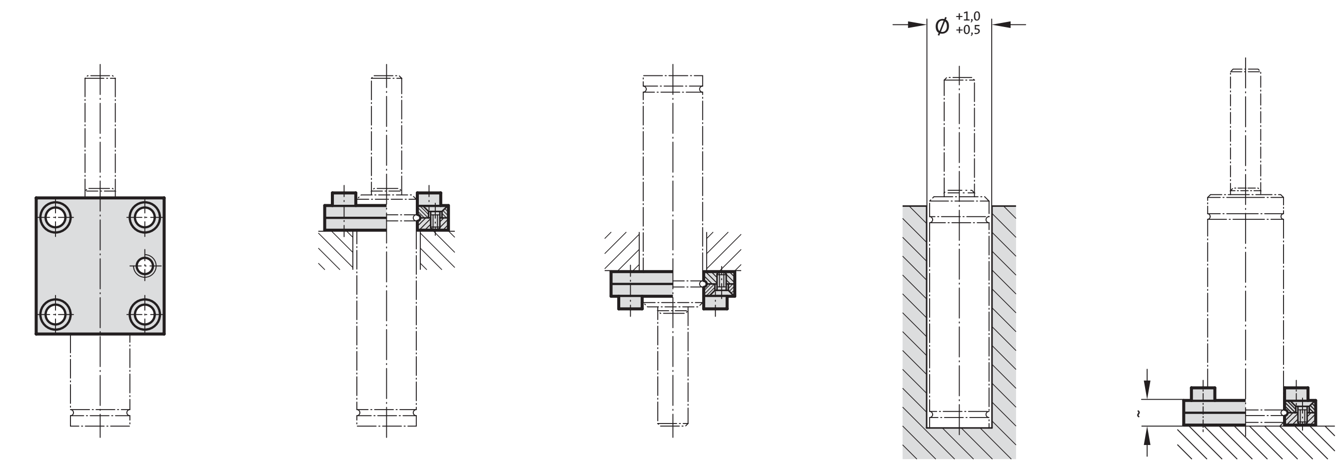
Compact Gas Spring
Mounting variations

2480.053.00150





Mounting examples:



Compact gas spring

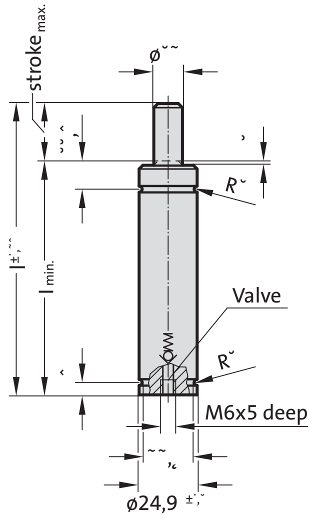
Note:

Initial spring force at 150 bar = 420 daN

Worn gas springs cannot be repaired, they have to be replaced completely.

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 50 to 100 (at 20°C)
Max. piston speed: 0.8 m/s

2490.14.00420.



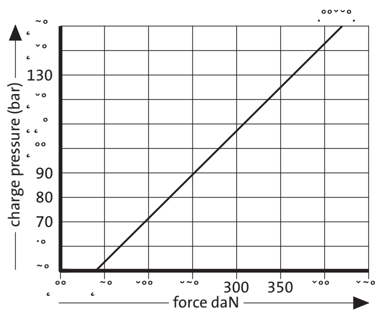
V>max

Flex Guide™

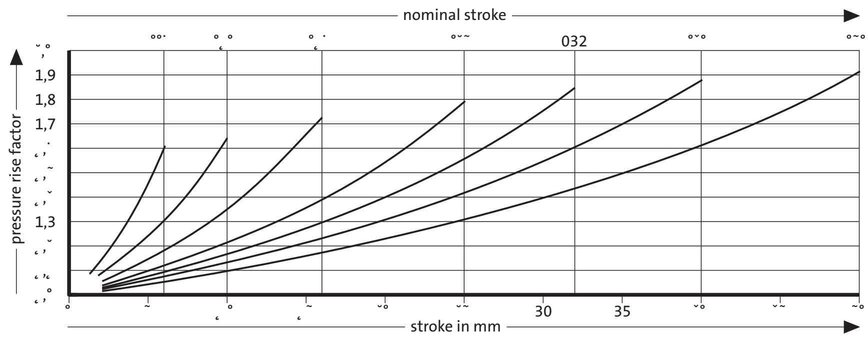
2490.14.00420.
Compact gas spring

Order No	Stroke max.	l min.	l
2490.14.00420.006	6	50	56
2490.14.00420.010	10	60	70
2490.14.00420.016	16	75	91
2490.14.00420.025	25	95	120
2490.14.00420.032	32	108	140
2490.14.00420.040	40	125	165
2490.14.00420.050	50	145	195

Initial spring force versus charge pressure

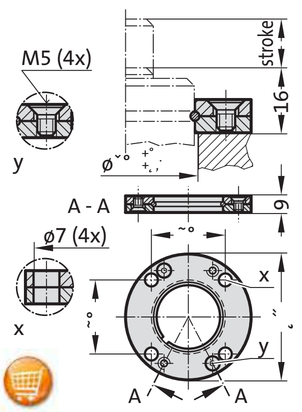


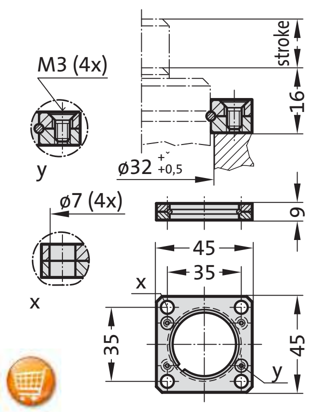
Spring force Diagram displacement versus stroke rise



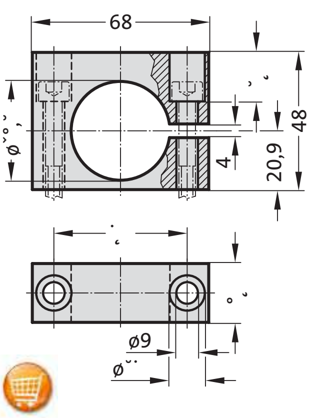
Pressure rise factor accounts for displacement but not external influences!

Compact gas spring
Mounting variations





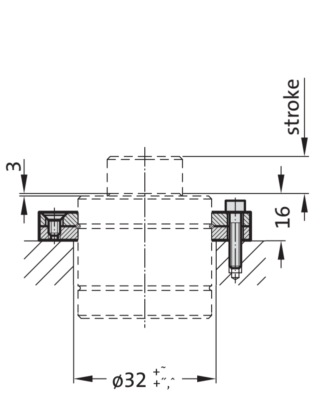
2480.044.03.00150 [2)]

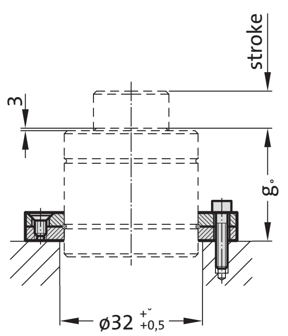


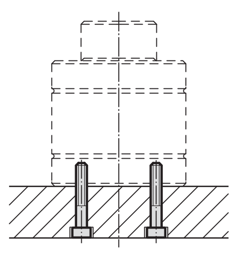
Note:

[2)] Attention:
The spring force must be absorbed by the stop surface!

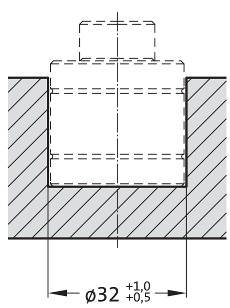
Mounting examples:







see Note!



Compact gas spring

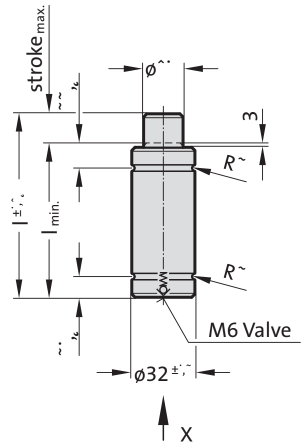
Note:

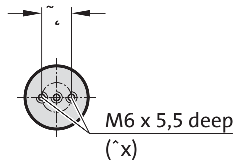
Initial spring force at 150 bar = 750 daN

Worn gas springs cannot be repaired, they have to be replaced completely.

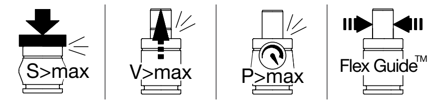
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 50 to 100 (at 20°C)
Max. piston speed: 0.8 m/s





View X

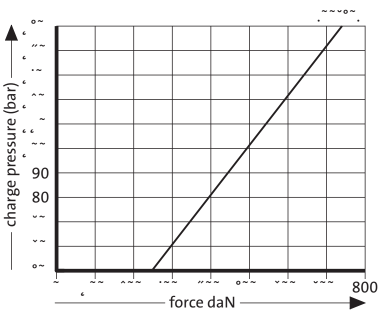


2490.14.00750. Compact gas spring

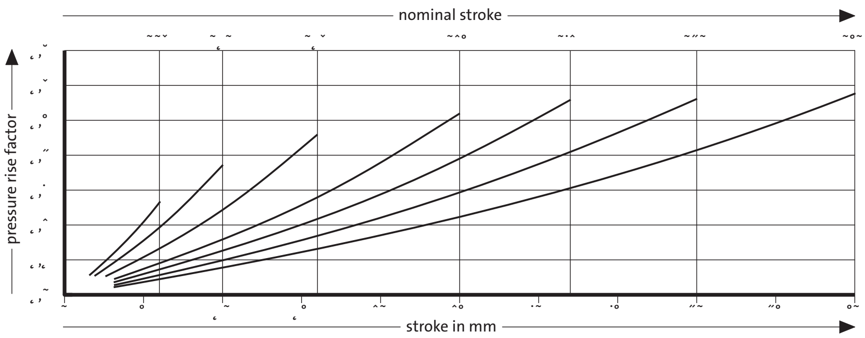
Order No	$Stroke_{max.}$	$l_{min.}$	l	g_2*
2490.14.00750.006	6	57	63	51
2490.14.00750.010	10	65	75	59
2490.14.00750.016	16	77	93	71
2490.14.00750.025	25	95	120	89
2490.14.00750.032	32	108	140	102
2490.14.00750.040	40	125	165	119
2490.14.00750.050	50	145	195	139

*see mounting example

Initial spring force versus charge pressure

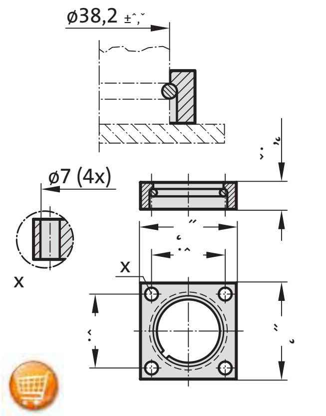


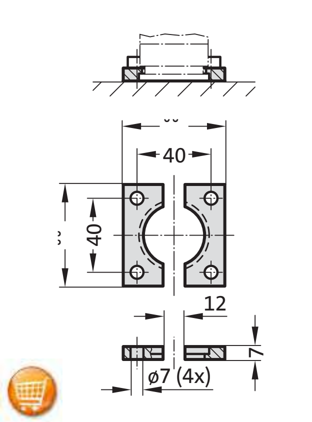
Spring force Diagram displacement versus stroke rise

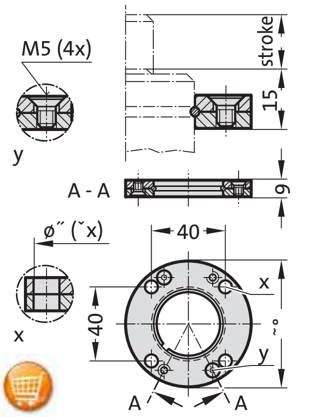


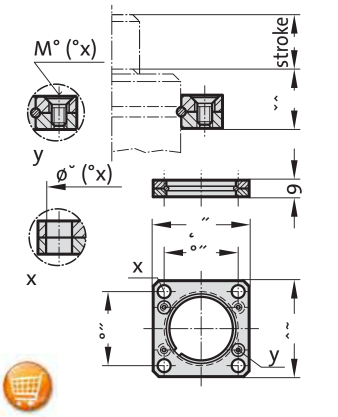
Pressure rise factor accounts for displacement but not external influences!

Compact gas spring
Mounting variations

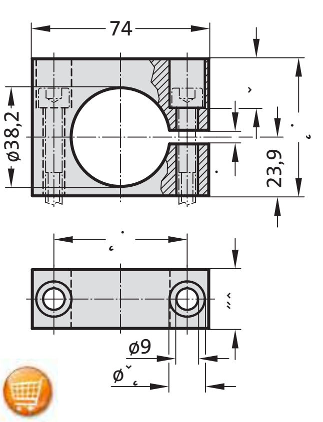


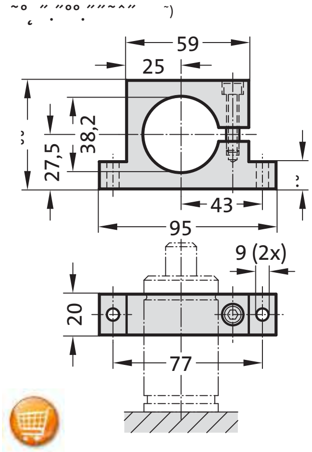






2480.044.03.00250 2)

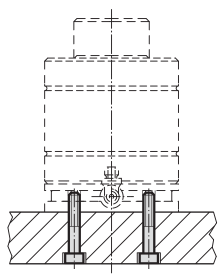




Note:

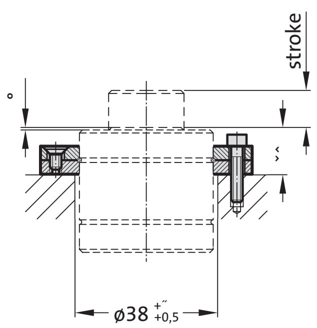
2) Attention:
The spring force must be absorbed by the stop surface!

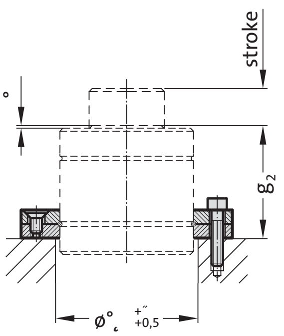
Mounting Example:

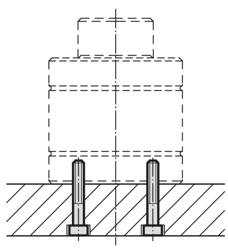


with Adapter Baseplate

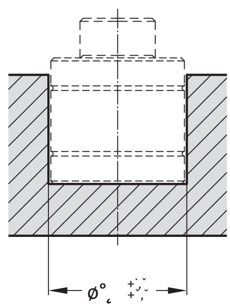
Mounting examples:

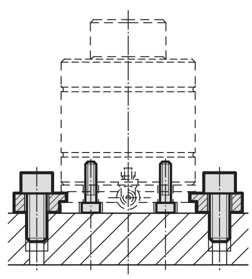






see Note!





with Adapter Baseplate

Compact gas spring

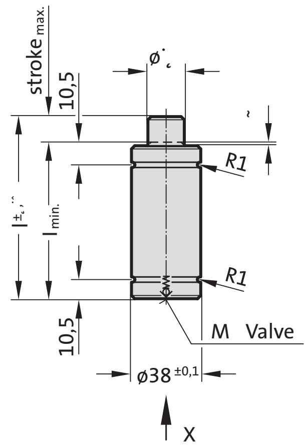
Note:
Initial spring force at 150 bar = 1000 daN

Order No for spare parts kit: 2490.14.01000

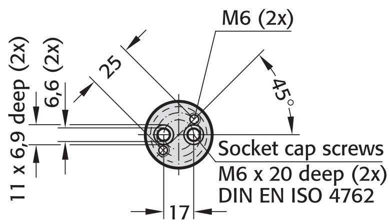
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

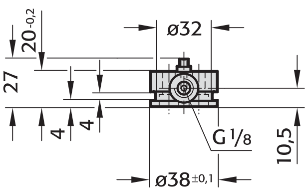
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 100 (at 20°C)
Max. piston speed: 0.8 m/s

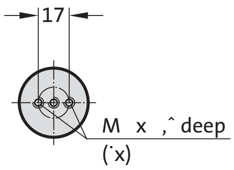
2490.14.01000.



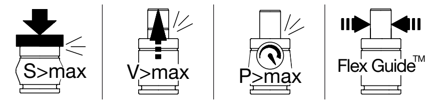
Adapter baseplate with connecting fitting, without valve (only for use with composite connections)







View X

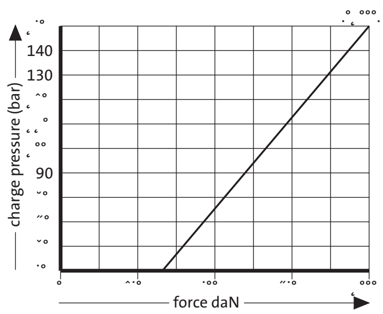


2490.14.01000.
Compact gas spring

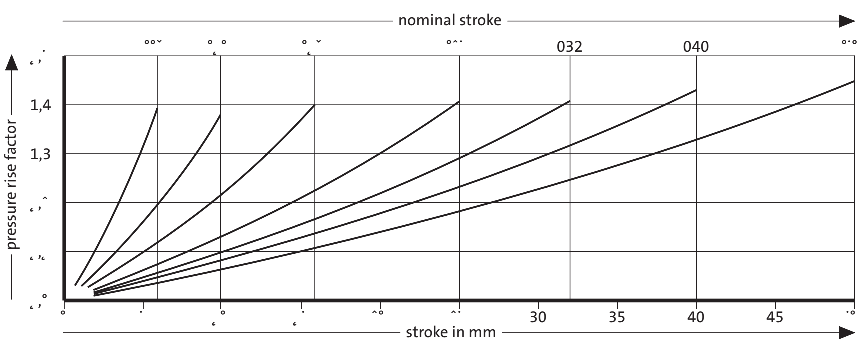
Order No	Stroke$_{max.}$	l$_{min.}$	l	g$_2$*
2490.14.01000.006	6	55	61	49
2490.14.01000.010	10	68	78	62
2490.14.01000.016	16	84	100	78
2490.14.01000.025	25	110	135	104
2490.14.01000.032	32	135	167	129
2490.14.01000.040	40	155	195	149
2490.14.01000.050	50	180	230	174

*see mounting example

Initial spring force
versus charge pressure



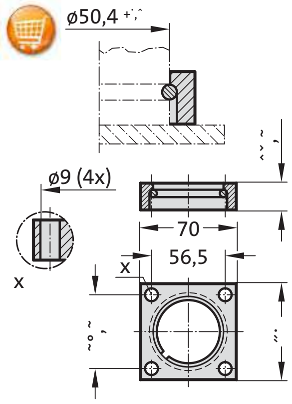
Spring force Diagram displacement versus stroke rise

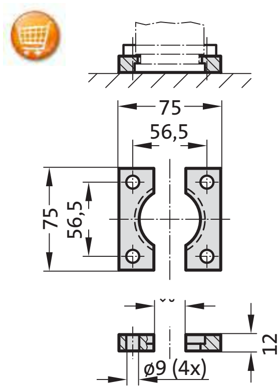


Pressure rise factor accounts for displacement but not external influences!

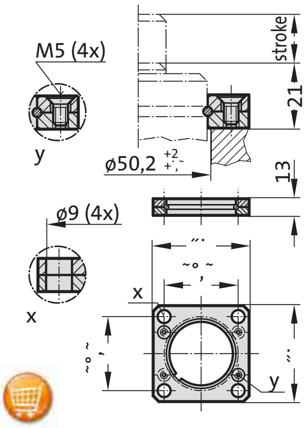
Compact gas spring
Mounting variations

2480.052.1.01800



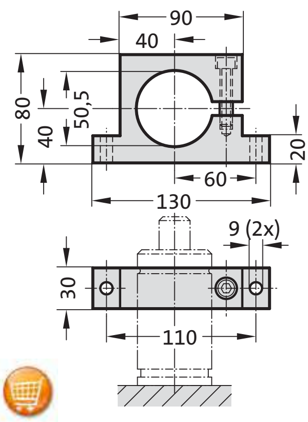


2480.058.00750

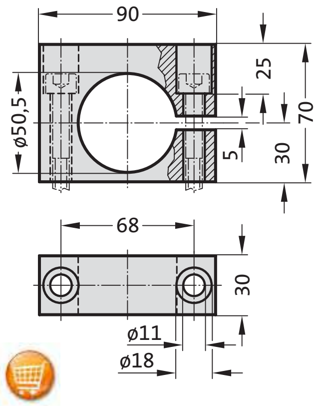


Note:

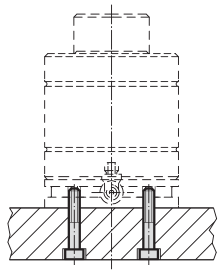
2) Attention:
The spring force must be absorbed by the stop surface.



2480.044.03.00750 2)

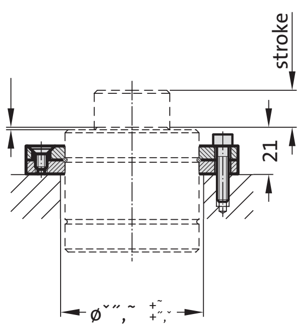


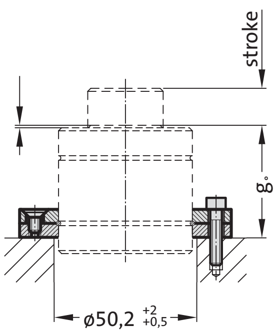
Mounting Example:

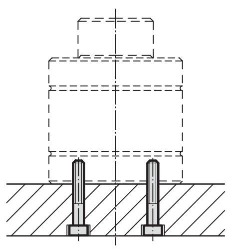


with Adapter Baseplate

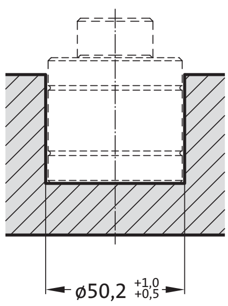
Mounting examples:

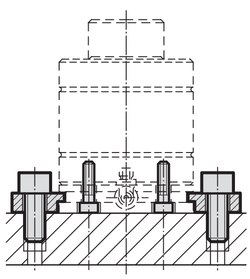






see Note!





with Adapter Baseplate

Compact gas spring

Note:

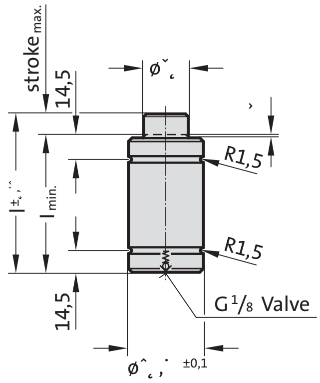
Initial spring force at 150 bar = 1800 daN

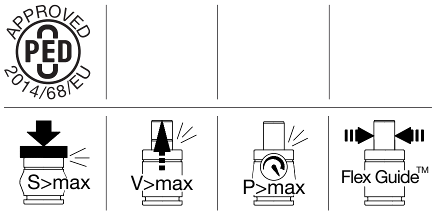
Order No for spare parts kit: 2490.14.01800

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 50 to 100 (at 20°C)
Max. piston speed: 0.8 m/s

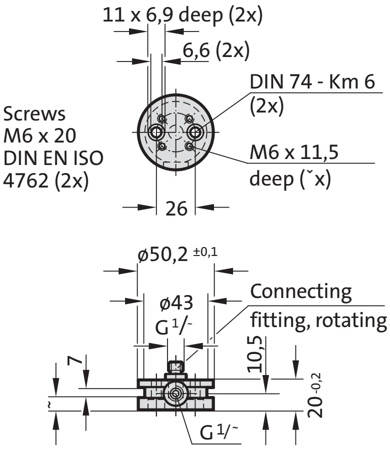
2490.14.01800.

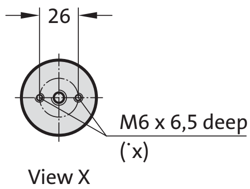




2480.00.20.01800

Adapter baseplate with connecting fitting, without valve (only for use with composite connections)



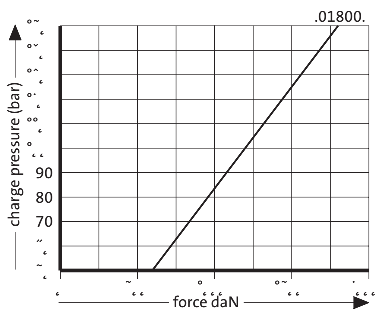


2490.14.01800.
Compact gas spring

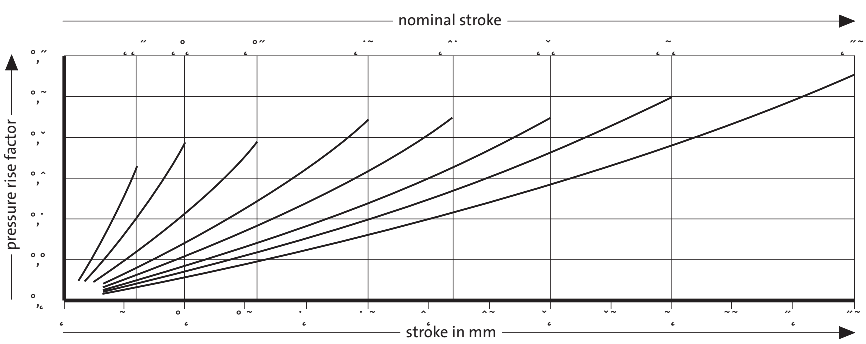
Order No	$Stroke_{max.}$	$l_{min.}$	l	g_2*
2490.14.01800.006	6	60	66	52
2490.14.01800.010	10	70	80	62
2490.14.01800.016	16	90	106	82
2490.14.01800.025	25	110	135	102
2490.14.01800.032	32	130	162	122
2490.14.01800.040	40	150	190	142
2490.14.01800.050	50	170	220	162
2490.14.01800.065	65	206	271	198

*see mounting example

Initial spring force versus charge pressure

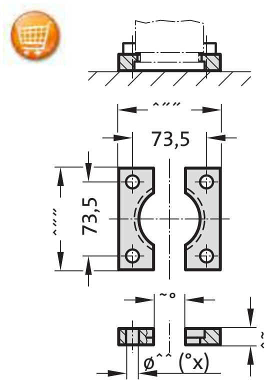


Spring force Diagram displacement versus stroke rise

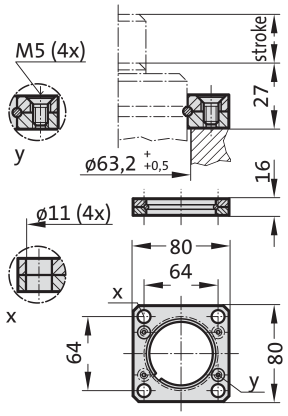


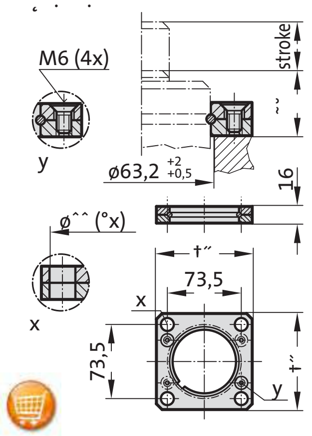
Pressure rise factor accounts for displacement but not external influences!

Compact gas spring
Mounting variations

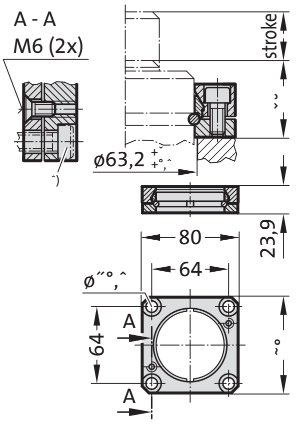


2480.057.03.01000

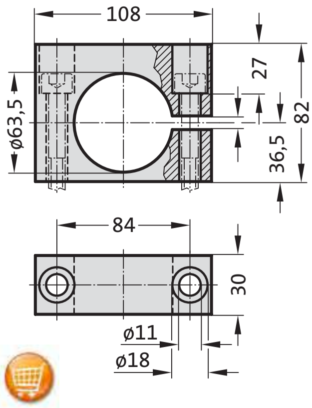




2480.064.01000



2480.044.03.01000



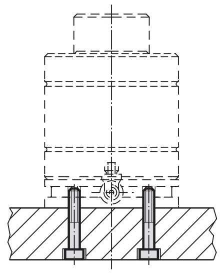
Note:

2) Attention:
The spring force must be absorbed by the stop surface!

4) Square collar flange, non-rotating, fixing for composite connection.

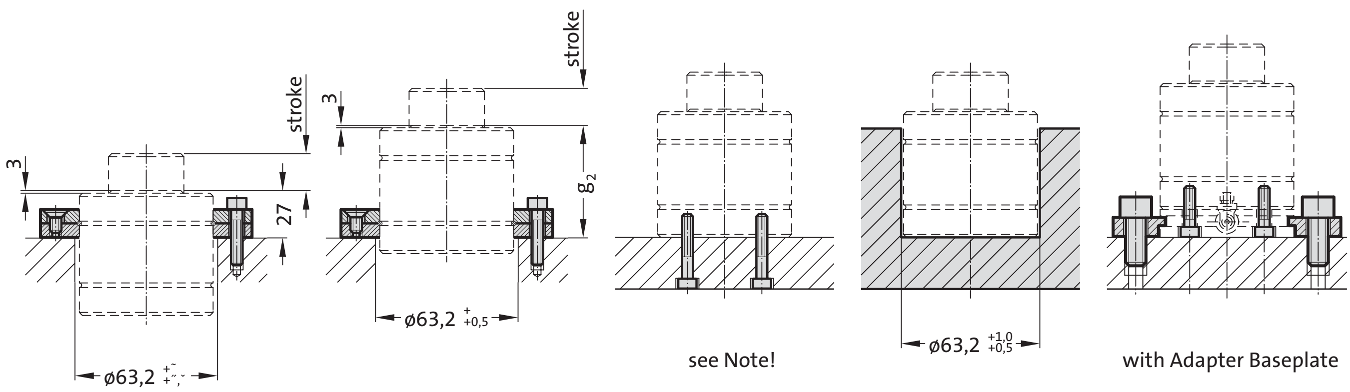
5) Machine screws with hexagonal socket (compact head recommended)

Mounting Example:



with Adapter Baseplate

Mounting examples:



Compact gas spring

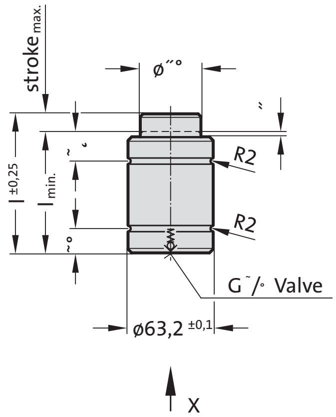
Note:
Initial spring force at 150 bar = 3000 daN

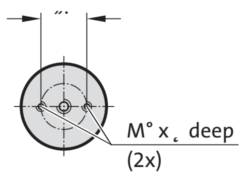
Order No for spare parts kit: 2490.14.03000

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 0.8 m/s

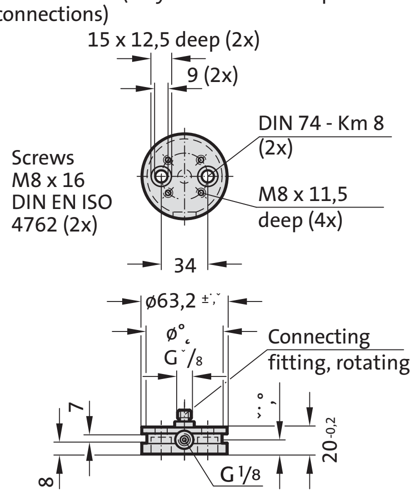
2490.14.03000.





View X

2480.00.20.03000
Adapter baseplate with connecting fitting, without valve (only for use with composite connections)

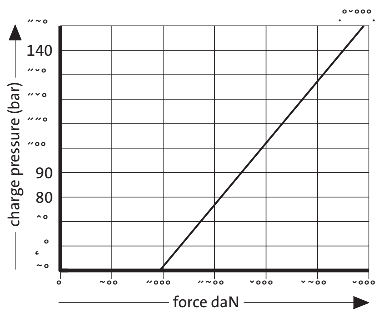


2490.14.03000.
Compact gas spring

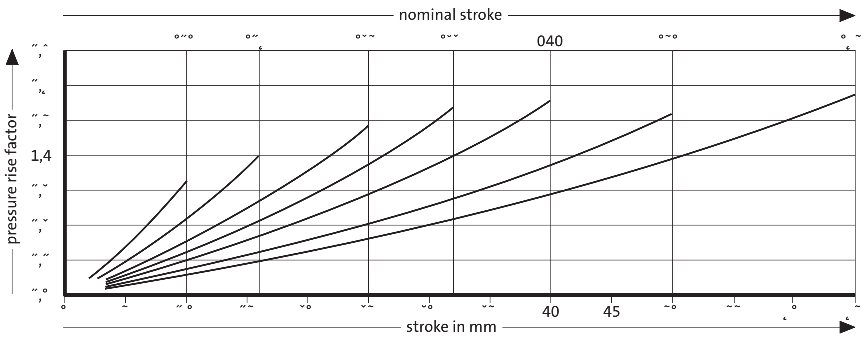
Order No	Stroke$_{max.}$	l$_{min.}$	l	g$_2$*
2490.14.03000.010	10	75	85	65
2490.14.03000.016	16	87	103	77
2490.14.03000.025	25	105	130	95
2490.14.03000.032	32	118	150	108
2490.14.03000.040	40	135	175	125
2490.14.03000.050	50	155	205	145
2490.14.03000.065	65	191	256	181

*see mounting example

Initial spring force versus charge pressure

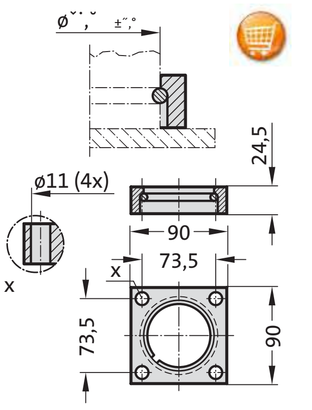


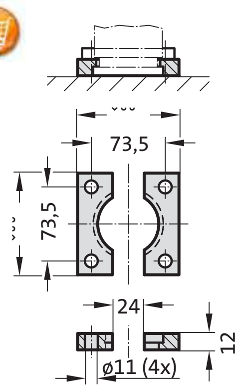
Spring force Diagram displacement versus stroke rise

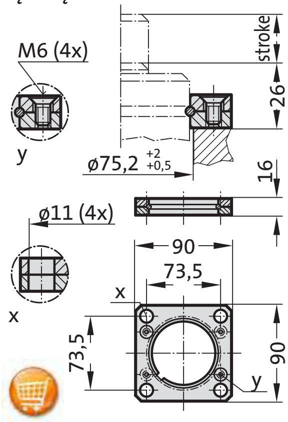


Pressure rise factor accounts for displacement but not external influences!

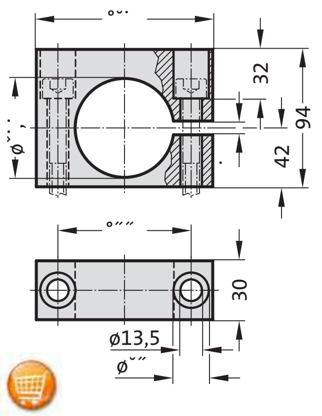
Compact gas spring
Mounting variations

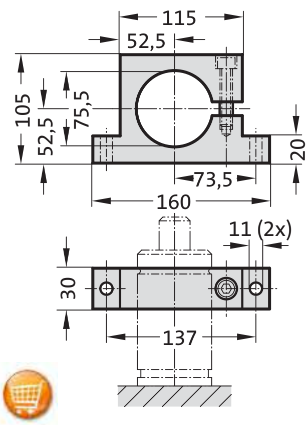






2480.044.03.01500 [2]

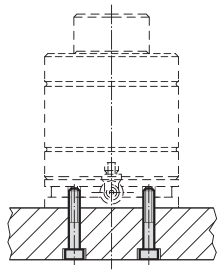




Note:

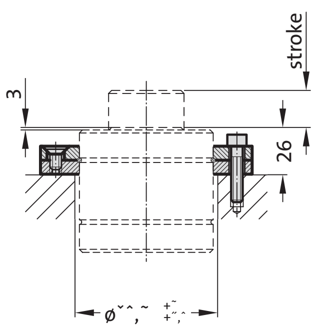
2) Attention:
The spring force must be absorbed by the stop surface!

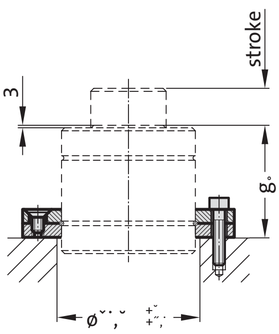
Mounting Example:

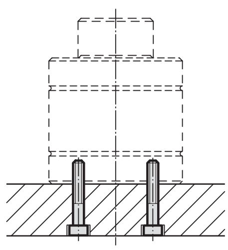


with Adapter Baseplate

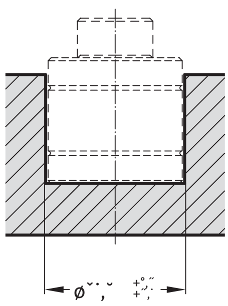
Mounting examples:

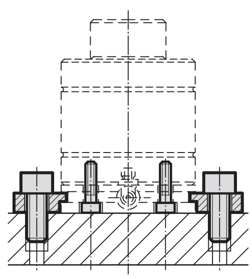






see Note!





with Adapter Baseplate

Compact gas spring

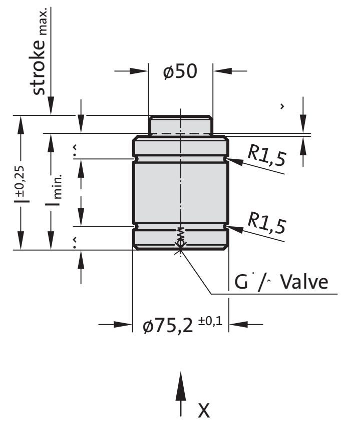
Note:
Initial spring force at 150 bar = 4700 daN

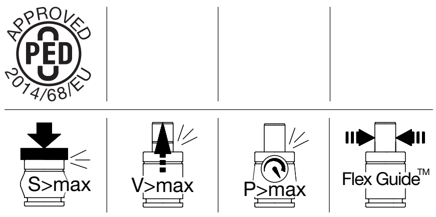
Order No for spare parts kit: 2490.14.04700

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

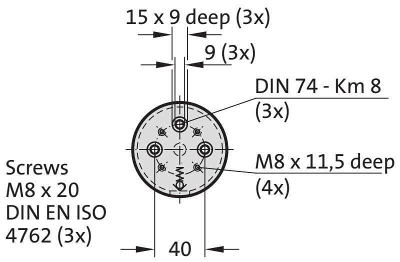
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 0.8 m/s

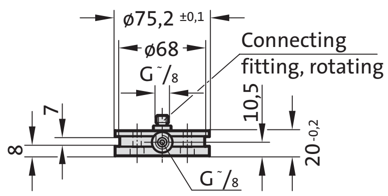
2490.14.04700.

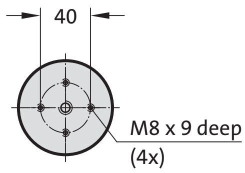




2480.00.20.04700
Adapter baseplate with connecting Fitting







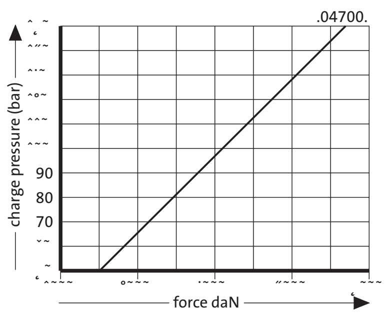
View X

2490.14.04700.
Compact gas spring

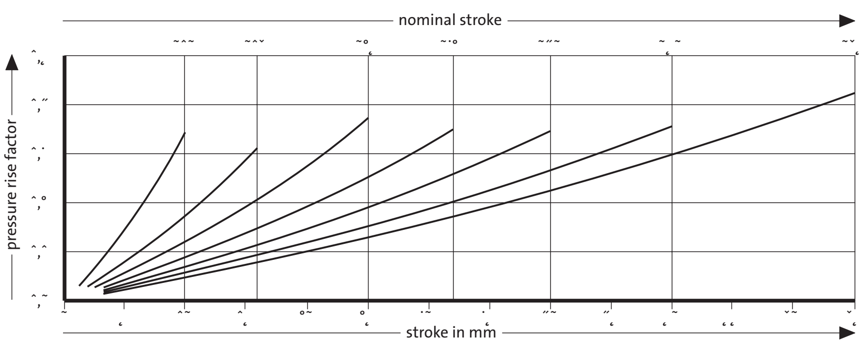
Order No	$Stroke_{max.}$	$l_{min.}$	l	g_2*
2490.14.04700.010	10	70	80	60
2490.14.04700.016	16	90	106	80
2490.14.04700.025	25	110	135	100
2490.14.04700.032	32	135	167	125
2490.14.04700.040	40	160	200	150
2490.14.04700.050	50	190	240	180
2490.14.04700.065	65	208	273	198

*see mounting example

Initial spring force versus charge pressure

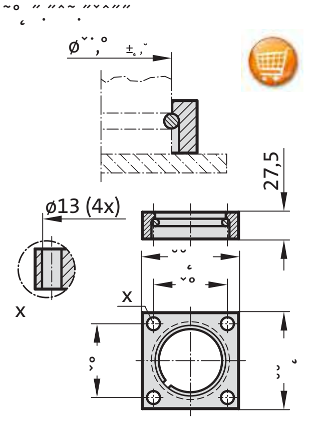


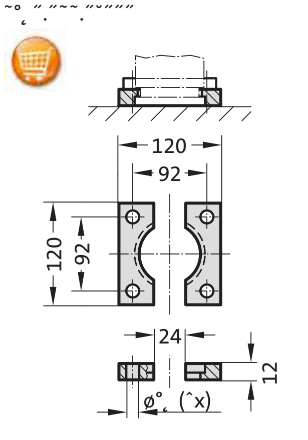
Spring force Diagram displacement versus stroke rise

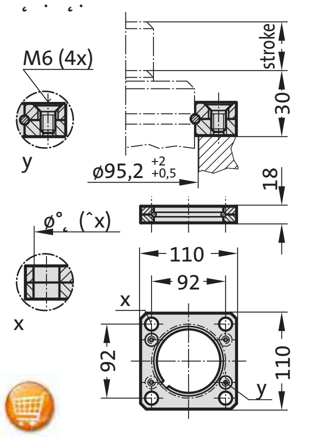


Pressure rise factor accounts for displacement but not external influences!

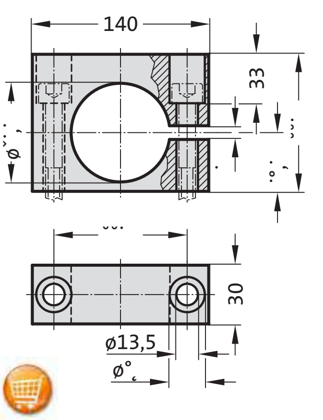
Compact gas spring
Mounting variations

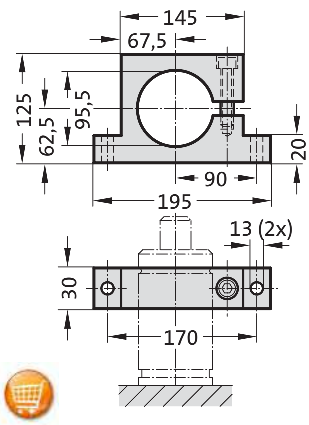






2480.044.03.03000 *)

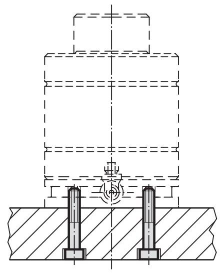




Note:

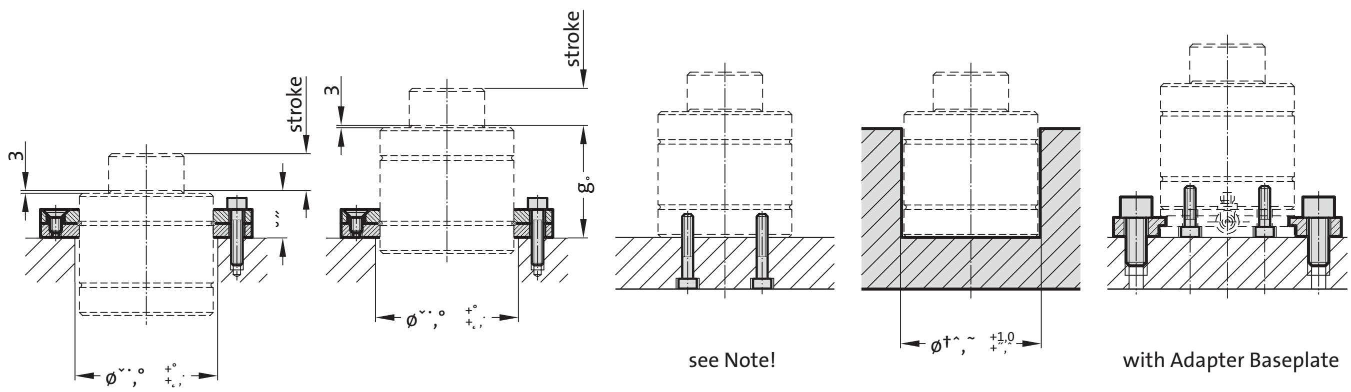
2) Attention:
The spring force must be absorbed by the stop surface!

Mounting Example:



with Adapter Baseplate

Mounting examples:



Compact gas spring

Note:

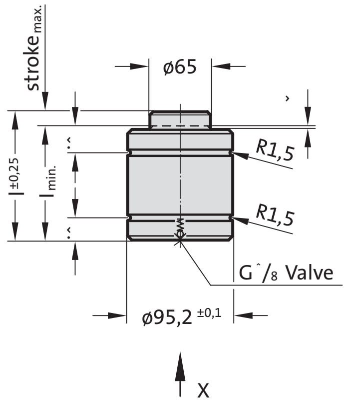
Initial spring force at 150 bar = 7500 daN

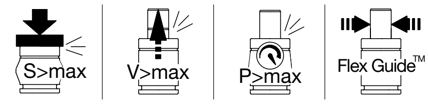
Order No for spare parts kit: 2490.14.07500

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 0.8 m/s

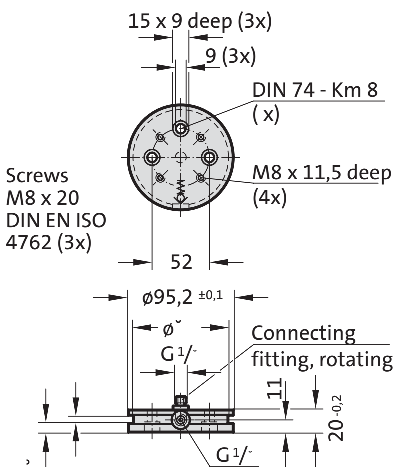
2490.14.07500.

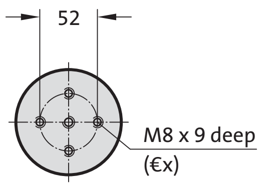




2480.00.20.07500

Adapter baseplate with connecting Fitting





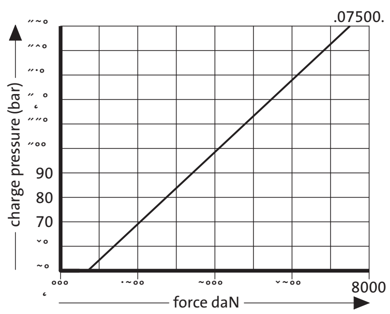
View X

2490.14.07500.
Compact gas spring

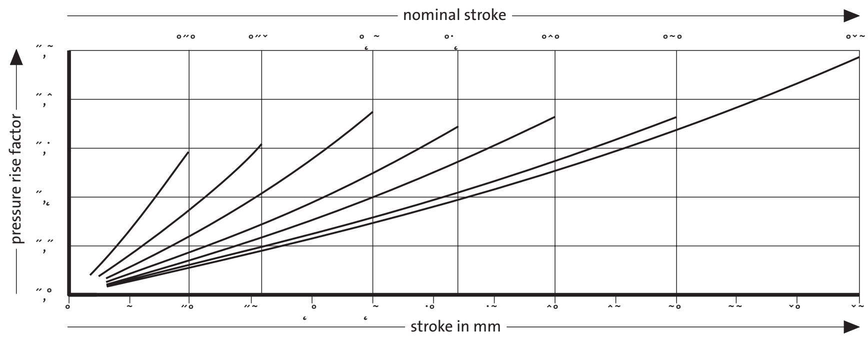
Order No	Stroke$_{max.}$	l$_{min.}$	l	g_2*
2490.14.07500.010	10	80	90	68
2490.14.07500.016	16	100	116	88
2490.14.07500.025	25	120	145	108
2490.14.07500.032	32	150	182	138
2490.14.07500.040	40	170	210	158
2490.14.07500.050	50	205	255	193
2490.14.07500.065	65	214	279	202

*see mounting example

Initial spring force
versus charge pressure

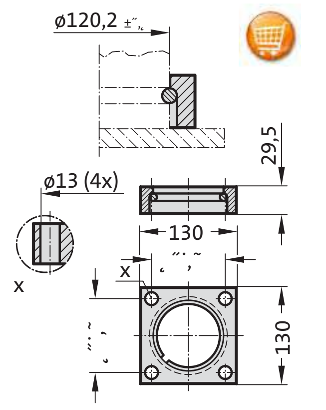


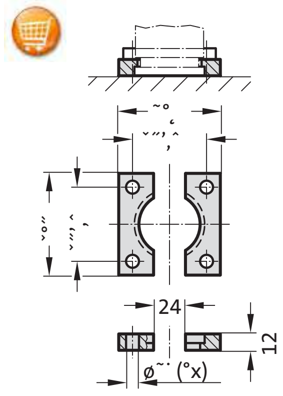
Spring force Diagram displacement versus stroke rise



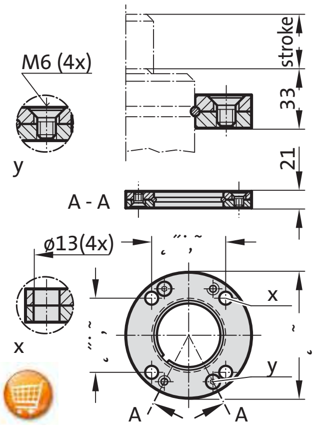
Pressure rise factor accounts for displacement but not external influences!

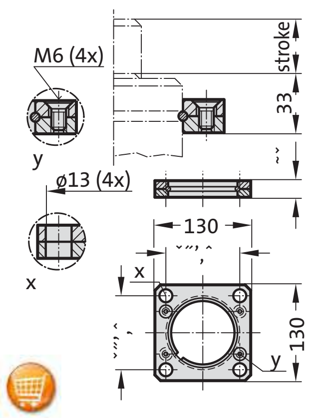
Compact gas spring
Mounting variations





2480.055.05000





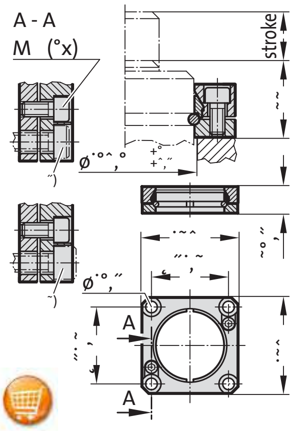
Note:

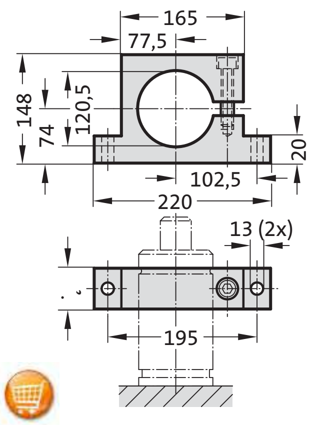
2) Attention:
The spring force must be absorbed by the stop surface!

4) Square collar flange, non-rotating, fixing for composite connection.

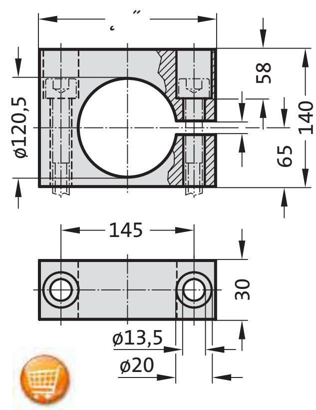
5) Machine screws with hexagonal socket (compact head recommended)

2480.064.05000

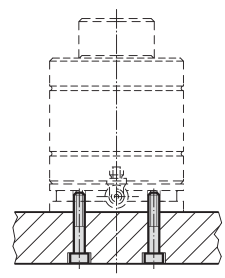




2480.044.03.05000 2)

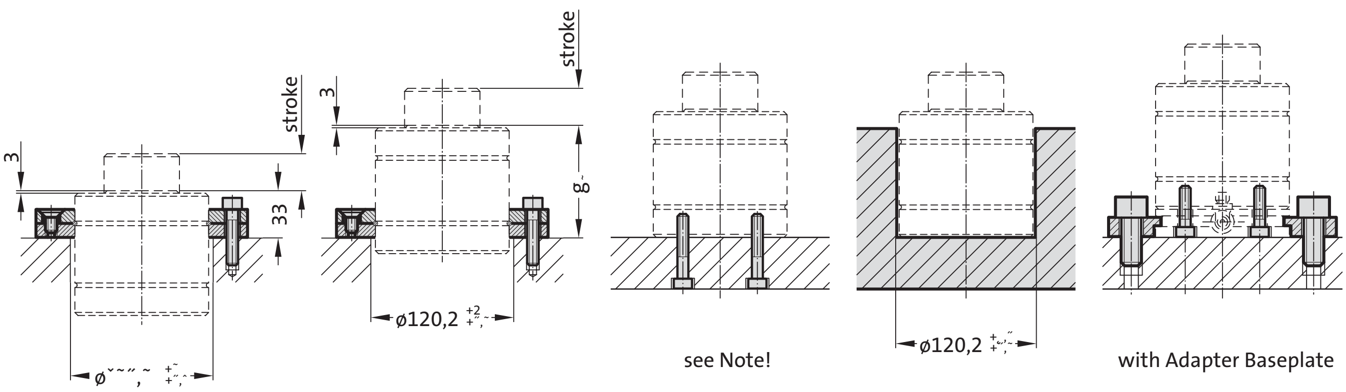


Mounting Example:



with Adapter Baseplate

Mounting examples:



Compact gas spring

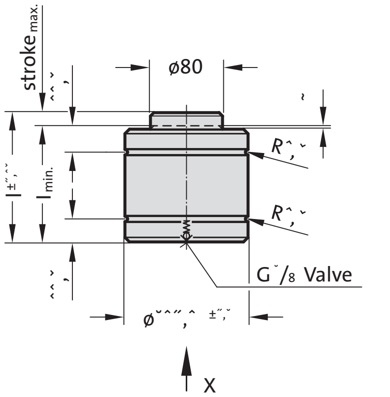
Note:
Initial spring force at 150 bar = 11800 daN

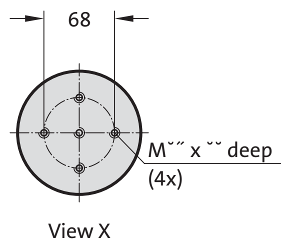
Order No for spare parts kit: 2490.14.11800

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

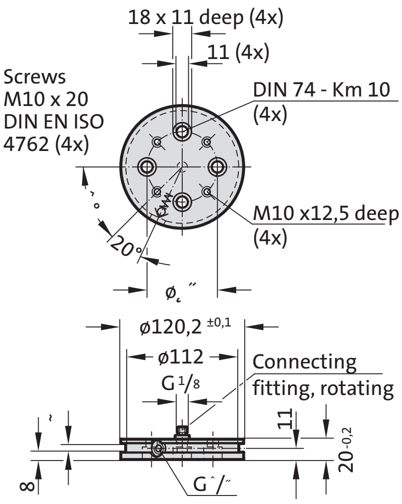
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 0.8 m/s

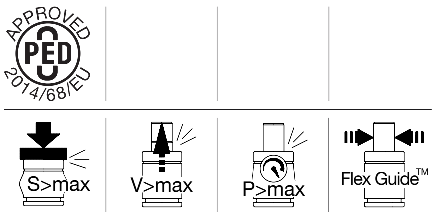
2490.14.11800.





2480.00.20.11800
Adapter baseplate with connecting Fitting



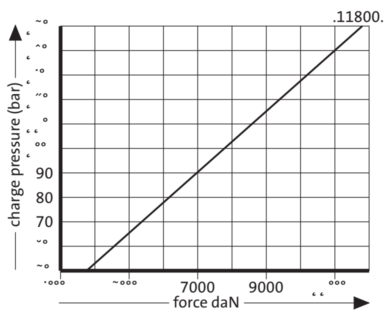


2490.14.11800.
Compact gas spring

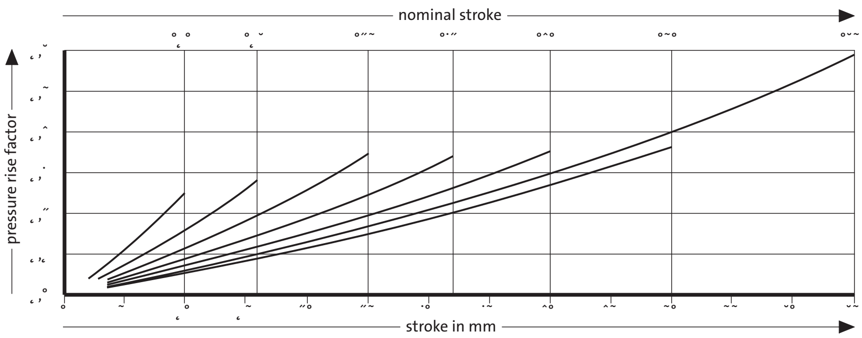
Order No	Stroke$_{max.}$	l$_{min.}$	l	g$_2$*
2490.14.11800.010	10	90	100	78
2490.14.11800.016	16	110	126	98
2490.14.11800.025	25	130	155	118
2490.14.11800.032	32	155	187	143
2490.14.11800.040	40	180	220	168
2490.14.11800.050	50	210	260	198
2490.14.11800.065	65	255	320	243

*see mounting example

Initial spring force versus charge pressure

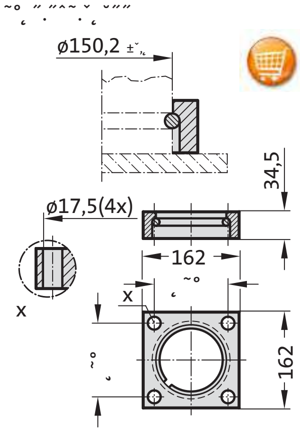


Spring force Diagram displacement versus stroke rise

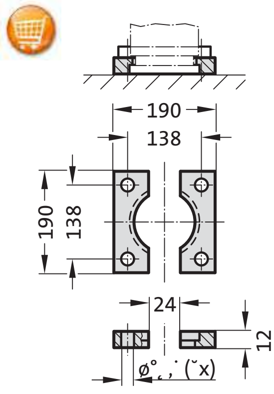


Pressure rise factor accounts for displacement but not external influences!

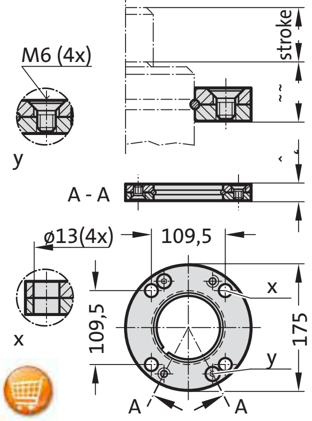
Compact gas spring
Mounting variations



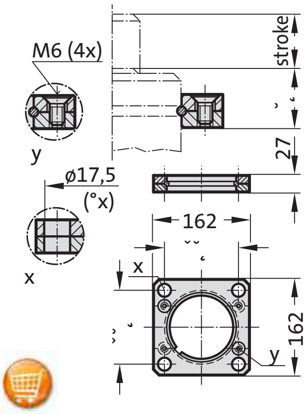
2480.022.07500



2480.055.05000



2480.057.07500



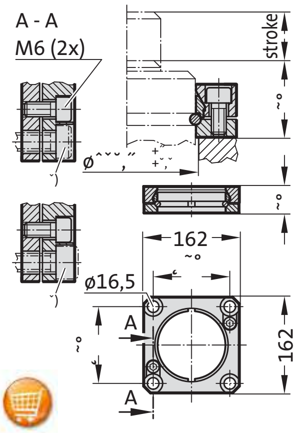
Note:

2) Attention:
The spring force must be absorbed by the stop surface!

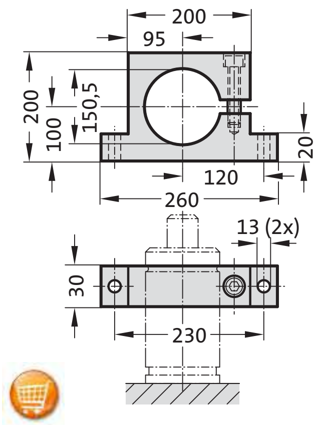
4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

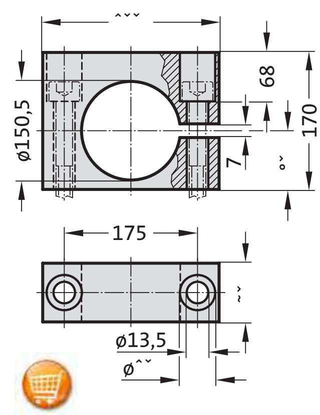
2480.064.07500



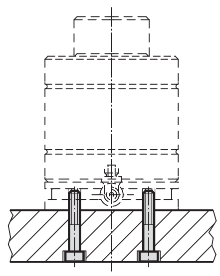
2480.044.07500



2480.044.03.07500

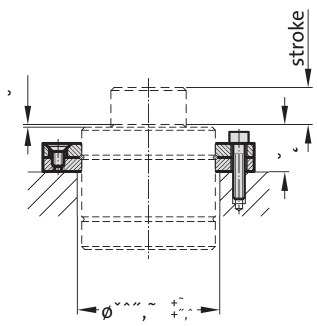


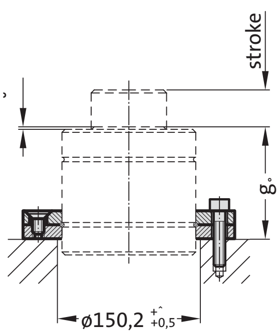
Mounting Example:

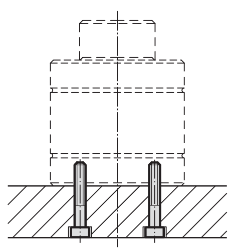


with Adapter Baseplate

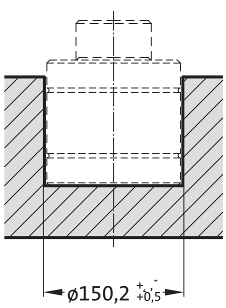
Mounting examples:

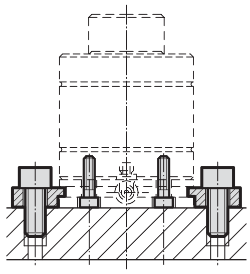






see Note!





with Adapter Baseplate

Compact gas spring

Note:

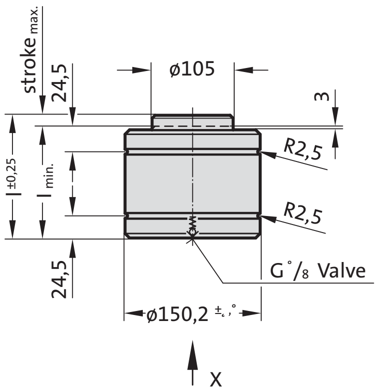
Initial spring force at 150 bar = 18300 daN

Order No for spare parts kit: 2490.14.18300

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!
Before fitting the adapter base plate remove the valve from the gas spring.
If vibration occurs, tighten the fixing screws accordingly.

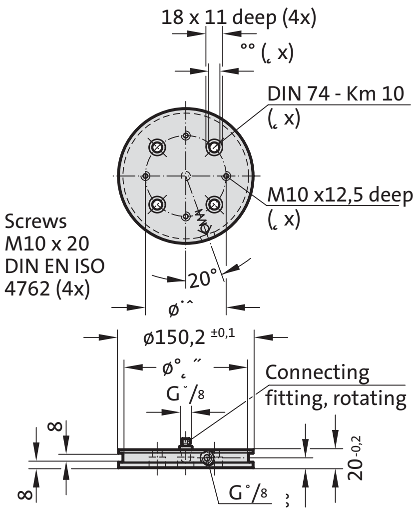
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 0.8 m/s

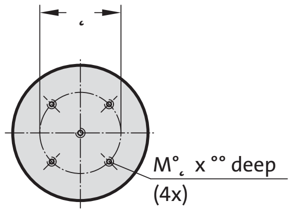
2490.14.18300.

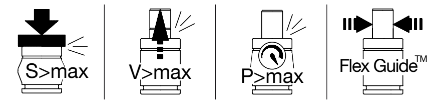


2480.00.20.18300

Adapter baseplate with connecting Fitting





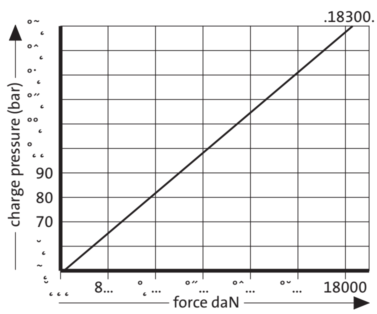


2490.14.18300.
Compact gas spring

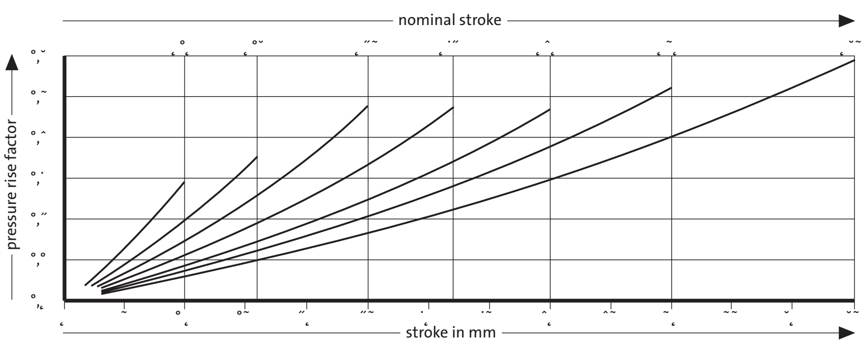
Order No	$Stroke_{max.}$	$l_{min.}$	l	g_2*
2490.14.18300.010	10	100	110	89
2490.14.18300.016	16	120	136	109
2490.14.18300.025	25	140	165	129
2490.14.18300.032	32	165	197	154
2490.14.18300.040	40	195	235	184
2490.14.18300.050	50	220	270	209
2490.14.18300.065	65	258	323	247

*see mounting example

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



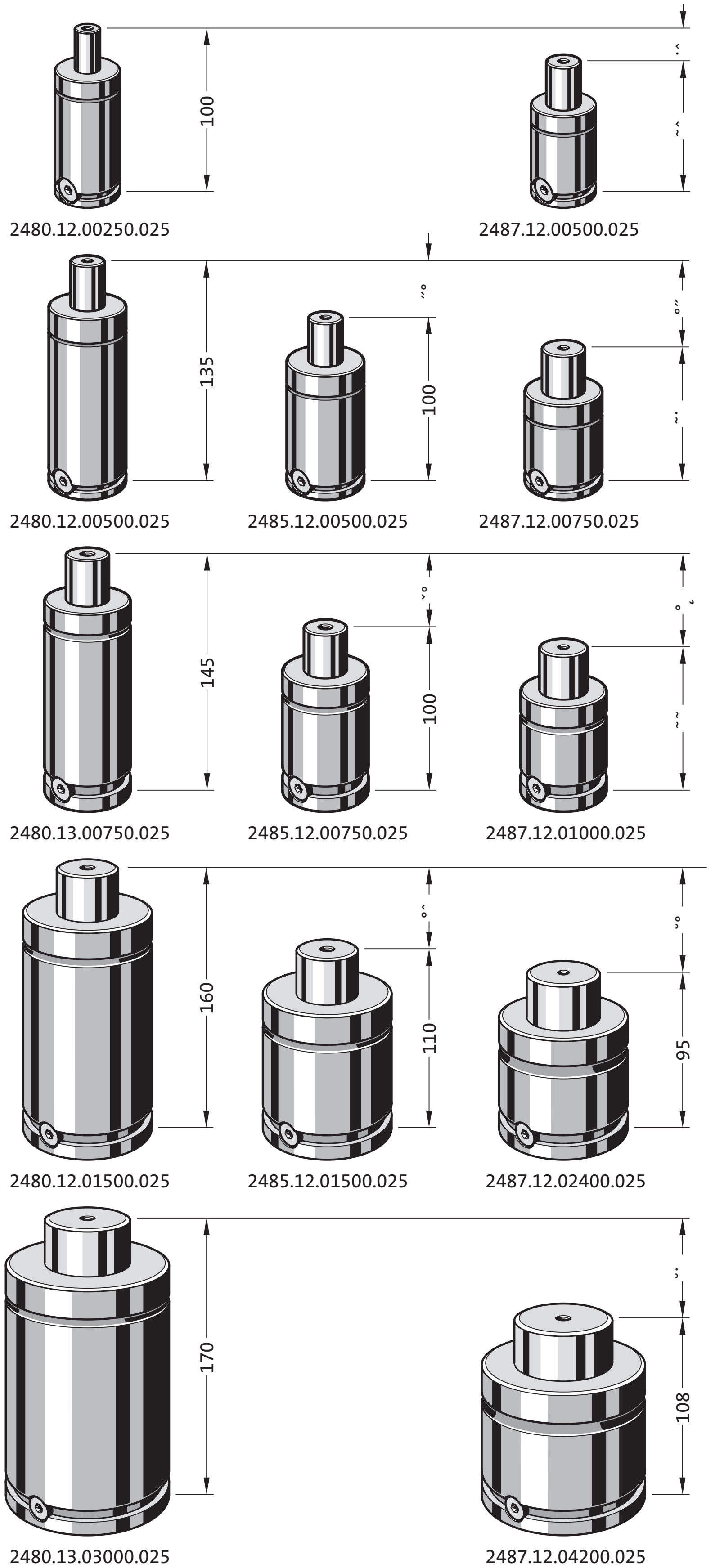
Pressure rise factor accounts for displacement but not external influences!

Gas springs low build height

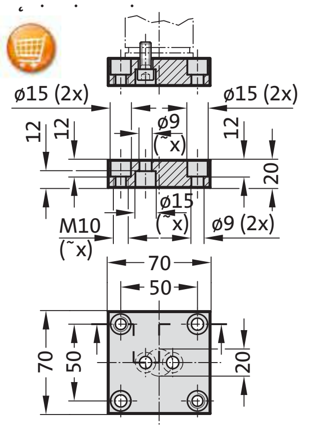
Gas spring, with low build height

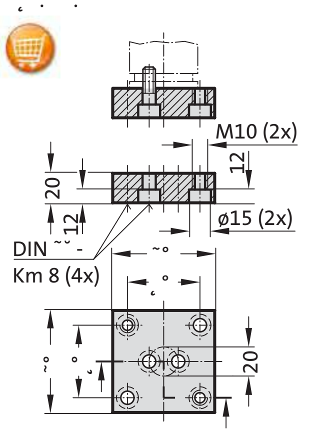
Normal construction | Compact construction | POWER LINE

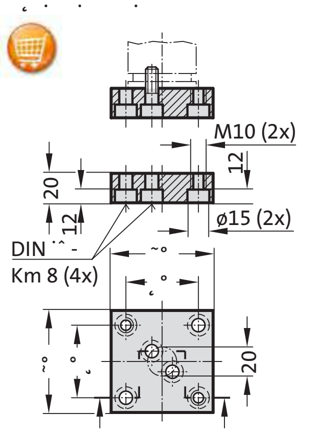
Construction heights with the same stroke and the same / increased spring force

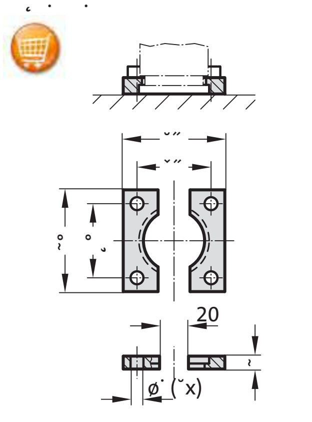


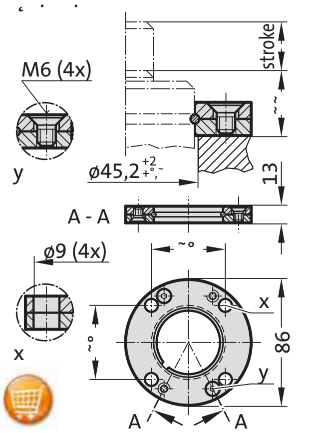
Gas spring, with low build height
Mounting variations

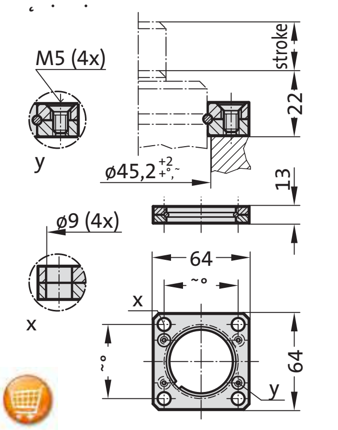


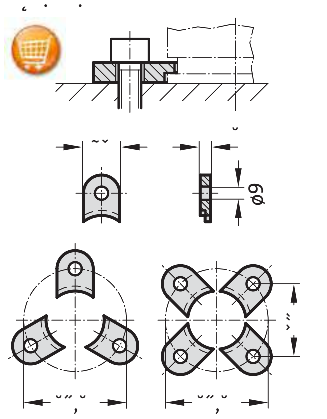


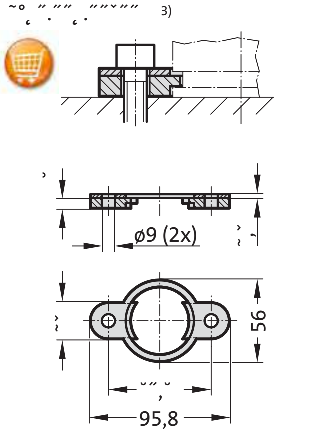




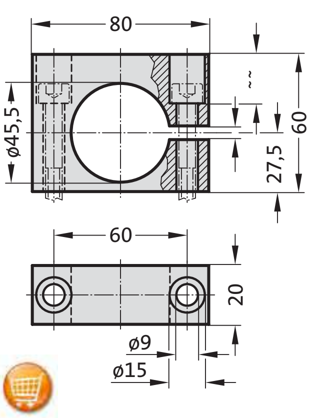


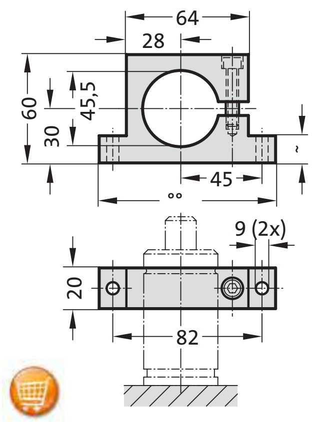




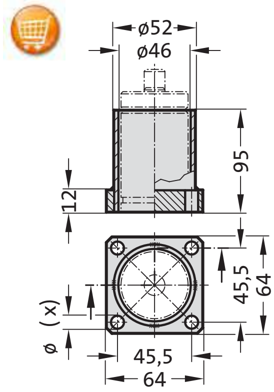


2480.044.03.00500

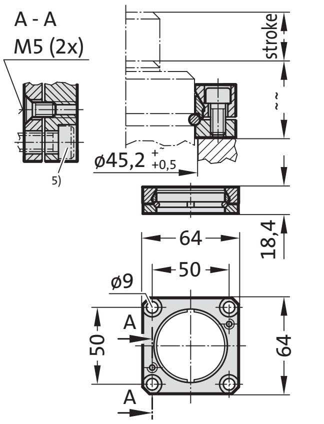




2480.010.00500.095 [3]



2480.064.00500



Note:

[2] Attention:
The spring force must be absorbed by the stop surface!

[3] Not for use with composite connection.

Gas spring, with low build height

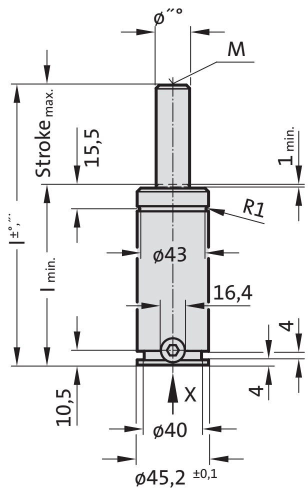
Note:

Initial spring force at 150 bar = 470 daN

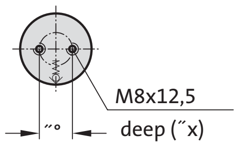
Order No for spare parts kit: 2485.12.00500

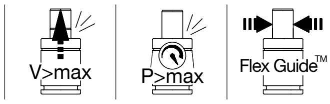
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 80 (at 20°C)
Max. piston speed: 1.6 m/s

2485.12.00500.



View X - Gas spring

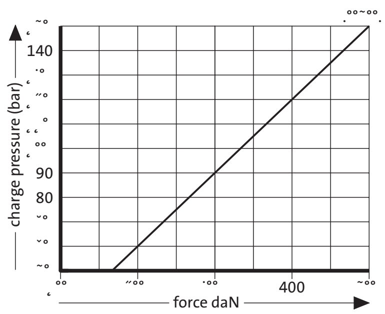




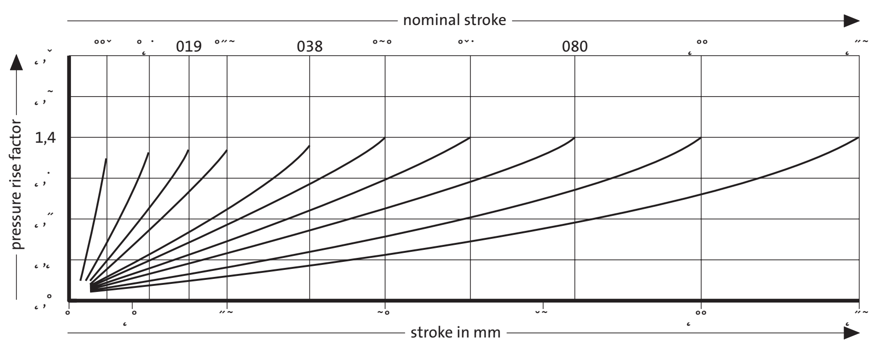
2485.12.00500.
Gas spring, with low build height

Order No	Stroke$_{max.}$	l$_{min.}$	l
2485.12.00500.006	6	56	62
2485.12.00500.013	12.7	62.7	75.4
2485.12.00500.019	19	69.1	88.1
2485.12.00500.025	25	75	100
2485.12.00500.038	38.1	88.1	126.2
2485.12.00500.050	50	100	150
2485.12.00500.063	63.5	113.5	177
2485.12.00500.080	80	130	210
2485.12.00500.100	100	150	250
2485.12.00500.125	125	175	300

Initial spring force versus charge pressure



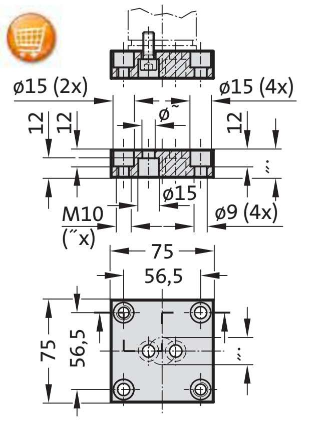
Spring force Diagram displacement versus stroke rise

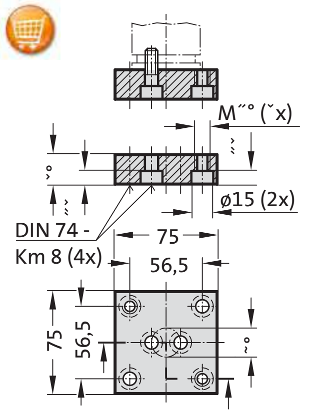


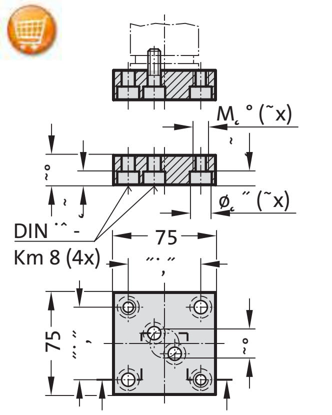
Pressure rise factor accounts for displacement but not external influences!

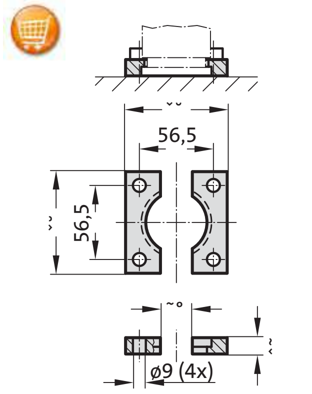
Gas spring, with low build height
Mounting variations

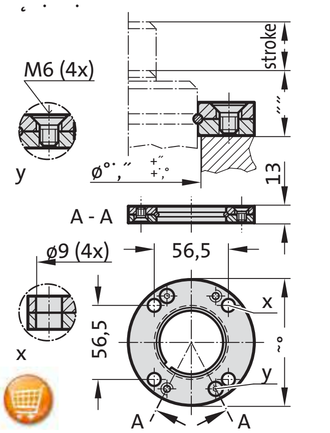
2480.011.00750.3

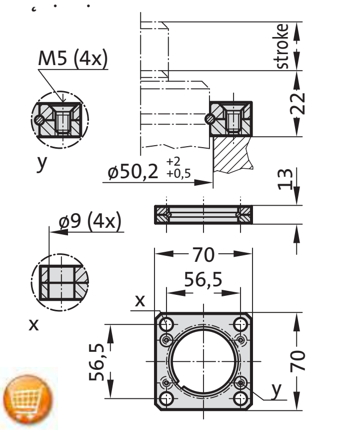


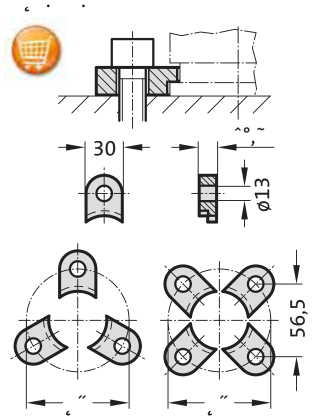


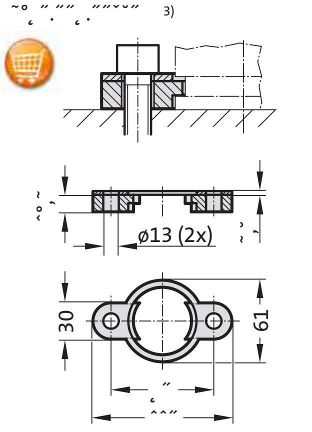












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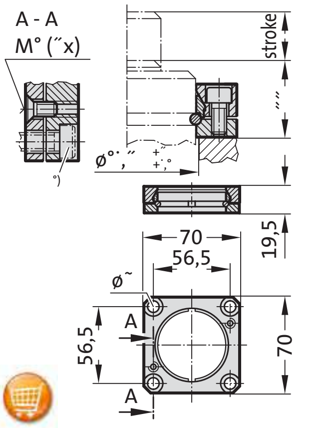

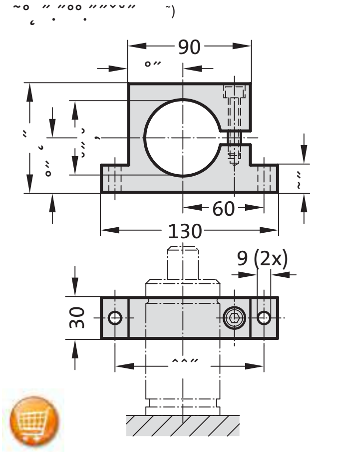

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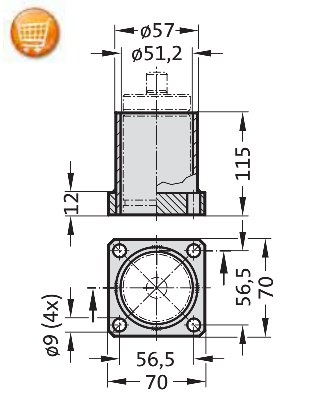

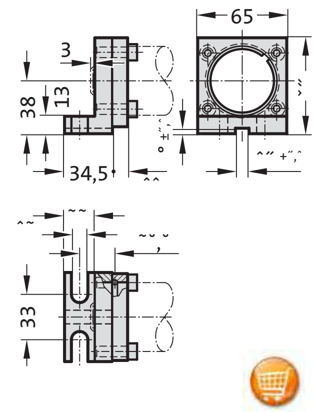

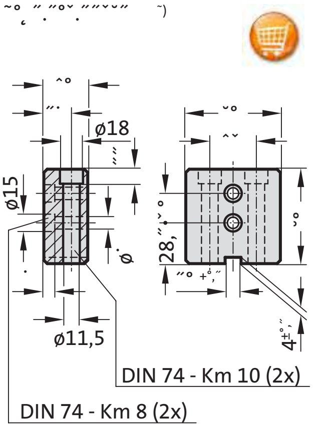

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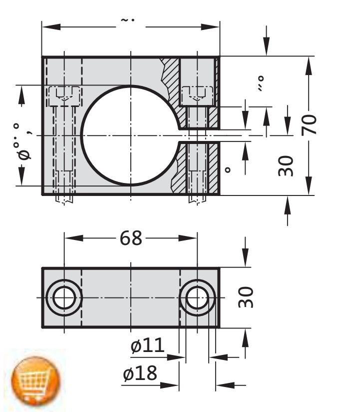


Note:

[2] Attention:
The spring force must be absorbed by the stop surface!

[3] Not for use with composite connection.

[4] Square collar flange, non-rotating, fixing for composite connection.

[5] Machine screws with hexagonal socket (compact head recommended)

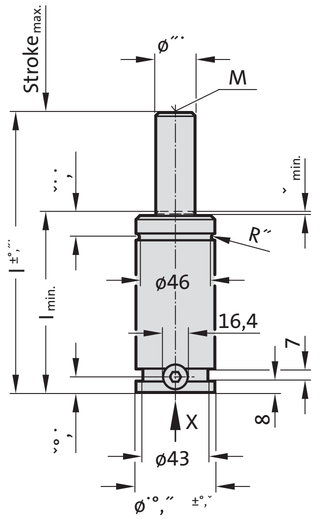
Gas spring, with low build height

Note:
Initial spring force at 150 bar = 750 daN

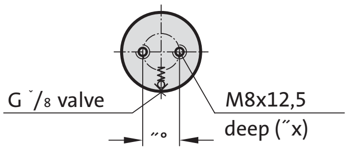
Order No for spare parts kit: 2485.12.00750

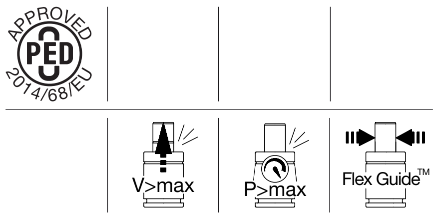
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

2485.12.00750.



View X - Gas spring

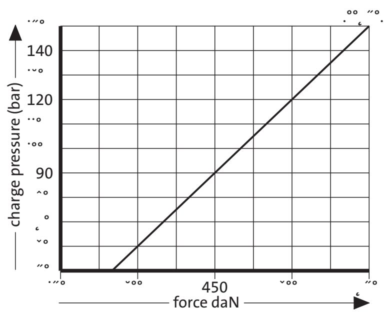




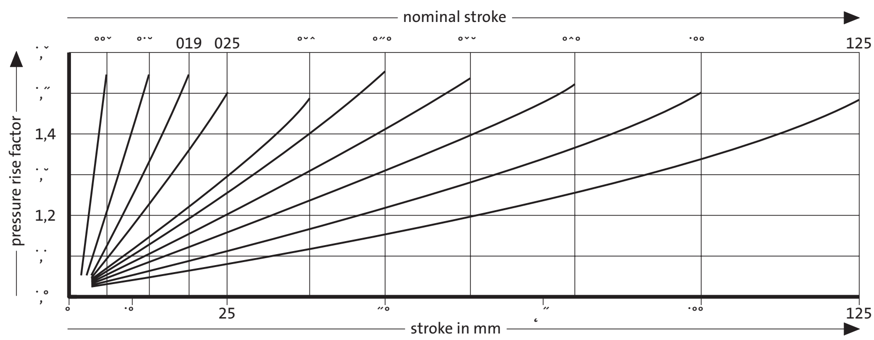
2485.12.00750.
Gas spring, with low build height

Order No	Stroke max.	l min.	l
2485.12.00750.006	6	56	62
2485.12.00750.013	12.7	62.7	75.4
2485.12.00750.019	19	69.1	88.1
2485.12.00750.025	25	75	100
2485.12.00750.038	38.1	88.1	126.2
2485.12.00750.050	50	100	150
2485.12.00750.063	63.5	113.5	177
2485.12.00750.080	80	130	210
2485.12.00750.100	100	150	250
2485.12.00750.125	125	175	300

Initial spring force
versus charge pressure



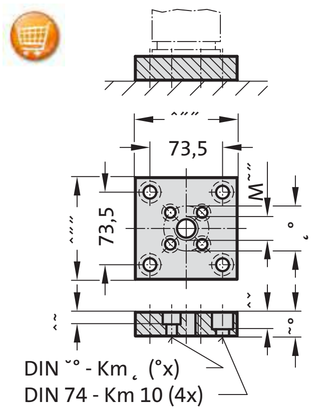
Spring force Diagram displacement versus stroke rise

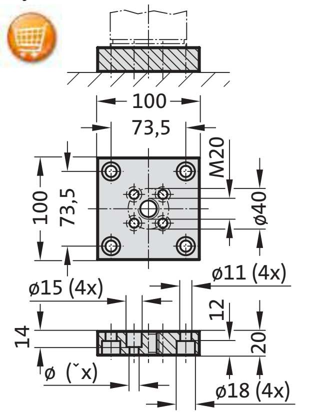


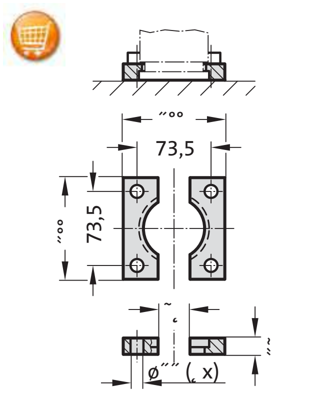
Pressure rise factor accounts for displacement but not external influences!

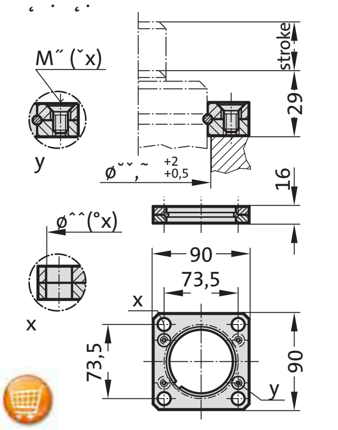
FIBRO

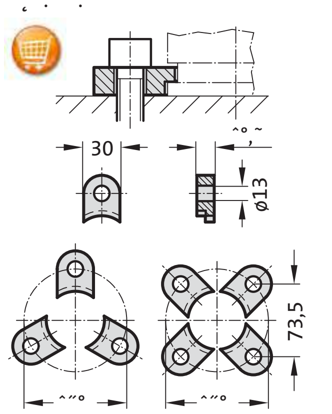
Gas spring, with low build height
Mounting variations

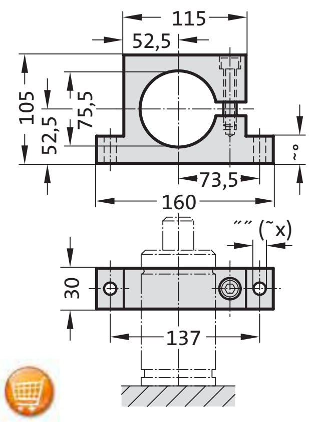




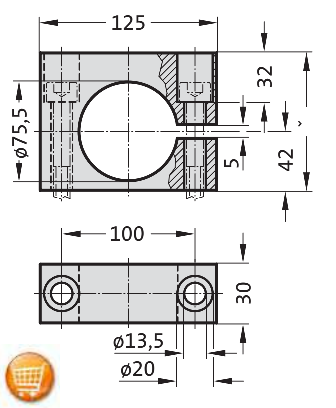








2480.044.03.01500 [2]



Note:

[2] Attention:
The spring force must be absorbed by the stop surface.

subject to alterations

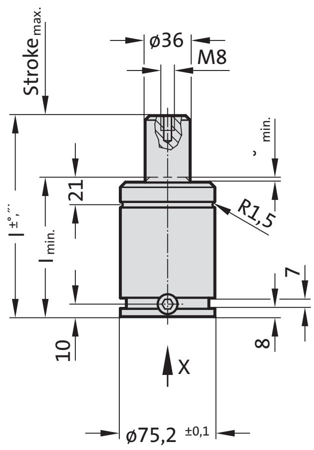
Gas spring, with low build height

Note:
Initial spring force at 150 bar = 1500 daN

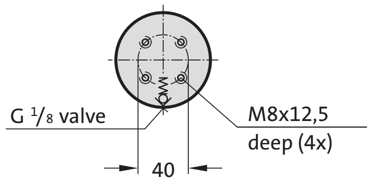
Order No for spare parts kit: 2485.12.01500

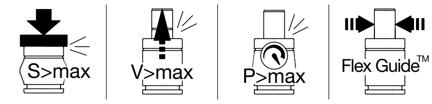
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

2485.12.01500.



View X - Gas spring

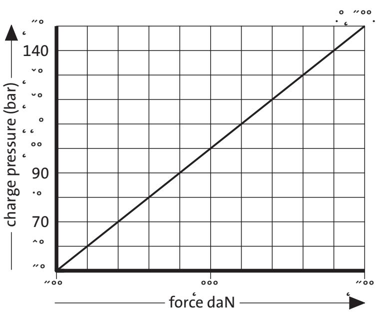




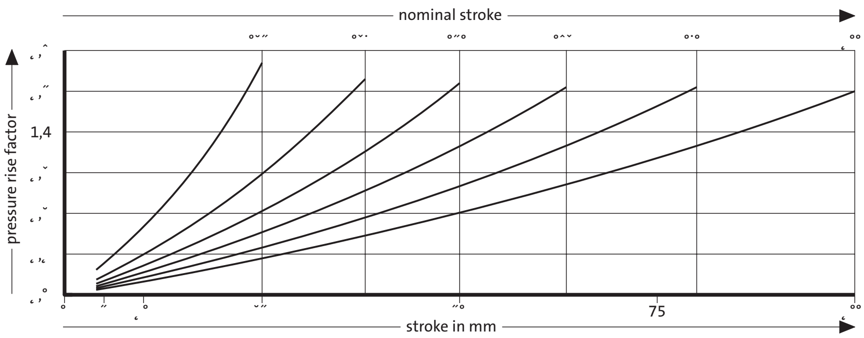
2485.12.01500.
Gas spring, with low build height

Order No	Stroke$_{max.}$	l$_{min.}$	l
2485.12.01500.025	25	85	110
2485.12.01500.038	38.1	98.1	136.2
2485.12.01500.050	50	110	160
2485.12.01500.063	63.5	123.5	187
2485.12.01500.080	80	140	220
2485.12.01500.100	100	160	260

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

»Speed Control™«, Gas springs, SPC, cushioned

SPC gas spring, cushioned

Description

FIBRO SPC gas springs »Speed Control™« have been engineered to reduce or eliminate blank holder bounce; commonly associated with increased return stroke speeds form link drive presses.

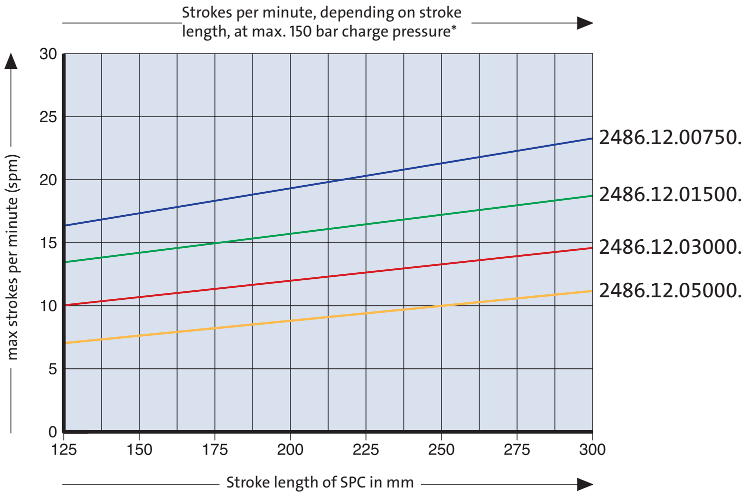
SPC gas springs have inbuilt return stroke speed dampening, which decelerates the last 30 mm of piston rod stroke to 0.4 m/s, helping to bring the blank holder to a smooth stop.

Benefits of the »Speed Control™« SPC gas springs, cushioned:

- Eliminates blank holder bounce
- Increases productivity by more increasing part transfer efficiency.
- Easily retrofitted to existing dies
- Stroke lengths 125 t o 300 mm.
- Linkable using hose system.

SPC gas spring, cushioned

Performance



The diagram shows the max. possible number of strokes per minutes [min^{-1}] of SPC gas springs with a max. filling pressure (150 bar) and max. used stroke lengths before there is a risk of excessive heating.

Note !

The number of strokes per minutes can be doubled by halving the initial filling pressure.

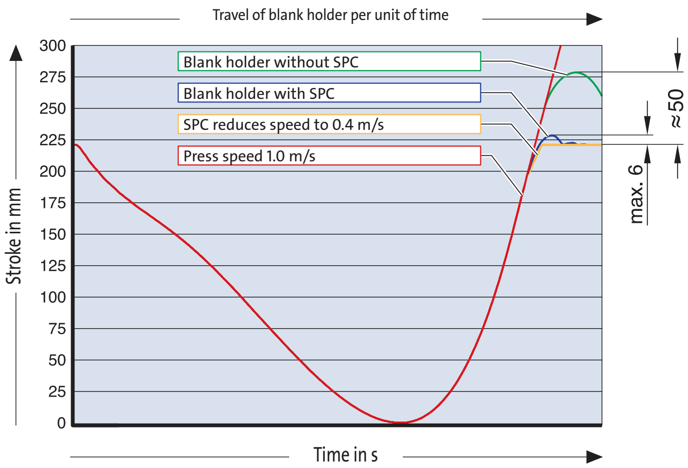
Caution !

SPC gas springs are subject to a higher heating than standard gas springs.

For this reason, please ensure adequate ventilation of the SPC gas springs in the tool.

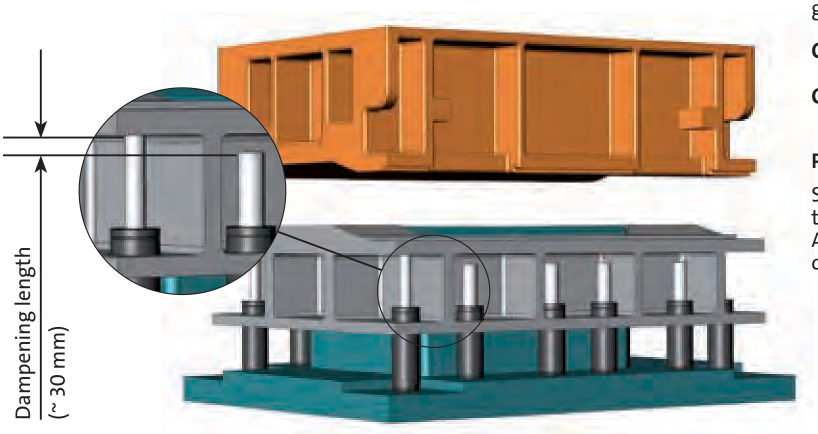
*At ambient room temperature with free air flow

Function example



»Speed Control™« SPC gas springs gave a 90% reduction of blank holder bounce.

Installation



It is important that approx. 25 to 30 mm before the sheet metal retainer has reached its home position, only SPC gas springs are applied. Therefore, for the retrofitting of existing tools with SPC gas springs we recommend the following two options:

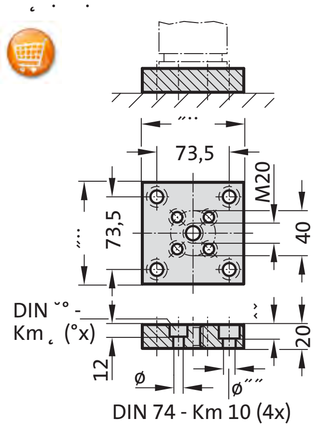
Option 1 – replace all gas springs with SPC gas springs

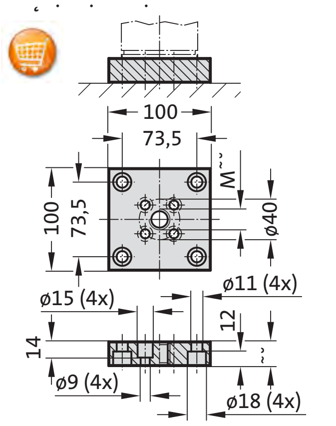
Option 2 – corner solution (see below)

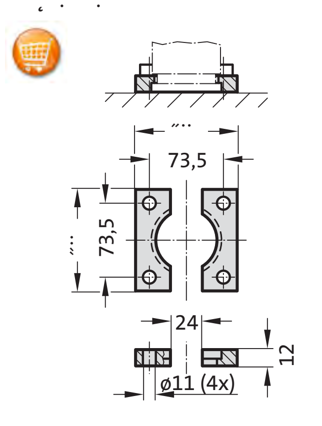
Please note:

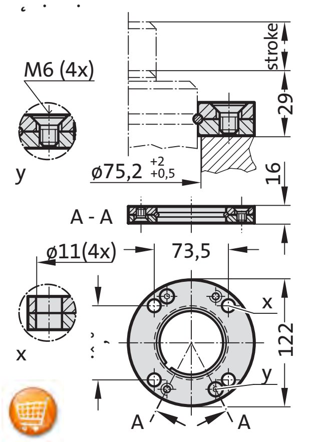
Springs must be installed with a recess of 25 mm to balance the total length difference (2 x stroke length = 50 mm). Alternatively, the contact surface of the sheet metal retainer can be recessed in order to achieve the same effect.

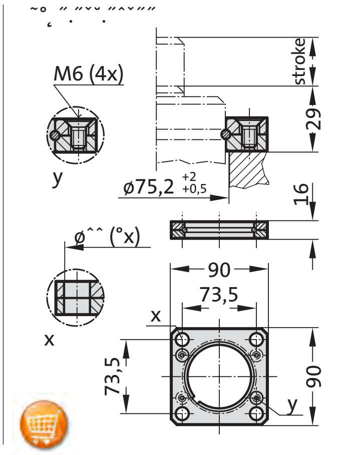
Gas spring SPEED CONTROL, cushioned
Mounting variations

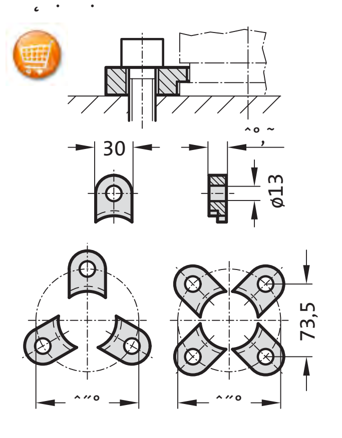


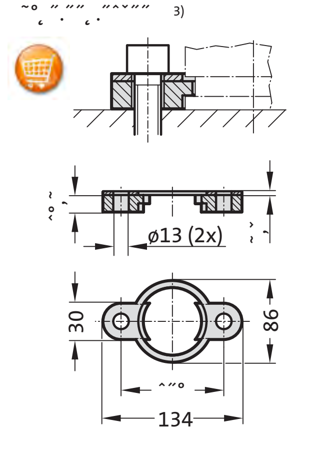




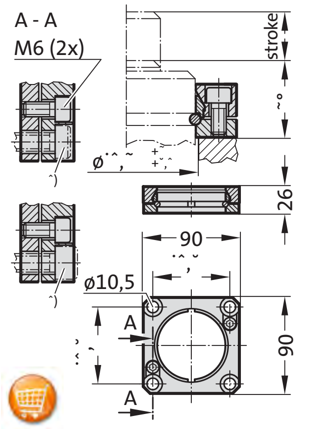


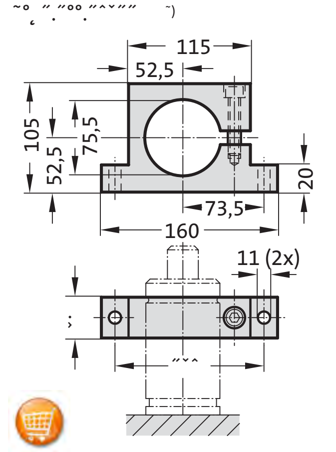


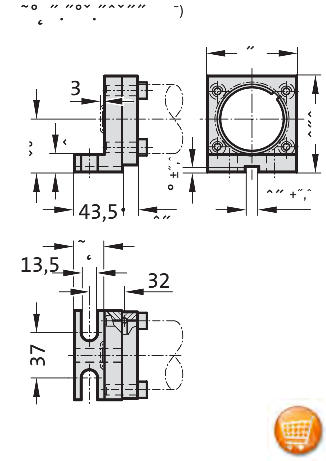


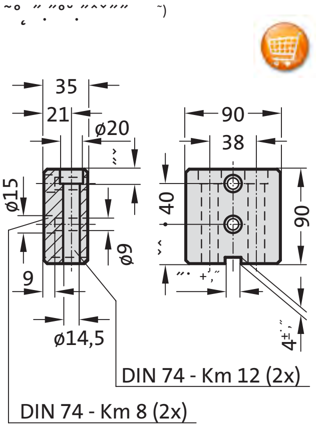


2480.064.01500 ⁵)

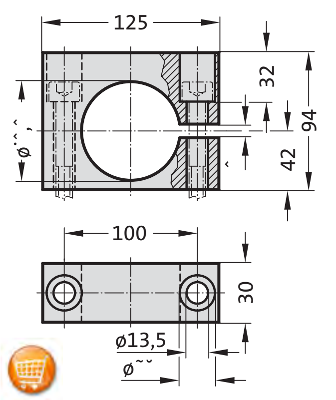








2480.044.03.01500 ⁵)



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended).

Gas spring SPEED CONTROL, cushioned

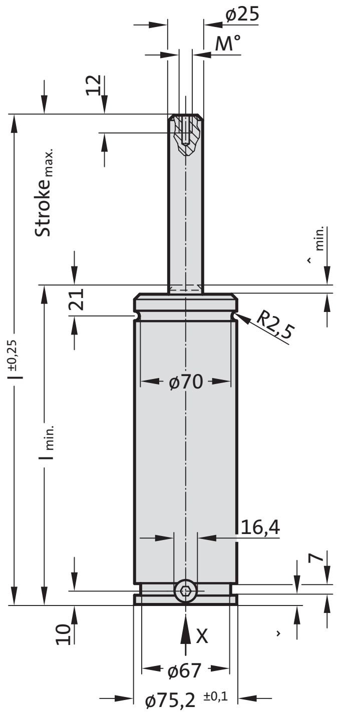
Note:

Initial spring force at 150 bar = 750 daN

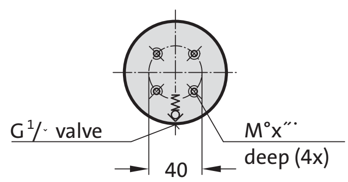
Order No for spare parts kit: 2486.12.00750

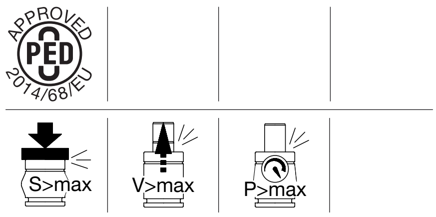
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 16 to 24 (at 20°C)
Dampening length: ~ 30 mm
Piston rod speed, decelerated: 0.4 m/s

2486.12.00750.



View X - Gas spring

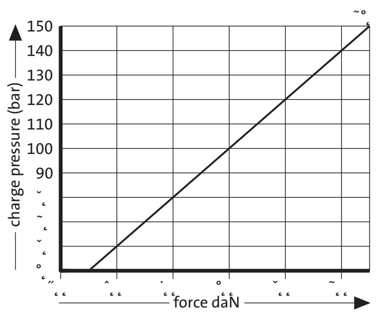




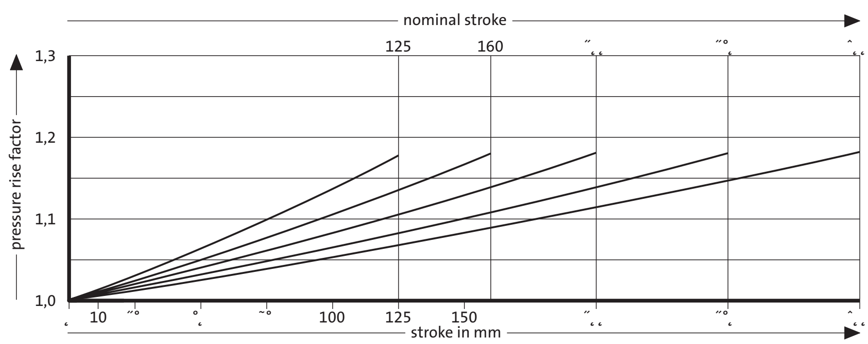
2486.12.00750.
Gas spring SPEED CONTROL, cushioned

Order No	Stroke$_{max.}$	l$_{min.}$	l
2486.12.00750.125	125	235	360
2486.12.00750.160	160	270	430
2486.12.00750.200	200	310	510
2486.12.00750.250	250	360	610
2486.12.00750.300	300	410	710

Initial spring force
versus charge pressure

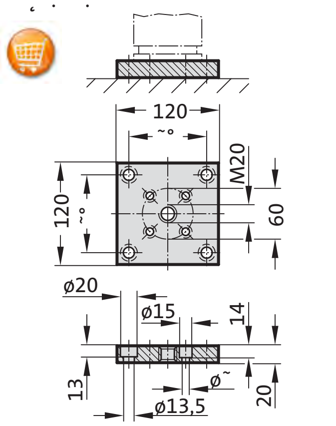


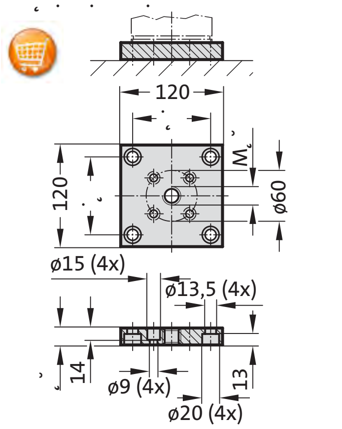
Spring force Diagram displacement versus stroke rise

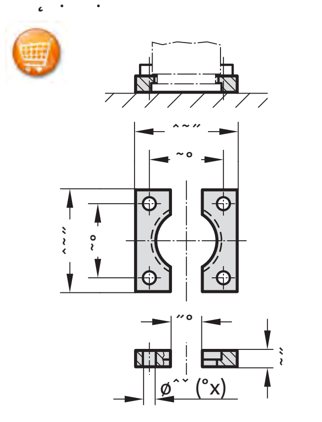


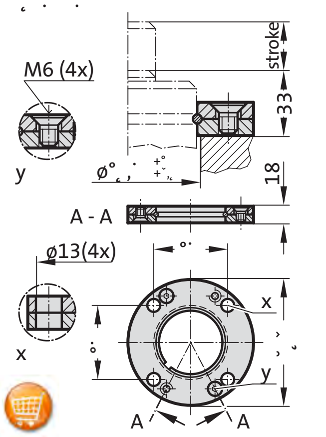
Pressure rise factor accounts for displacement but not external influences!

Gas spring SPEED CONTROL, cushioned
Mounting variations

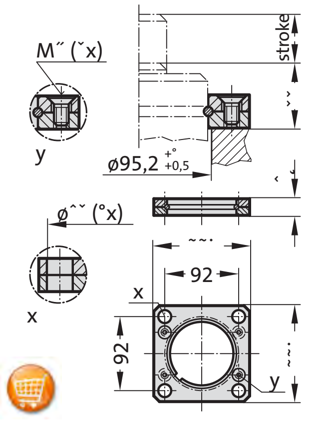




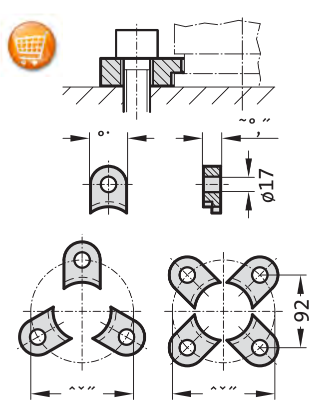


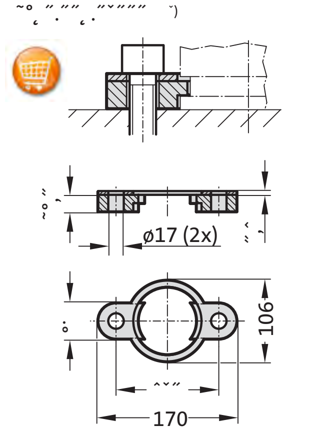


2480.057.03000

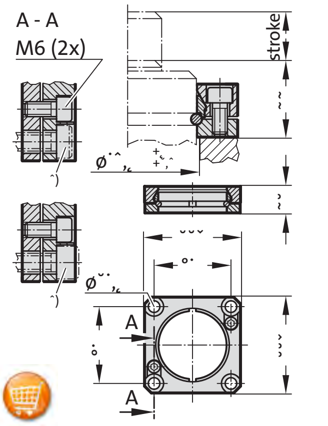


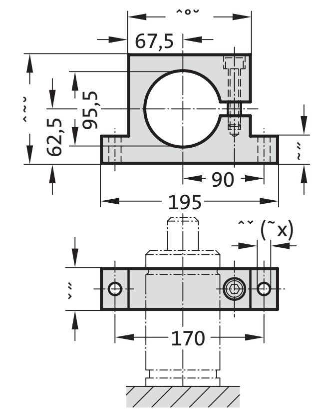
2480.007.03000

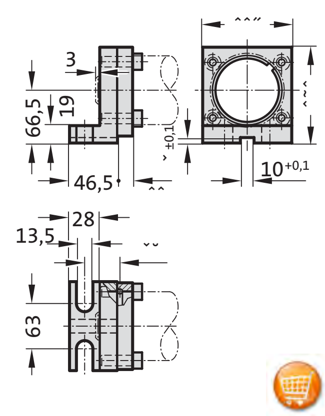




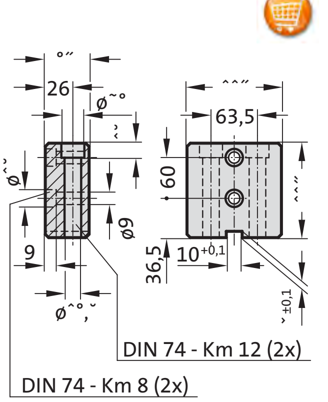
2480.064.03000 ³⁾



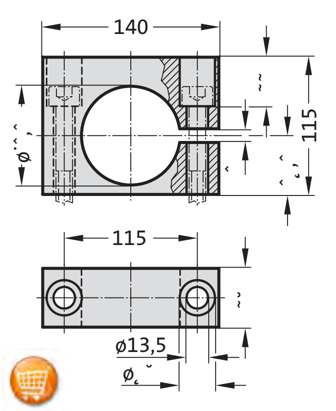




2480.047.03000 ³⁾



2480.044.03.03000



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended).

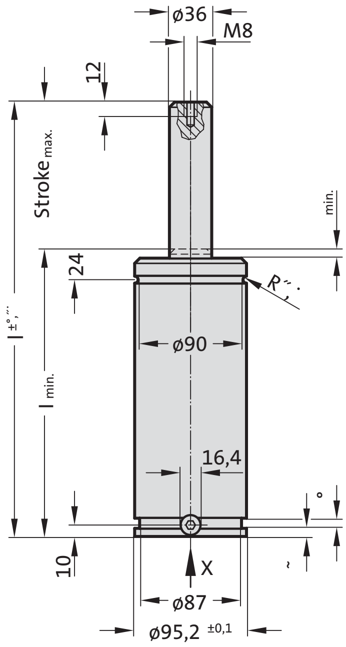
Gas spring SPEED CONTROL, cushioned

Note:
Initial spring force at 150 bar = 1500 daN

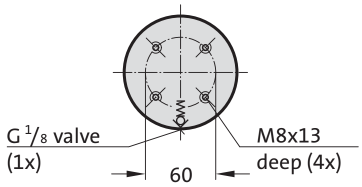
Order No for spare parts kit: 2486.12.01500

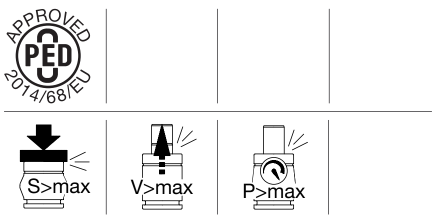
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 14 to 19 (at 20°C)
Dampening length: ~ 30 mm
Piston rod speed, decelerated: 0.4 m/s

2486.12.01500.



View X - Gas spring

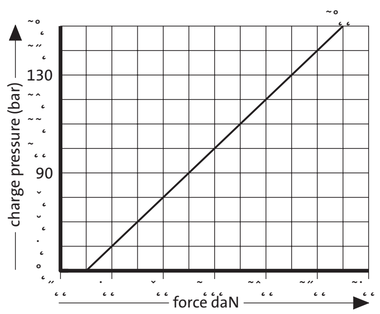




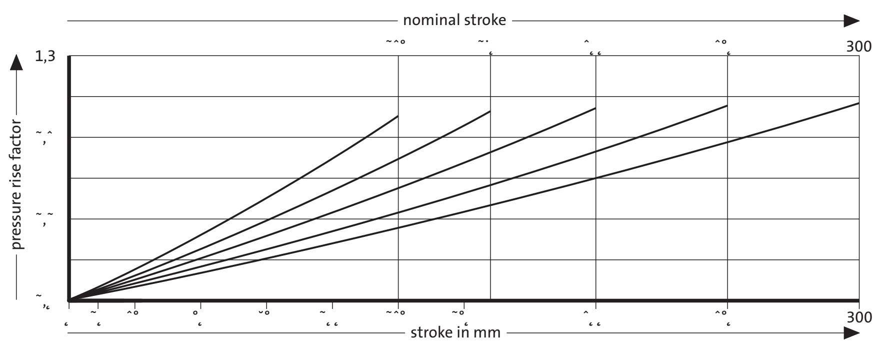
2486.12.01500.
Gas spring SPEED CONTROL, cushioned

Order No	Stroke$_{max.}$	l$_{min.}$	l
2486.12.01500.125	125	245	370
2486.12.01500.160	160	280	440
2486.12.01500.200	200	320	520
2486.12.01500.250	250	370	620
2486.12.01500.300	300	420	720

Initial spring force
versus charge pressure



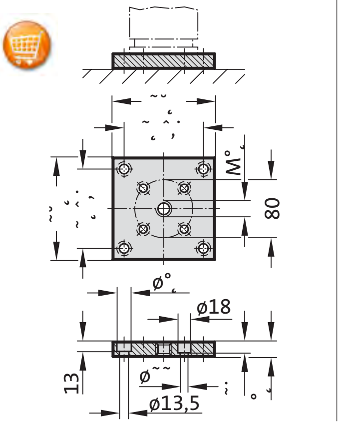
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas spring SPEED CONTROL, cushioned
Mounting variations

2480.011.05000



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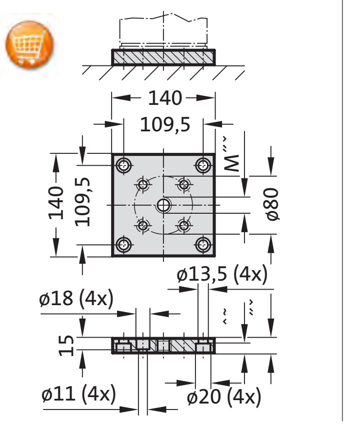

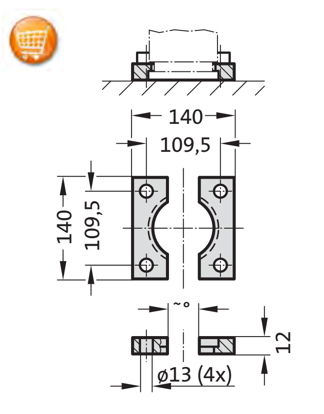

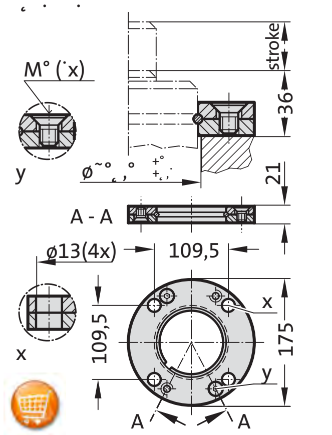

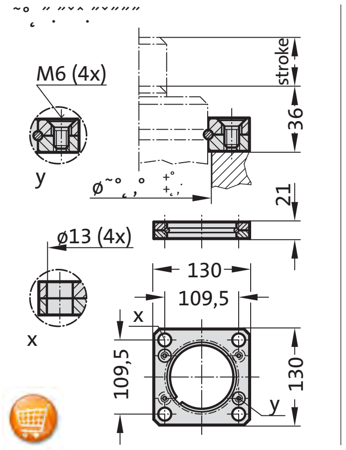

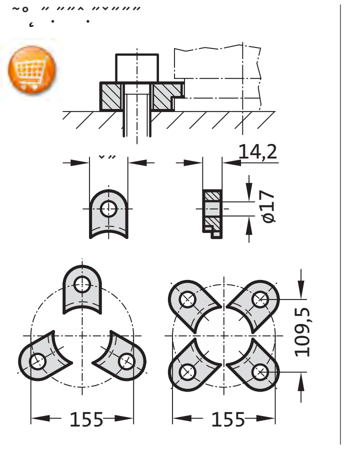

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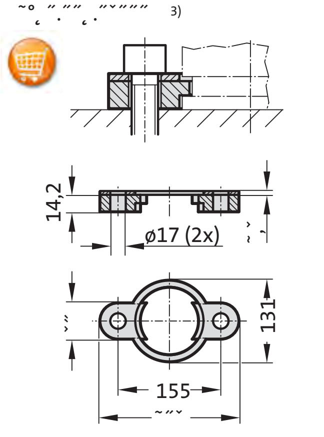
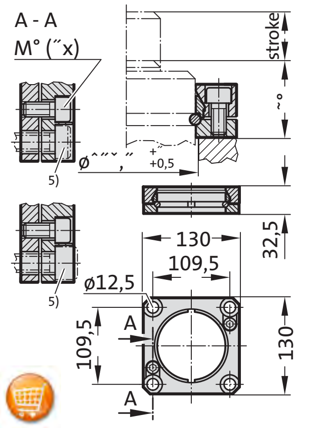
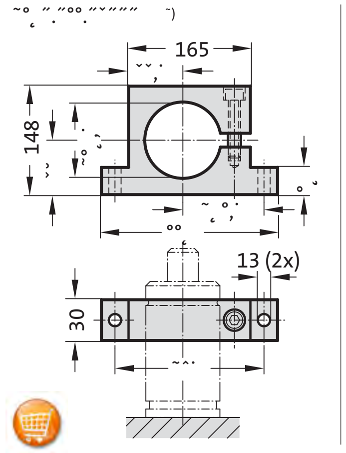
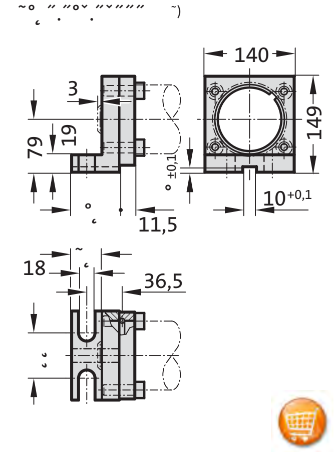
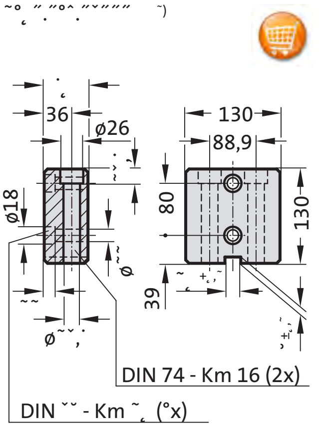


2480.064.05000 5)

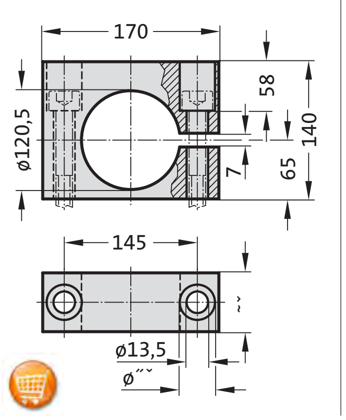








2480.044.03.05000



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended).

Gas spring SPEED CONTROL, cushioned

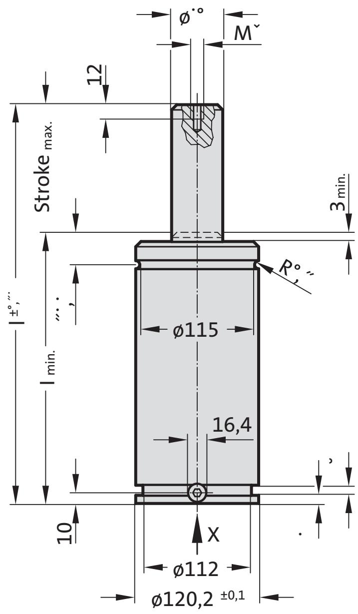
Note:

Initial spring force at 150 bar = 3000 daN

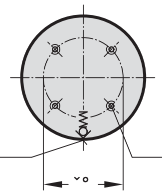
Order No for spare parts kit: 2486.12.03000

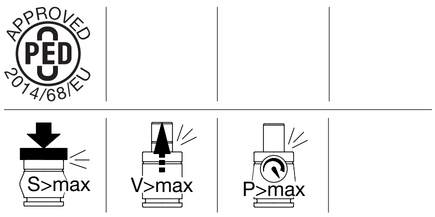
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 10 to 13 (at 20°C)
Dampening length: ~ 30 mm
Piston rod speed, decelerated: 0.4 m/s

2486.12.03000.



View X - Gas spring

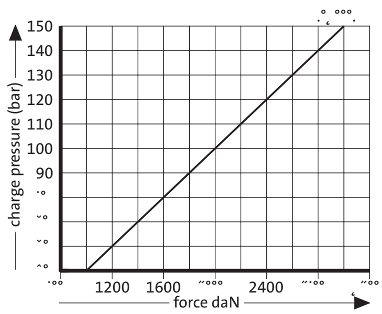




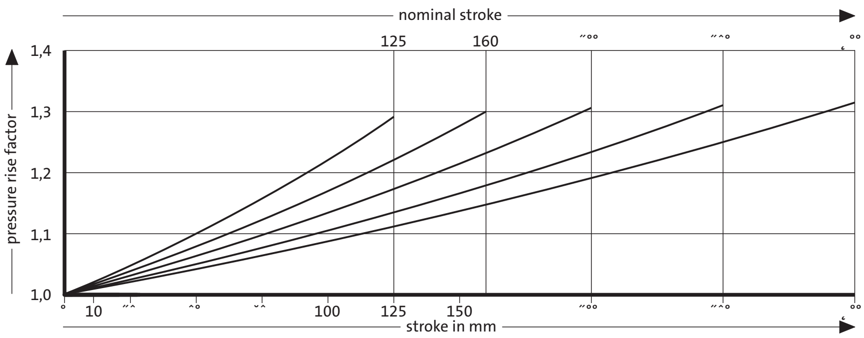
2486.12.03000.
Gas spring SPEED CONTROL, cushioned

Order No	Stroke$_{max.}$	l$_{min.}$	l
2486.12.03000.125	125	265	390
2486.12.03000.160	160	300	460
2486.12.03000.200	200	340	540
2486.12.03000.250	250	390	640
2486.12.03000.300	300	440	740

Initial spring force
versus charge pressure

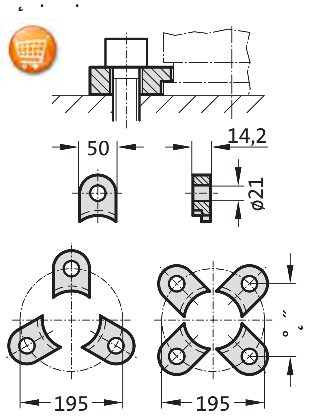


Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas spring SPEED CONTROL, cushioned
Mounting variations



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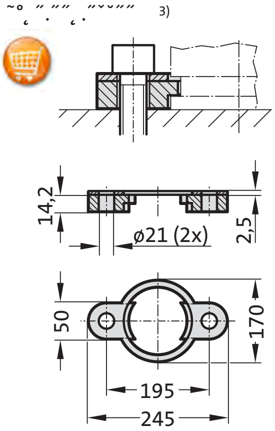
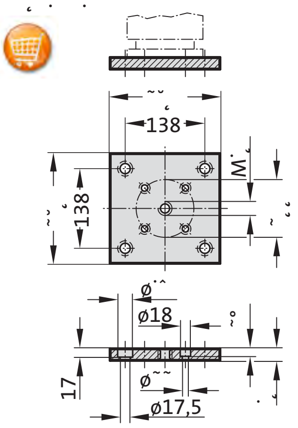
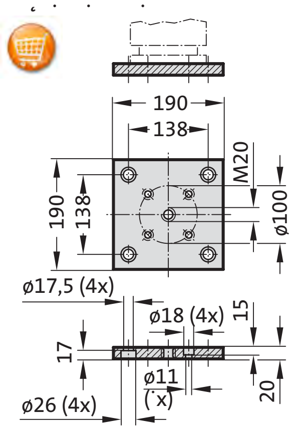
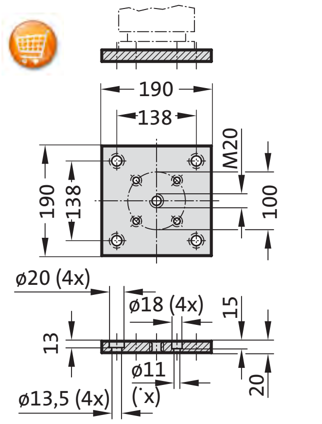


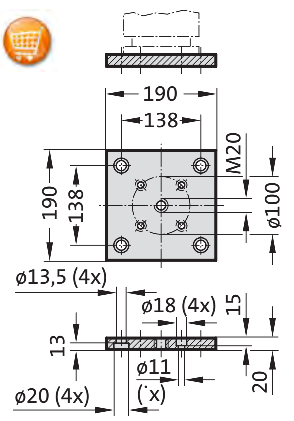


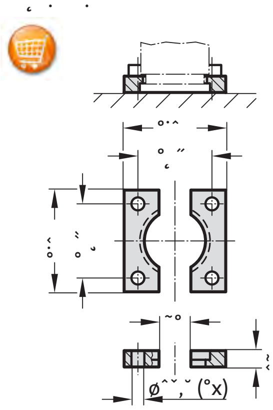


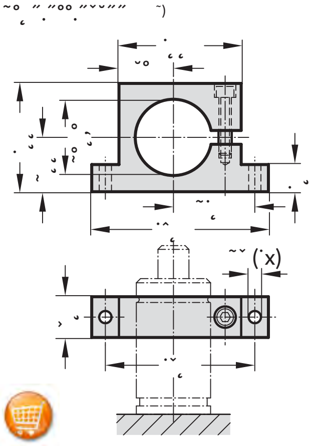
2480.011.03.07500



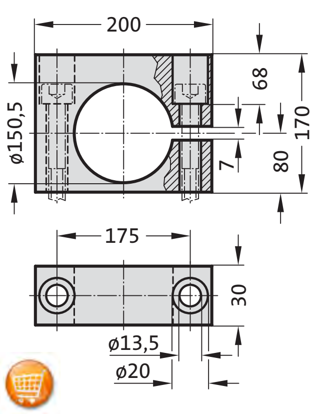
2480.011.03.07500.2

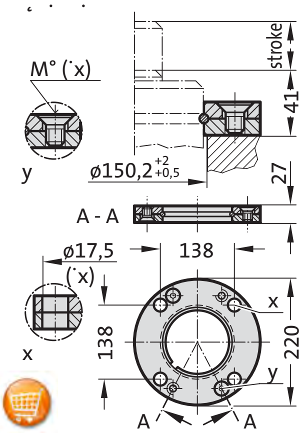


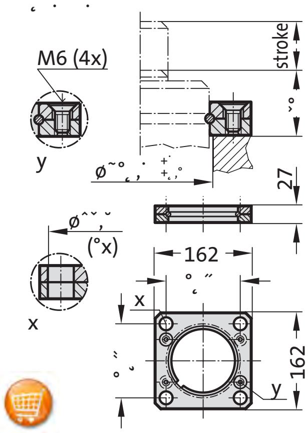




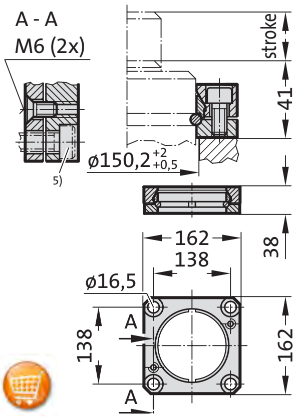
2480.044.03.07500 2)







2480.064.07500



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexa-gonal socket (compact head recommended).

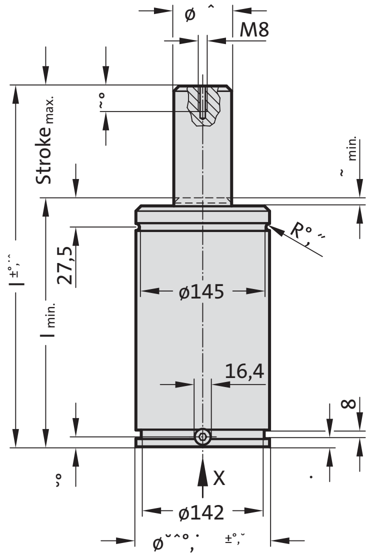
Gas spring SPEED CONTROL, cushioned

Note:
Initial spring force at 150 bar = 5000 daN

Order No for spare parts kit: 2486.12.05000

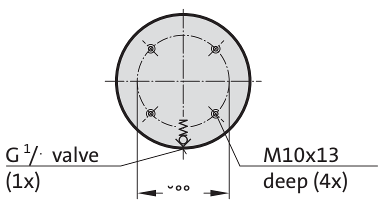
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 6 to 11 (at 20°C)
Dampening length: ~ 30 mm
Piston rod speed, decelerated: 0.4 m/s

2486.12.05000.



S>max
V>max
P>max

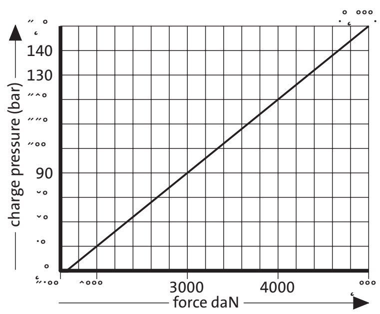
View X - Gas spring



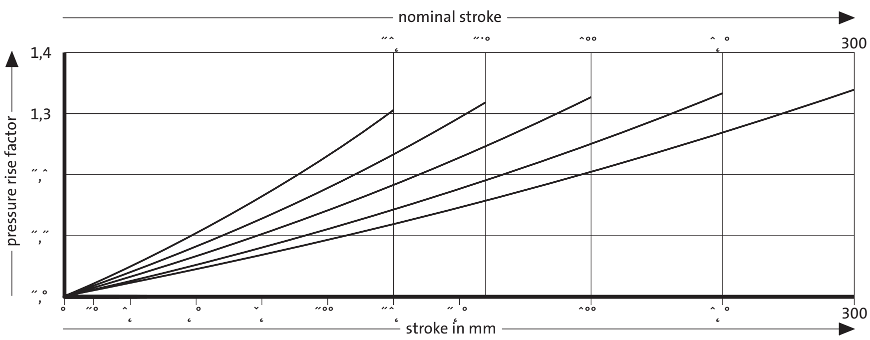
2486.12.05000.
Gas spring SPEED CONTROL, cushioned

Order No	Stroke$_{max.}$	l$_{min.}$	l
2486.12.05000.125	125	280	405
2486.12.05000.160	160	315	475
2486.12.05000.200	200	355	555
2486.12.05000.250	250	405	655
2486.12.05000.300	300	455	755

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

GAS SPRING, DS FOR DIE SEPARATION

GAS SPRINGS, DS, FOR DIE SEPARATION

Description:

In line of reducing the set-up time while installing the tool in the press there are used autonomous acted gas springs for tool spacing.
While using conventional gas springs they are activated with every press stroke about the whole stroke length.
The new FIBRO gas spring, DS (Die Separation) have been developed especially for tool spacing.
Because of the slow return stroke speed, the gas spring DS does not need the total stroke length.
The FIBRO gas spring, DS minimises unwanted friction in the tool, press and in the gas spring itself.
A further benefit is that they use up to 80% less energy than "conventi-onal" standard gas springs.

Properties:

- Initial spring forces of 3000 daN to 7500 daN
- Stroke lengths of 50 mm to 300 mm
- Standardised dimensions in accordance with ISO, VDI, CNOMO
- Very slow return stroke speed 0.2 m/min.
- Standard safety features (FIBRO Safer Choice)
  - Safety piston rod
  - Excess pressure protection
  - Overtravel protection
- High flexibility during fixing from the top mounting notch and lower fixing groove, together with the tapped bores in the spring base

Function:

When conventional standard gas springs are used to distance the upper and lower parts of the die, additional initial forces are exerted on each stroke carried out. This force can increase further at the end of the stroke (see diagram 1). When using the "new" DS gas springs in the same application, the force is reduced to less than 10% for each stroke (diagram 2).
The return stroke speed of the gas springs DS is very slow. The duration of the complete return stroke is 1-2 minutes. However, this slow speed has no negative influence on the end position (gas springs fully extended). The piston rod is actuated oscillating up to 10% of the total stroke depending on the production rate.

Diagram 1

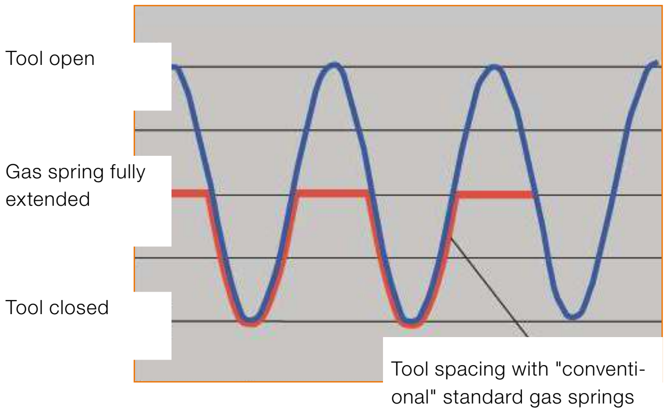
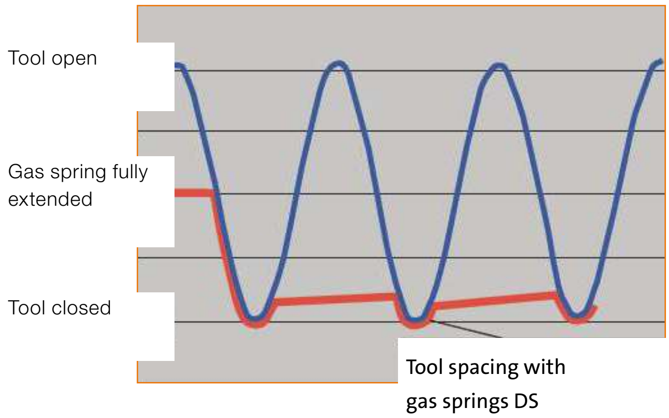
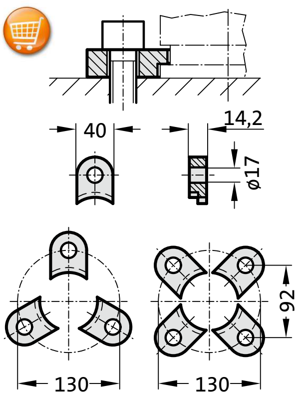


Diagram 2

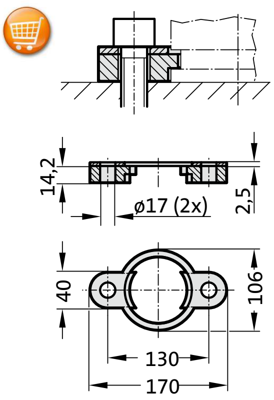


GAS SPRING DS
MOUNTING VARIATIONS

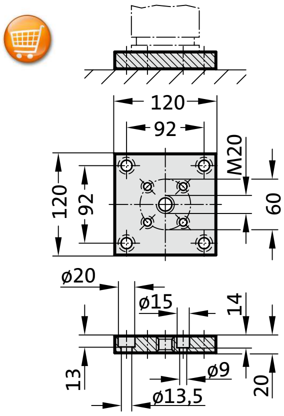
2480.007.03000



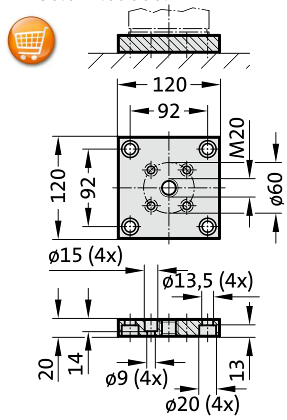
2480.008.03000 [3)]



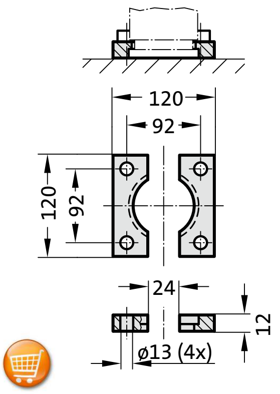
2480.011.03000



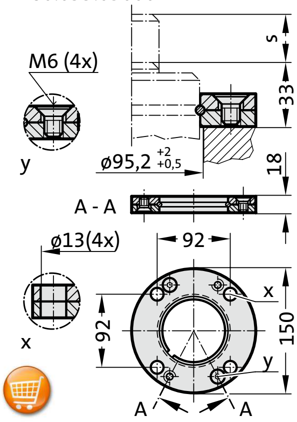
2480.011.03000.2



2480.022.03000



2480.055.03000



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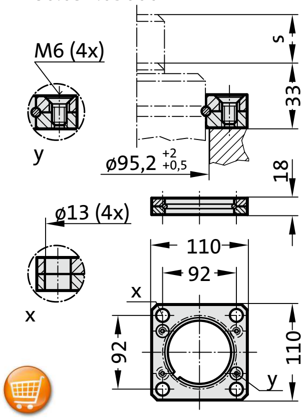
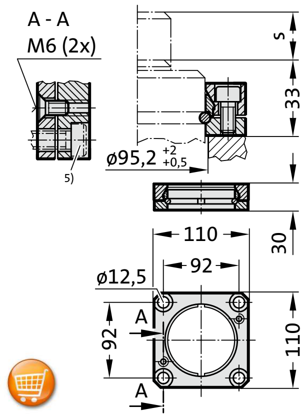


2480.064.03000 [4)]



Note:

[3)] Not for use with composite connection.

[4)] Square collar flange, non-rotating, fixing for composite connection.

[5)] Machine screws with hexagonal socket (compact head recommended)

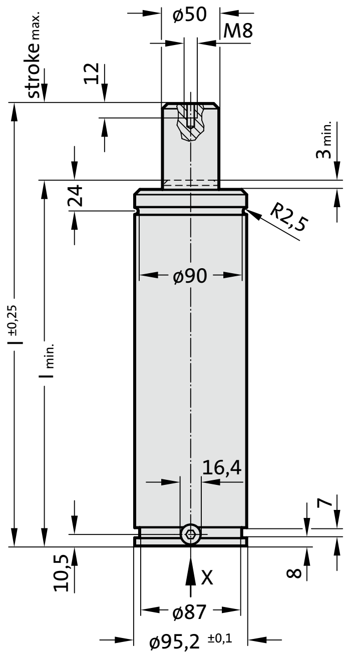
GAS SPRING DS

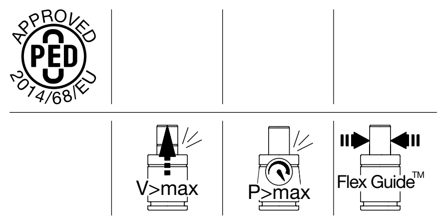
Note:
Initial spring force at 150 bar = 3000 daN

Order No. for spare parts kit: 2486.22.03000

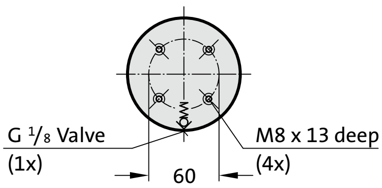
Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C bis +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 50 (at 20°C)
Max. piston speed: 1.6 m/s
Max. return stroke speed: 0.2 m/min

2486.22.03000.





View X - Gas spring

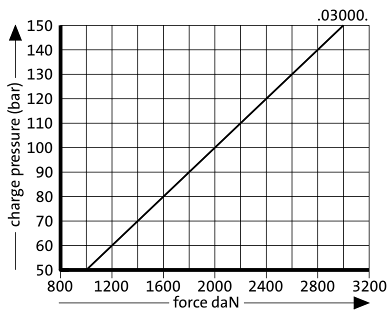


2486.22.03000.

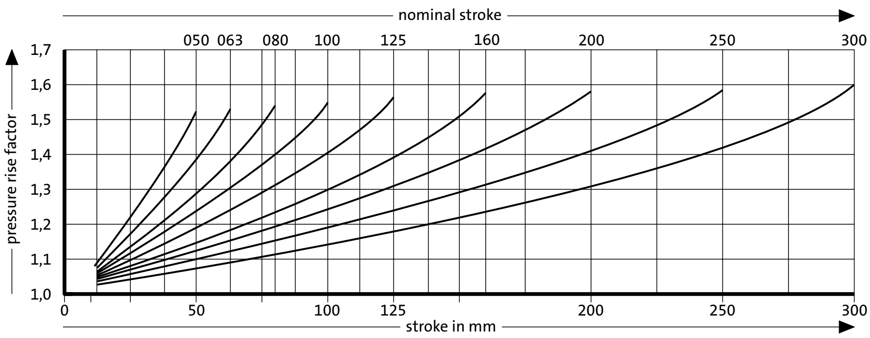
Gas spring DS

Order No	Stroke$_{max.}$ (s)	l$_{min.}$	l
2486.22.03000.050	50	170	220
2486.22.03000.063	63.5	183.5	247
2486.22.03000.080	80	200	280
2486.22.03000.100	100	220	320
2486.22.03000.125	125	245	370
2486.22.03000.160	160	280	440
2486.22.03000.200	200	320	520
2486.22.03000.250	250	370	620
2486.22.03000.300	300	420	720

Initial spring force
versus charge pressure



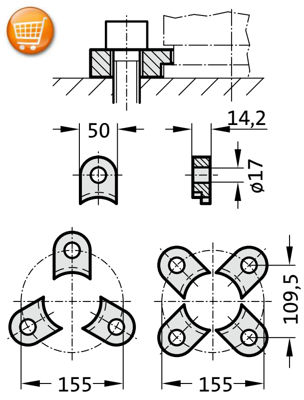
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

GAS SPRING DS
MOUNTING VARIATIONS

2480.007.05000



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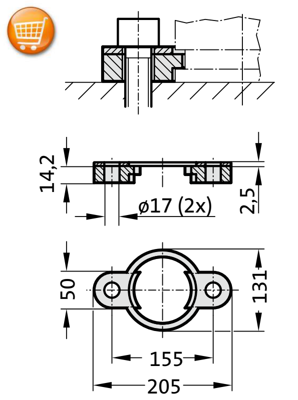

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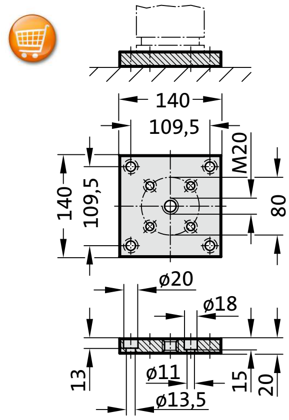
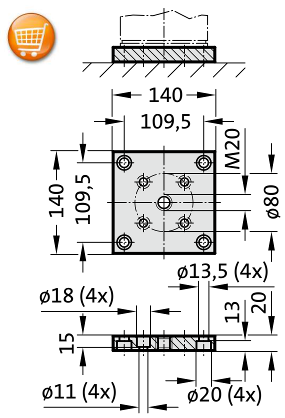
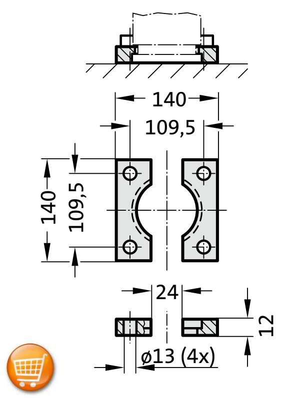


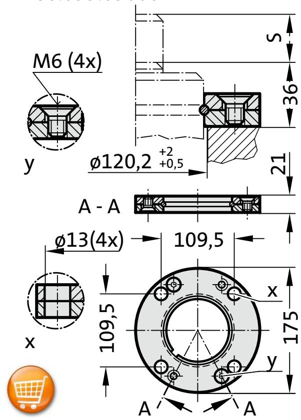
2480.011.05000.2



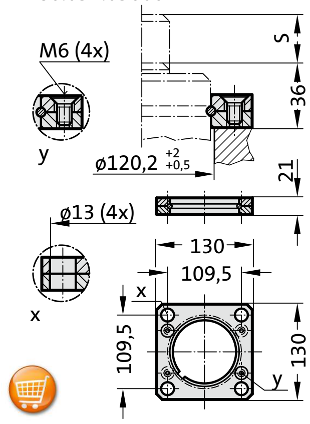
2480.022.05000



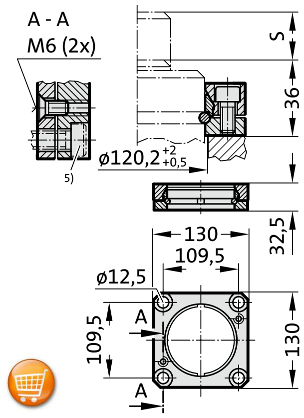
2480.055.05000



2480.057.05000



2480.064.05000 [4)]



Note:

[3)] Not for use with composite connection.

[4)] Square collar flange, non-rotating, fixing for composite connection.

[5)] Machine screws with hexagonal socket (compact head recommended)

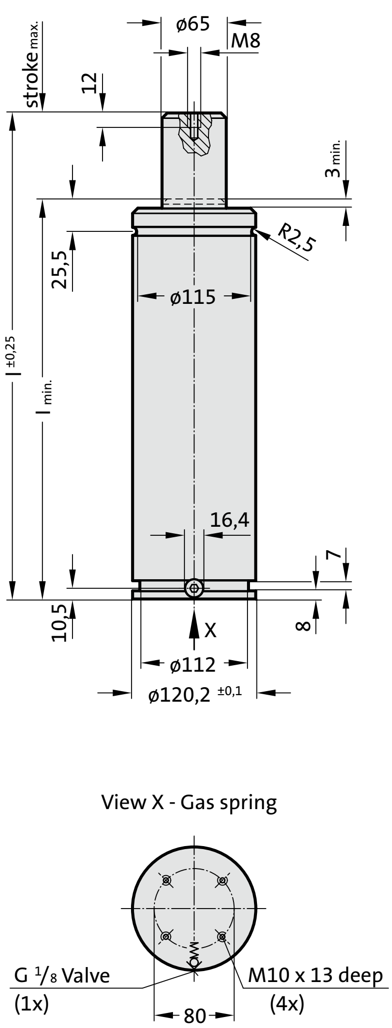
GAS SPRING DS

Note:
Initial spring force at 150 bar = 5000 daN

Order No. for spare parts kit: 2486.22.05000

Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C bis +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 50 (at 20°C)
Max. piston speed: 1.6 m/s
Max. return stroke speed: 0.2 m/min

2486.22.05000.

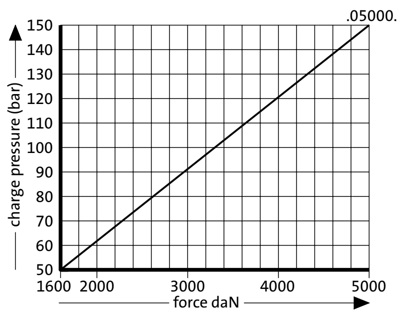


2486.22.05000.

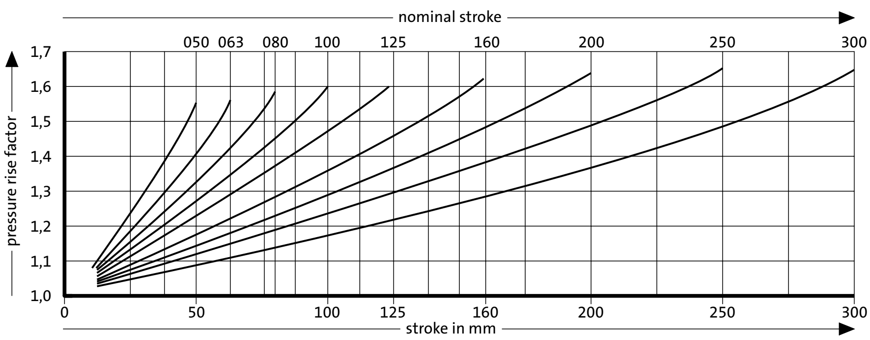
Gas spring DS

Order No	Stroke$_{max.}$ (s)	l$_{min.}$	l
2486.22.05000.050	50	190	240
2486.22.05000.063	63.5	203.5	267
2486.22.05000.080	80	220	300
2486.22.05000.100	100	240	340
2486.22.05000.125	125	265	390
2486.22.05000.160	160	300	460
2486.22.05000.200	200	340	540
2486.22.05000.250	250	390	640
2486.22.05000.300	300	440	740

Initial spring force
versus charge pressure



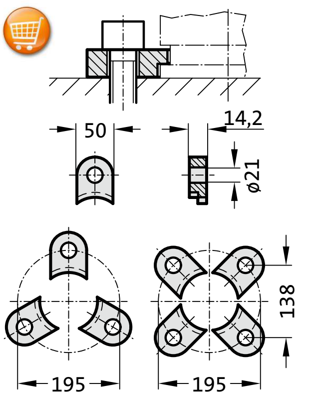
Spring force Diagram displacement versus stroke rise



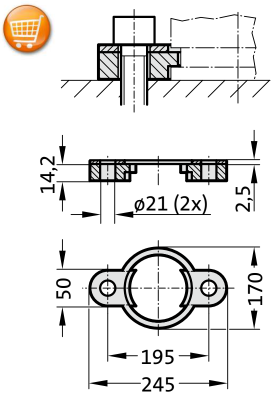
Pressure rise factor accounts for displacement but not external influences!

GAS SPRING DS
MOUNTING VARIATIONS

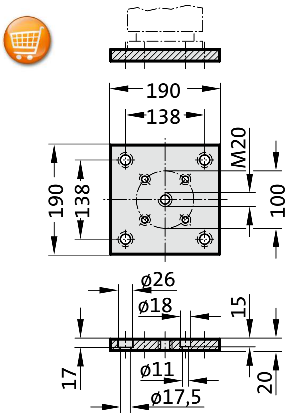
2480.007.07500



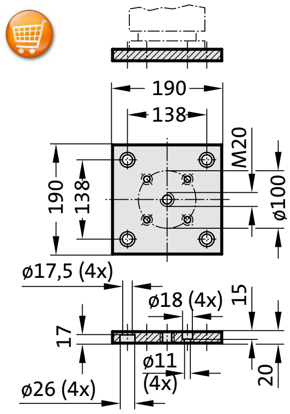
2480.008.07500 [3]



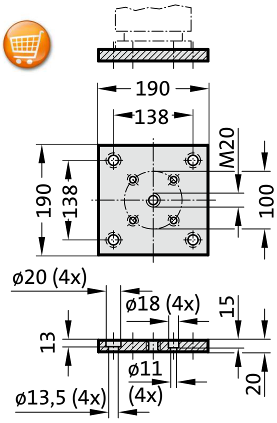
2480.011.07500



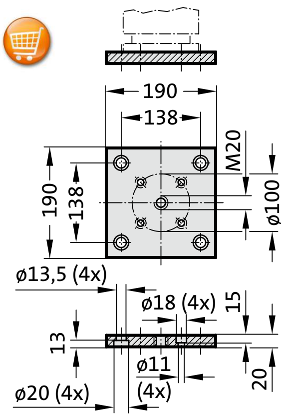
2480.011.07500.2



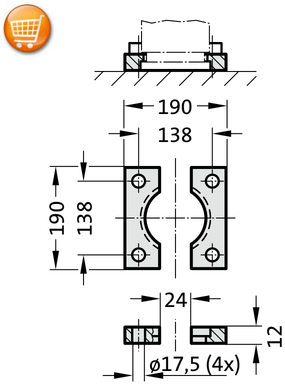
2480.011.03.07500



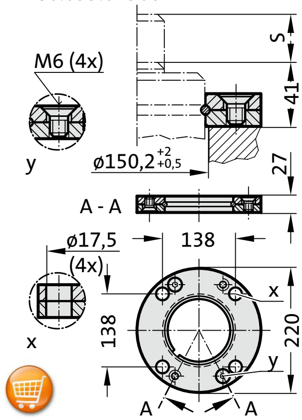
2480.011.03.07500.2



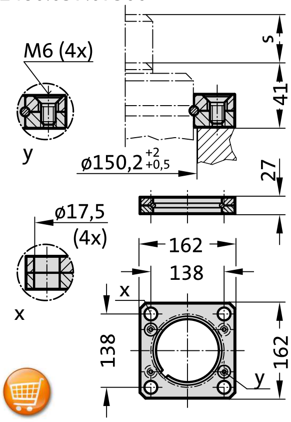
2480.022.07500



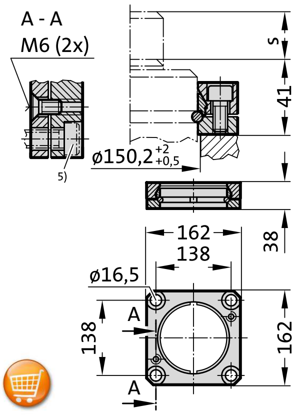
2480.055.07500



2480.057.07500



2480.064.07500 [4]



Note:

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

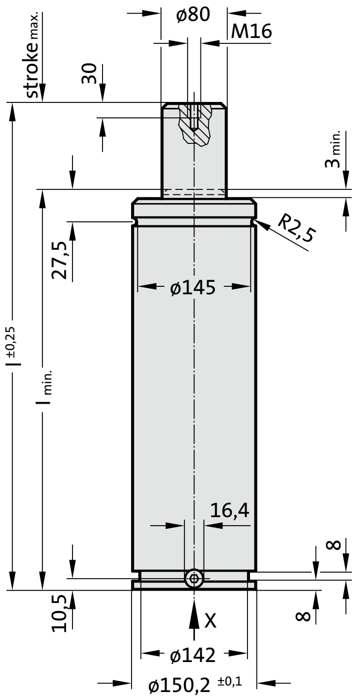
GAS SPRING DS

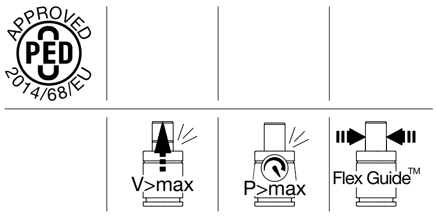
Note:
Initial spring force at 150 bar = 7500 daN

Order No. for spare parts kit: 2486.22.07500

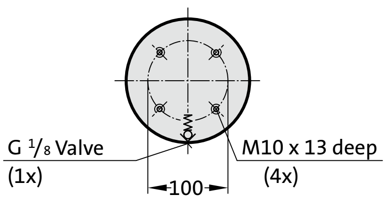
Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C bis +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 50 (at 20°C)
Max. piston speed: 1.6 m/s
Max. return stroke speed: 0.2 m/min

2486.22.07500.





View X - Gas spring

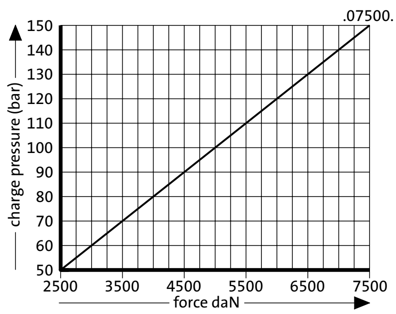


2486.22.07500.

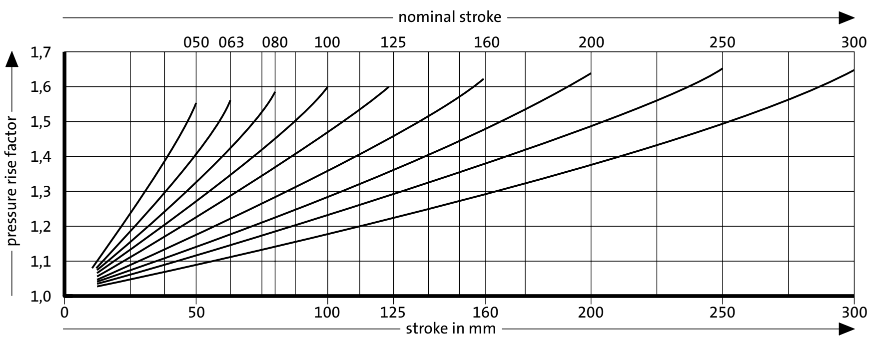
Gas spring DS

Order No	Stroke$_{max.}$ (s)	$l_{min.}$	l
2486.22.07500.050	50	205	255
2486.22.07500.063	63.5	218.5	282
2486.22.07500.080	80	235	315
2486.22.07500.100	100	255	355
2486.22.07500.125	125	280	405
2486.22.07500.160	160	315	475
2486.22.07500.200	200	355	555
2486.22.07500.250	250	405	655
2486.22.07500.300	300	455	755

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas springs with fastening to Ford Standard WDX

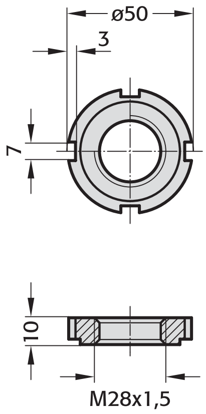
Please request your catalogue

Gas springs with thread

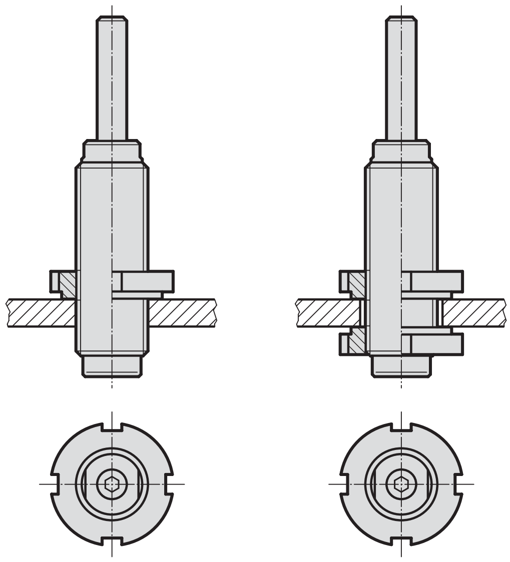
Gas spring with external thread
Mounting variations

2480.005.00200.

Slotted nut



Mounting examples:



Gas spring with external thread

Description:

The gas springs are colour-coded according to the spring force rating ranges 50–100–150–200 daN.

All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Do take into consideration the colour-coded pressure rating during repair work and recharging.

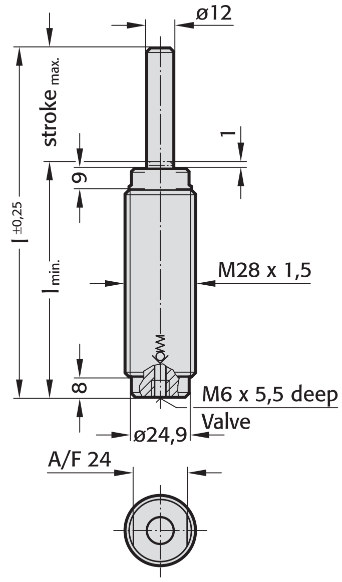
Note:

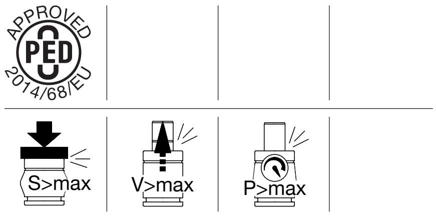
Order No for spare parts kit: 2480.21.00150

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

Spring forces as per spring diagram.

Upon customers request, also available unfilled, Order No 2482.32.00000...., Colour: black



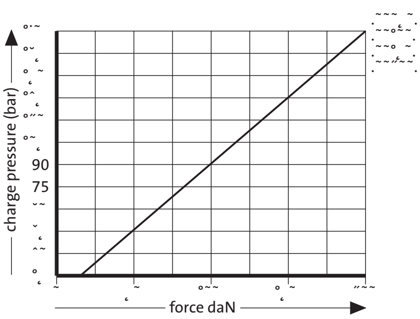


2480.32. Gas spring with external thread

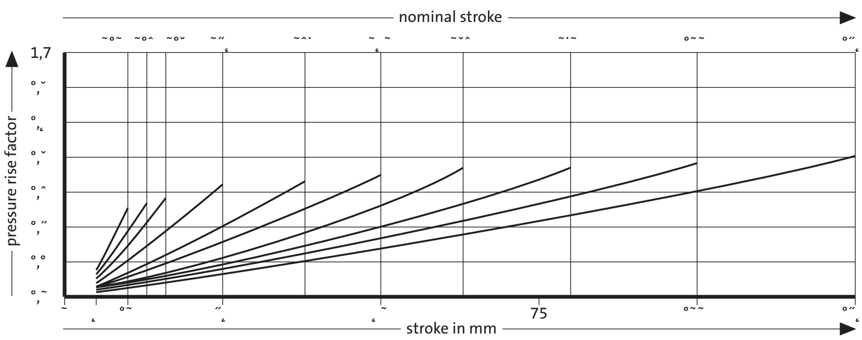
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2480.32.□□□□□.010	10	62	52
2480.32.□□□□□.013	12.7	67.4	54.7
2480.32.□□□□□.016	16	74	58
2480.32.□□□□□.025	25	92	67
2480.32.□□□□□.038	38.1	118.2	80.1
2480.32.□□□□□.050	50	142	92
2480.32.□□□□□.063	63.5	169	105.5
2480.32.□□□□□.080	80	202	122
2480.32.□□□□□.100	100	242	142
2480.32.□□□□□.125	125	292	167

*complete with initial spring force
Spring force marking:
Initial spring force [daN] - Pressure [bar] - Colour:
.00050. - 45 - green
.00100. - 90 - blue
.00150. - 135 - red
.00200. - 180 - yellow

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise

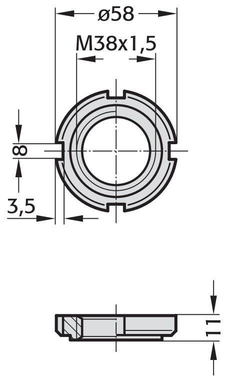


Pressure rise factor accounts for displacement but not external influences!

Gas spring with external thread
Mounting variations

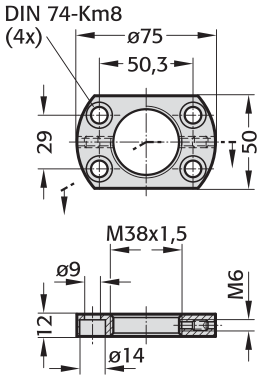
2480.005.00250.

Slotted nut



2480.006.00250.

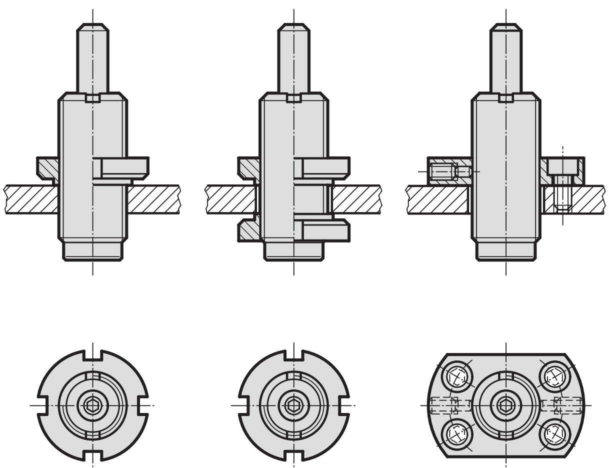
Clamped flange



2480.00.51.01

Box spanner for assembling/disassembling of gas springs

Mounting examples:



Gas spring with external thread

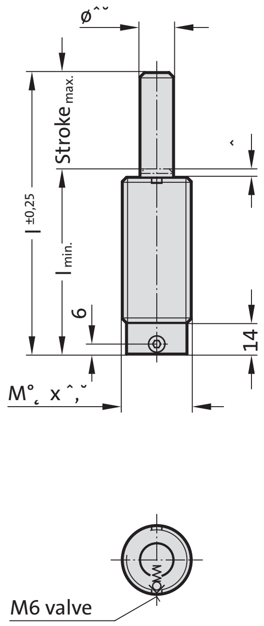
Note:
Initial spring force at 150 bar = 250 daN

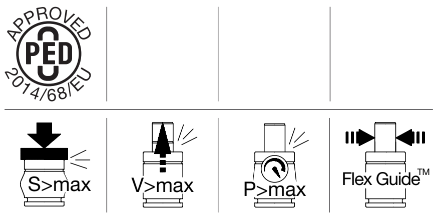
Order No for spare parts kit: 2480.12.00250

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

Fixing:
Installation with ring nut(s) 2480.005.00250 can be done with one or two ring nuts. If the hole in the bolster plate is not threaded, two ring nuts are needed. Holes threaded M 38 × 1,5 require one only ring nut for mounting of the gas springs.
Mounting with a threaded flange plate has the advantage of a degree of adjustability as far as the flange screws permit, moreover it is often found easier to make do with a clearance hole in the tool plate. Locking is by way of two lock screws with thrust plugs, provided in the threaded flange.
Diameter of through-hole in tool plate = 38 mm – plus four tapped holes M 8.

2480.32.00250.

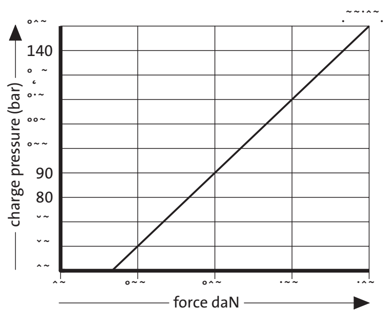




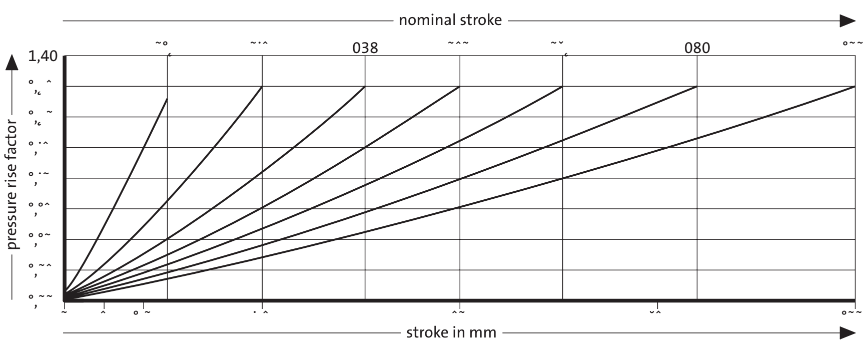
2480.32.00250.
Gas spring with external thread

Order No	Stroke max.	l min.	l
2480.32.00250.013	12.7	62.7	75.4
2480.32.00250.025	25	75	100
2480.32.00250.038	38.1	88.1	126.2
2480.32.00250.050	50	100	150
2480.32.00250.063	63.5	113.5	177
2480.32.00250.080	80	130	210
2480.32.00250.100	100	150	250

Initial spring force versus charge pressure



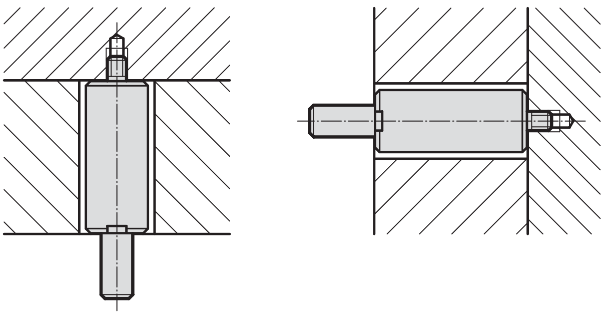
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas spring with male fixing thread, small mounting height
Mounting variations

Mounting examples:



Gas spring with male fixing thread, small mounting height

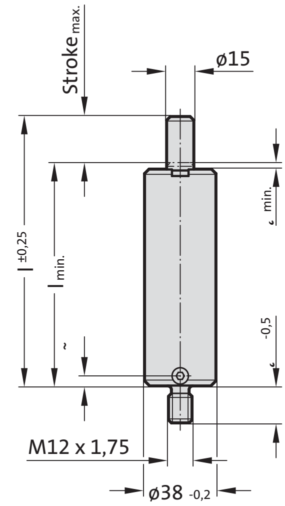
Note:

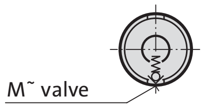
Initial spring force at 150 bar = 250 daN

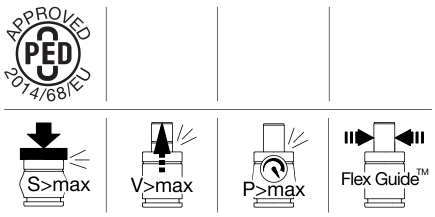
Order No for spare parts kit: 2480.12.00250

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2480.82.00250.



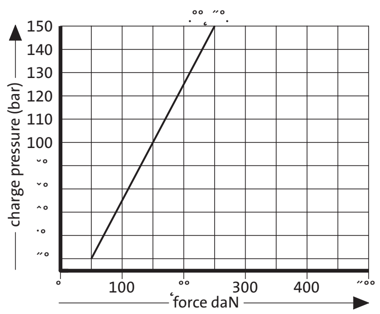




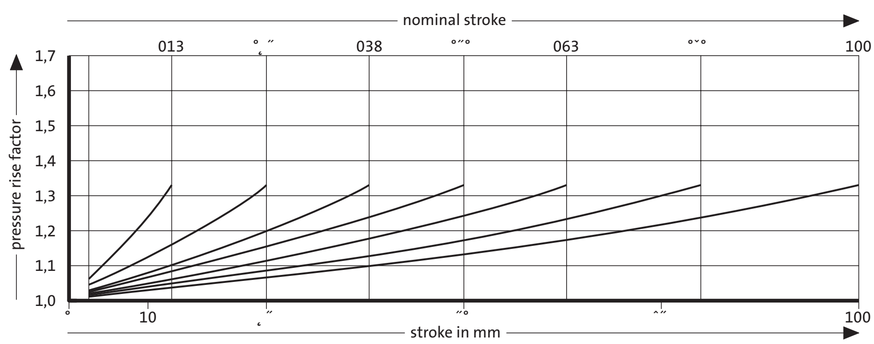
2480.82.00250.
Gas spring with male fixing thread, small mounting height

Order No	$Stroke_{max.}$	$l_{min.}$	l
2480.82.00250.013	12.7	62.7	75.4
2480.82.00250.025	25	75	100
2480.82.00250.038	38.1	88.1	126.2
2480.82.00250.050	50	100	150
2480.82.00250.063	63.5	113.5	177
2480.82.00250.080	80	130	210
2480.82.00250.100	100	150	250

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



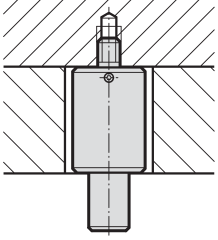
Pressure rise factor accounts for displacement but not external influences!

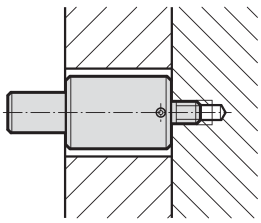
Gas spring with male fixing thread, POWERLINE
Mounting variations

2480.00.51.05

Box spanner for assembling/disassembling of gas springs

Mounting examples:





Gas spring with male fixing thread, POWERLINE

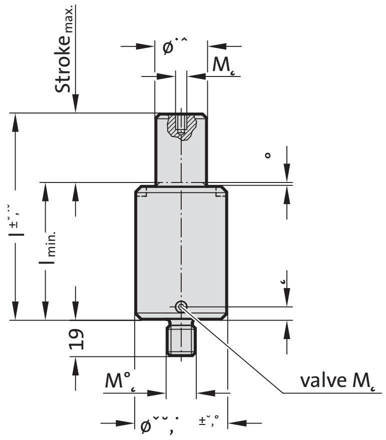
Note:

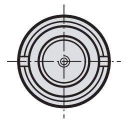
Initial spring force at 150 bar = 920 daN

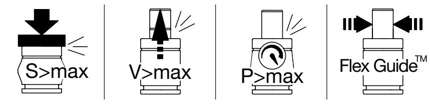
Order No for spare parts kit: 2487.12.01000

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 50 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.82.01000.



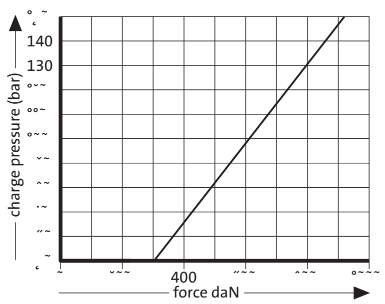




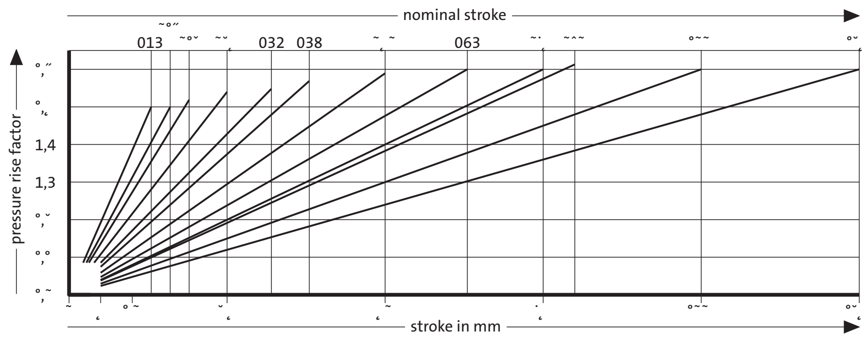
2487.82.01000.
Gas spring with male fixing thread, POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.82.01000.013	13	51	64
2487.82.01000.016	16	54	70
2487.82.01000.019	19	57	76
2487.82.01000.025	25	63	88
2487.82.01000.032	32	70	102
2487.82.01000.038	38	76	114
2487.82.01000.050	50	88	138
2487.82.01000.063	63	101	164
2487.82.01000.075	75	113	188
2487.82.01000.080	80	118	198
2487.82.01000.100	100	138	238
2487.82.01000.125	125	163	288

Initial spring force versus charge pressure

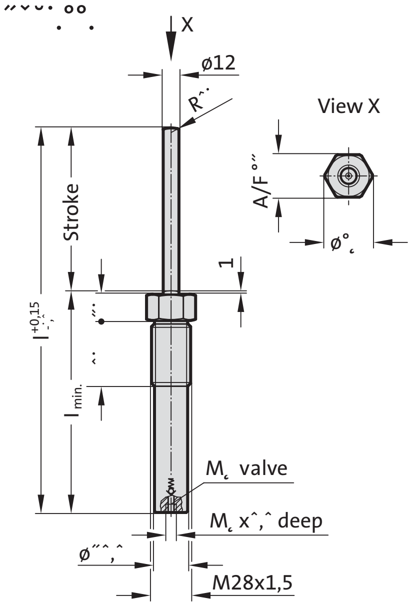


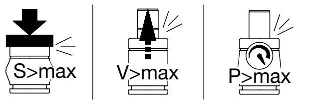
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas spring with hexagonal flange





Description:

The gas springs are colour-coded according to the spring force rating ranges 15–50–100–150–200 daN.

All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Do take into consideration the colour-coded pressure rating during repair work and recharging.

Note:

Other stroke lengths avail on request! See gas spring 2480.32.

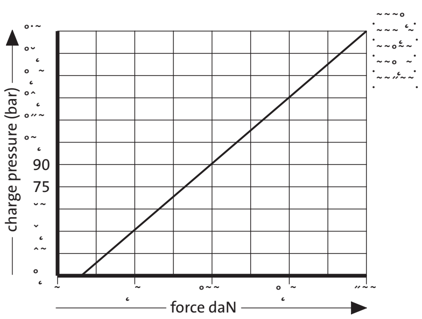
Order No for spare parts kit: 2480.21.00150

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 13 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

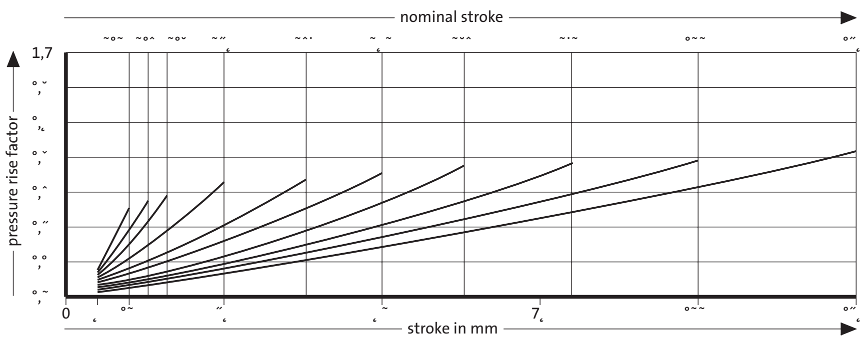
2480.33. Gas spring with hexagonal flange

Order No	$Stroke_{max.}$	$l_{min.}$	l	Spring force [daN] initial	Colour
2480.33.00015.125	125	167	292	15	black
2480.33.00050.125	125	167	292	50	green
2480.33.00100.125	125	167	292	100	blue
2480.33.00150.125	125	167	292	150	red
2480.33.00200.125	125	167	292	200	yellow

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas springs for working temperatures up to 120 ° C

see chapter L:
Gas springs Mould Line

LCF gas springs, damped

LCF gas springs, damped

Description

The LCF series represents a whole new generation of nitrogen-filled gas springs developed to meet the needs of the machine tool and press-making industries.

Negative factors such as

- ▶ high impact stresses
- ▶ excessive noise
- ▶ extreme bounce off the pad

are all minimised by LCF springs.

Characteristics such as

- ▶ dimensions
- ▶ fixing methods
- ▶ filling with gas and purging
- ▶ working in interconnected systems

are identical to those for standard ISO or type 2480.13 g as springs.

The springs from the LCF series reduce impact stresses by 50% compared to conventional gas springs.

The force builds up gradually and acceleration is uniform, reducing wear on both tool and press. As a result, less maintenance is required.

LCF springs are at least 20% quieter than standard gas springs.

The reduced noise level is due to the lower impact force, making these springs a cost-effective alternative to soundproofing panels. They are thus more economical and environmentally-friendly.

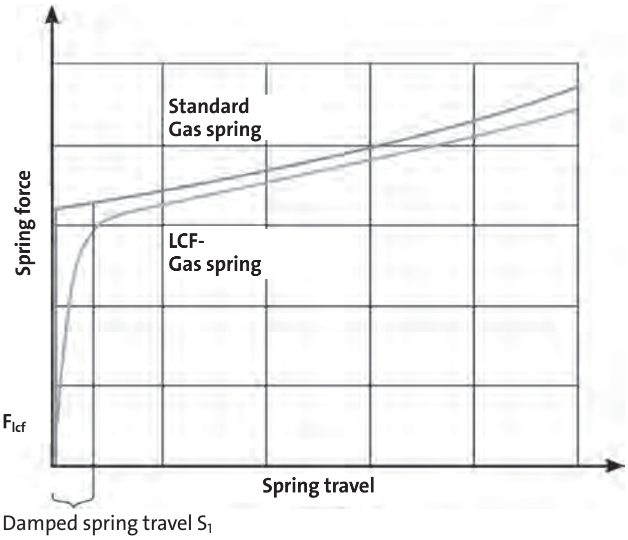
The LCF springs reduce the extreme bounce off the pad during the return stroke, thus lessening vibration on the workpiece and allowing the workpiece to be transported more effectively.

Since the spring travel is damped, the pad motion is more uniform, so in many cases the press stroke rate and thus productivity can be increased.

* LCF Force Manager ist ein Warenzeichen der Associated Spring

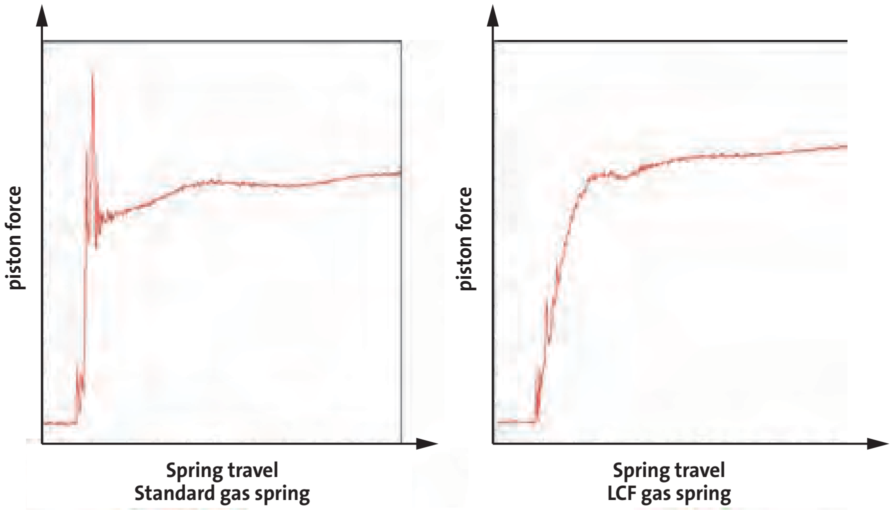
LCF gas springs, damped

2484.13. F orce diagram for gas springs

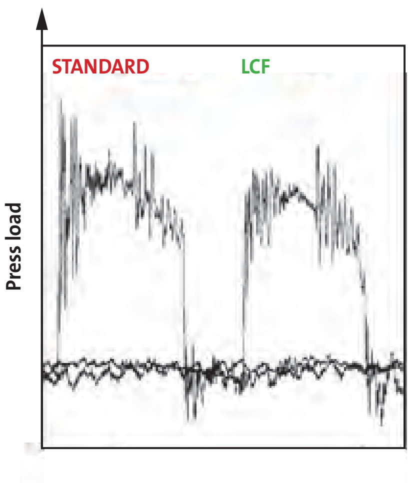


With the springs from the LCF series, the force builds up gradually and acceleration is uniform.

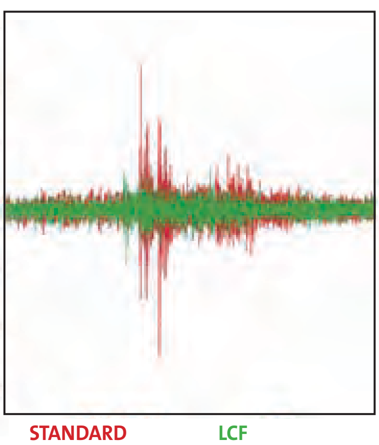
Measured dynamic piston force, Measured values for the 5000th series



Comparative press load diagram



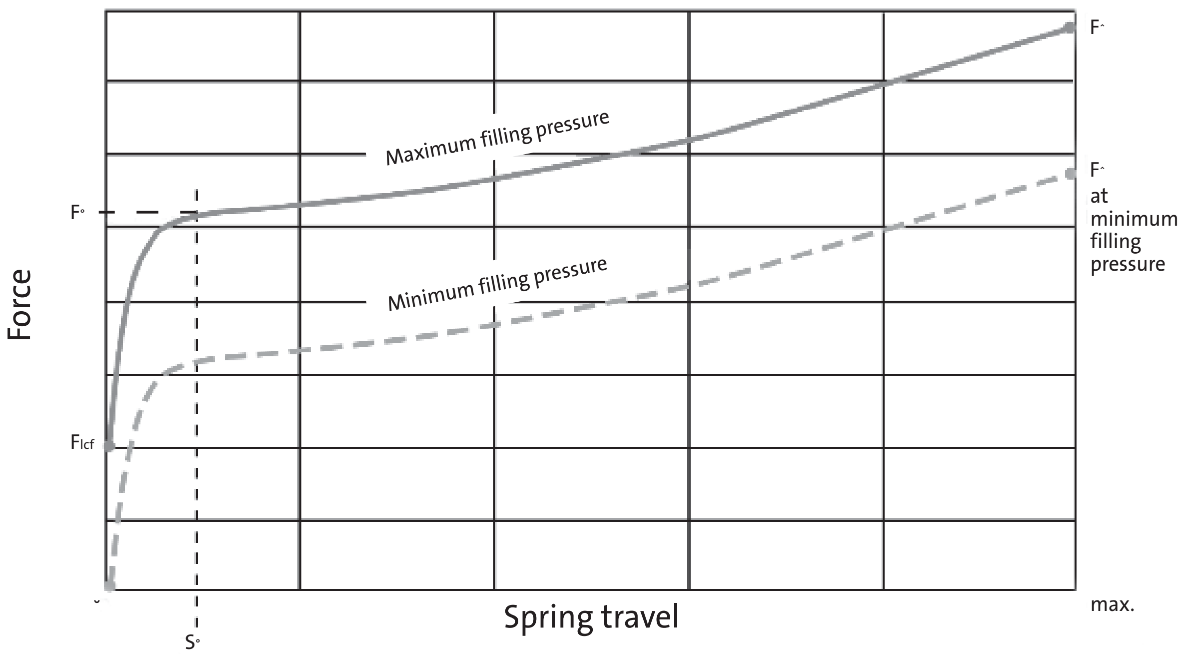
Noise reduction



The springs from the LCF series are quieter due to the reduced impact force.

LCF gas springs, damped

2484.13. F orce diagram for gas springs



Note: Maximum pressure for LCF gas springs: 150 bar . Observe minimum filling pressure.

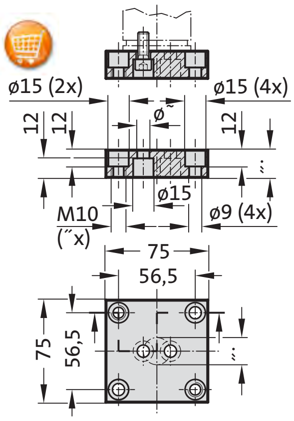
Guidelines for the use of LCF gas springs

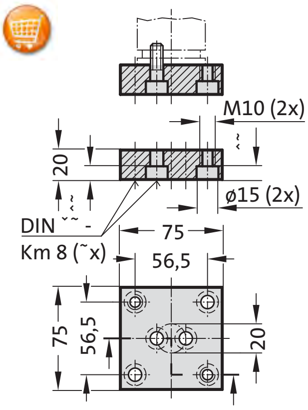
1. After the damped spring travel (S_1) the LCF gas spring achieves the same initial spring force (F_1) and pressure build up as the standard gas spring (to ISO).
2. The spring force (F_{lcf}) should exceed the weight (e.g. the pad) by at least 15% so tha t it is held in the correct position (this does not apply in the case of minimum filling pressure).

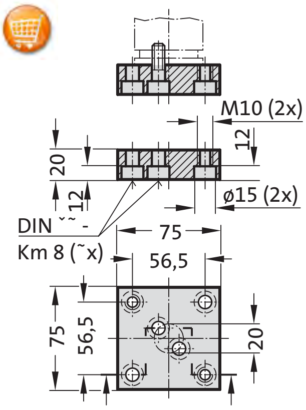
Spring Size	F_{lcf} bei 150 bar in daN	Damped spring travel S_1	Minimum filling pressure in bar
2484.13.00750.	470	3,1	70
2484.12.01500.	700	4,6	105
2484.13.03000.	1600	3,8	69
2484.13.05000.	2500	7,7	76
2484.13.07500.	3000	10,4	90

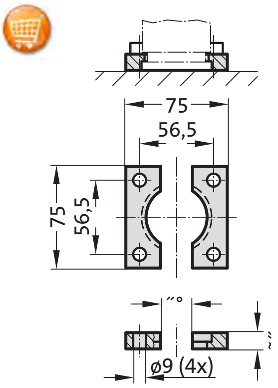
LCF gas spring, damped
Mounting variations

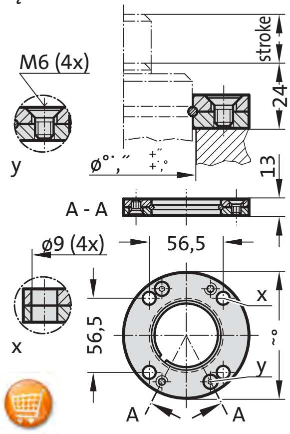
2480.011.00750.3

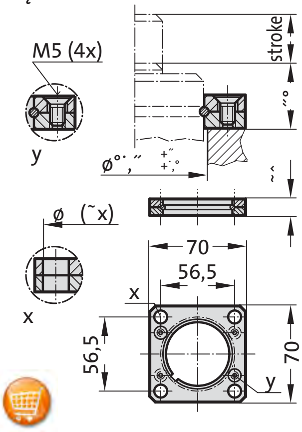


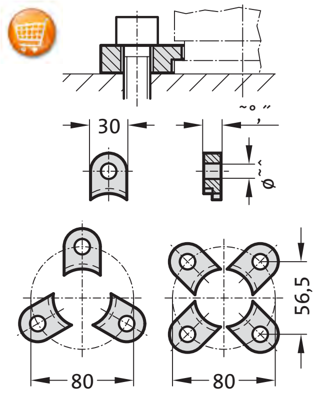












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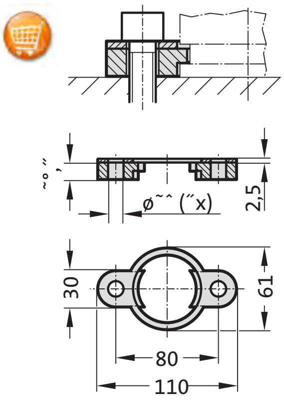
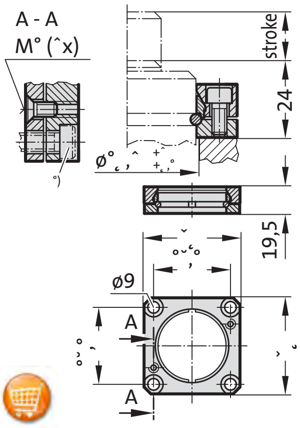
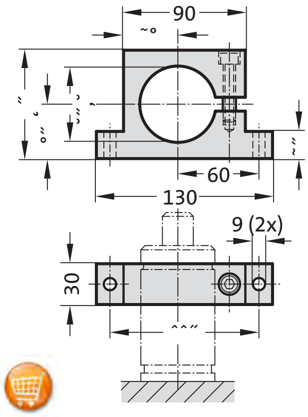
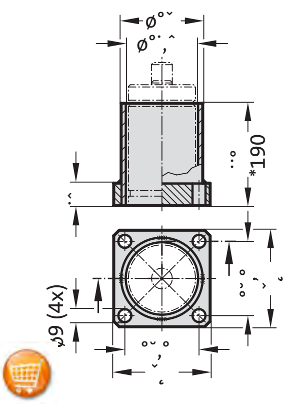


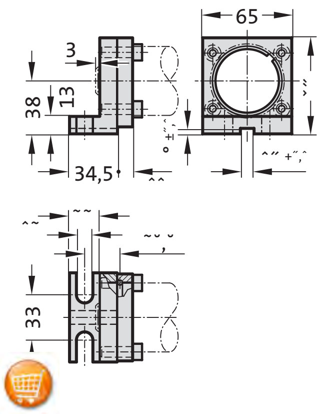
2480.064.00750 4)

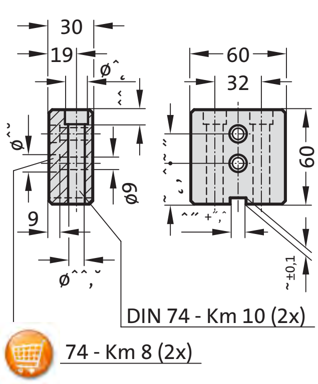




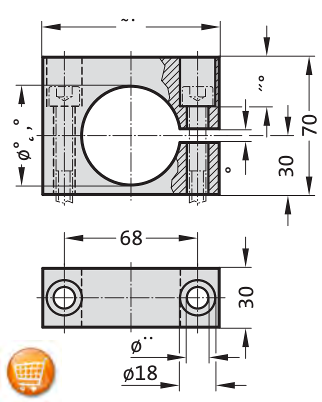
2480.010.00750.115 3)
2480.010.00750.190* 3)







2480.044.03.00750



Note:

2) Attention: The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

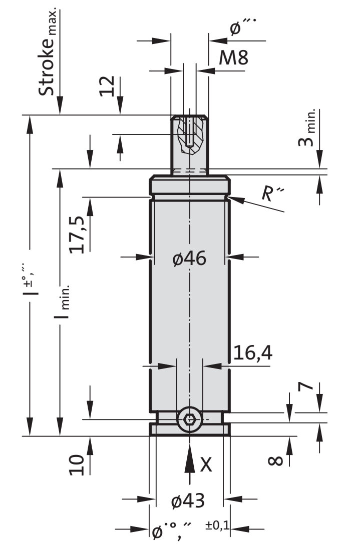
LCF Gas Spring, damped

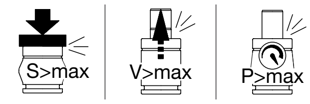
Note:
Initial spring force F_{lcf} at 150 bar = 470 daN
Full spring force after 3.1 mm damped spring travel

Order No for spare parts kit: 2484.13.00750

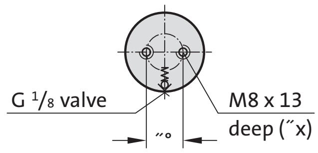
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 70 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

2484.13.00750.





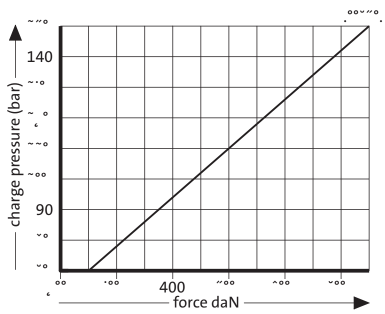
View X - Gas spring



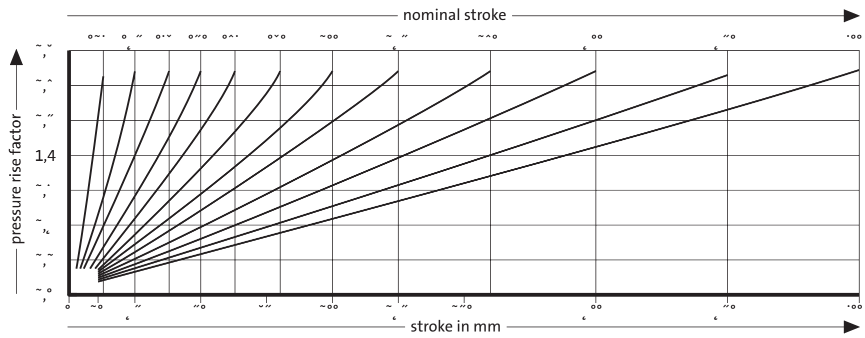
2484.13.00750.
LCF Gas Spring, damped

Order No	Stroke max.	l min.	l
2484.13.00750.013	12.7	107.7	120.4
2484.13.00750.025	25	120	145
2484.13.00750.038	38.1	133.1	171.2
2484.13.00750.050	50	145	195
2484.13.00750.063	63.5	158.5	222
2484.13.00750.080	80	175	255
2484.13.00750.100	100	195	295
2484.13.00750.125	125	220	345
2484.13.00750.160	160	255	415
2484.13.00750.200	200	295	495
2484.13.00750.250	250	345	595
2484.13.00750.300	300	395	695

Initial spring force
versus charge pressure

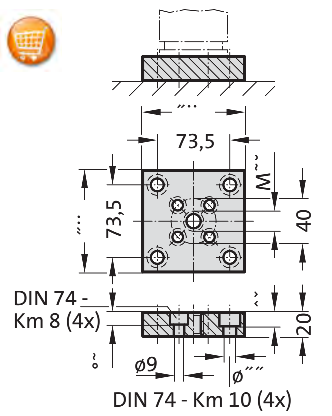


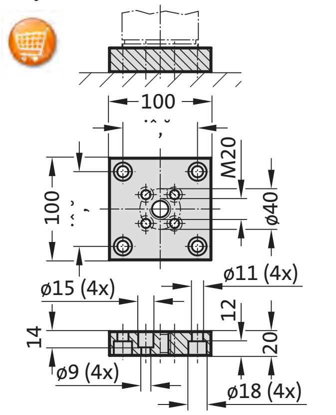
Spring force Diagram displacement versus stroke rise

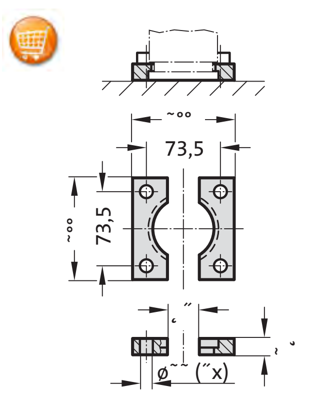


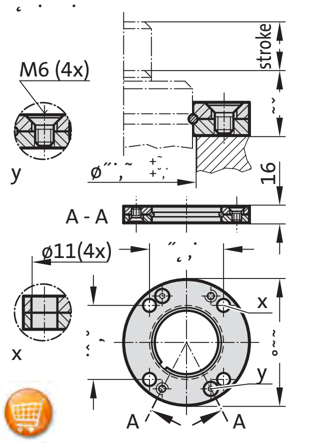
Pressure rise factor accounts for displacement but not external influences!

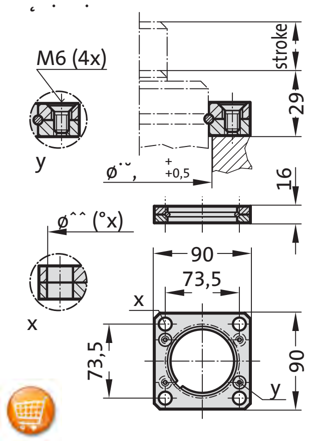
LCF gas spring, damped
Mounting variations

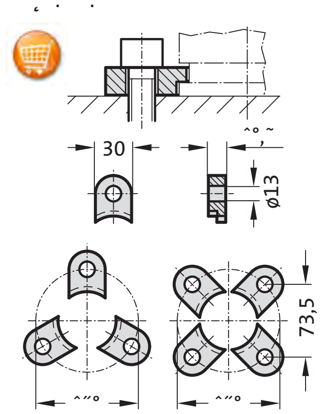












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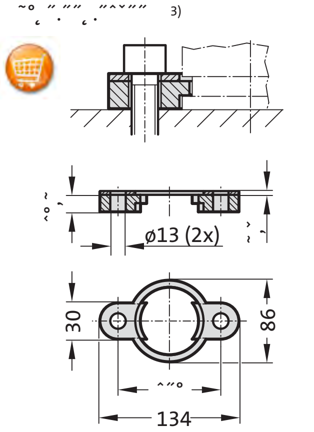
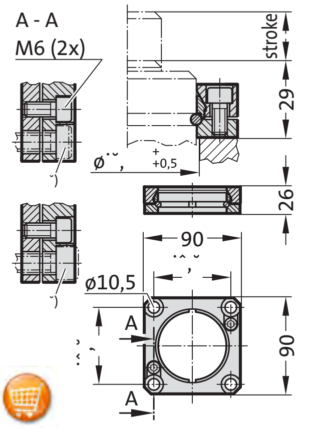
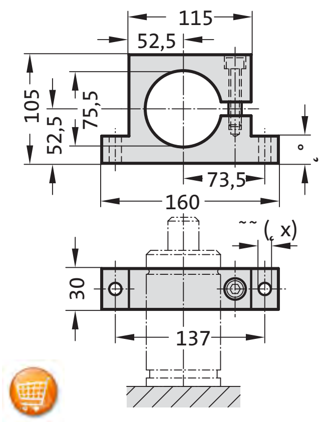
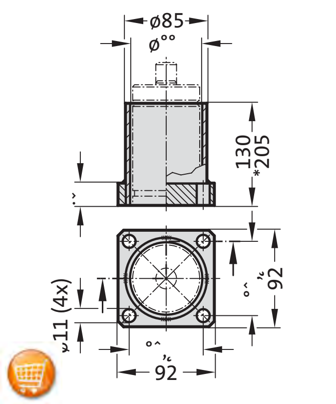


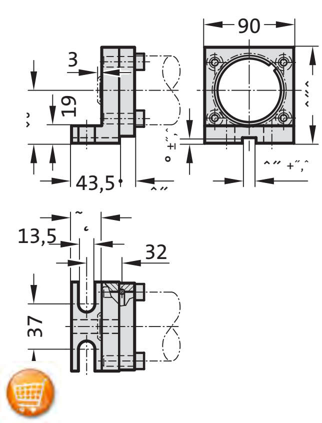
2480.064.01500 [5]

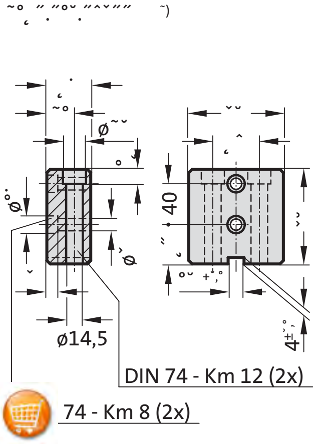




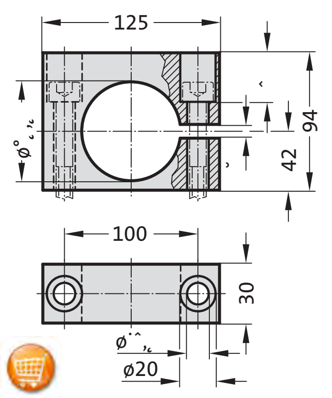
2480.010.01500.130 [5]
2480.010.01500.205* [5]







2480.044.03.01500 [5]



Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

LCF Gas Spring, damped

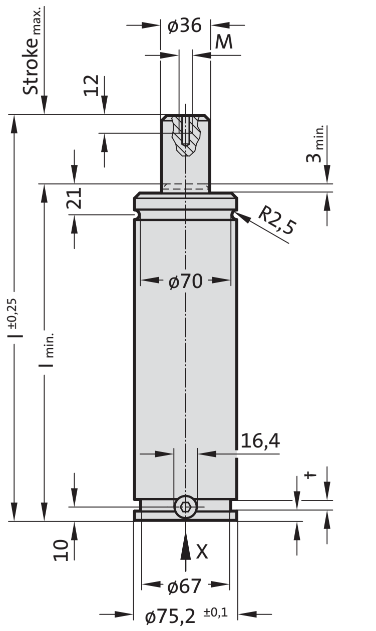
Note:

Initial spring force F_{lcf} at 150 bar = 700 daN
Full spring force after 4.6 mm damped spring travel

Order No for spare parts kit: 2484.12.01500

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 105 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

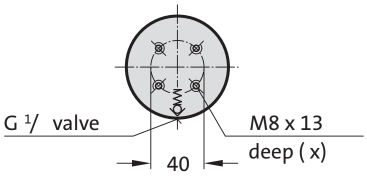
2484.12.01500.



S>max
V>max
P>max

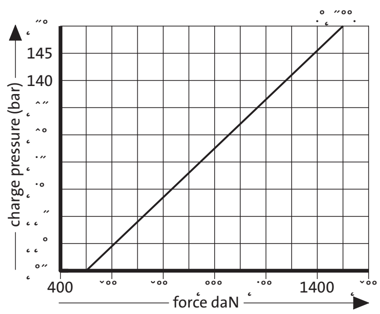
2484.12.01500.
LCF Gas Spring, damped

View X - Gas spring

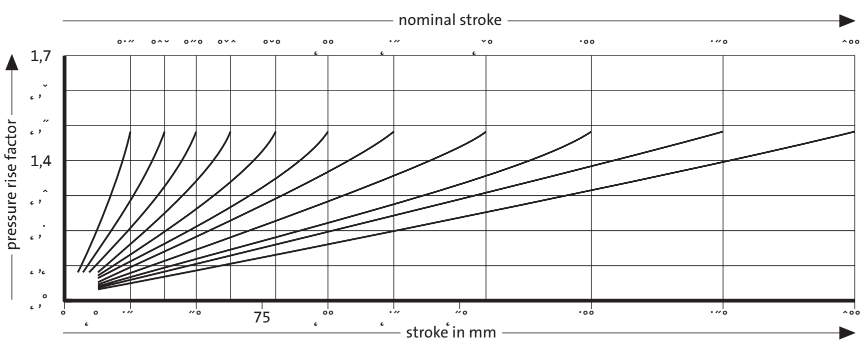


Order No	$Stroke_{max.}$	$l_{min.}$	l
2484.12.01500.025	25	135	160
2484.12.01500.038	38.1	148.1	186.2
2484.12.01500.050	50	160	210
2484.12.01500.063	63.5	173.5	237
2484.12.01500.080	80	190	270
2484.12.01500.100	100	210	310
2484.12.01500.125	125	235	360
2484.12.01500.160	160	270	430
2484.12.01500.200	200	310	510
2484.12.01500.250	250	360	610
2484.12.01500.300	300	410	710

Initial spring force
versus charge pressure

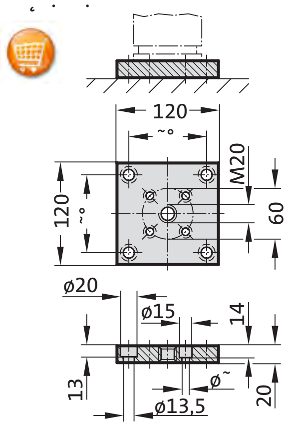


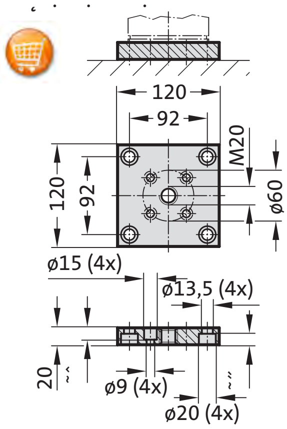
Spring force Diagram displacement versus stroke rise

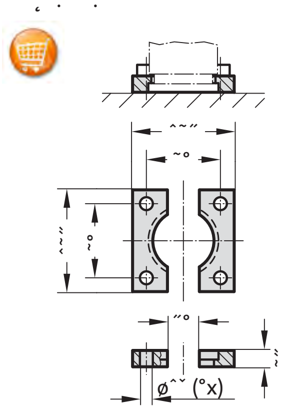


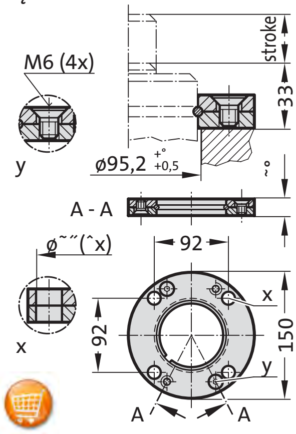
Pressure rise factor accounts for displacement but not external influences!

LCF gas spring, damped
Mounting variations

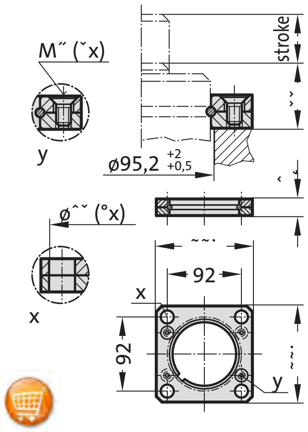




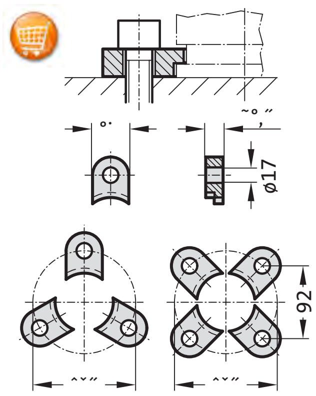


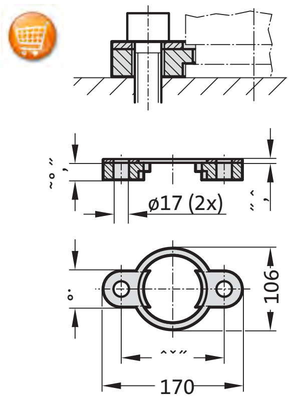


2480.057.03000

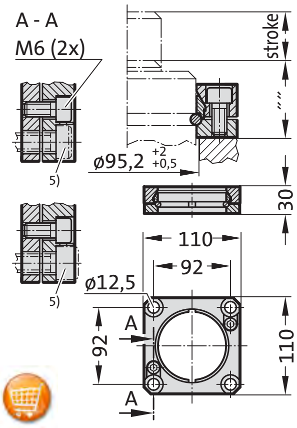


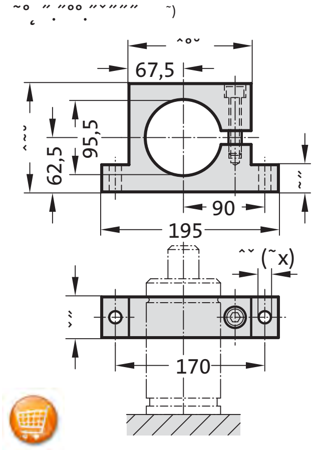
2480.007.03000





2480.064.03000 °)





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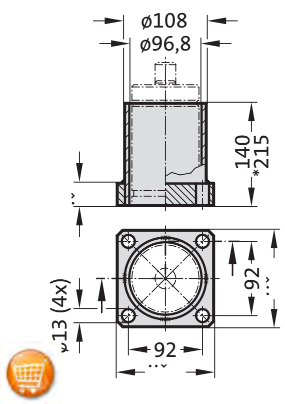
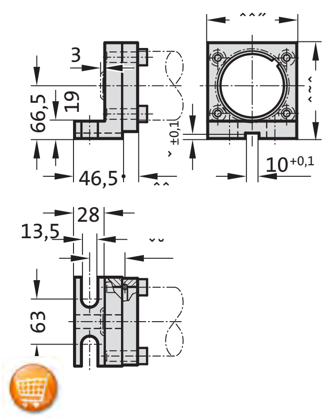
2480.010.03000.215* ˉ)





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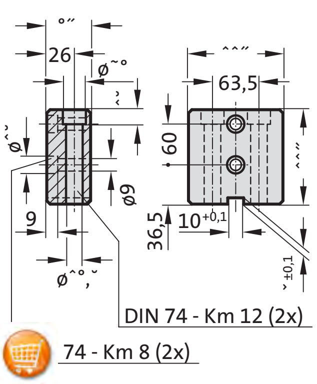
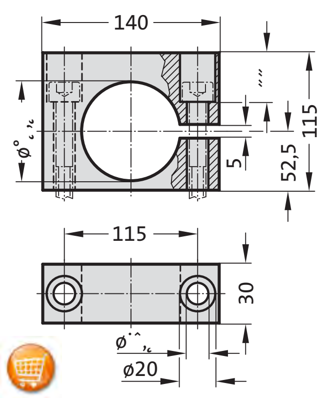


2480.044.03.03000 2)



Note:

2) Attention: The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

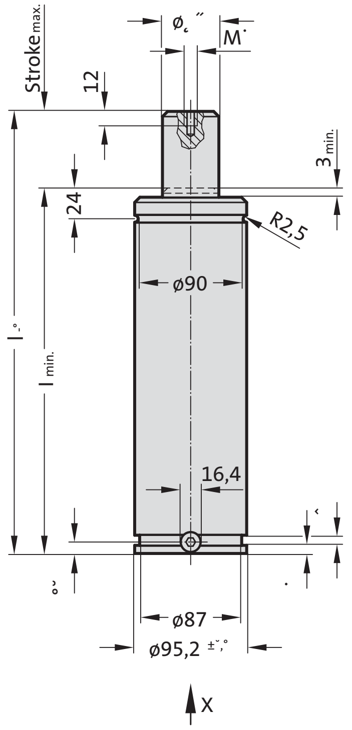
LCF Gas Spring, damped

Note:
Initial spring force F_{lcf} at 150 bar =1600 daN
Full spring force after 3.8 mm damped spring travel

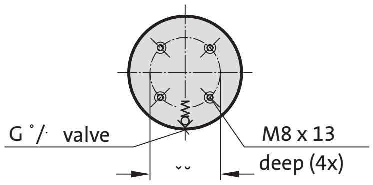
Order No for spare parts kit: 2484.13.03000

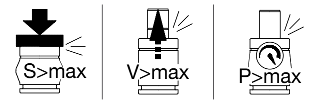
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 68 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

2484.13.03000.



View X - Gas spring

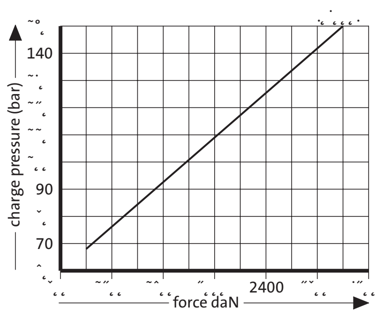




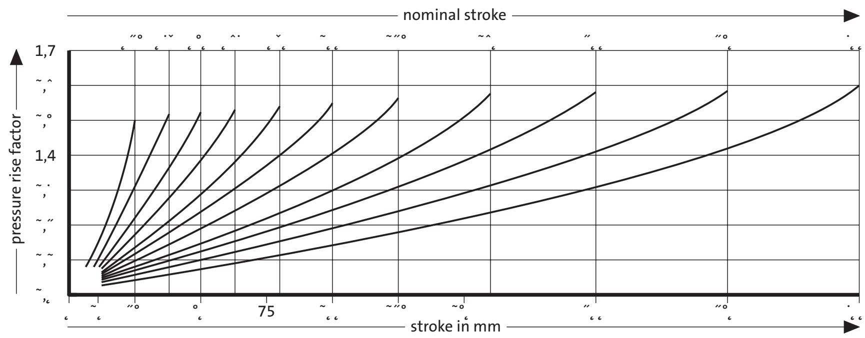
2484.13.03000.
LCF Gas Spring, damped

Order No	$Stroke_{max.}$	$l_{min.}$	l
2484.13.03000.025	25	145	170
2484.13.03000.038	38.1	158.1	196.2
2484.13.03000.050	50	170	220
2484.13.03000.063	63.5	183.5	247
2484.13.03000.080	80	200	280
2484.13.03000.100	100	220	320
2484.13.03000.125	125	245	370
2484.13.03000.160	160	280	440
2484.13.03000.200	200	320	520
2484.13.03000.250	250	370	620
2484.13.03000.300	300	420	720

Initial spring force
versus charge pressure



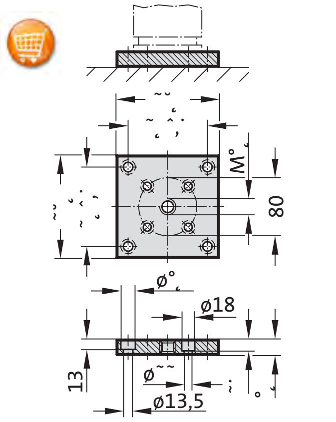
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

LCF gas spring, damped
Mounting variations

2480.011.05000



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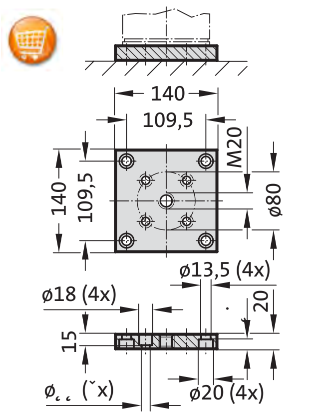
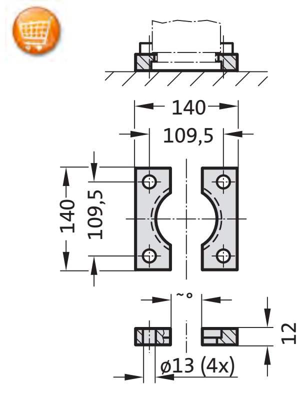
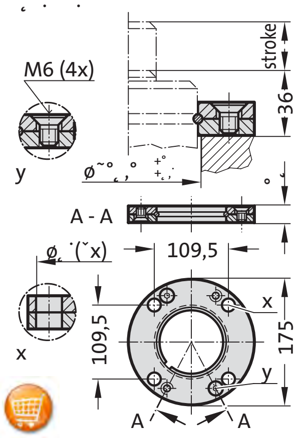
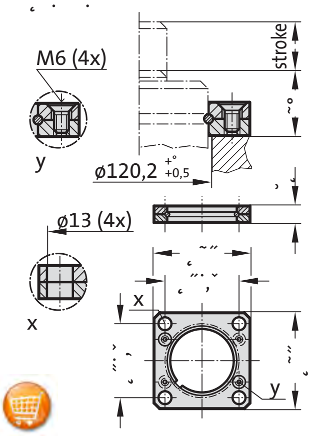
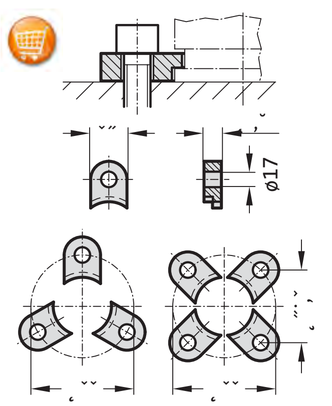


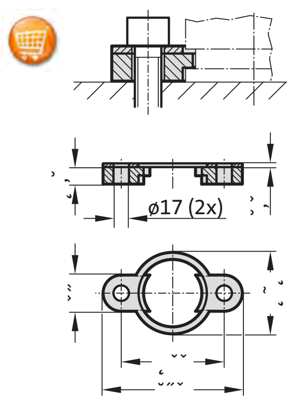








[3]



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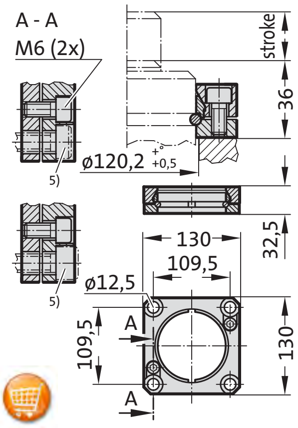

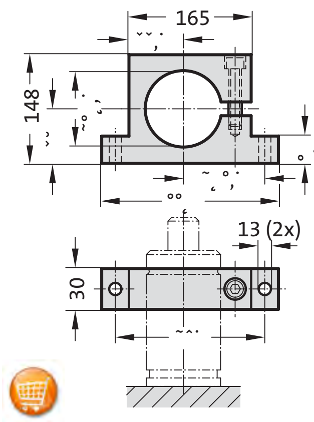

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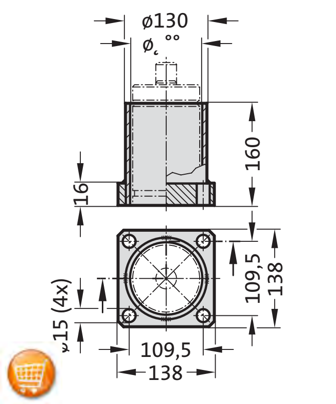

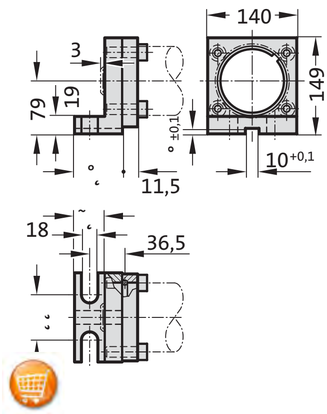

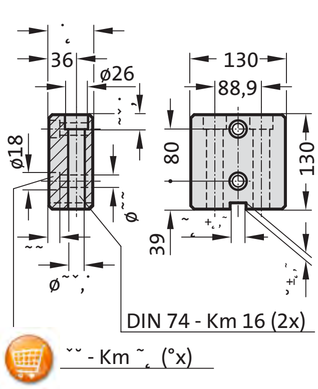

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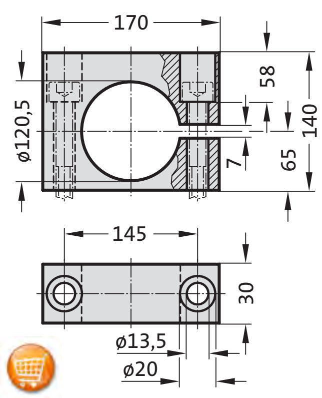


Note:

2) Attention:
The spring force must be absorbed by the stop surface!

3) Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

subject to alterations

LCF Gas Spring, damped

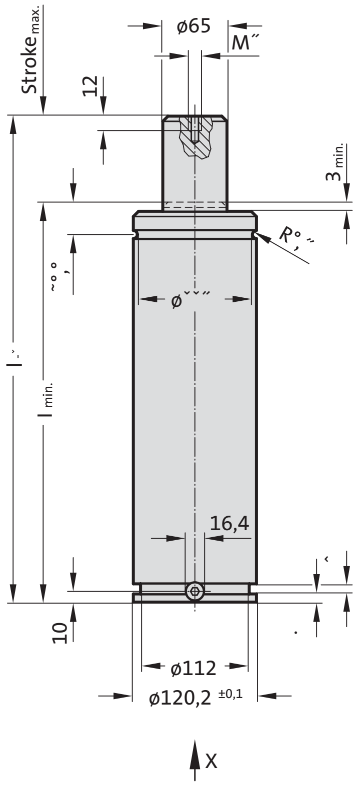
Note:

Initial spring force F_{lcf} at 150 bar =2500 daN
Full spring force after 7.7 mm damped spring travel

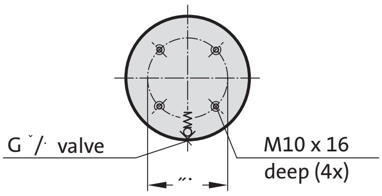
Order No for spare parts kit: 2484.13.05000

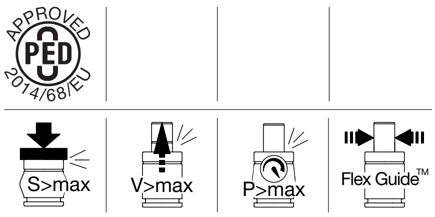
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 75 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

2484.13.05000.



View X - Gas spring

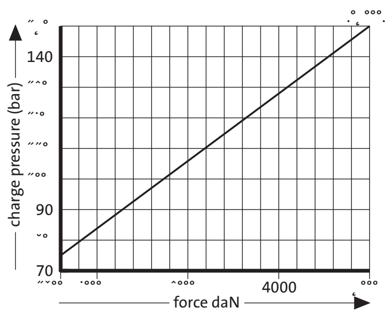




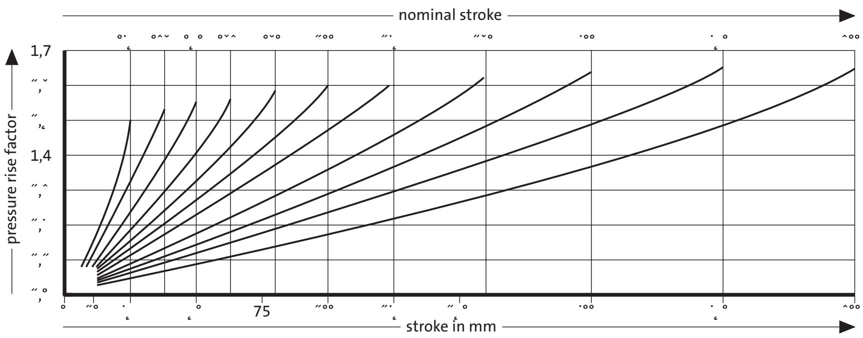
2484.13.05000.
LCF Gas Spring, damped

Order No	$Stroke_{max.}$	$l_{min.}$	l
2484.13.05000.025	25	165	190
2484.13.05000.038	38.1	178.1	216.2
2484.13.05000.050	50	190	240
2484.13.05000.063	63.5	203.5	267
2484.13.05000.080	80	220	300
2484.13.05000.100	100	240	340
2484.13.05000.125	125	265	390
2484.13.05000.160	160	300	460
2484.13.05000.200	200	340	540
2484.13.05000.250	250	390	640
2484.13.05000.300	300	440	740

Initial spring force versus charge pressure

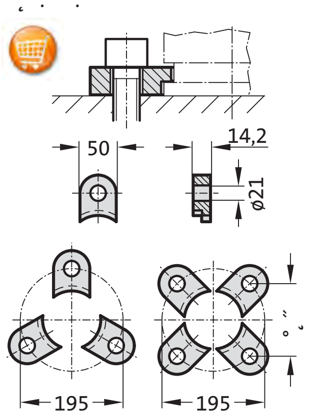


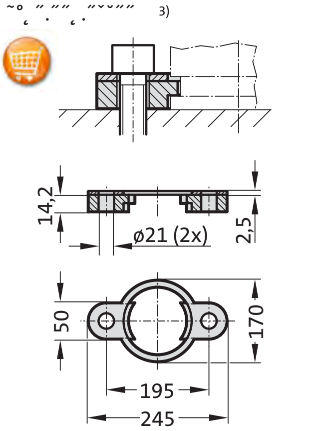
Spring force Diagram displacement versus stroke rise

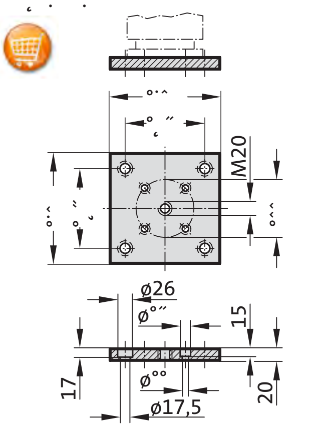


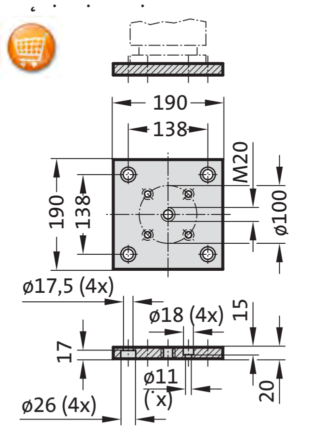
Pressure rise factor accounts for displacement but not external influences!

LCF gas spring, damped
Mounting variations

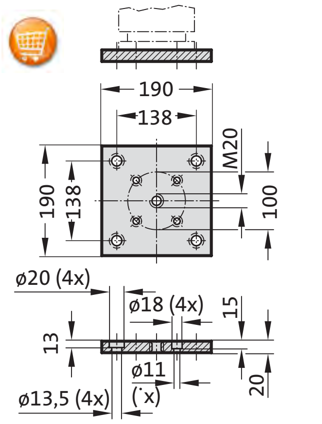




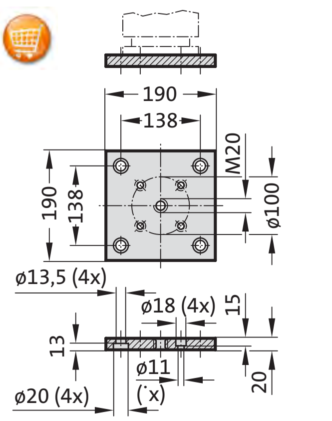


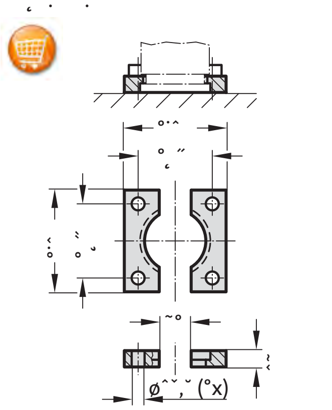


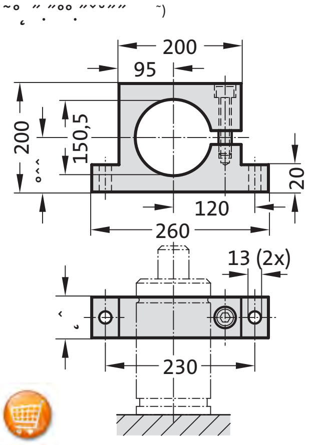
2480.011.03.07500



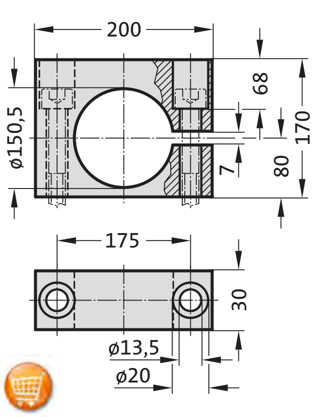
2480.011.03.07500.2

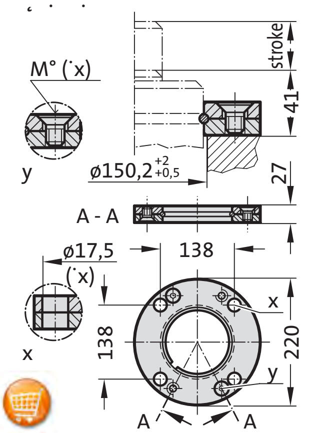


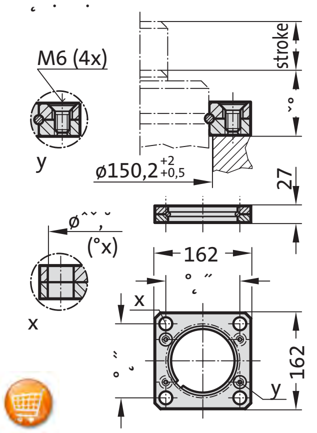




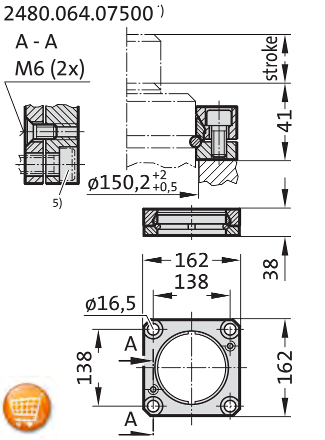
2480.044.03.07500 2)







2480.064.07500



Note:

2) Attention:
The spring force must be absorbed by the stop surface.

3) Note:
Not for use with composite connection.

4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexa-gonal socket (compact head recommended).

LCF Gas Spring, damped

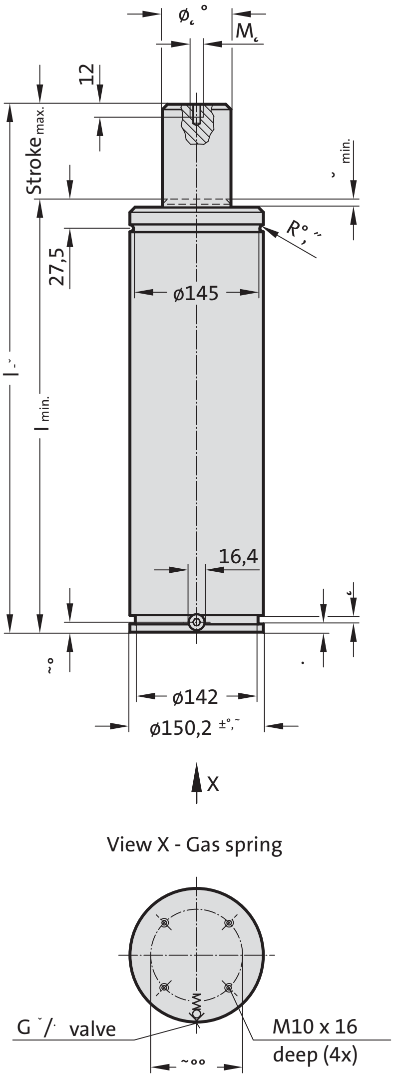
Note:

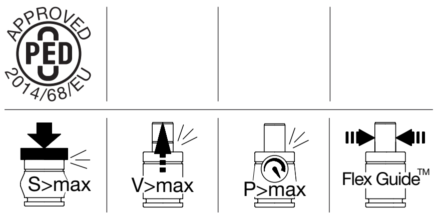
Initial spring force F_{lcf} at 150 bar =3000 daN
Full spring force after 10.4 mm damped spring travel

Order No for spare parts kit: 2484.13.07500

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 89 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s

2484.13.07500.

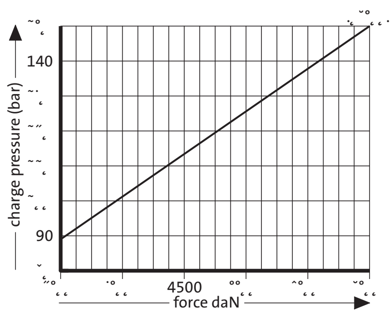




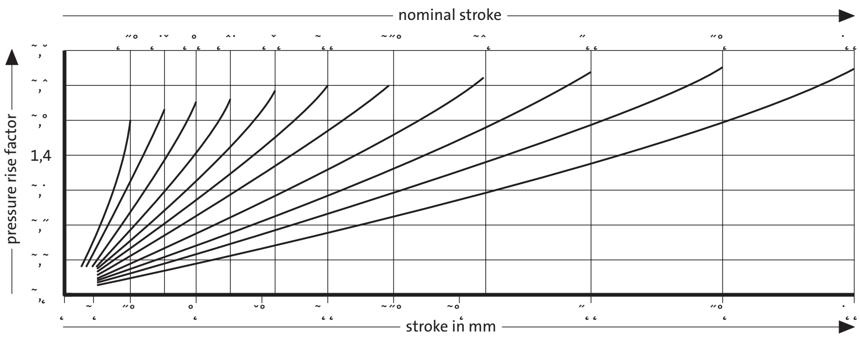
2484.13.07500.
LCF Gas Spring, damped

Order No	Stroke$_{max.}$	l$_{min.}$	l
2484.13.07500.025	25	180	205
2484.13.07500.038	38.1	193.1	231.2
2484.13.07500.050	50	205	255
2484.13.07500.063	63.5	218.5	282
2484.13.07500.080	80	235	315
2484.13.07500.100	100	255	355
2484.13.07500.125	125	280	405
2484.13.07500.160	160	315	475
2484.13.07500.200	200	355	555
2484.13.07500.250	250	405	655
2484.13.07500.300	300	455	755

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Controllable Gas springs

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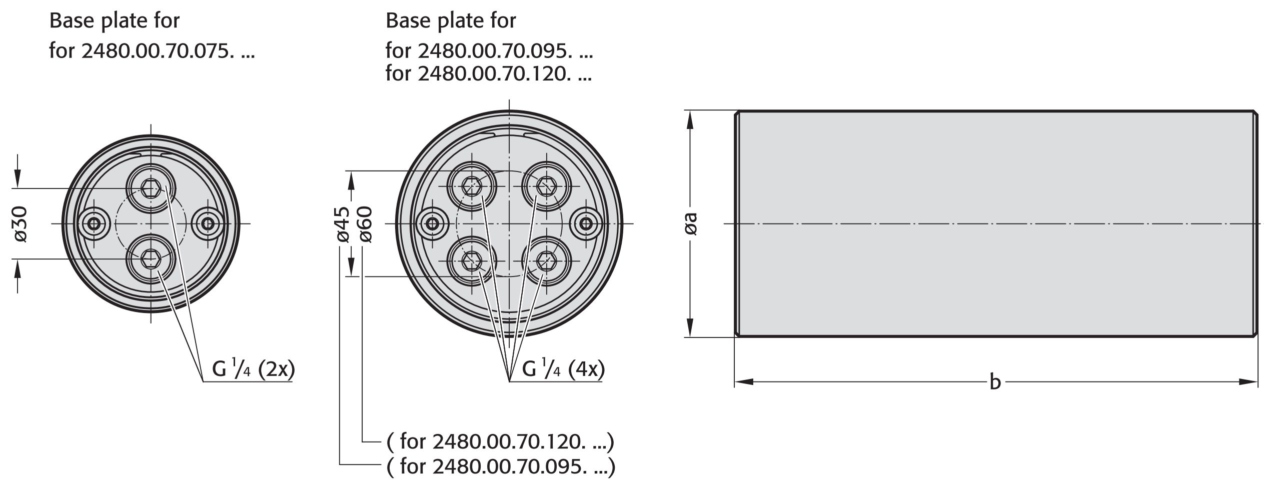
Gas spring Accessories

Pressure reservoir
for reduced pressure rise

2480.00.70.



Description:

The pressure reservoir and its base plates are manufactured from the same high grade steel als FIBRO gas springs. The advantage of including a pressure reservoir in the system is that in operation the gas pressure rises to a lesser extent. Apart from the purely tecnical pressure factors, a reduced pressure rise is beneficial to the service life of the system.

Function:

The pressure reservoir has two or four mounting holes with G¼" at both sides, which are designed for connection to the control fitting or gas spring.

Note:

If a pressure reservoir is to be installed, we recommend the 24°-cone-system, which ensures that the gas flow is not inhibited. Mounting clamps should be ordered separately. At least 2 are required for each pressure reservoir, see following pages.

2480.00.70. Pressure reservoir

Order No.	Volume in l [litres]	∅a	b
2480.00.70.075.0170	0,25	75	170
2480.00.70.075.0250	0,50	75	250
2480.00.70.075.0410	1,0	75	410
2480.00.70.095.0300	1,0	95	300
2480.00.70.095.0500	2,0	95	500
2480.00.70.095.0700	3,0	95	700
2480.00.70.095.0900	4,0	95	900
2480.00.70.120.0360	2,0	120	360
2480.00.70.120.0615	4,0	120	615
2480.00.70.120.1125	8,0	120	1125

Ordering Code (example):

Pressure reservoir	= 2480.00.70.
∅a = 75 mm	= 075.
b = 170 mm	= 0170
Order No.	= 2480.00.70.075.0170

Gas spring size/daN	Piston rod area/dm²
.00500	0,031
.00750	0,049
.01500	0,102
.03000	0,196
.05000	0,332
.07500	0,503
.10000	0,709

Calculating the isothermic increase in pressure*

(*by approximation)

$$\text{Pressure increase} = \frac{V_a+(n\times V_g{}^{1)})}{V_a+(n\times(V_g{}^{1)}-\text{Stroke}\times A))}$$

V_a	[l]	Volume of pressure reservoir, see table
V_g 1)	[l]	Gas volume of gas springs, appropriate spring types
		1) Note: When designing gas volume of spring types, please contact us at FIBRO.
Stroke	[dm]	Travel of gas springs, appropriate spring types
A	[dm²]	For area of piston rods of the gas spring, see table
n		Number of gas springs

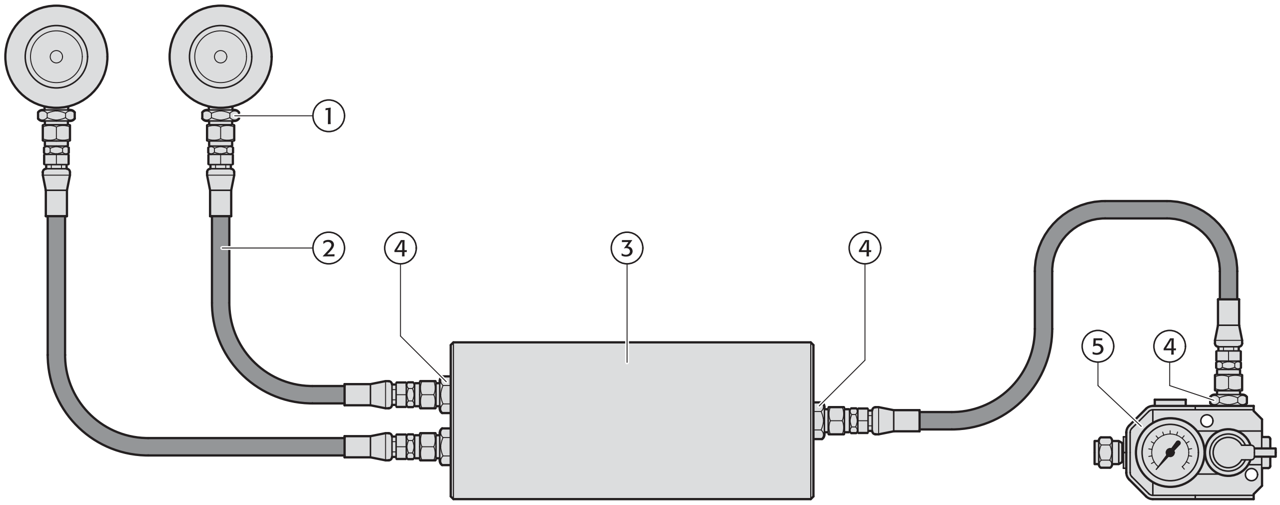
Calculation example:

10 gas springs, type 248.13.05000.050 with a travel of 50 mm (0,5 dm) are connected to a system with an 8 litres pressure reservoir.

$$\text{Pressure increase} = \frac{8\,l + (10\times 0{,}51\ l)}{8\,l + (10\times(0{,}51\ l - 0{,}5\ dm\times 0{,}332\ dm^2))} = 1{,}145$$

Pressure reservoir
for reduced pressure rise

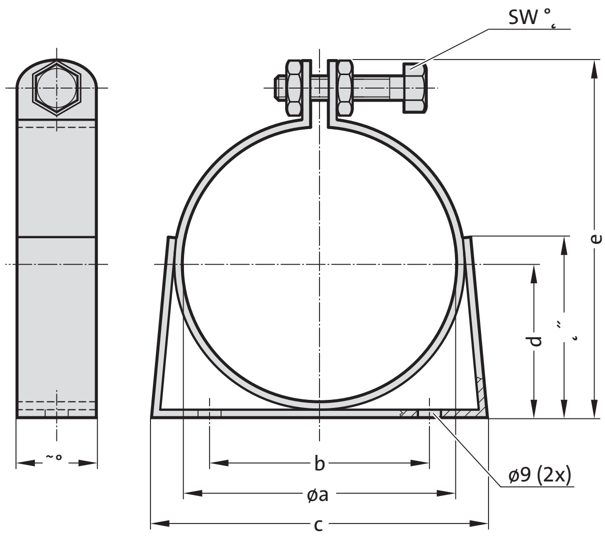
2480.00.70. Installation example: 24°-cone-system



Item	Quantity	Description	Order No.
1	2	Connection thread G1/8	2480.00.26.03
2	3	24°-cone-hose	2480.00.25.01.□ □ □ □
3	1	Pressure reservoir	2480.00.70. □ □ □.□ □ □ □
4	4	Connection thread G1/4	2480.00.26.04
5	1	Monitoring unit	2480.00.31.01

Mounting clamp
for pressure reservoir

2480.00.70.



Description:

The mounting clamp is a rubber coated galvanised sheet steel ring and is used for mounting the FIBRO pressure reservoir.

Important:

At least 2 fixing clamps are required per pressure reservoir. If the pressure tank is to be mounted vertically,
it should be seated on a robust base.

Ordering Code (example):

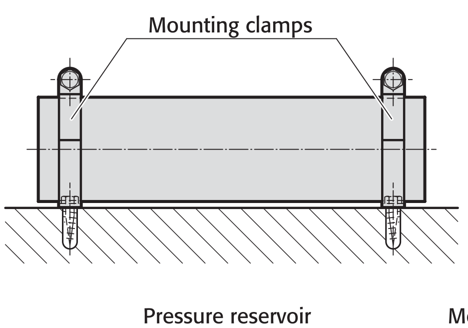
Mounting clamp (1)	
for pressure reservoir	= 2480.00.70.
Øa = 75 mm	= 075
Order No.	= 2480.00.70.075

2480.00.70. Mounting clamp

Order No.	Øa	b	c	d	e
2480.00.70.075	75	80	105	41,5	102
2480.00.70.095	95	100	145	51,5	122
2480.00.70.120	120	100	145	64	147

Installation Example:

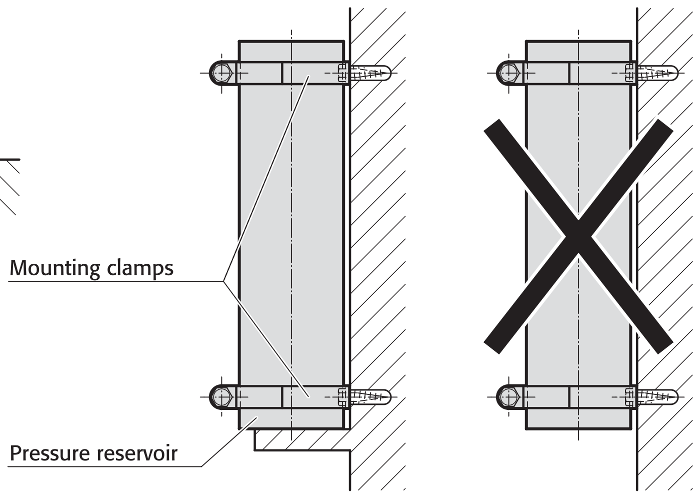
Horizontal



Vertical

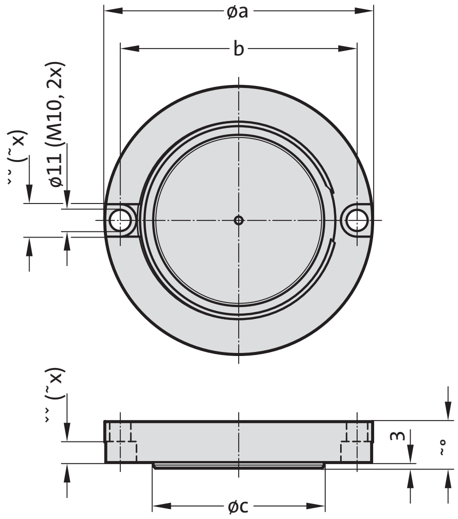
Correct

Wrong

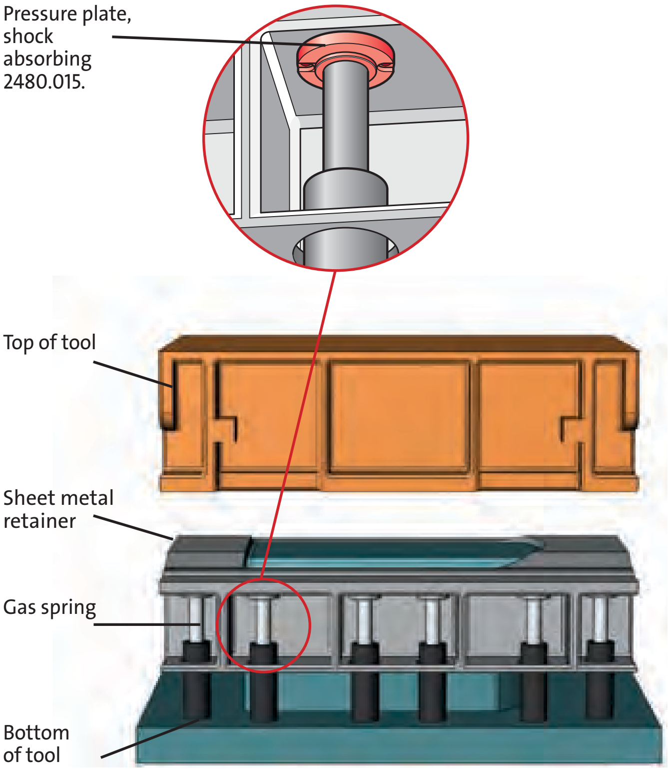


Pressure plate, shock absorbing

2480.015.



Installation example



2480.015. Pressure plate

Order No.	Gas spring strength	a	b	c
2480.015.01500	750 – 1500	108	91	58
2480.015.05000	> 1500 – 6600	143	126	92
2480.015.10000	> 6600 – 10600	167	150	112

Description:

The shock absorbing pressure plate is designed to minimise the main problems in the metal forming industry.

A specially designed shock absorbing unit is designed to reduce:
– extreme impact loads
– consequent high costs for press maintenance
– high noise levels
– risk of production of lower quality parts.

Guidelines for using shock absorbing pressure plates with gas springs:

1. After the maximum shock absorbing travel of 3 mm the gas spring will reach the same initial spring force as it would without the shock absorbing pressure plate.
2. The shock absorbing pressure plate is mounted between the tool and the piston rod of the gas spring.

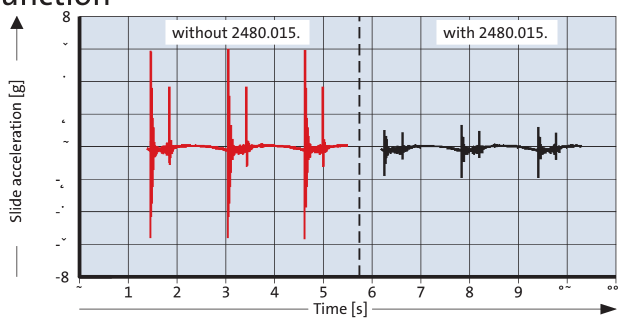
Material:

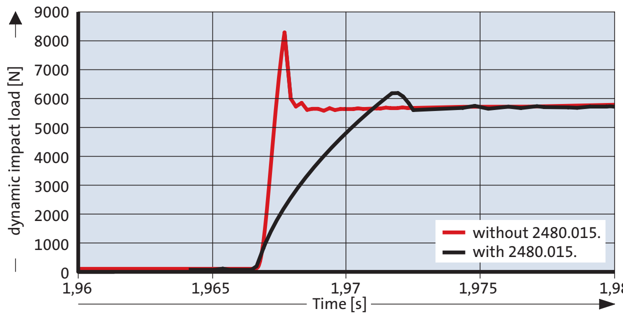
Steel, nitride
Polyurethane

Note:

Working temperature: 0 °C to 80 °C
Recommended max. strokes/min: 20
Max. press speed: 1.6 m/s
Max. shock absorbing travel: 3 mm

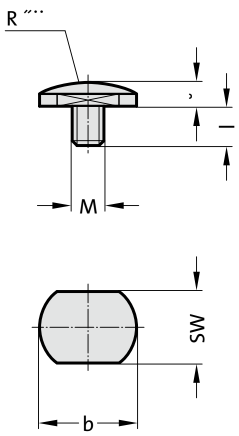
Function





THRUST PAD
PRESSURE PLATE

2480.004.



2480.004. Thrust Pad

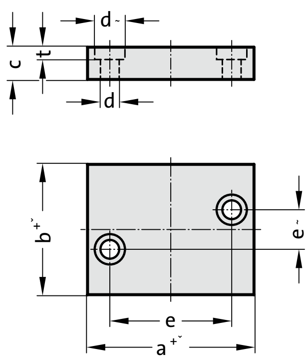
Order No	Socket cap screw DIN EN ISO 4762	SW	b	l
2480.004.06	6	17	20	6
2480.004.08	8	19	22.5	11

Description:
Trust pad for gas springs with M6 and M8 thread in the piston rod, not for 2480.13.00500.□□□.

Material:
No 1.7131, case-hardened

Attention:
Can only be used for gas springs, standard 2480.12./13.!

2480.009.



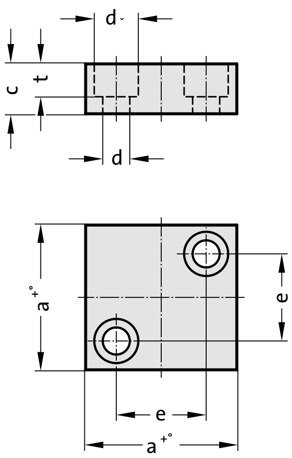
2480.009. Pressure plate

Order No*	max. piston rod diameter	a	b	c	d	d_1	e	e_1	t
2480.009.00250	15	50	25	12	7	11	32	8	7
2480.009.00500	20	55	30	12	7	11	40	14	7
2480.009.00500.1	20	55	32	16	9	15	37	0	9
2480.009.00750	25	70	35	15	9	15	48	14	9
2480.009.00750.1	36	65	50	16	9	15	47	0	9
2480.009.01500	36	75	50	15	9	15	56	30	9
2480.009.03000	50	85	60	15	9	15	66	40	9
2480.009.03000.1	50	80	60	16	9	15	62	0	9
2480.009.05000	65	100	80	20	11	18	72	56	11
2480.009.05000.2	65	102	80	20	11	18	80	0	11
2480.009.07500	80	110	100	20	11	18	85	75	11
2480.009.07500.2	80	117	100	20	11	18	95	0	11
2480.009.10000.1	90	132	100	20	11	18	110	0	11

*Execution .1/.2 to Volvo standard

Material:
No 1.2842, hardened
or
No 1.2379, hardened

2480.018.



2480.018. Pressure plate

Order No	max. piston rod diameter	a	c	d	d_1	e	t
2480.018.01500	65	90	12	9	15	64	9

Material:
No 1.2842, hardened

Thrust plate
Thrust plate to Renault standard

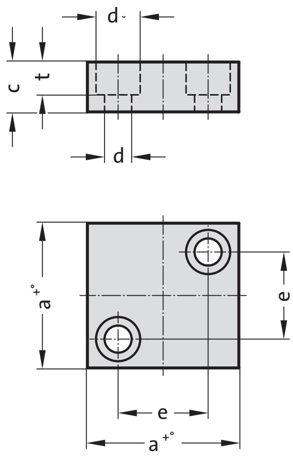
2480.019. Thrust plate

Order No*	max. piston rod diameter	a	c	d	d_1	e	t
2480.019.00100	15	40	15	9	15	21	10
2480.019.00100.2	15	40	15	7	11	24	7
2480.019.00750	25	56	20	11	18	32	13
2480.019.03000	50	71	20	11	18	48	13
2480.019.03000.2	50	70	15	9	15	50	9
2480.019.03000.1	80	90	20	11	18	67	13
2480.019.07500.2	80	90	15	9	15	70	9
2480.019.07500	95	140	20	11	18	110	13

*Execution .2 to VDI 3003

Material:
No 1.2842, hardened
or
No 1.2379, hardened

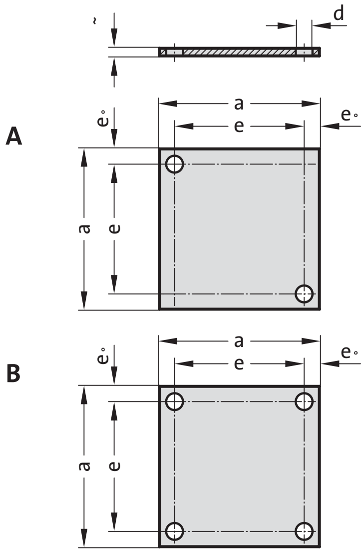
2480.019.



2480.019.45. Thrust plate to Renault standard

Order No	Shape	max. piston rod diameter	a	e	d
2480.019.45.00750	A	50	70	50	11
2480.019.45.01500	A	80	90	70	11
2480.019.45.03000	B	95	105	85	11
2480.019.45.05000	B	95	125	105	11
2480.019.45.07500	B	95	150	125	13
2480.019.45.10000	B	95	190	165	13

Material:
No 1.2842, hardened
or
No 1.2379, hardened

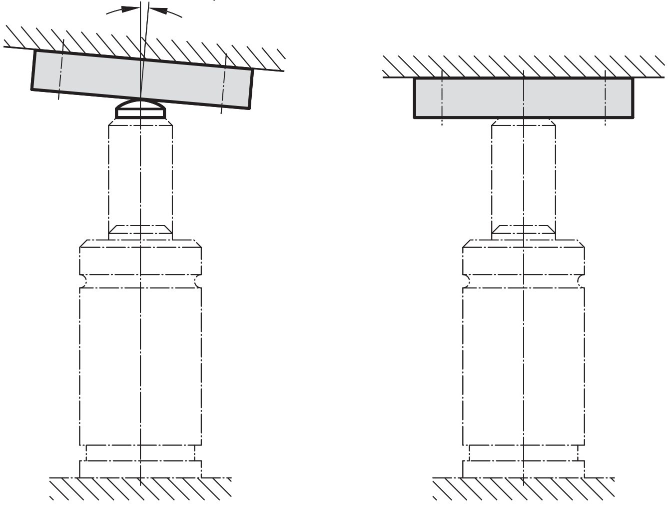


Description:
The hardened thrust pad 2480.004. reduces side forces in cases of skew thrust vaces or lateral displacement component.

In conjunction with the thrust pads, the hardened thrust plates 2480.009., 2480.018. and 2480.019. further helps to protect the gas spring from lateral forces, through reduction of friction – even when used without the thrust pad.

Note:
Especially with gas springs of large stroking capacity we recommend the use of the pad plate combination!

Mounting example:



Concertina shroud for gas springs

Description:

The concertina shroud protects the piston rod of the gas spring against negative influences, such as e.g.:

- drawing in dirt
- damage to the surface of the piston rod
- adhesion of dirt particles
- drawing in of oil and/or emulsion

The concertina shroud is internally (cylinder tube side) fastened and is free of any obstructing contours, such as externally mounted tube clamps. This enables fastening and installation of the gas spring inside the tool without any restrictions.
The concertina shroud for gas springs prolongs the lifetime of the gas springs under rough operating conditions.

Technical data

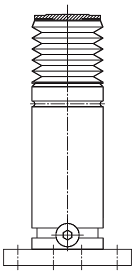
Material	Concertina shroud:	CSM-Rubber 65 ±3 Shore A
	Disc:	Steel burnished
	Ring:	stainless Steel
Temperature range:		0-90 °C
Chemical resistance	Acids:	very good
	Alkaline solutions:	very good
	Solvents:	sufficient
Weather resistance	Sun light (UV):	good
	Ozone:	very good
	Water:	sufficient
Oil resistance	Mineral:	good
	Synthetic:	sufficient

Delivery:

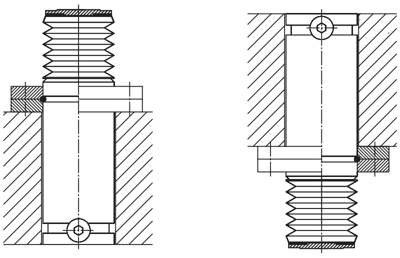
Concertina shroud incl. rotatable disk and countersunk screw.

Custom dimensions/materials available on request.

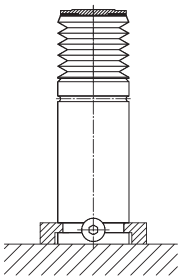
Mounting examples



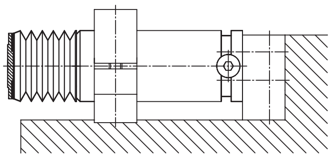
screw mounted at the bottom with 2480.011.



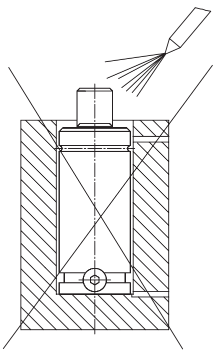
fixed with 2480.055./057./064.

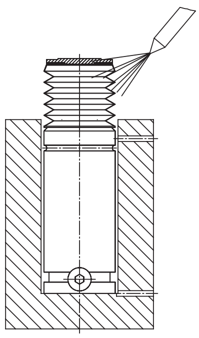


fixed with 2480.007./008.



fixed with 2480.044./045./047.



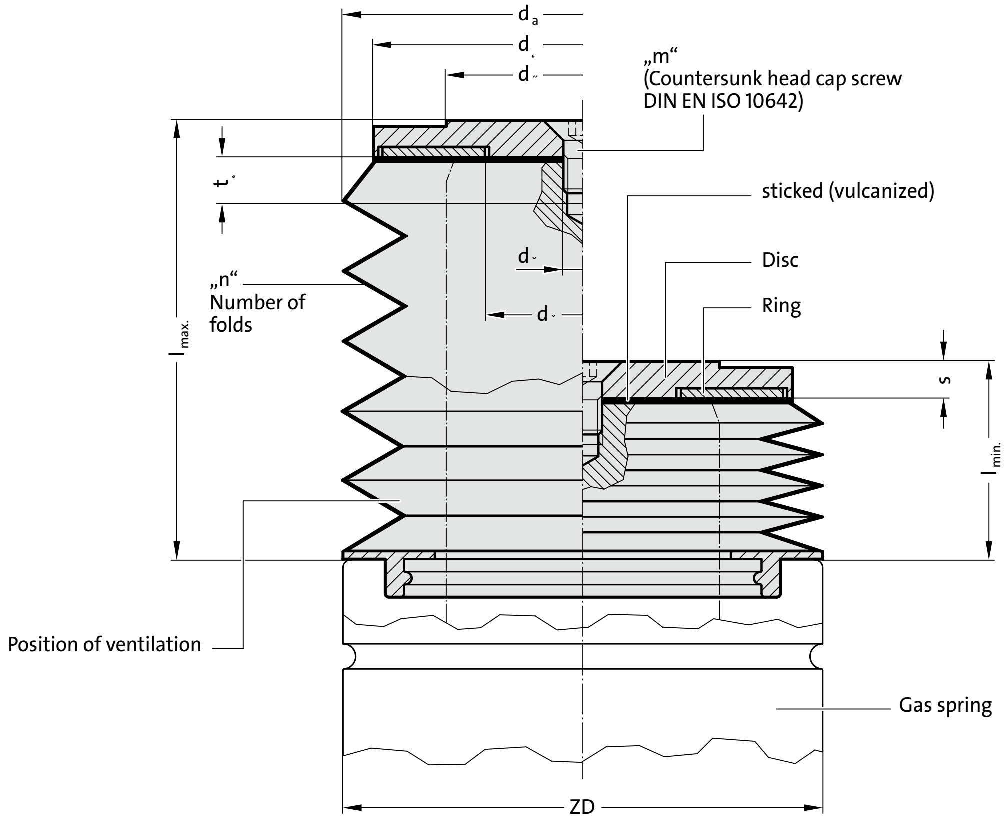


installed loose in the bore

More mounting examples for gas springs see page „Mounting directions for gas springs“

Concertina shroud for gas springs

2480.080.



2480.080. Concertina shroud for gas springs

Type of Gas spring	2487.12.00350.	24 87.12.00500.	2480.13.00500.	2487.12.00750. .1 2488.13.00750.	2480.13.00750.	2487.12.01000. .1 2488.13.01000.	2487.12.01500. 2488.13.01500.	2480.12.01500.	2487.12.02400. 2488.13.02400.	2480.13.03000.	2487.12.04200. 2488.13.04200.	2480.13.05000.	2487.12.06600. 2488.13.06600.	2480.13.07500.	2487.12.09500. 2488.13.09500.
ZD	32	38	45	45	50	50	63	75	75	95	95	120	120	150	150
d_a	45	50	50	55	55	65	65	75	75	95	95	120	120	150	150
d_1	32	38	45	45	50	50	63	75	75	95	95	120	120	150	150
d_2 / KD	16	20	20	25	25	28	36	36	45	50	60	65	75	80	90
s	6	6	6	6	6	6	6	6	6	6	6	6	6	9	6
d_3	6.6	6.6	6.6	6.6	9	6.6	6.6	9	6.6	9	9	9	9	17	9
d_5	10	14	14	17	17	20	28	28	37	42	51	57	66	71	81
t_1	5	5	10	5	10	5	5	10	5	10	5.5	10	5.5	20	5.5
m	M6×8	M6×8	M6×12	M6×8	M8×12	M6×10	M6×10	M8×12	M6×10	M8×12	M8×12	M8×12	M8×12	M16 ×25	M8×12
Stroke	125 (Str oke ≤ 125)														
$l_{min.}$	28	28	28	28	28	28	28	28	28	28	28	23	23	24	21
$l_{max.}$	133	133	133	133	134	134	134	134	134	134	134	134	134	137	134
n	10	10	10	10	10	10	10	10	10	8	8	6	6	5	5
Stroke	300 (Stroke > 125), not f or 2487.12.*														
$l_{min.}$	-	-	-	-	52	--*/52	--*/52	52	-- */52	54	--*/54	41	--*/41	37	--*/34
$l_{max.}$	-	-	-	-	309	309	309	309	309	309	309	309	309	402	309
n	-	-	-	-	22	--*/22	--*/22	22	--*/22	19	--*/19	14	--*/14	11	--*/11

Ordering Code (example)

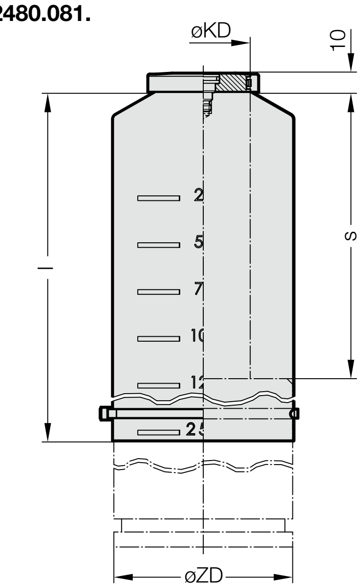
Concertina shroud for gas springs	= 2480.080.	
ZD = 120 mm	=	120.
d_2/KD = 65 mm	=	065.
Stroke = 125 (Str oke ≤ 125 mm)	=	125
Order No.	= 2480.080.120.065.125	

Concertina shroud for gas springs	= 2480.080.	
ZD = 120 mm	=	120.
d_2/KD = 65 mm	=	065.
Stroke = 300 (Stroke > 125 mm)	=	300
Order No.	= 2480.080.120.065.300	

PISTON ROD PROTECTION, FIBRO-TEX®

Mounting example

2480.081.



Description:

The FIBRO-TEX® protects the piston rod of the gas spring against negative influences, such as:

- drawing in dirt
- damage to the surface of the piston rod
- adhesion of dirt particles
- drawing in oil and/or emulsion

The FIBRO-TEX® breathable material doesn't require aditional ventilation.
Due to the piston rod protection, FIBRO-TEX®, increases the lifetime of the gas spring under rough operating conditions.

Note:

Included with this part number is the piston rod protection FIBRO-TEX®, with the necessary washer with screw and o-ring, premountet with cable ties (to piston rod), cable tie (for gas spring housing) is added separately. The piston rod protetion has a length of 250 mm. The length of the piston rod protection is shortend individually to the stroke length of the gas spring.

Technical data:

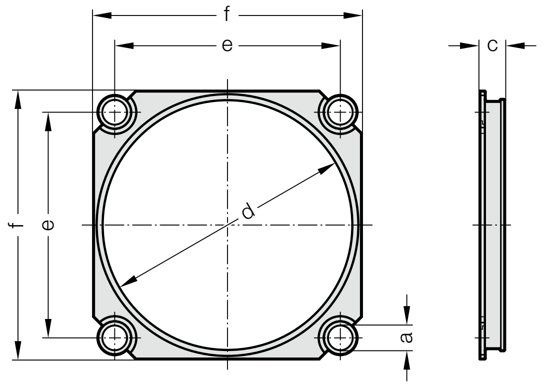
Material:	Piston rod protection:	Polytetrafluo-rethylene (ePTFE)
	Washer:	Steel, burnished
	Cable tie (piston rod side):	Polyamide
	Cable tie (cylinder tube side):	Polyamide
Working temperature:		0°C - 80°C
Temperature resistance:		-35°C - 200°C
Chemical resistance:	Acids:	excellent
	Alkalines:	excellent
	Solvent:	excellent
Weather-resistance:	Sunlight (UV):	excellent
	Ozone:	excellent
	Water:	excellent
Oil resistance:	mineral:	excellent
	synthetic:	excellent

2480.081. Piston rod protection, FIBRO-TEX®

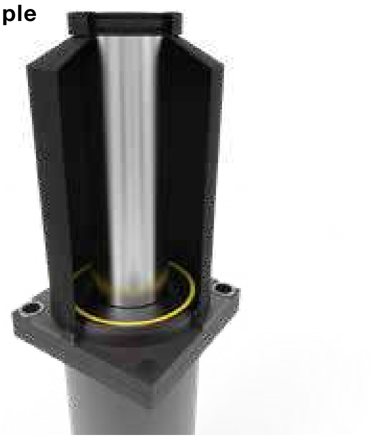
Type of Gas spring					2480.13.03000.	2489.14.01500.	2484.13.03000.	2488.13.04200.	2487.12.04200.	2487.12.33.04200.	2480.13.05000.	2489.14.03000.	2484.13.05000.	2488.13.06600.	2487.12.06600.	2487.12.33.06600.	2480.13.07500.	2484.13.07500.	2488.13.09500.	2487.12.09500.	2489.14.05000.
Order No	øKD	øZD	s	l																	
2480.081.095.050.250	50	95	10 - 250	250	•	•	•														
2480.081.095.060.250	60	95	10 - 250	250				•	•	•											
2480.081.120.065.250	65	120	10 - 250	250							•	•	•								
2480.081.120.075.250	75	120	10 - 250	250										•	•	•					
2480.081.150.065.250	65	150	10 - 250	250																	•
2480.081.150.075.250	75	150	10 - 250	250													•	•			
2480.081.150.090.250	90	150	10 - 250	250															•	•	

FLANGE ADAPTER
CABLE TIE PLIERS

2480.081.00.057.



Mounting example



2480.081.00.057. Flange adapter

Order No	Tube-ø	a	c	d	e	f
2480.081.00.057.095	95	12	12	96.2	92	110
2480.081.00.057.120	120	12	12	121.2	109.5	130
2480.081.00.057.150	150	16	11	151.2	138	162

Description:
When the gas spring is mounted with a saddle flange, an additional retainer plate can be used. The retainer plate is mounted on the upper side of the saddle flange with fastening screws.

Material:
Retainer plate: Plastic Discs: Steel

Attention:
The retainer plate is determined by the cylinder tube diameter of the gas spring.

2480.081.00.007 Cable tie pliers

Description:
We recommend to use a cable tie plier (tong) to mount the cable ties

Note:
Order Number for spare part cable ties
2480.081.00.006.1 (piston rod)
2480.081.00.006.2 (gas spring housing)

Minimum tensile strength:	220 up to 540 N
Cable tie width:	4,8 up to 7,6 mm
Stroke length:	25,4 mm

Gas spring connection systems
Introduction

Connecting gas springs in one more systems enables the user to monitor gas spring pressure from outside the tool, to adjust it if necessary, to fill it and to drain it. The connector system has many advantages including ease of maintenance, reliability and improvement in the quality of gas spring use in the tool.

FIBRO offers four different systems for hose connections for gas springs: Minimess system, Compression fitting system, JIC system (24° flare) and Micro connector system. The hoses, screwed connectors and other components are selected to meet the most stringent standards and undergo a series of tests including service life, static seel and robustness after repeated assembly and disassembly.

Minimess system 2480.00.23./.24.

+ Small external hose diameter Ø 5 mm
+ Small bending radius R_{min} = 20
+ High pressure resistance
+ Vibration-proof measurement couplings
+ Connector with valve
+ No tools needed for connecting hose to adapter, and disconnecting
± Swaged non-detachable hose fitting
– Not for use with a pressure reservoir

Technical data:

Hose:	polyamide 11, black, dimpled
Hose fitting:	free cutting steel, galvanised
Measurement couplings:	free cutting steel, galvanised
Adapter:	steel, gunmetal finish
Max. pressure:	630 bar
Temperature range:	0–100 °C

Recommended application:

Most used system for all gas springs with G¹/₈ gas connection.
Not suitable for use with a pressure reservoir because of the small internal diameter which reduces the flow.

Compression fitting system 2480.00.10.

+ Assemble on-site system
+ Reusable hose fitting
+ High pressure resistance
± Suitable for connecting to a pressure reservoir under certain conditions
– Larger bending radius R_{min} = 40
– Not suitable for gas springs with M6 connection thread
– Extra time required for preparing hose and fitting it

Technical data:

Hose:	polyurethane/polyamide, black, dimpled
Hose fittting:	steel, galvanised
Adapter:	steel, galvanised
Max. pressure:	380 bar
Temperatur range:	0–100 °C

Recommended application:

For all gas springs with G¹/₈ gas connection.
Mainly used for self-assembly in small numbers.

24°-cone-system 2480.00.25./.26.

+ Suitable for connecting to a pressure reservoir
+ Wide range of connection adapters
+ Vibration-proof (O-ring seal)
+ High pressure resistance
± Swaged non-detachable hose fitting
– Larger bending radius R_{min} = 40
–Not suitable for gas springs with M6 connection thread

Technical data:

Hose:	polyurethane/polyamide, black, dimpled
Hose fitting:	steel, galvanised
Adapter:	steel, galvanised
Max. pressure:	315 bar
Temperatur range:	0–100 °C

Recommended application:

For all gas springs with G¹/₈ gas connection.
Mainly used for connection to pressure reservoir.

Connector system, 24° conus micro 2480.00.27./.28.

+ small external hose diameter ø5 mm
+ hose: small bending radius R_{min} = 20 mm
+ pipe: Min. bending radius = 12 mm (3x da)
+ high pressure resistance
+ small connection adapter
+ vibration-safe due to O-ring seal
+ tightly pressed, non-detachable hose fitting
- not suitable for use with a pressure reservoir
- limited suitability for gas springs with thread connection G¹/₈

Technical data:

Hose:	Polyamide 11, black, dimpled
Hose adapter:	free cutting steel, galvanised
Adapter:	steel, galvanised
Max. perm. pressure:	475 bar
Temperature range:	0 to +80 °C
Pipe:	steel
Pipe external diameter (da):	ø4 mm
Pipe internal diameter (di):	ø2 mm
max. dynamic pressure:	430 bar
Temperature range:	0 to +100 °C

Note: Pipe system, 24° conus micro for higher temps on request.

Recommended application:

For all gas springs with M6 gas connection.
Not suitable for use with a pressure reservoir due to small internal diameter (reduced flow volume).

Instruction for hose assembly
Mounting arrangement
for gas springs in the Minimess system

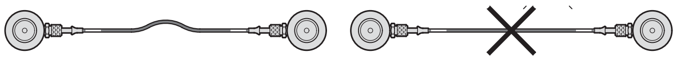
Never exceed the maximum pressures and temperatures for the hoses.

Ensure that all hoses and adaptors are perfectly clean prior to assembly.

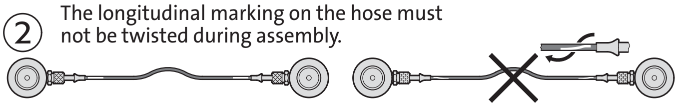
To be suitable for use with compressed gas the hose sheath must be perforated. We recommend the use of the 24°-cone-hose system for pressure reservoir to ensure an unrestricted gas flow.

Follow the instructions below to ensure functionality and maximum service life for the hose connection:

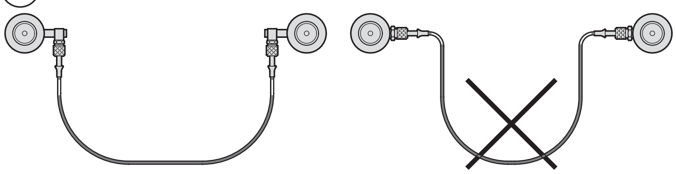
(1) Select a hose length to provide a certain amount of play.



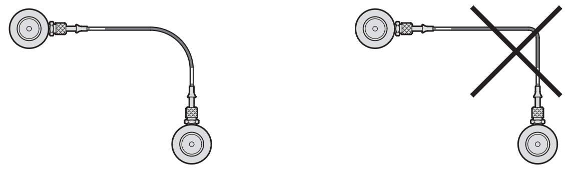
(2) The longitudinal marking on the hose must not be twisted during assembly.



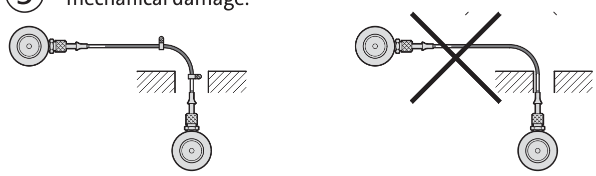
(3) Use only hose fittings which prevent kinks forming in the hose.



(4) Any bends in the hose must always have the recommended minimum radius, as detailed in the catalogue.



(5) The hose must be connected correctly to avoid mechanical damage.



Refer to DIN 20066 for further details on installing hose connections.

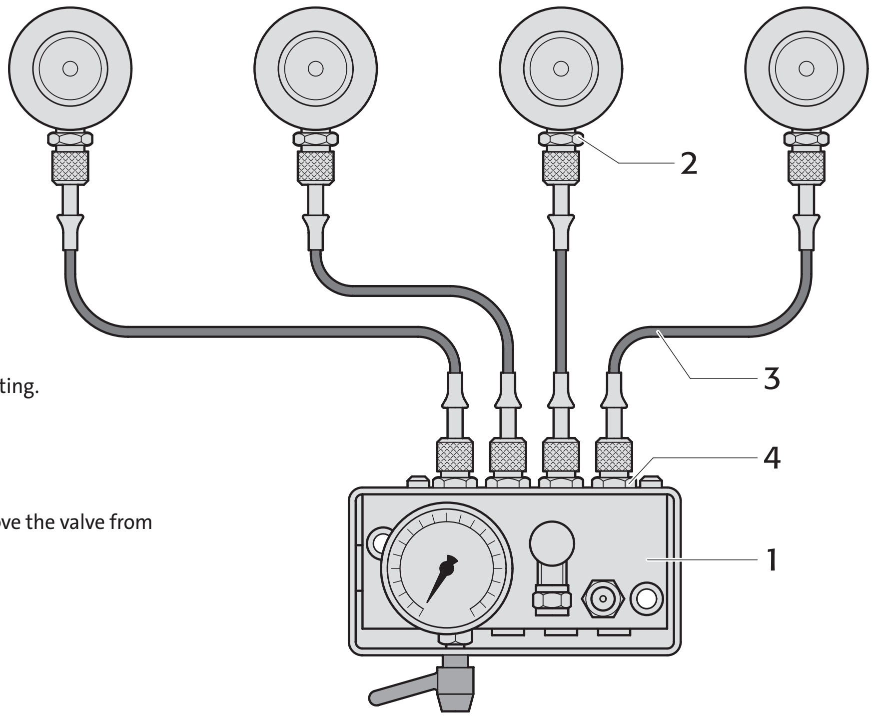
Warning:

Any modifications whatsoever to the product are prohibited.

For further information refer to the FIBRO Gas Spring Catalogue, visit www.fibro.com or contact your FIBRO agent.

2480. Example 1:

Direct connection for group



Function:

Each spring has a direct connection with the control fitting.
They are not interconnected and form a pressure zone

See control fitting 2480.00.30

Note:

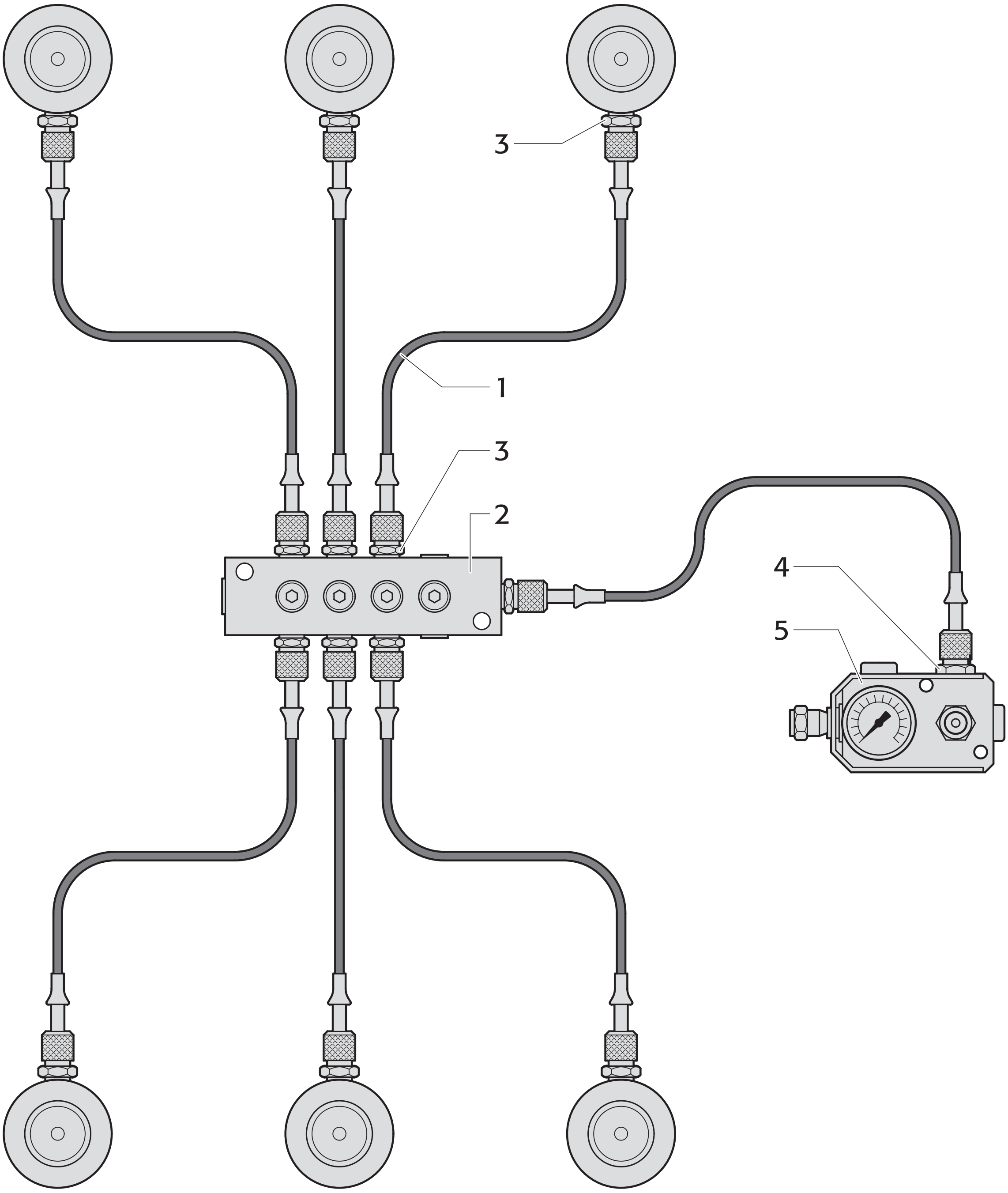
When installing gas springs in the system always remove the valve from the gas spring.

Item	Designation	Number	Order No.	Comment
1	Control fitting	1	2480.00.30.01	Optionally with diaphragm pressure switch 2480.00.30.02
2	Gauging coupling	4	2480.00.24.01	
3	Measuring hose	4	2480.00.23.□□.□□□	Type of connection and length as required
4	Gauging coupling	4	2480.00.24.02	

Mounting arrangement for gas springs in the Minimess system

2480. Example 2:

Group series connection



Function:

The springs are interconnected and there is just one test line to the control fitting.

Note:

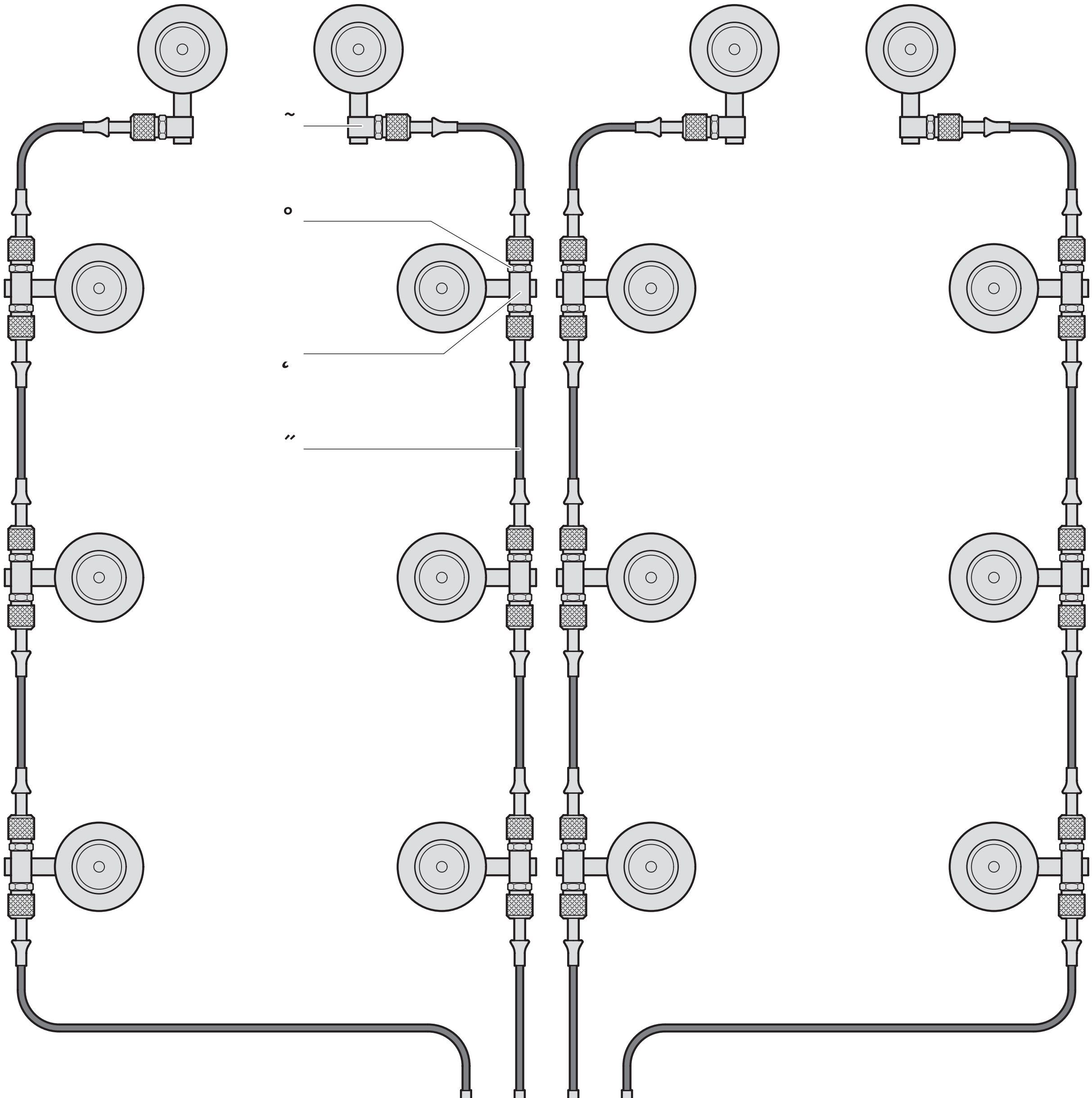
When installing gas springs in the system always remove the valve from the gas spring.

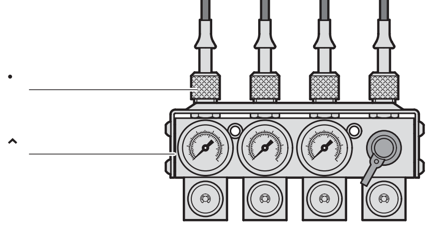
Position	Designation	Number	Order No.	Comment
1	Measuring hose	7	2480.00.23.□□.□□□	Type of connection and length as required
2	Distributor	1	2480.00.24.33	
3	Gauging coupling	13	2480.00.24.01	
4	Gauging coupling	1	2480.00.24.02	
5	Control fitting	1	2480.00.31.01	

Mounting arrangement for gas springs in the Minimess system

2480. Example 3:

Multiple connections with independent functioning





Function:

Each series of springs has a direct connection with the control fitting. By using a common pressure supply the springs can be joined in the fitting so that joint filling/releasing of gas is possible. The gas in each series of springs can also be filled/released or monitored individually .

See Multi control fitting 2480.00.39.05.04

Note:

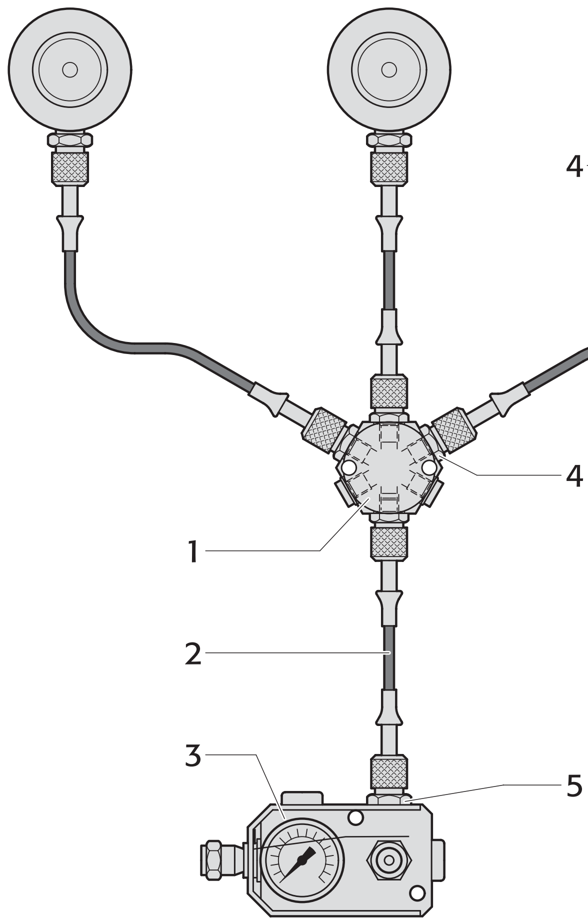
When installing gas springs always remove the valve from the gas spring.

Item	Designation	Number	Order No.	Comment
1	Simple adaptor, short	4	2480.00.24.17	Choice of "long" or "very long" depending on the specific mounting arrangements.
2	Gauging coupling	28	2480.00.24.01	
3	Multi adapter	12	2480.00.24.11	Choice of "long" or "very long" depending on the specific mounting arrangements.
4	Measuring hose	16	2480.00.23.□□.□□□	Type of connection and length as required
5	Multi control fitting	1	2480.00.39.05.04	
6	Gauging coupling	4	2480.00.24.01	

Mounting arrangement for gas springs in the Minimess system

2480. Example 4.1:

Group series connection



Function:

The springs are interconnected and there is just one test line to the control fitting.

Note:

When installing gas springs always remove the valve from the gas spring.

Item	Designation	Number	Order No.	Comment
1	Coupling	1	2480.00.24.31	
2	Measuring hose	4	2480.00.23.□□.□□□	Type of connection and length as required
3	Control fitting	1	2480.00.31.01	
4	Gauging coupling	7	2480.00.24.01	
5	Gauging coupling	1	2480.00.24.02	

2480. Example 4.2:

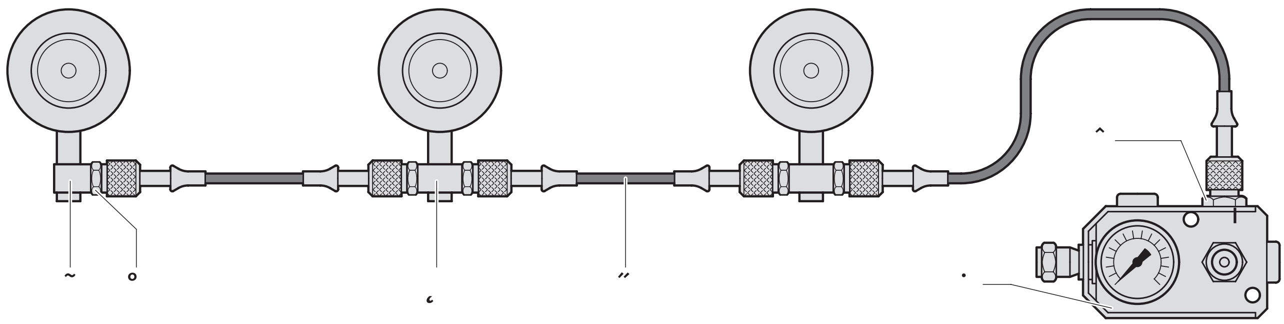
Group series connection

Function:

The springs are interconnected and there is just one test line to the control fitting.

Note:

When installing gas springs always remove the valve from the gas spring.

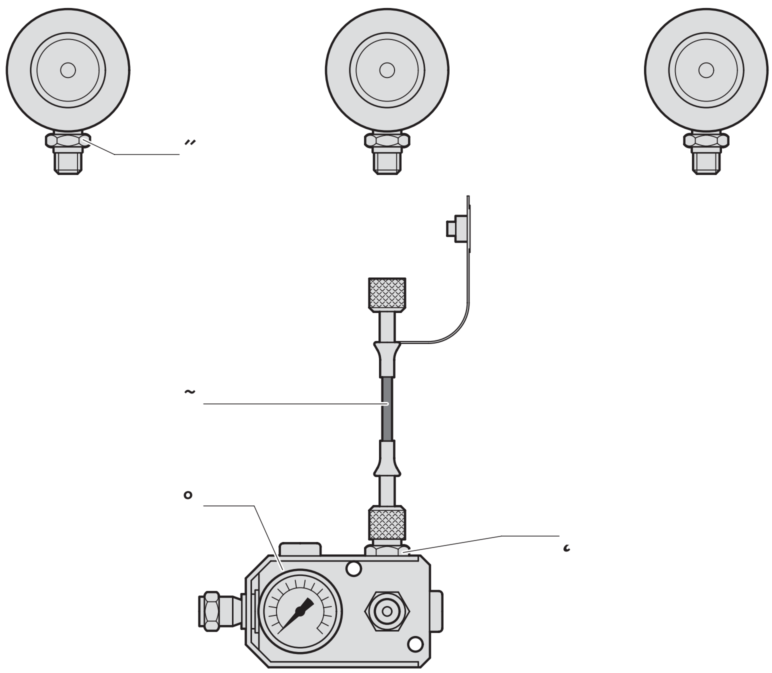


Item	Designation	Number	Order No	Comment
1	Simple adaptor, short	1	2480.00.24.17	Choice of "long" or "very long" depending on the specific mounting arrangements.
2	Gauging coupling	5	2480.00.24.01	
3	Multi adapter	2	2480.00.24.11	Choice of "long" or "very long" depending on the specific mounting arrangements.
4	Measuring hose	3	2480.00.23.□□.□□□	Type of connection and length as required
5	Control fitting	1	2480.00.31.01	
6	Gauging coupling	1	2480.00.24.02	

Mounting arrangement for gas springs in the Minimess system

2480. Example 5:

Independent test connection



Function:

The springs work independently and have a gauging coupling (2480.00.24.01) with valve.

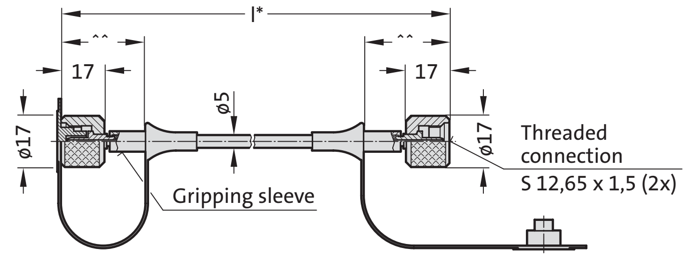
If required the springs can be tested and pressure adjusted individually. A control fitting (2480.00.31.01) is used for the purpose.

Item	Designation	Number	Order No	Comment
1	Gauging coupling	3	2480.00.24.01	
2	Measuring hose	1	2480.00.23.□□.□□□	Type of connection and length as required
3	Control fitting	1	2480.00.31.01	
4	Gauging coupling	1	2480.00.24.02	

Gas spring accessories
Minimess – Compound threaded joints

~o ‚ ″.″″.~^.″ˇ.

Gauging hose -
both ends straight

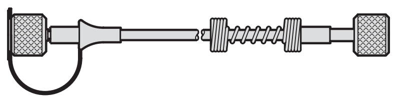


2480.00.23.01.

Order No	l*
2480.00.23.01.0200	200
2480.00.23.01.0300	300
2480.00.23.01.0400	400
2480.00.23.01.0500	500
2480.00.23.01.0630	630
2480.00.23.01.0800	800
2480.00.23.01.1000	1000
2480.00.23.01.1200	1200
2480.00.23.01.1500	1500
2480.00.23.01.2000	2000
2480.00.23.01.2500	2500
2480.00.23.01.3000	3000

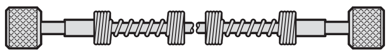
~o ‚ ″.″″.~^.″ˇ.----.ˇ

Antikink spiral, at one end



~o ‚ ″.″″.~^.″ˇ.----.~

Antikink spiral, at both ends



* other lengths available in 5 mm steps,
shortest factory lengths:

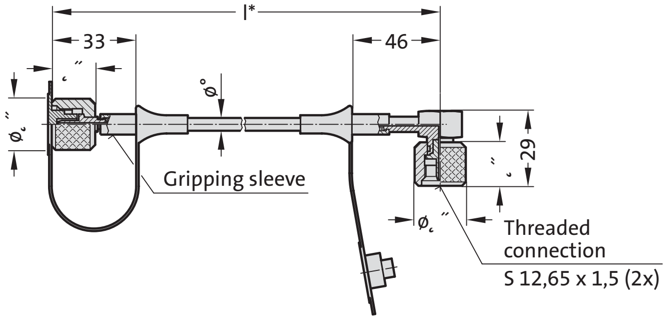
without antikink protection: 90 mm

antikink protection at one end: 150 mm

antikink protection at both ends: 300 mm

~o ‚ ″.″″.~^.″~.

Gauging hose -
one end straight
″°-angle

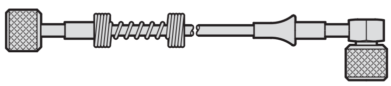


2480.00.23.02.

Order No	l*
2480.00.23.02.0200	200
2480.00.23.02.0300	300
2480.00.23.02.0400	400
2480.00.23.02.0500	500
2480.00.23.02.0630	630
2480.00.23.02.0800	800
2480.00.23.02.1000	1000
2480.00.23.02.1200	1200
2480.00.23.02.1500	1500
2480.00.23.02.2000	2000
2480.00.23.02.2500	2500
2480.00.23.02.3000	3000

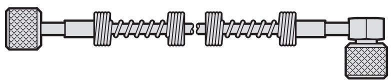
~o ‚ ″.″″.~^.″~.----.ˇ

Antikink spiral, at one end, straight



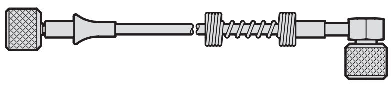
~o ‚ ″.″″.~^.″~.----.~

Antikink spiral, at both ends



~o ‚ ″.″″.~^.″~.----.^

Antikink spiral, at one end, 90°



* other lengths available in 5 mm steps,
shortest factory lengths:

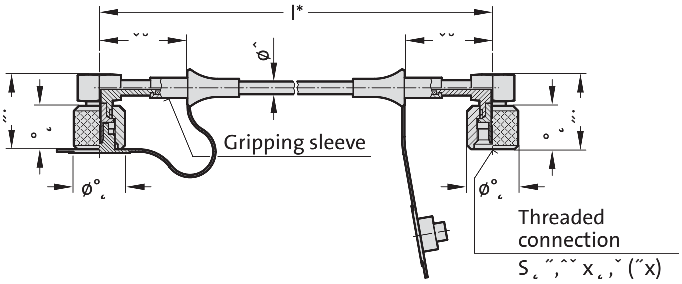
without antikink protection: 90 mm

antikink protection at one end: 150 mm

antikink protection at both ends: 300 mm

~o ‚ ″.″″.~^.″^.

Gauging hose -
both ends
″°-angle

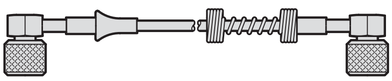


2480.00.23.03.

Order No	l*
2480.00.23.03.0200	200
2480.00.23.03.0300	300
2480.00.23.03.0400	400
2480.00.23.03.0500	500
2480.00.23.03.0630	630
2480.00.23.03.0800	800
2480.00.23.03.1000	1000
2480.00.23.03.1200	1200
2480.00.23.03.1500	1500
2480.00.23.03.2000	2000
2480.00.23.03.2500	2500
2480.00.23.03.3000	3000

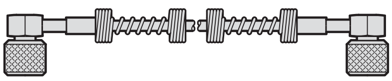
2480.00.23.03.----.3

Antikink spiral, at one end



2480.00.23.03.----.2

Antikink spiral, at both ends



* other lengths available in 5 mm steps,
shortest factory lengths:

without antikink protection: 105 mm

antikink protection at one end: 150 mm

antikink protection at both ends: 300 mm

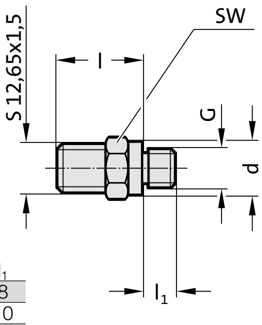
GAS SPRING ACCESSORIES
MINIMESS – COMPOUND THREADED JOINTS

Gauging coupling
2480.00.24.01 with valve

2480.00.24.03 without valve for connection to gas springs

Gauging coupling
2480.00.24.02 with valve

2480.00.24.04 without valve for connection to control fitting



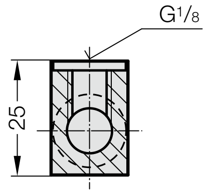
Order No.	G	d	SW	l	l_1
2480.00.24.01	G 1/8	14	14	22	8
2480.00.24.02	G 1/4	19	19	21	10
2480.00.24.03	G 1/8	14	14	22	8
2480.00.24.04	G 1/4	19	19	21	10

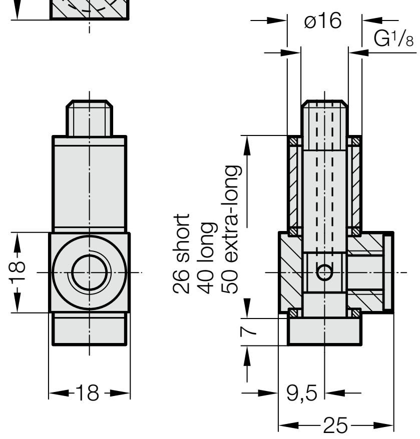
*SW = spanner size

Note:

The measuring coupling with valve is used for standard assembly layouts. Where the system requires frequent filling pressure changes (e.g. die drawing cushions), the measuring coupling is used without a valve.

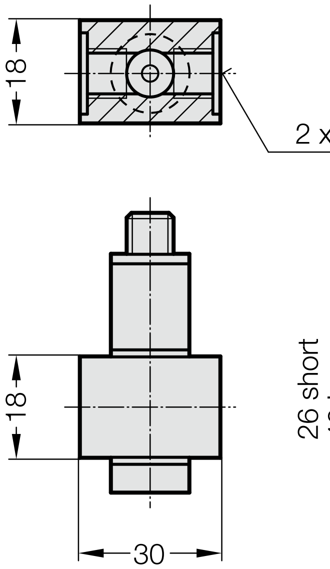
2480.00.24.16 long
2480.00.24.17 short
2480.00.24.18 extra-long
Single adapter

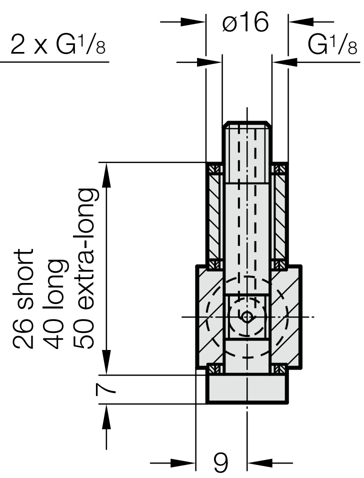




2480.00.24.13 long

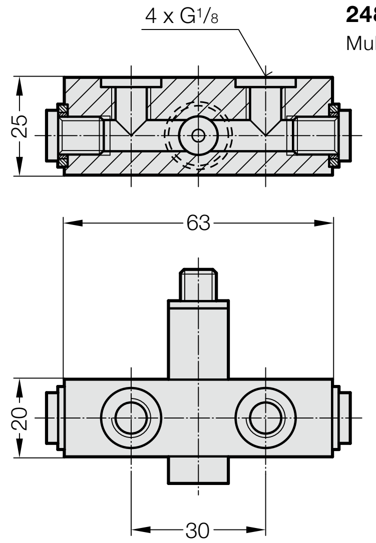
2480.00.24.14 short
2480.00.24.15 extra-long
Dual adapter

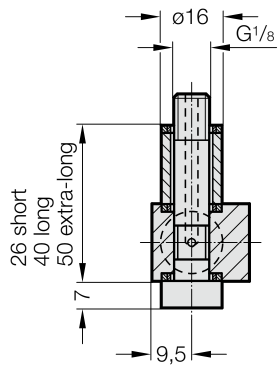




2480.00.24.10 long

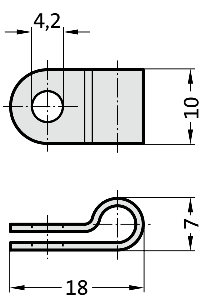
2480.00.24.11 short
2480.00.24.12 extra-long
Multiple adapter





2480.00.23.12.01

Hose clamp for gauging hose DN2 (∅5 mm)

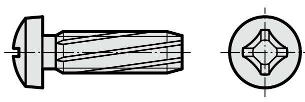


Material: Polyamide

Note:
Supplied without screws

2192.50.04.012

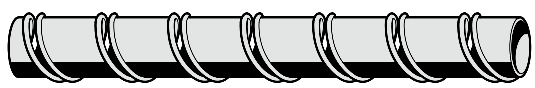
Self-tapping screw
A M4x12 DIN 7516



Note:
self-tapping
Diameter of hole for self-tapping screw = 3.6 mm

2480.00.23.13.

Anti-scuff spiral
for subsequent installation over hoses and tubing



Order No.	l in mm
2480.00.23.13.0001	1000
2480.00.23.13.0002	2000
2480.00.23.13.0005	5000
2480.00.23.13.0010	10000

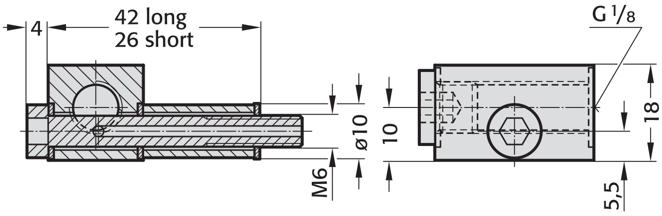
Inner ø For hose	7 mm
external ø	max. 5-11 mm
Temperature range	-30°C up to +100°C

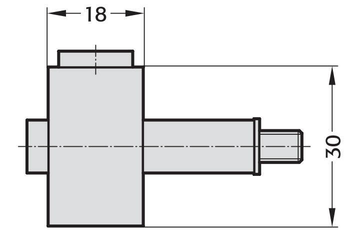
Material:
Polyamide
Description:
The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

Gas Spring Accessories
Minimess - Compound Threaded Joints

2480.00.24.53 horizontal, long
2480.00.24.54 horizontal, short

Double adapter



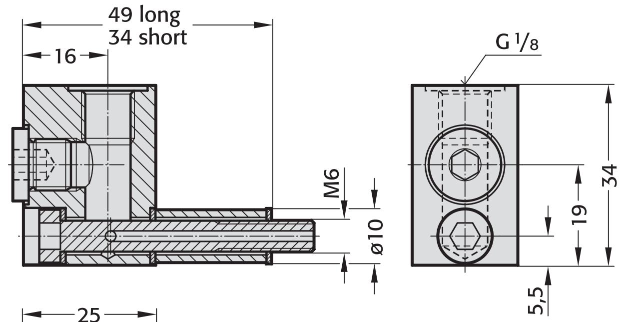


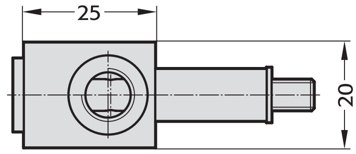
Note:

for connection of gas springs with M6 filling connection

2480.00.24.56 vertical, long
2480.00.24.57 vertical, short

Double adapter



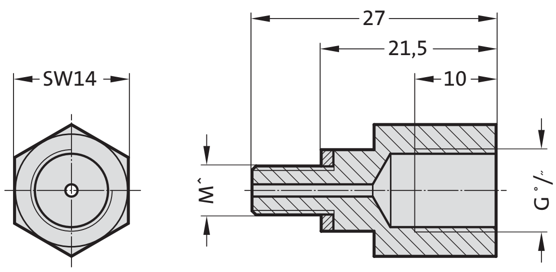


Note:

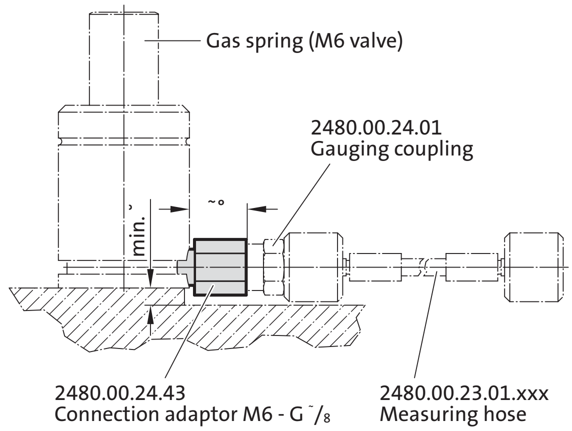
for connection of gas springs with M6 filling connection

2480.00.24.43

Connection adaptor M6 - G 1/8



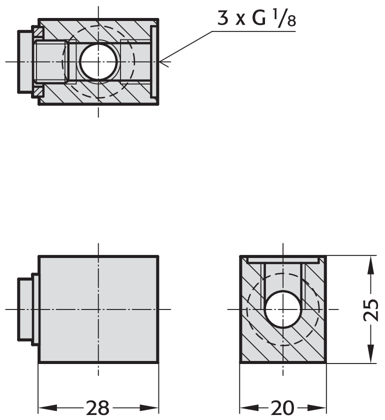
Mounting example:



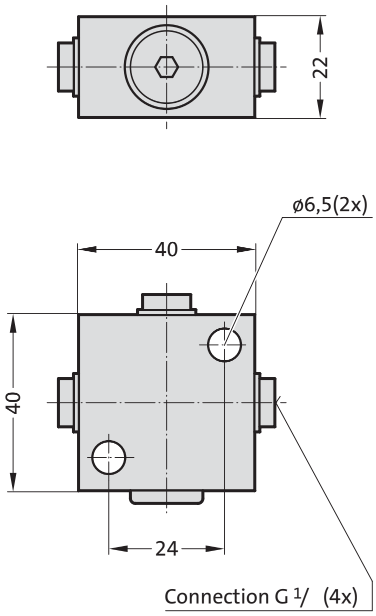
subject to alterations

Gas spring accessories
Minimess – Compound threaded joints

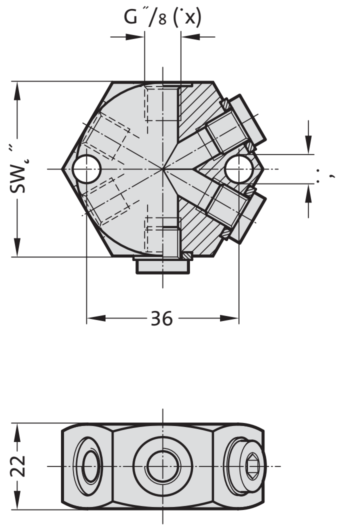
2480.00.24.30
Distributor block G 1/8
3 ports



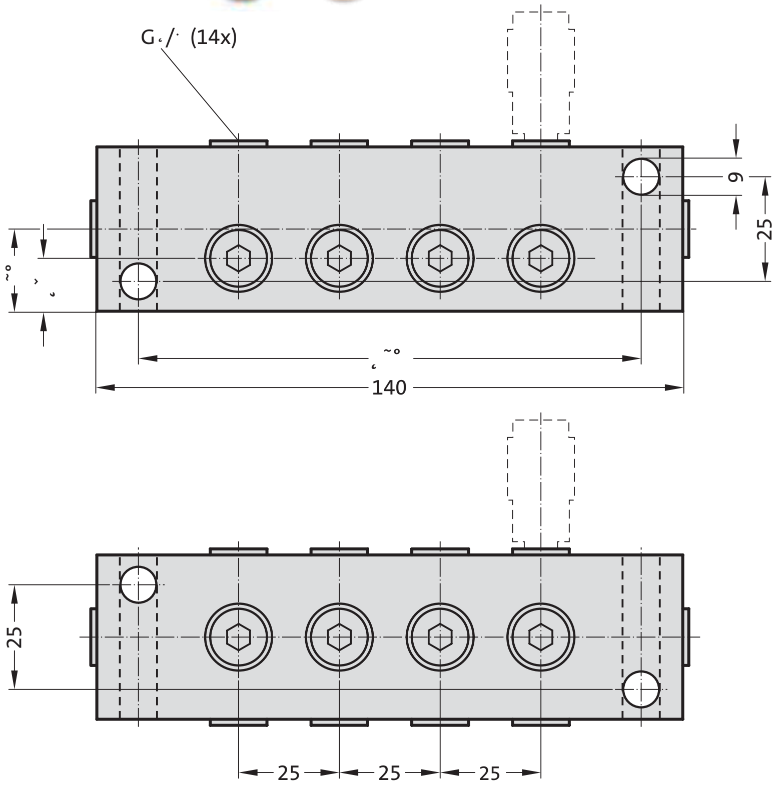
2480.00.24.34
Distributor block G 1/8
4 ports



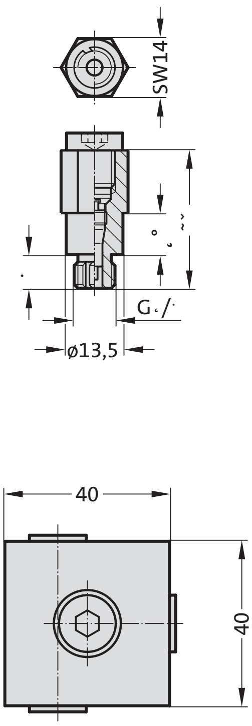
2480.00.24.31
Distributor block G 1/8
6 ports



2480.00.24.33
Distributor G 1/8
14 ports



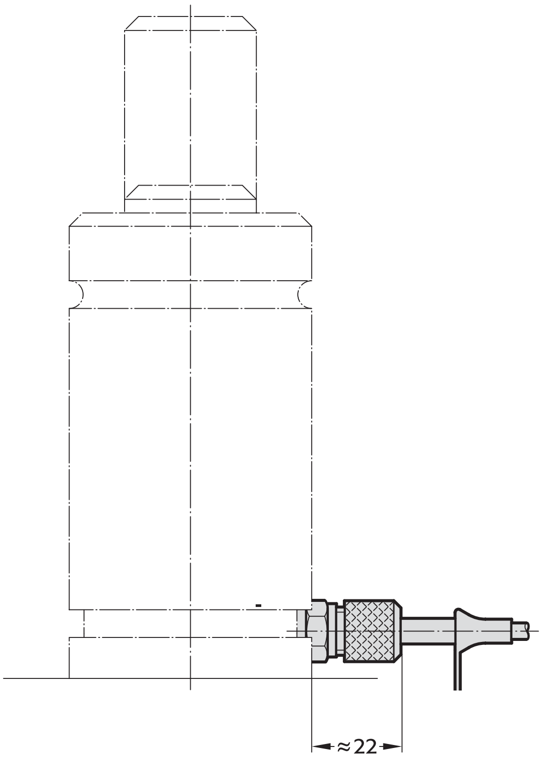
2480.00.40
Charging adapter

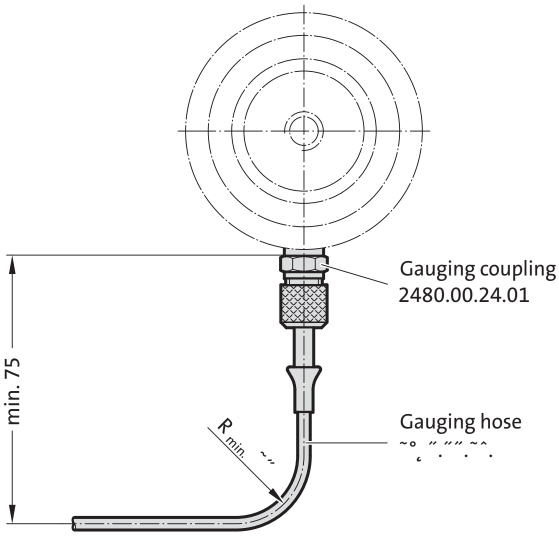


Gas spring accessories
Minimess – Compound threaded joints

2480.00.24.01

Gauging coupling with valve instal





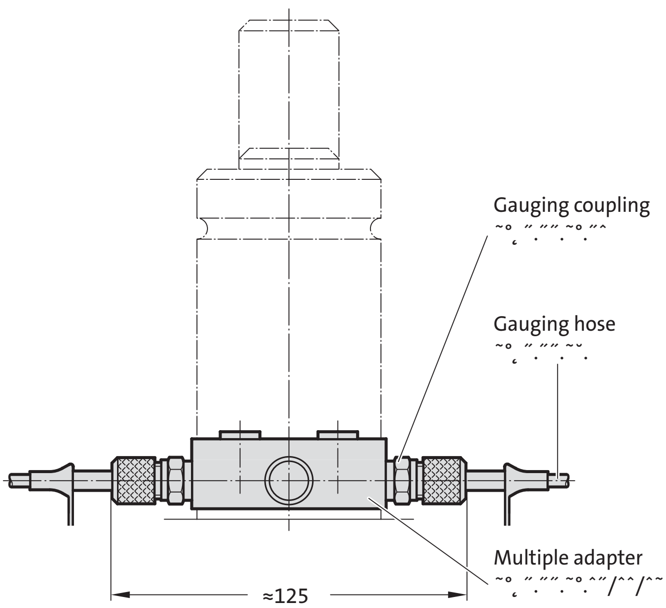
2480.00.24.10 long
11 shor t
12 e xtra-long

Multiple adapter with two gauging couplings

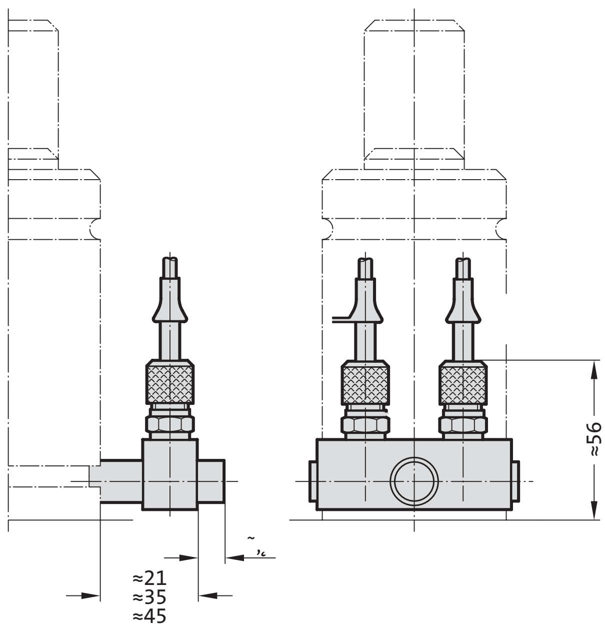
Note:

When installing or fitting a gauging coupling the valve must be removed from the gas spring.

connected horizontally

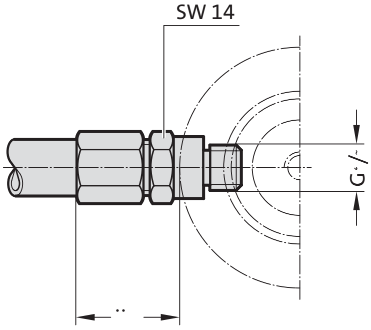


connected vertically



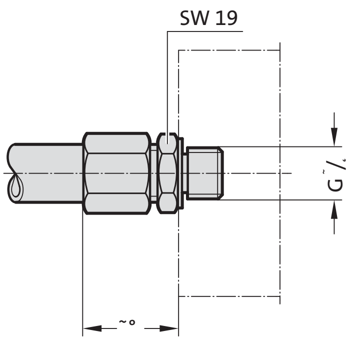
2480.00.10.01

Direct connector to gas spring



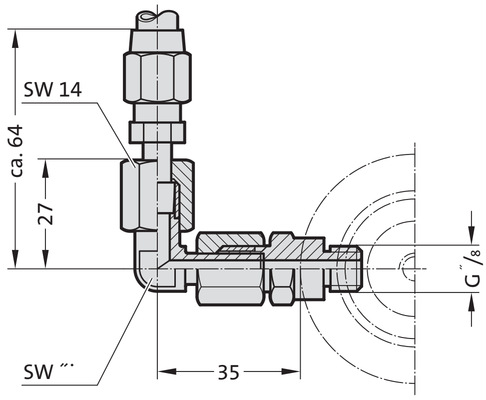
2480.00.10.03

Direct connector to control fitting



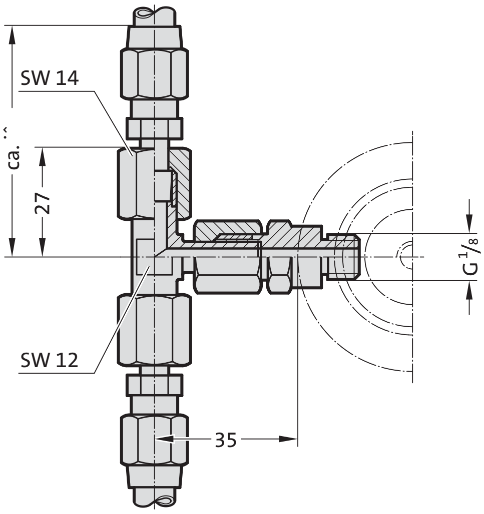
2480.00.10.10

angle connector, adjustable



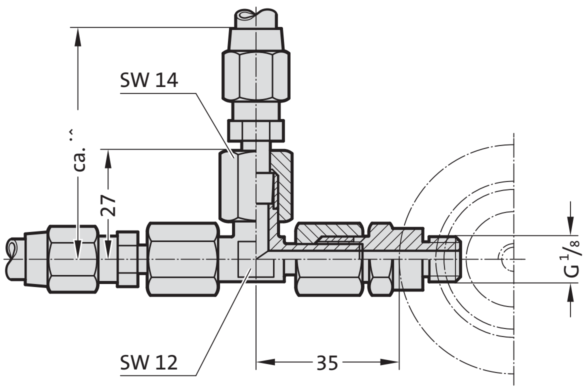
2480.00.10.11

T-connector, adjustable



2480.00.10.12

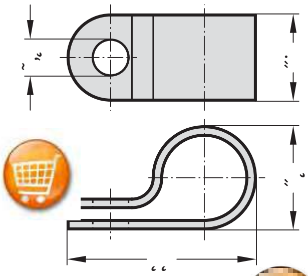
L-connector, adjustable



Gas springs accessoires
Compression fitting – Compound threaded joints

2480.00.10.20.12.01

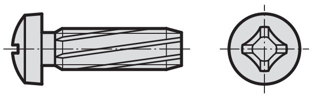
Hose clamp for gauging hose DN4
(Ø 9 mm)



Material: Polyamide
Note:
Supplied without screws

2192.50.04.012

self-tapping screw
A M4x12 DIN 7516



Note: self-tapping
Diameter of hole for self-tapping
screw = 3.6 mm

2480.00.23.13.

Anti-scuff spiral
for subsequent installation over hoses and tubing

Order No	l in mm
2480.00.23.13.0001	1000
2480.00.23.13.0002	2000
2480.00.23.13.0005	5000
2480.00.23.13.0010	10000

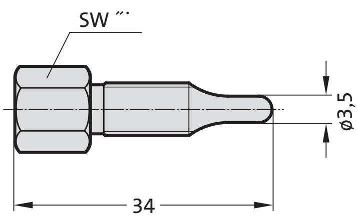
Inner-Ø	7 mm
For hose/tubing outer-Ø	max. 5-11 mm
Temperature range	-30 °C to +100 °C

Material:
Polyamide

Description:
The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

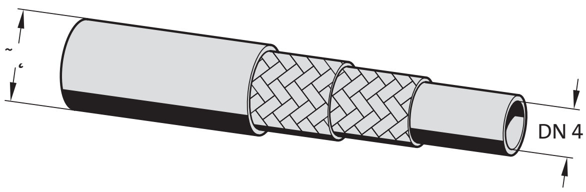
2480.00.54.01

Expansion punch for hosing



2480.00.10.20.

High-pressure hose

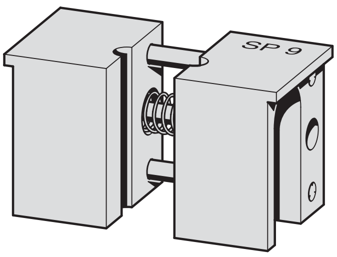


Ordering Code (example):

High pressure hose	=	2480.00.10.20.
length 10 m	=	0010
Order No	=	2480.00.10.20.0010

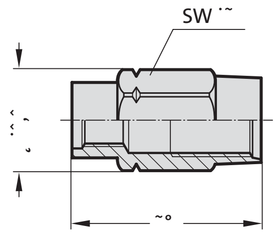
2480.00.54.02

Vice jaws for holding high-pressure h



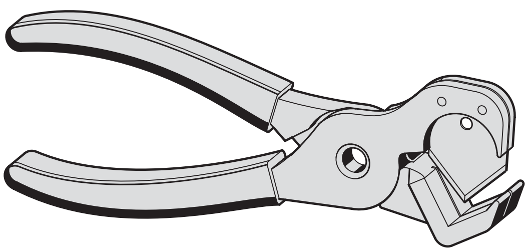
2480.00.10.21

Hose screw fitting (female)



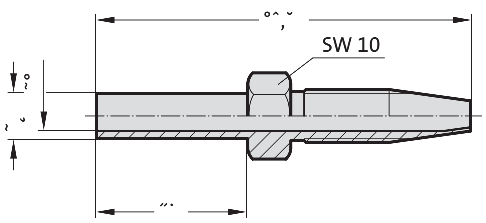
2480.00.54.03

Hose shears

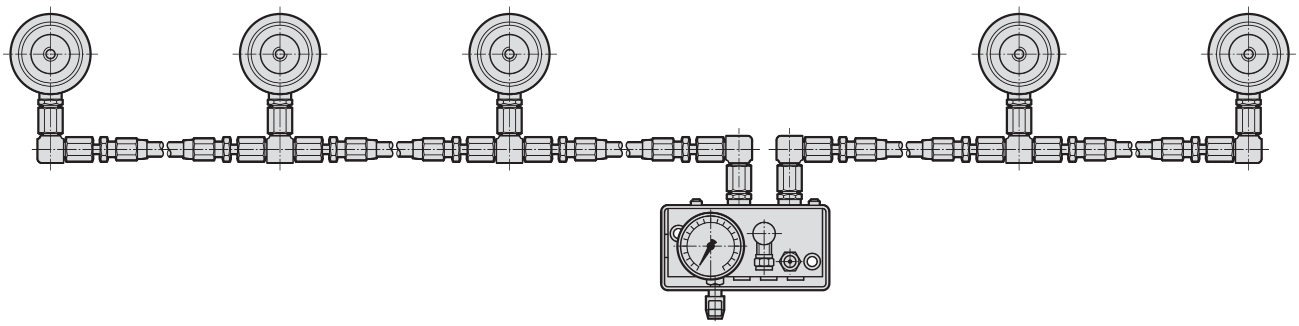


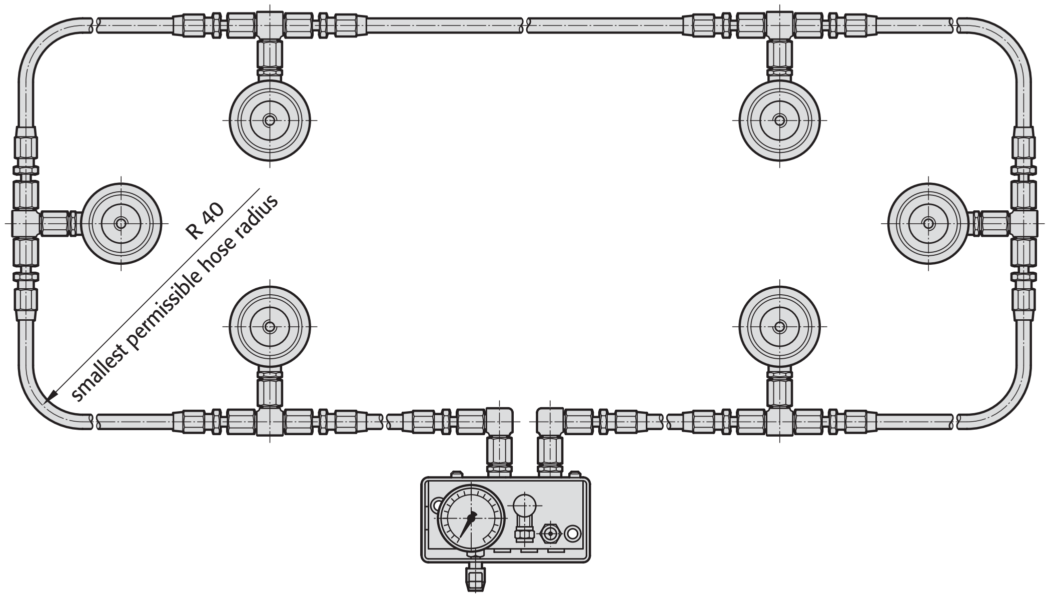
2480.00.10.22

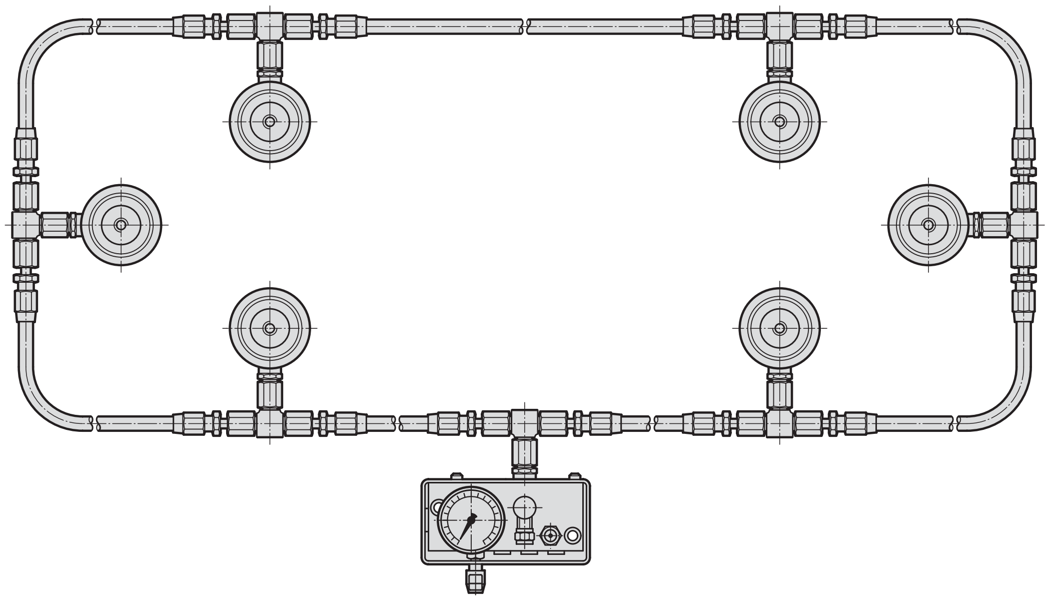
Hose screw fitting (male)



Assembly arrangement of gas springs in servial connection compression fitting



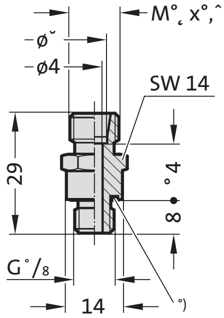




Note: When installing gas springs always remove the valve from the gas spring.

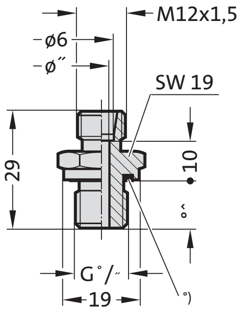
Gas spring accessories 24°-cone-threaded Joints (DIN 2353 / DI N EN ISO 8434-1)

2480.00.26.03
Threaded Joint G1/8



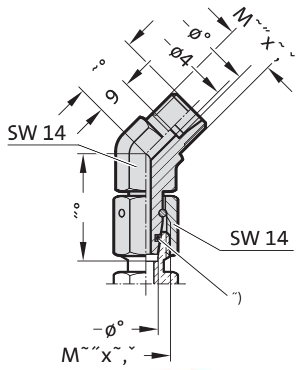
1) Eolastic-Seal ED

2480.00.26.04
Threaded Joint G1/4



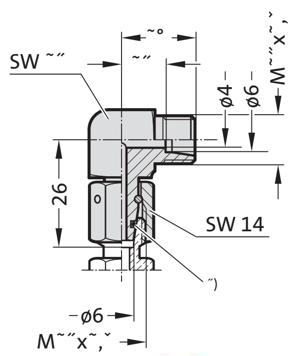
1) Eolastic-Seal ED

2480.00.26.21
Adjustable threaded joint 45°, complete



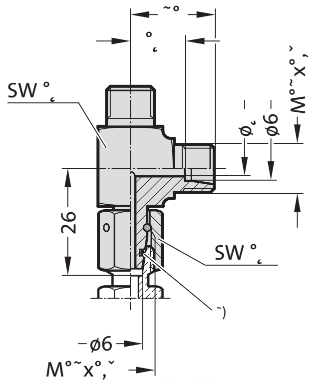
2) O-ring

2480.00.26.22
Adjustable threaded joint 90°, complete



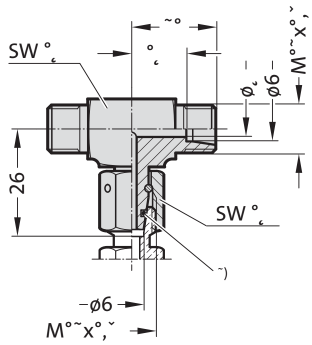
2) O-ring

2480.00.26.23
Adjustable L-Coupling, complete



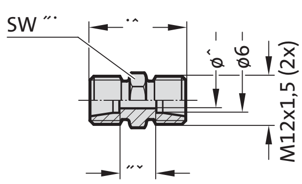
2) O-ring

2480.00.26.24
Adjustable T-Coupling, complete

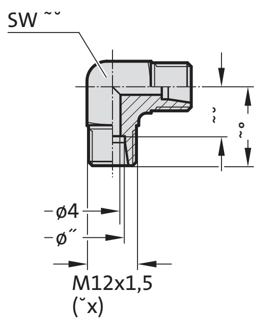


2) O-ring

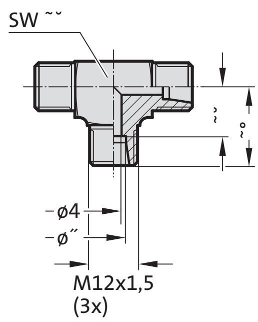
2480.00.26.25
Adapter straight, hose to hose



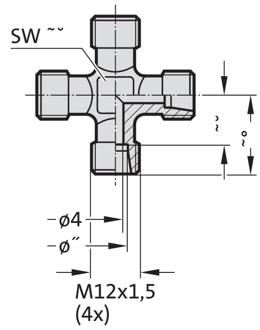
2480.00.26.26
Adapter, 90°, hose to hose



2480.00.26.27
Adapter, T, hose to hose



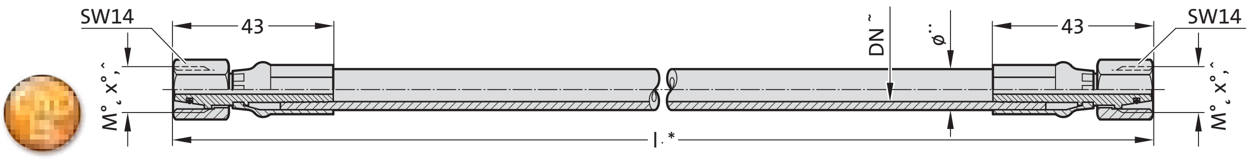
2480.00.26.28
Adapter, K, hose to hose



Gas springs accessories
Connecting hoses with 24° cone
(DIN 2353 / DI N EN ISO 8434-1)

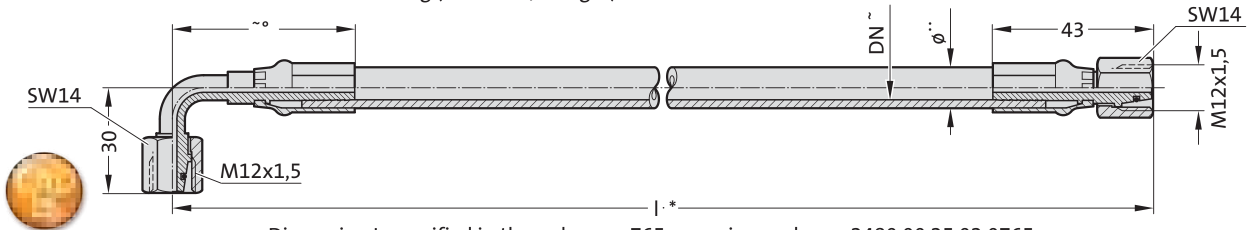
2480.00.25.01.
Hose – conical seals with union nuts and O-Ring (straight/straight)

* Shortest factory lengths: 140 mm; minimum bending radius R40



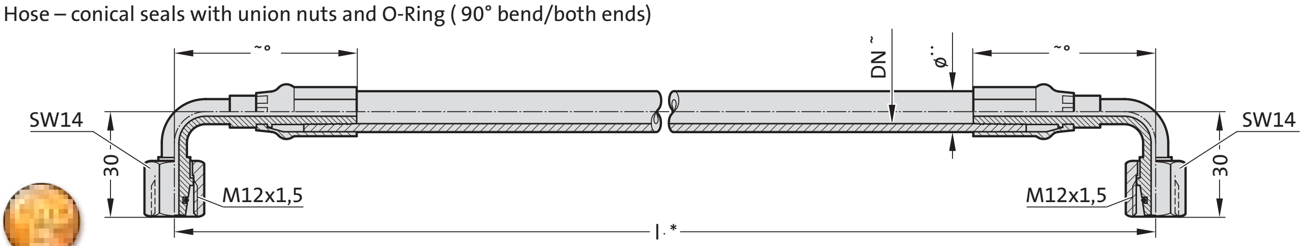
Dimension l specified in the order, e.g. 765 mm, gives order no 2480.00.25.01.0765

2480.00.25.02.
Hose – conical seals with union nuts an O-Ring (90° bend/straight)



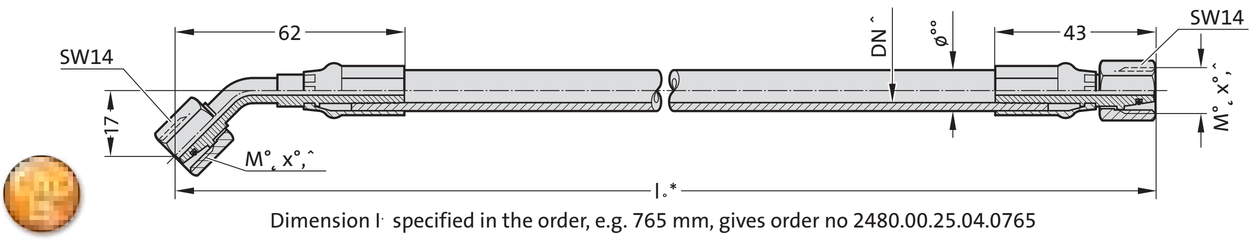
Dimension l specified in the order, e.g. 765 mm, gives order no 2480.00.25.02.0765

2480.00.25.03.
Hose – conical seals with union nuts and O-Ring (90° bend/both ends)



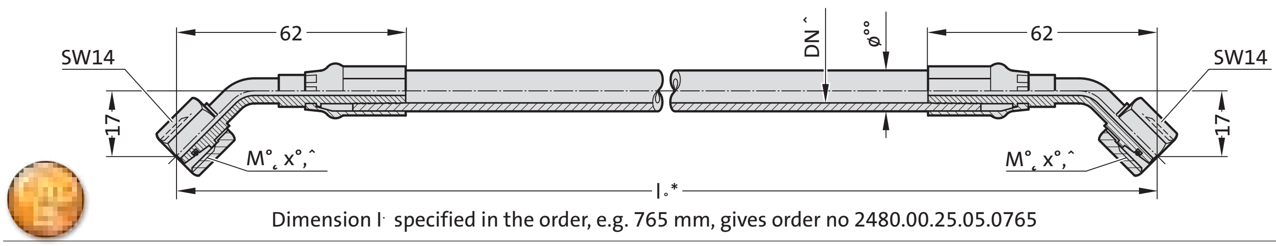
Dimension l specified in the order, e.g. 765 mm, gives order no 2480.00.25.03.0765

2480.00.25.04.
Hose – conical seals with union nuts and O-Ring (45° bend/straight)



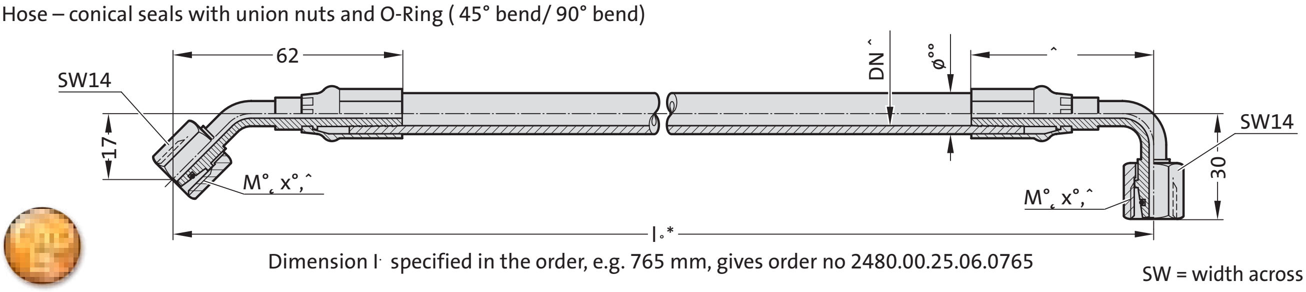
Dimension l specified in the order, e.g. 765 mm, gives order no 2480.00.25.04.0765

2480.00.25.05.
Hose – conical seals with union nuts and O-Ring (45° bend/both ends)



Dimension l specified in the order, e.g. 765 mm, gives order no 2480.00.25.05.0765

2480.00.25.06.
Hose – conical seals with union nuts and O-Ring (45° bend/ 90° bend)



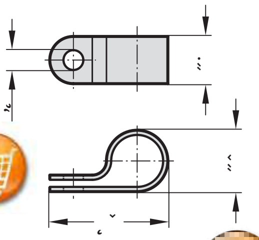
Dimension l specified in the order, e.g. 765 mm, gives order no 2480.00.25.06.0765

SW = width across flats

Gas springs accessories
Direct connection dimensions
24°-cone threaded joint (DIN 2353 / DI N EN ISO 8434-1)

2480.00.25.12.01

Hose clamp for gauging hose DN5
(∅11 mm)

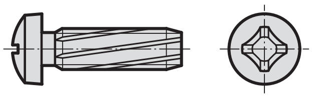


Material: Polyamide

Note:
Supplied without screws

2192.50.04.012

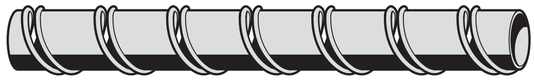
self-tapping screw
A M4x12 DIN 7516



Note: self-tapping,
Diameter of hole for self-tapping screw = 3,6 mm

2480.00.23.13.

Anti-scuff spiral
for subsequent installation over hoses and tubing



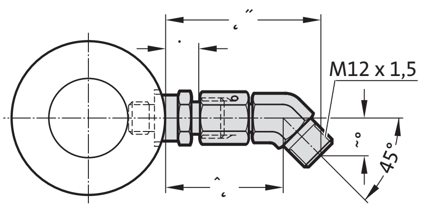
Order No	l in mm
2480.00.23.13.0001	1000
2480.00.23.13.0002	2000
2480.00.23.13.0005	5000
2480.00.23.13.0010	10000

Inner-∅	7 mm
For hose/tubing outer-∅	max. 5-11 mm
Temperature range	-30 °C to +100 °C

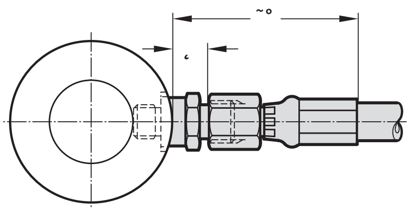
Material:
Polyamide

Description:
The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

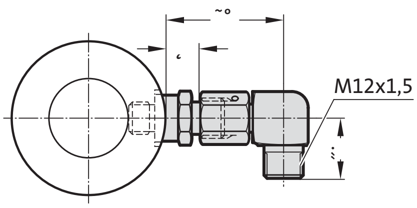
Direct connection
with 45°-elbow adaptor
2480.00.26.21



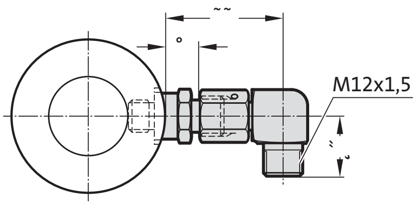
Direct connection
hose straight
adaptor 2480.00.26.03



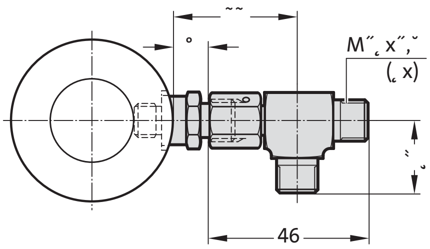
Direct connection
with 90°-elbow adaptor
2480.00.26.22



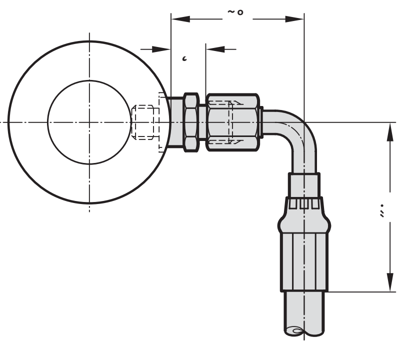
Direct connection
45° hose with
adaptor 2480.00.26.03



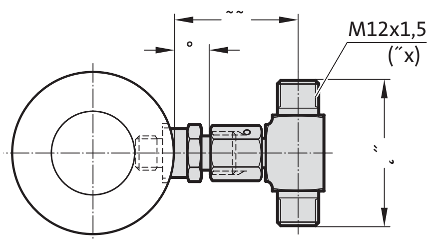
Direct connection
with L-coupling
2480.00.26.23



Direct connection
90° hose with
adaptor 2480.00.26.03



Direct connection
with T-coupling
2480.00.26.24

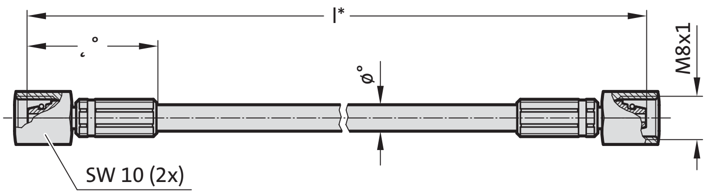


Gas spring accessories
Connector system, 24° conus micro

~°¸ ". "". ~^. "˘.

Min. bending radius R20 mm

Connection hose, 24° conus micro, straight on both sides (connection hose, sealing cone with union nut and O ring)

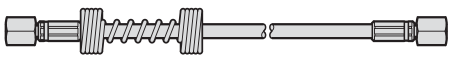


2480.00.27.01.

Order No	l*
2480.00.27.01.0200	200
2480.00.27.01.0300	300
2480.00.27.01.0400	400
2480.00.27.01.0500	500
2480.00.27.01.0630	630
2480.00.27.01.0800	800
2480.00.27.01.1000	1000
2480.00.27.01.1200	1200
2480.00.27.01.1500	1500
2480.00.27.01.2000	2000
2480.00.27.01.2500	2500
2480.00.27.01.3000	3000

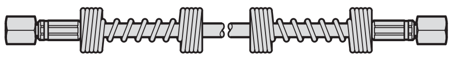
2480.00.27.01. 1

Antikink spiral, at one end



2480.00.27.01. 2

Antikink spiral, at both ends

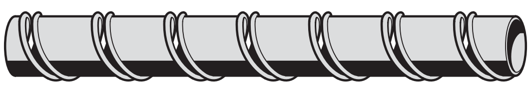


* other lenghts available in 5mm steps.

Shortest factory lengths:	
without antikink protection	90 mm
antikink protection at one end	150 mm
antikink protection at both ends	300 mm

2480.00.23.13.

Anti-scuff spiral
for subsequent installation over hoses and tubing



Order No	l in mm
2480.00.23.13.0001	1000
2480.00.23.13.0002	2000
2480.00.23.13.0005	5000
2480.00.23.13.0010	10000

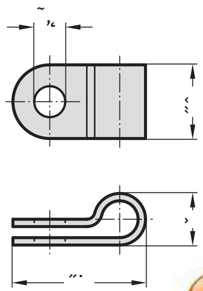
Material:
Polyamide

Description:
The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

Inner-Ø	7 mm
For hose/tubing outer-Ø	max. 5-11 mm
Temperature range	-30 °C to +100 °C

2480.00.23.12.01

Hose clamp for gauging hose DN2 (Ø5 mm)

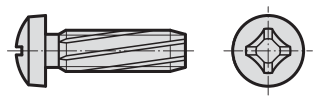


Material: Polyamide

Note:
Supplied without screws

2192.50.04.012

self-tapping screw
A M4x12 DIN 7516



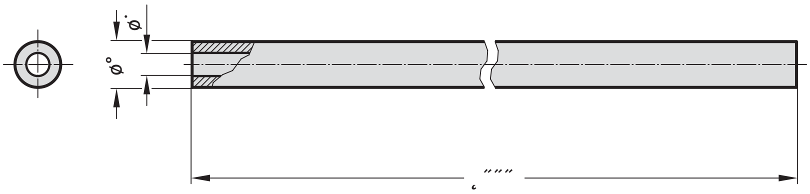
Note: self-tapping
Diameter of hole for self-tapping screw = 3,6 mm

Gas spring accessories
Connector system, 24° conus micro

2480.00.27.11

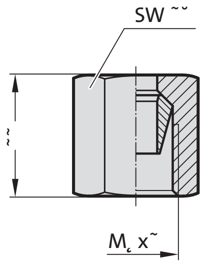
Pipe for 24° conus micro
Delivery length: 1 m

Min. bending radius R12 mm
(3x exterior diameter)



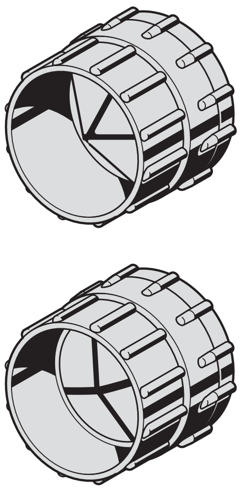
2480.00.27.11.01

Cutting ring screw connection, 24° conus micro



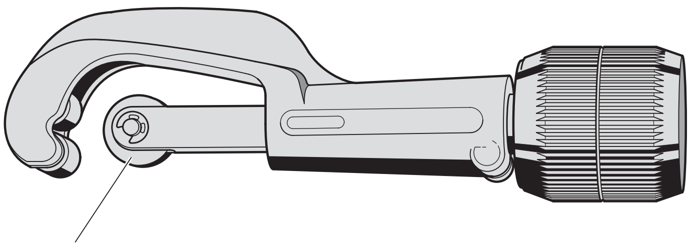
2480.00.27.00.01

Deburring tool for 24° conus micro



2480.00.27.00.02

Pipe cutter for 24° conus micro



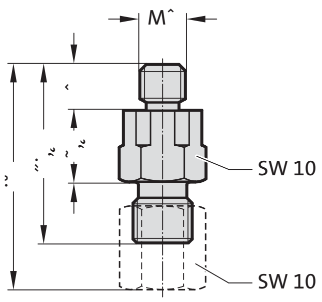
2480.00.27.00.02.1

Replacement cutting wheel for pipe cutter

Gas spring accessories
Connector system, 24° conus micro

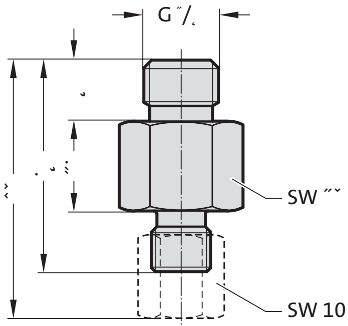
2480.00.28.01

Screw connection GE–M6–24° conus micro



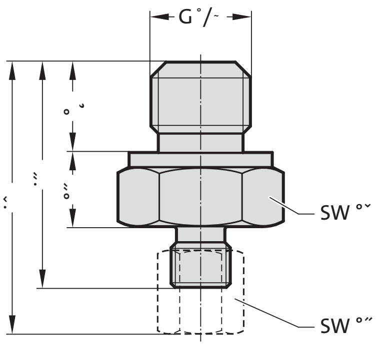
2480.00.28.02

Screw connection GE–G1/8 24° conus micro



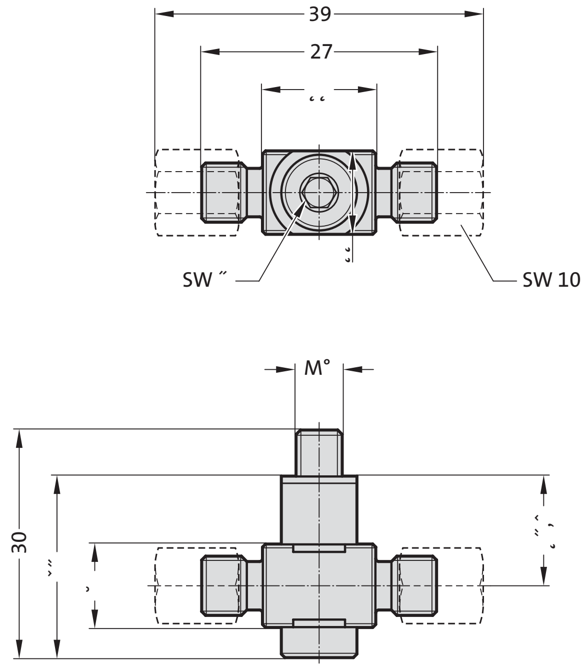
2480.00.28.03

Screw connection GE–G1/4 24° conus micro



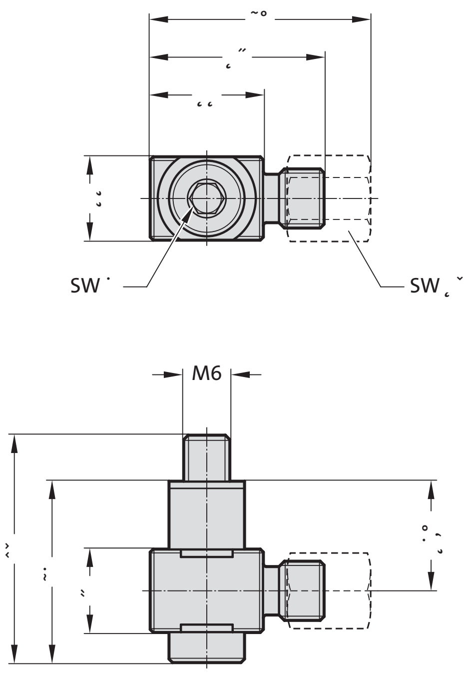
2480.00.28.14

Screw connection T–24° conus micro



2480.00.28.17

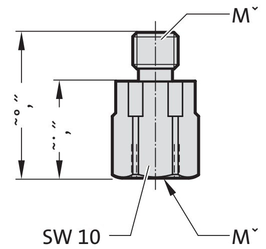
Screw connection W–24° conus micro



Gas spring accessories
Connector system micro

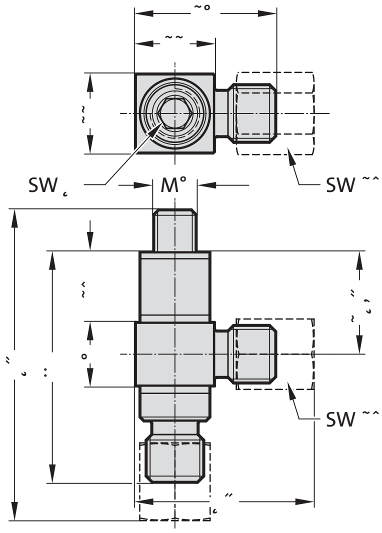
2480.00.22.06.06

Screw connection, GE–M6–M6 micro for connection to gas spring with divided wheel flange 2480.022.



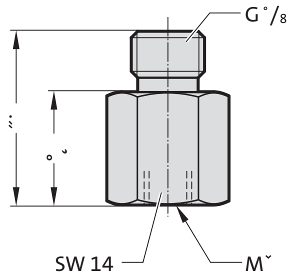
2480.00.28.15

Screw connection, L–24° conus micro



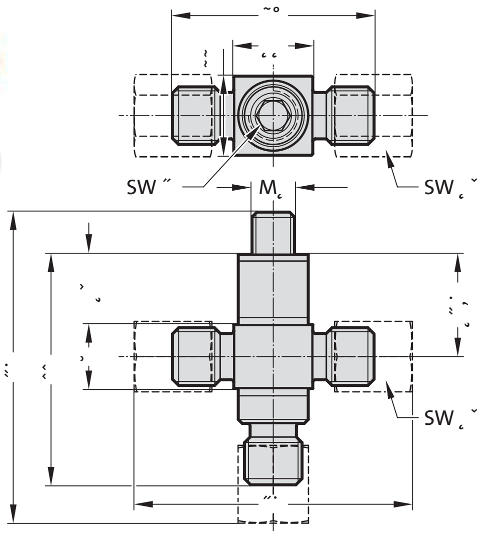
2480.00.22.18.06

Screw connection, GE–G$^1/_8$–M6 micro for 2480.00.28.14 / 2480.00.28.17



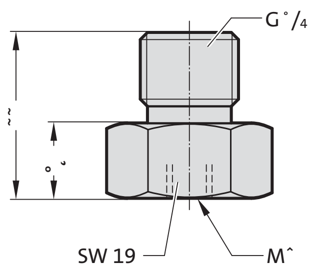
2480.00.28.16

Screw connection, K–24° conus micro



2480.00.22.14.06

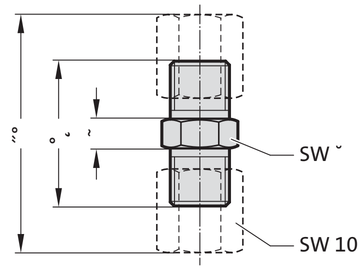
Screw connection, GE–G$^1/_4$–M6 micro for 2480.00.28.14 / 2480.00.28.17



Gas spring accessories
Connector system, 24° conus micro

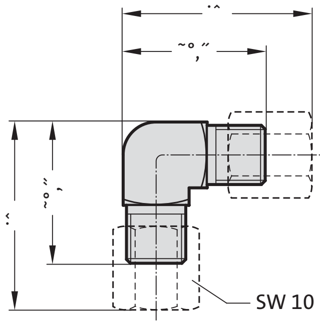
2480.00.28.25

Adapter, GE–24° conus micro
hose – hose



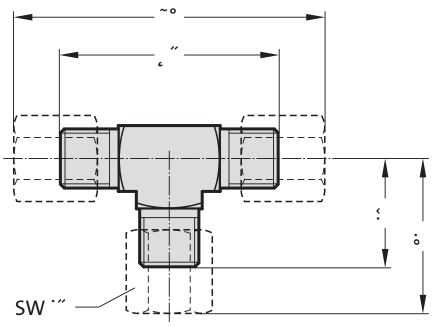
2480.00.28.26

Adapter, W–24° conus micro
hose – hose



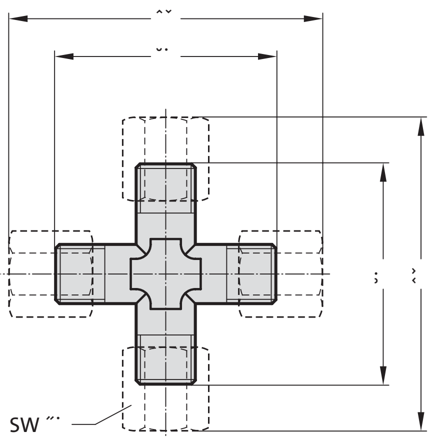
2480.00.28.27

Adapter, T–24° conus micro
hose – hose



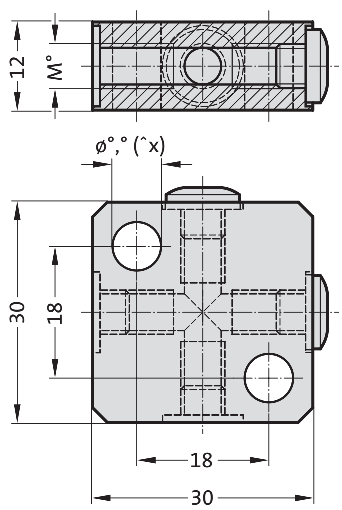
2480.00.28.28

Adapter, K–24° conus micro
hose – hose



2480.00.28.34

Distributor block M6, 4 ports



Micro control fitting without pressure relief with pressure relief

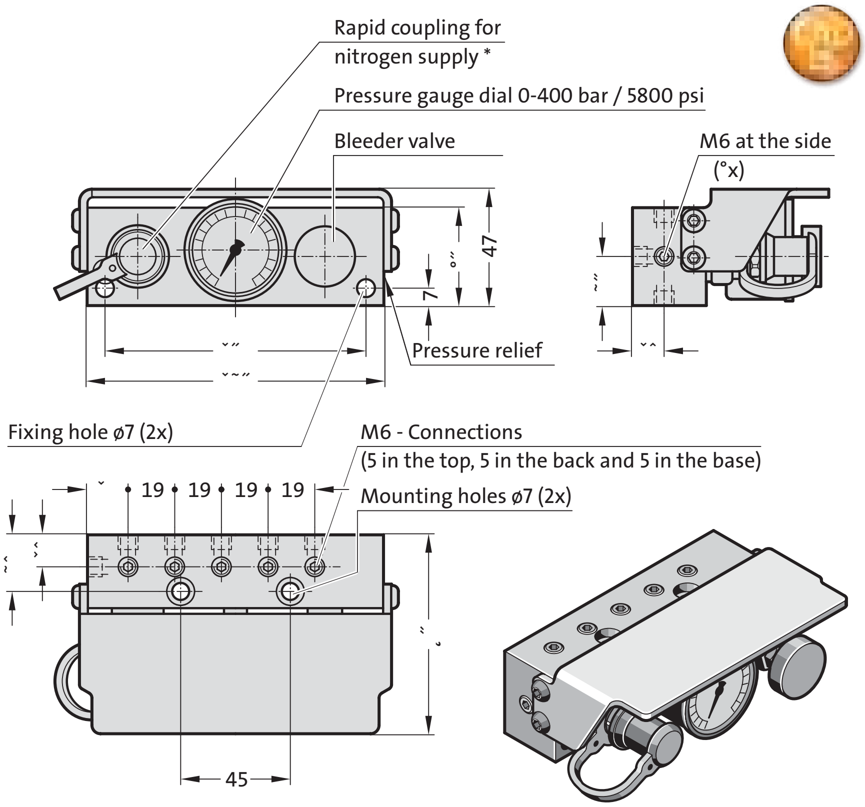
Description:

The micro control fitting 2480.00.34.11/13 is used to constantly monitor the charge pressure of one or more Gas Springs (3x5 connections M6, top, bottom, back and 1x at the side).

Note:

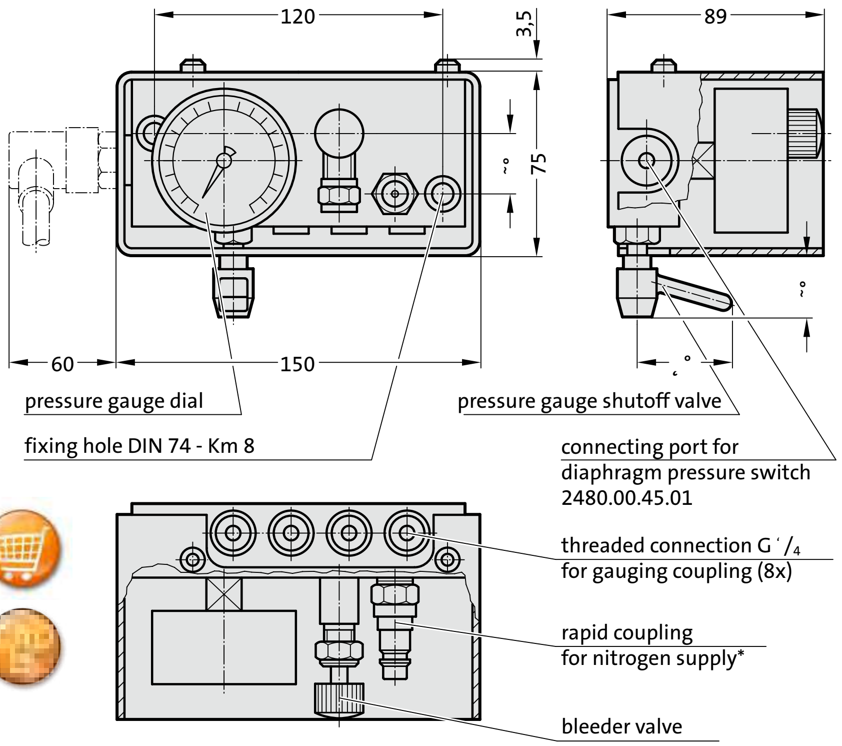
* 2 m long filling hose with rapid coupling, shut-off valve and gas bottle connector
Order no: 2480.00.31.02 (to be ordered separately)

~°¸ ˝.˝˝.^°.ˇˇ without pr essure relief
~°¸ ˝.˝˝.^°.ˇ^ with pr essure relief



Control Fitting

2480.00.30.01 without pressure switch, without pressure relief
2480.00.30.02 with pressure switch, without pressure relief
2480.00.30.03 without pressure switch, with pressure relief
2480.00.30.04 with pressure switch, with pressure relief



Description:

The control fitting 2480.00.30.01/02/03/04 serves to control the charge pressure of up to eight connected gas springs.

Pressure checks during operation can be effected in two ways:

a) via optical monitoring of the pressure gauge dial.

b) via automatic monitoring with a diaphragm pressure switch. The switch will shut down the machine or trigger a signal.

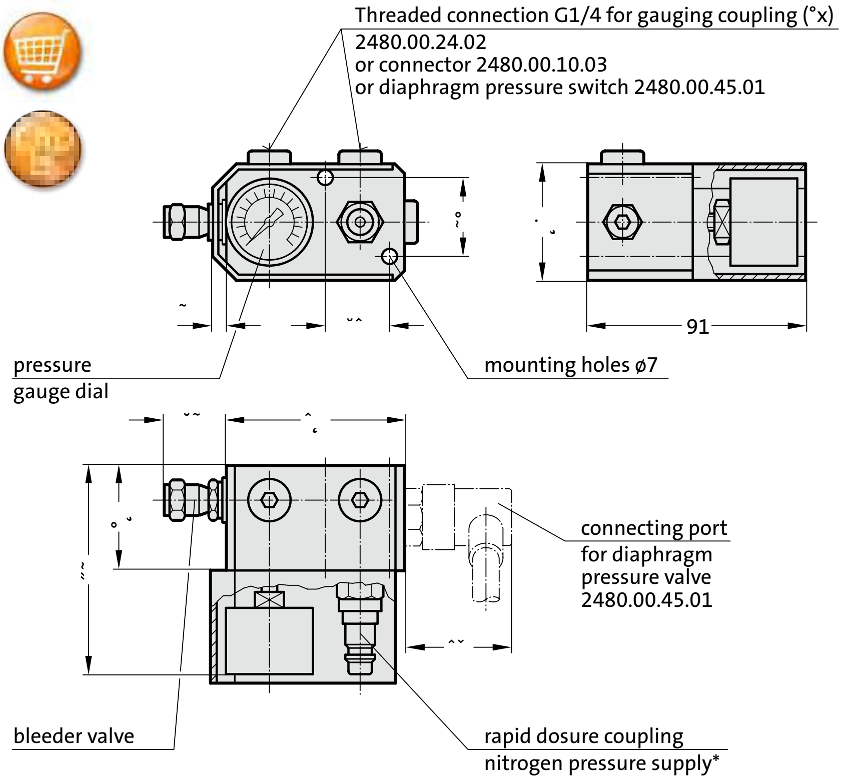
Note:

The shutoff valve may be open or closed during operation.

The closing of the pressure gauge shutoff valve ensures that no pressure peaks from the gas spring act on the pressure gauge.

* 2-m long filling hose with rapid coupling, shutoff valve and gas bottle connector, Order No. 2480.00.31.02 (to be ordered separately)

2480.00.31.01 without pressure switch
2480.00.31.06 with pressure switch
2480.00.31.07 without pressure switch and with pressure relief
2480.00.31.08 with pressure switch, with pressure relief

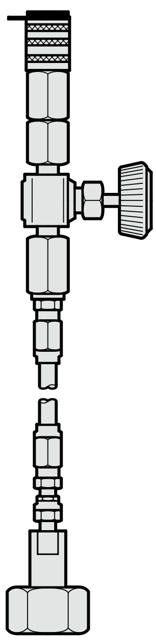


Description:

The control fitting 2480.00.31.01 per forms the same function as the control armature 2480.00.30.01..

Note:

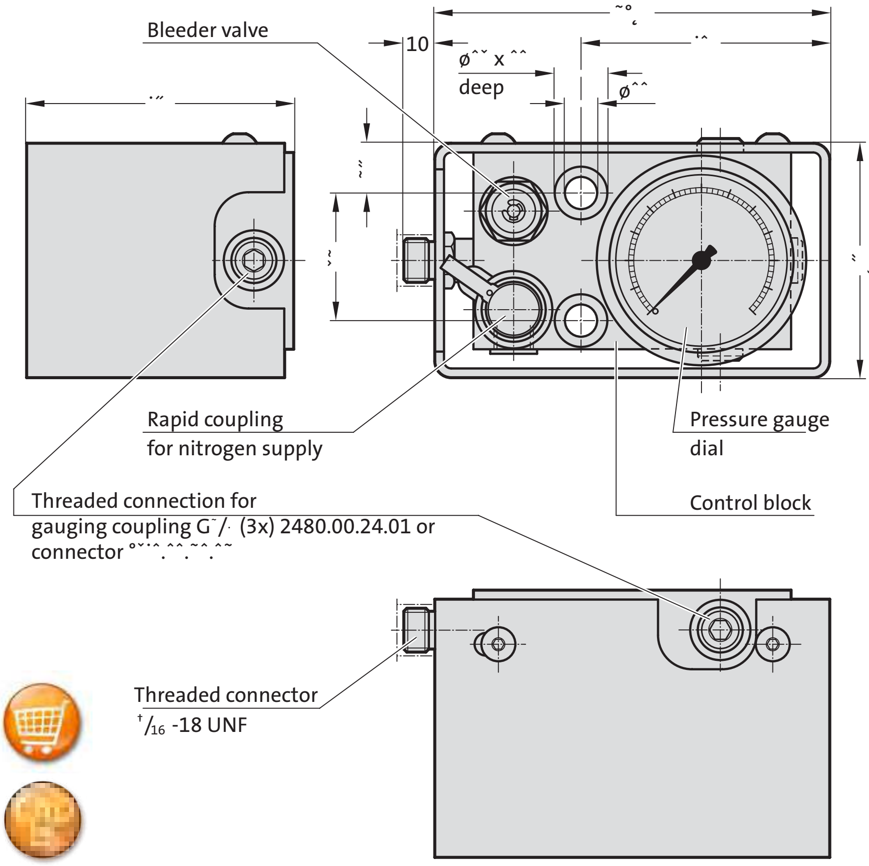
* 2-m long filling hose with rapid coupling, shutoff valve and gas bottle connector, Order No. 2480.00.31.02 (to be ordered separately)

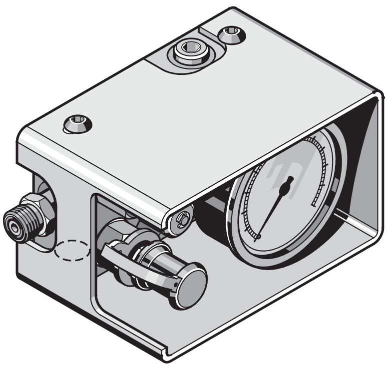


Control fitting

2480.00.30.13 without pressure switch, with pressure relief

~o˛ ˝ ˝˝.ˆ˝.˘ˆ





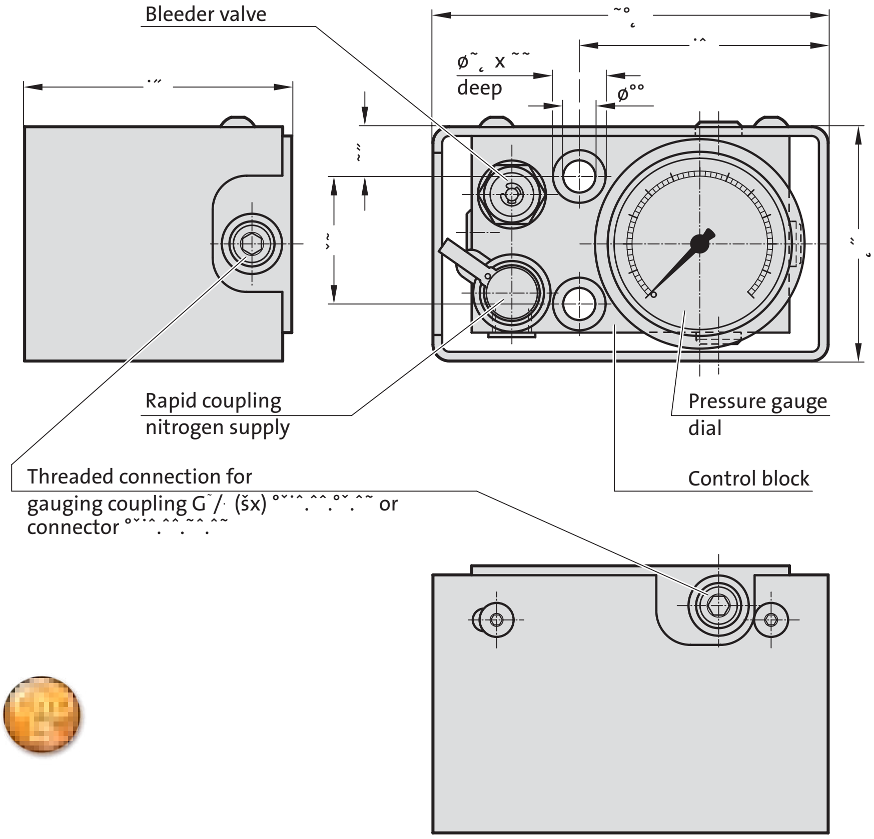
Description:

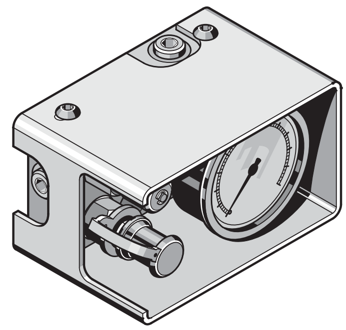
The control fitting 2480.00.30.13 is used to constantly monitor the filling pressure of one or more gas springs. The control fitting is equipped with rapid coupling for nitrogen supply and a bleeder valve. There are three G$^1/_8$ ports for simultaneous pressure checking at the control fitting.

Measuring range from
0 - 400 bar / 5800 psi.

°˘ˈˆ.ˆˆ.šˆ.˜˘ (˝ˆˆ bar) without pressure switch, without pressure relief

~o˛ ˝ ˝˝.ˆ˝.˘o





Description:

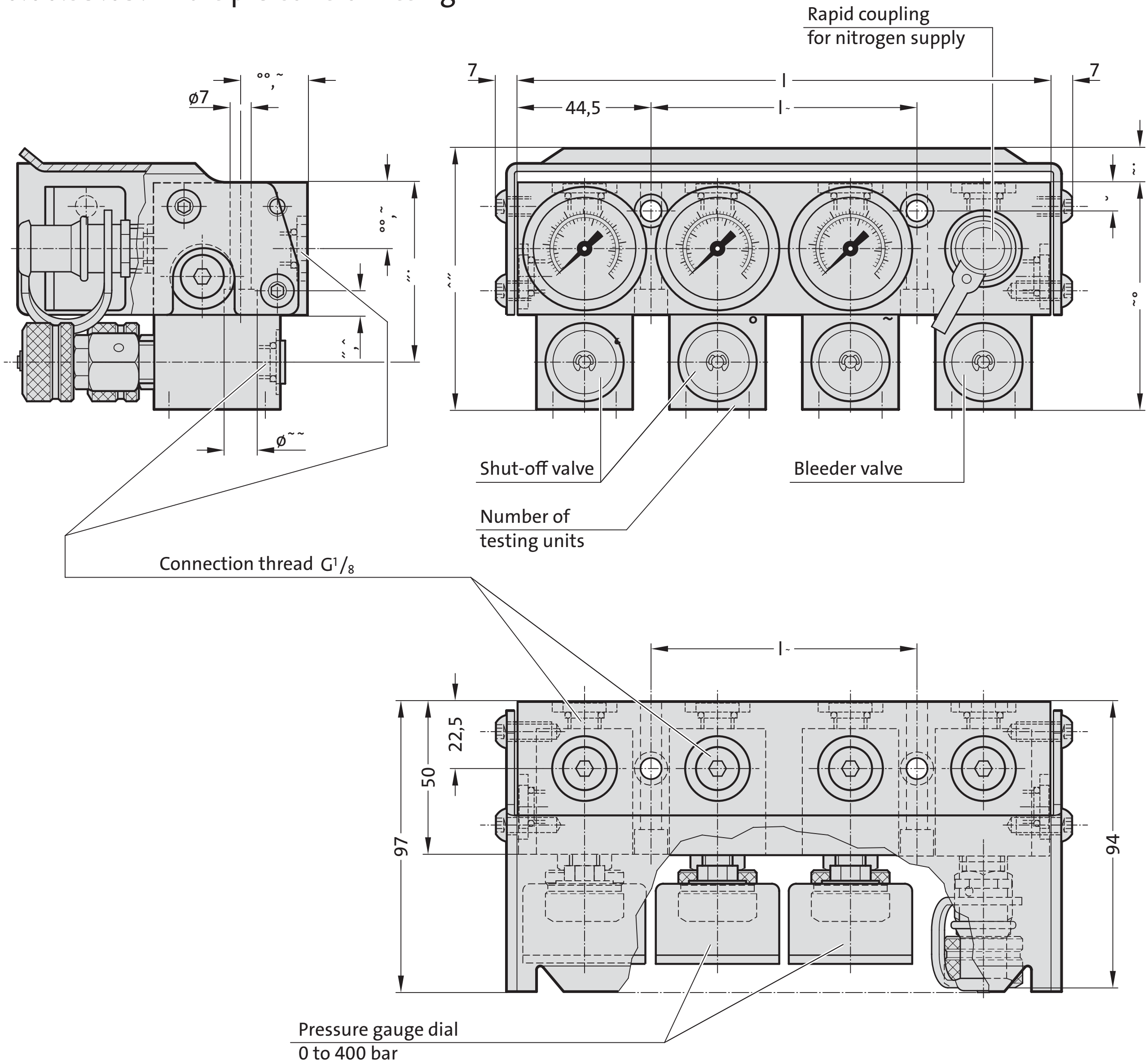
The control fitting 2480.00.30.14 is used for the constant monitoring of filling pressures > 150 bar of one or more gas springs.

The control fitting is equipped with rapid coupling for nitrogen supply and a bleeder valve. There are three G$^1/_8$ ports for simultaneous pressure checking at the control fitting.

Measuring range from
0-600 bar (8700 psi).

Multiple control fitting

2480.00.39.05. Multiple control fitting



Description:

The multiple control fitting is required if it is necessary to check or set the filling pressure of each spring or spring assembly individually.

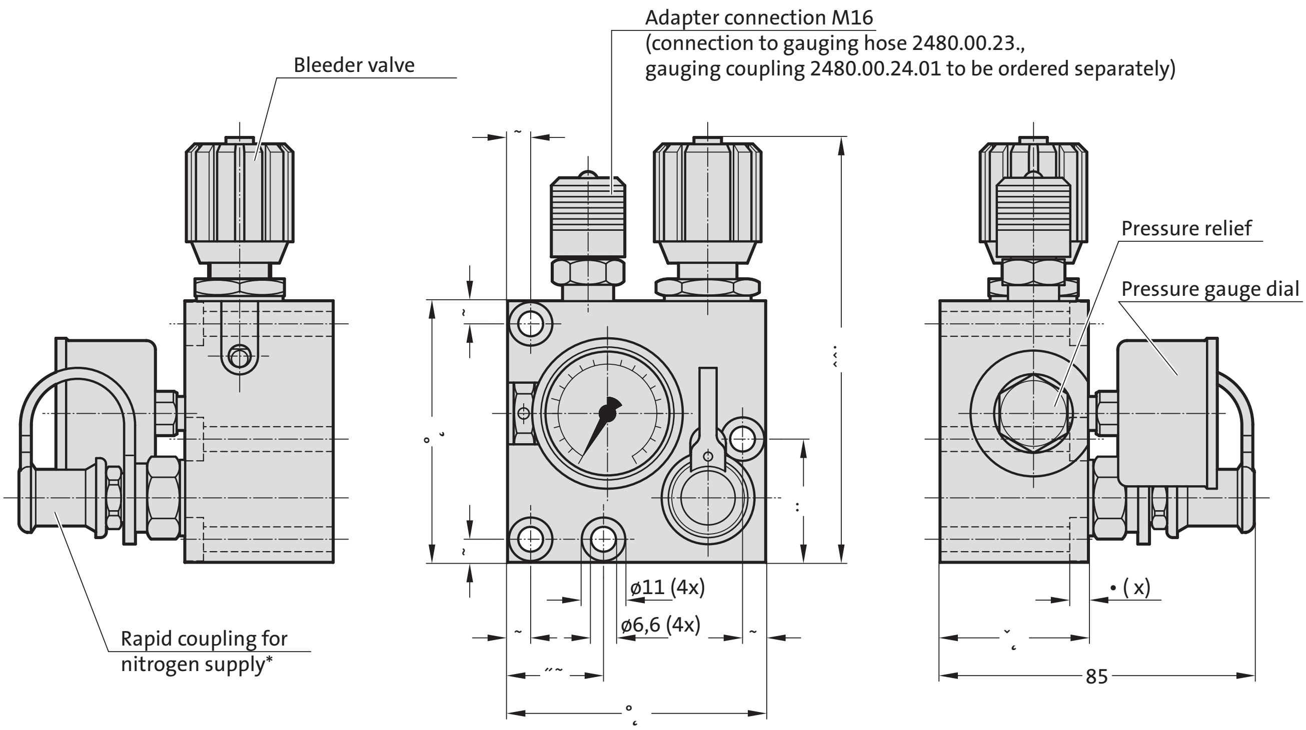
The filling of the springs is done at a central position using the rapid coupling for nitrogen supply. Each testing unit is provided with three threaded connections for the optional hose connection.

The cover protects against mechanical damages.

2480.00.39.05. Multiple control fitting

Order No	Quantity of testing units	l	l_1
2480.00.39.05.02	2	133.5	44.5
2480.00.39.05.03	3	178.0	89.0
2480.00.39.05.04	4	222.5	133.5
2480.00.39.05.05	5	267.0	178.0
2480.00.39.05.06	6	311.5	222.5
2480.00.39.05.08	8	400.5	311.5
2480.00.39.05.10	10	489.5	400.5

Control fitting with pressure relief



Description:

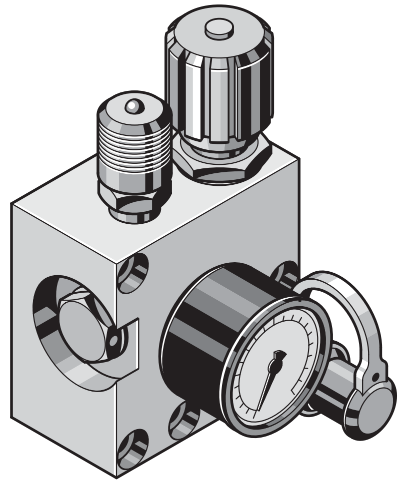
The control fitting with pressure relief 2480.00.31.11 (Faure) is used for continuous monitoring of the filling pressure of one or more gas springs (one connection G$^1/_8$-M16).
During operation the pressure can be checked by visual monitoring of the pressure gauge.

Note:

To connect the measuring hose system 2480.00.23, remove M16 connection adapter and screw in the gauging coupling with valve 2480.00.24.01 (to be ordered separately).

When installing gas springs always remove the valve from the gas spring.

* 2 m long filling hose with rapid coupling, shut-off valve and gas bottle connector, Order no. 2480.00.31.02 (to be ordered separately)



 subject to alterations

Diaphragm pressure switch
Adapter block
Screw connection GE - G $^1/_8$ - G $^1/_4$

Technical data of Diaphragm pressure switch

2480.00.45.01

switching range, adjustable	20-250 bar
switching tolerance	±5.0 bar
overpressure protection	350 bar
voltage (max.)	250 V

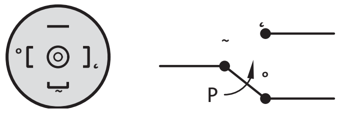
2480.00.45.02

switching range, adjustable	10-80 bar
switching tolerance	±1.6 bar
overpressure protection	350 bar
voltage (max.)	250 V

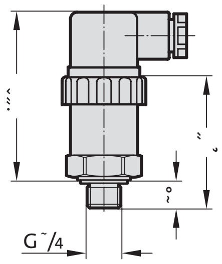
Note:

for monitoring pressure of single gas springs see adapter 2480.00.45.10

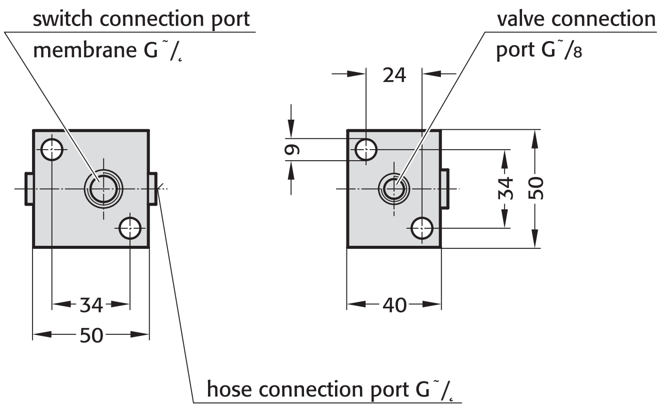
Circuit diagram for diaphragm pressure switch



2480.00.45.01
2480.00.45.02

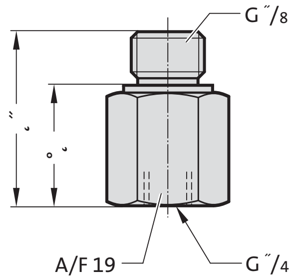


2480.00.45.10

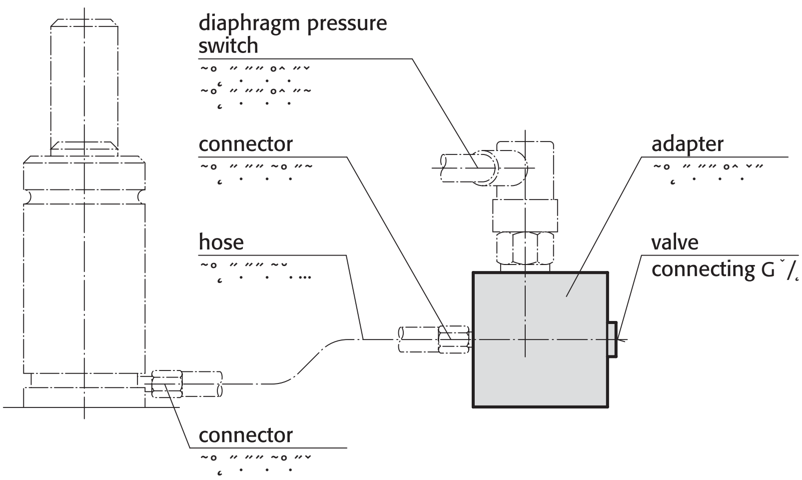


2480.00.45.00.01.18.14

Screw connection GE - G $^1/_8$ - G $^1/_4$ for Control fitting with connection thread G $^1/_8$



Installation example:

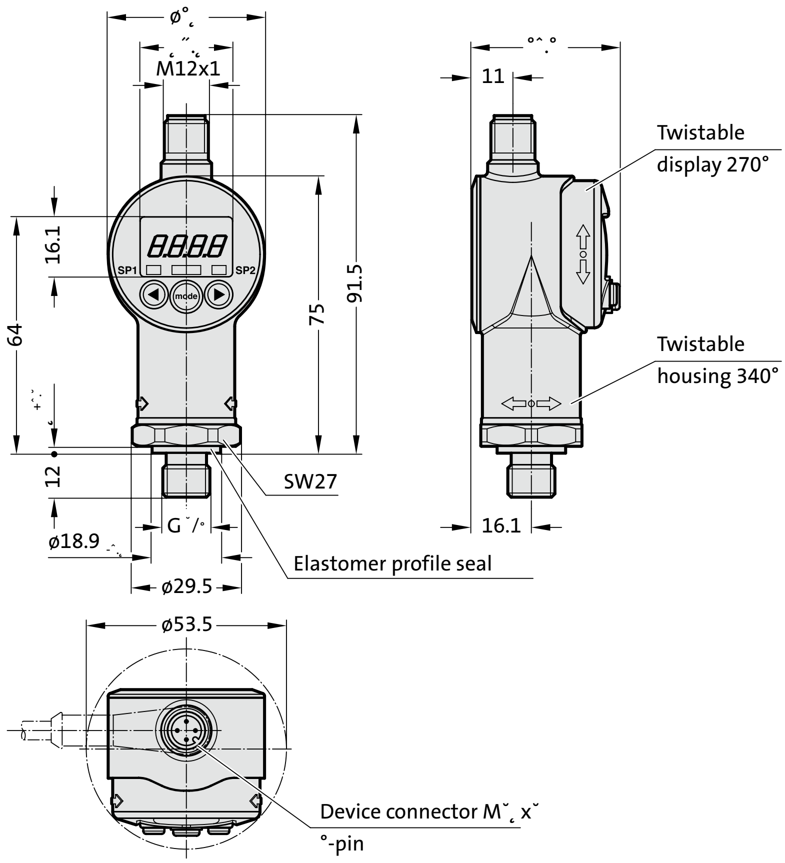


Description:

In conjunction with diaphragm pressure switch 2480.00.45.01 or .02, the adapter 2480.00.45.10 permits the monitoring of the charge pressure: if the pressure drops below a set value, the diaphragm pressure switch operates and emits a signal or stops the machine.

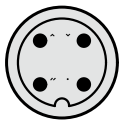
Diaphragm pressure switch, digital

˜°˛ ˝.˝˝.°ˆ.˝ˆ Diaphr agm pressure switch, digital



Pin assignment:

M˝˙x˝, ˆ-pin



Pin	
˝	+UB
˙	Analogue
˘	0 V
ˆ	SP˝

Note:

2191.00.12.04.030 connecting cable, straight
3 m long, to be ordered separately.

Description:

The diaphragm pressure switch, digital 2480.00.45.05 is a compact, electronic pressure switch with integrated digital display for relative pressure measurement in the high pressure range.
For this purpose, it has a stainless steel measuring cell with thin film strain gauge (DMS).
The device offers a switching output and a switchable analogue output signal (4 ... 20 mA resp. 0 ... 10 V).

Advantages:
- 1 PNP transistor output, loadable up to 1.2 A
- Precision ≤ ± 1 % F S
- Switchable analogue output (4 ... 20 mA / 0 ... 10 V)
- 4-digit digital display
- Optimal alignment by twisting in two axes
- Switching direction of the switch outputs adjustable (opening or closing function)
- Value display in bar, psi or MPa or freely scalable, for example, force
- Easy handling via button programming
- Switching points and reset hysteresis independently adjustable

Technical data:

Input characteristics:

Measuring range	400 bar
Overload range	800 bar
Burst pressure	2000 bar
Mechanical connection	$G^1/_4$
Tightening torque	20 Nm
Media-contacting parts	Connection piece: Stainless steel seal: FPM ($G^1/_4$ A DIN 3852)

Output parameters:

Precision according to DIN 16086,	≤ ± 0.5 % FS typical
Limit point adjustment (display, analogue output)	≤ ± 1 % F S max.
Reproducibility	≤ ± 0.25% FS max.
Temperature drift	≤ ± 0.025 % FS / °C max. Zero point ≤ ± 0.025 % FS / °C max. range

Analogue output:

Signal selectable:	4 ... 20 mA load max. 500 Ω 0 ... 10 V load min. 1 kΩ

Switching outputs:

Version	PNP transistor switching output
Switching current	max. 1.2 A
Operating temperature range	0° - 80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class according to DIN 40050	IP67

Setting ranges for the switching outputs:

Switching function

Measuring range in bar	Switching point in bar	Hysteresis in bar	Increment* in bar
0 ... 400	6.0 ... 400	2.0 ... 396	1

Window function

Measuring range in bar	Lower Switching value in bar	Upper Switching value in bar	Increment* in bar
0 ... 400	6.0 ... 392	9.0 ... 396	1

* All areas specified in the table are adjustable in the grid of the step width.

Wireless Pressure Monitoring (WPM)

Wireless monitoring of gas springs

PDF
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03.2018

Wireless Pressure Monitoring (WPM)

Wireless Pressure Monitoring (WPM)

Wireless monitoring of gas springs using Bluetooth LE 4.0

The core requirements on any pressing plant are: Automation and zero-defect production.
The FIBRO Wireless Pressure Monitoring (WPM) system monitors gas springs in all areas in which cable or hose-reliant systems reach their technical limitations, or are simply uneconomical.

The WPM system monitors temperature and pressure in gas springs.

It consists of a data holder and sensors, which transmit their data by radio to any desired Windows-based computer. Custom software analyses the data and initialises the necessary process control and pre-emptive maintenance steps accordingly.

FIBRO, with the WPM system for the fourth industrial revolution, provides a product and technology that supports concepts of intelligent processes and networked machines/tools.

Advantages:

- Around-the-clock monitoring and documentation
- Alert to defects avoiding production of faulty parts
- Pre-emptive wear detection and targeted troubleshooting
- Prevention of downtime and secondary failures
- Minimisation of leakage points
- Streamlined construction and assembly
- Optimised maintenance intervals and reduction of maintenance and repair costs

Monitoring system - Method of operation

The WPM system contains up to four components:

- Sensors in the pressing tool.
- Data holder manages the data from the tool sensors and transmits its parameters to the PC or gateway.
- PC with receiver:
  One device for setting up and initial parametrisation of the tool sensors as well as the data holder.
- Gateway that permanently installed on the press and communicates with both the tool sensors and the press control. (customer-specific)

Wireless Pressure Monitoring (WPM)
Software
Receiver

2480.00.91.51.01.0

PC-Software

Simple parameterisation of the system

Setting and display of the actual and setpoint values for pressure and temperature of the sensors in the tool via drag & drop.

Zero-defect production

Before and during the use of tools in the press, the WPM monitors the level of pressure of all gas springs.
The system reports defects pre-emptively before a faulty part can be manufactured. Definable warning and alarm value limits.

Gas spring location and status control via tool sensors

The system specifically locates the affected gas spring in the event of a fault.

Targeted maintenance

Temperature monitoring detects erosion before any drop of pressure occurs in the spring. System locates defective spring in case of malfunction. Downtime can be pre-emptively reduced or avoided.
The WPM system enables wear-specific maintenance intervals that significantly reduce maintenance and repair compared to fixed intervals.

Streamlined construction and assembly

Tool manufacturers need solely consider the position of sensors and springs. No need to install tube lines during assembly which means leakages are a thing of the past.

Process control documentation (Pressure/Time diagram)

Record data for pressure and temperature over the entire production period.

Description:

USB stick with Bluetooth LE 4.0 radio receiver.
Via the radio receiver, including driver, the WPM software can directly access the Bluetooth wireless network (sensors and data holders). The measurement data of the sensors are recorded via the radio interface and the configuration of the sensors and the data holder is performed.

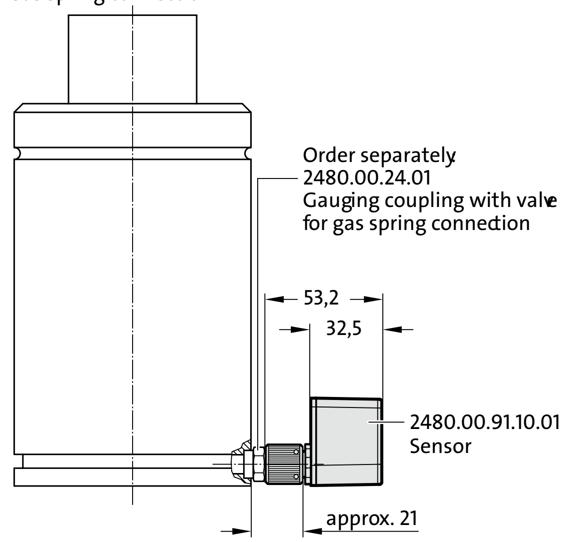
2480.00.91.20.01

Receiver, PC - USB2.0

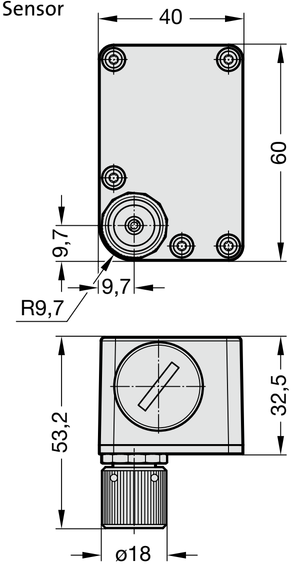
Bluetooth™ 4.0 Low Energy

Wireless Pressure Monitoring (WPM)
Sensor
Filling adapter, Battery

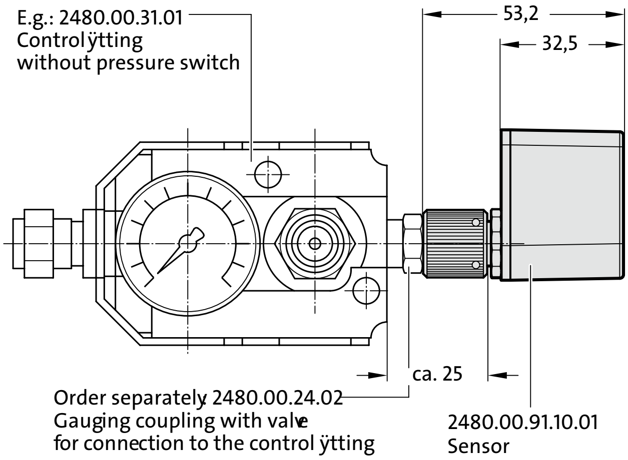
Mounting Example:
Sensor Gas spring connection



2480.00.91.10.01
Sensor



Mounting example:
Sensor - Control fitting connection



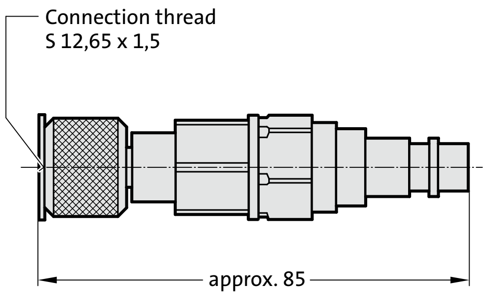
2480.00.91.10.01 Sensor
Description

The sensor is battery operated and thus wireless.
In the operating mode, the sensor cyclically transmits data via Bluetooth LE 4.0 to the gateway or the USB receiver for transmission to the WPM software.
The mechanical construction is designed according to the requirements of the press (shock- and vibration-resistant).
The data transmission during the programming of the sensor is encrypted. In addition, a special protocol sequence with a security key must also be followed so that the sensor accepts the data.

The following data are queried:

- Limits for pressure and temperature
- Part number (tool number)
- Part ID
- Sensor ID
- Position in the tool
- Various cycle times
- Battery status
- Transmission power

2480.00.90.00.10
Filling adapter for minimess connection



Technical specifications:

Housing:	Plastic
Baseplate:	Aluminium
Miniature test port:	Steel galvanised M12,65 x 1,5 FEM
Pressure measuring range:	0 - 500 bar relative
Accuracy::	± 2 bar
Temperature measurement range:	0 °C to 85 °C
Battery:	Lithium Li-SoC12 2 / 3 A 3,6 V
Signal transmission:	Bluetooth LE 4.0
Impermeability:	IP65 sealed with adhesive and screwed
Operating temperature range:	0 °C to 80 °C

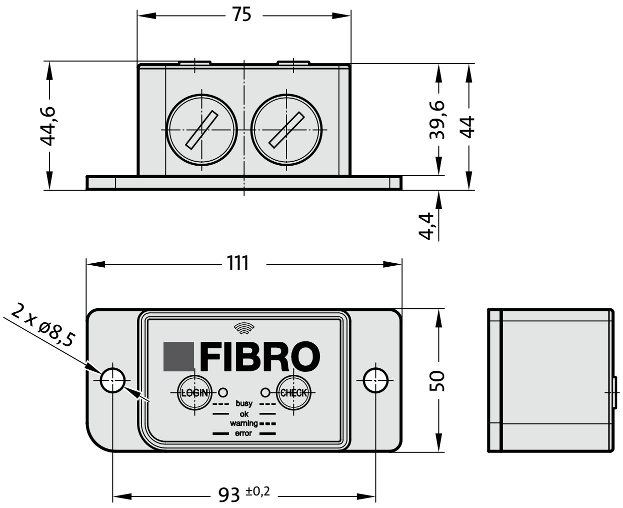
2480.00.91.10.00.1 Battery

Battery for reordering
(Battery is included in the sensor's scope of delivery.)

Battery capacity 3-4 years with "normal" tool use

Wireless Pressure Monitoring (WPM)
Data holder
Battery

2480.00.91.30



Description:

A data holder is installed on each tool. It stores all the tool data, as well as a list of all sensors that are found on the tool.
Up to 128 sensors can theoretically be used in one tool.
Via the CHECK button, the data holder can perform a quick tool scan (sensor condition such as pressure, battery and reception) with all the pressure sensors in the simplest manner.
The data holder receives the connection with the gateway or the read-out device (for example PC) and transmits its tool data. A tool change can be communicated to the gateway via the LOGIN button on the data holder.

Technical specifications:

Housing:	Plastic
Baseplate:	Aluminium
Battery compartment cover:	Aluminium
Signal transmission:	Bluetooth LE 4.0
Impermeability:	IP65 sealed with adhesive and screwed
Operating temperature:	0 °C to 55° C

Advantage:

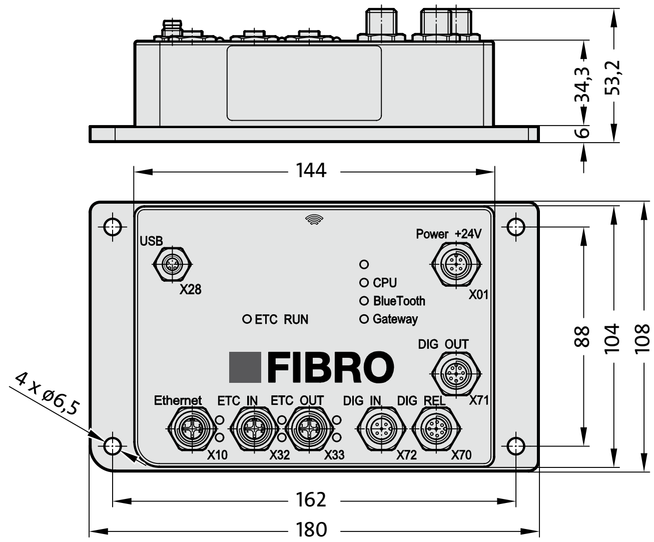
- Wireless pressure monitoring
- Tool data are always available on the tool
- Tool can also be used on press / machine without gateway
- Data evaluation via gateway, PC (WPM software) or also both possible in parallel
- Quick access to the sensor data by short Bluetooth LE 4.0 cycle times
- Fast tool check via button press on the data holder with optical evaluation

2480.00.91.10.00.1 Ba ttery

Order number for reordering
(2 batteries are included in the scope of supply of the data holder.)
Battery capacity 3-4 years for “normal” tool use

Wireless Pressure Monitoring (WPM)
Gateway, Fieldbus

2480.00.91.40



Description:

The gateway, fieldbus 2480.00.91.40 is used to connect the sensors and the data holder to the press control and is not absolutely necessary for pressure monitoring. Without connection to the PLC, an evaluation must be carried out manually via the WPM software. By means of the pressure limit values stored in the data holder, the gateway can initiate a warning or switch-off via the interface for press control.
The mounting location on the press should be chosen in such a way that a good radio connection to the sensors in the tool is ensured.
Installation in the control cabinet is not possible due to the shielding of the metal box.

Technical specifications:

Housing:	Plastic
Baseplate:	Aluminium
Signal transmission:	Bluetooth LE 4.0
Impermeability:	IP65, screwed
Operating temperature:	0 °C to 55° C
Voltage supply:	+24V DC±20%

The device offers the following options:

- Communication with the sensors on the tool
- Communication with the data holder which provides the tool data
- USB interface for the communication with the WPM software
- Interface to machine control.
  The standard version has the common interfaces digital I/O, relay contacts, EtherCAT fieldbus and Ethernet fieldbus.
  Other interfaces upon request.

2480.00.91.40 Interfaces

X28	USB device. Direct connection (tunnelled) to the radio chip	M8	4-pin
X01	Power supply	M12	4-pin
X10	Ethernet 100 MBit	M12	4-pin
X32	EtherCAT Fieldbus input 4 x in	M12	4-pin
X33	EtherCAT Fieldbus output 4 x out	M12	4-pin
X72	Digital inputs galvanically isolated from the system. 4 x in	M12	5-pin
X71	Digital outputs, galvanically isolated from the system. 4 x out, 0,5A	M12	8-pin
X70	Digital outputs, relay, 24V, 1A . 1 x on , 2 x around	M12	8-pin

FILLING AND CONTROL FITTING
FILLING HOSE
CYLINDER PRESSURE REGULATOR

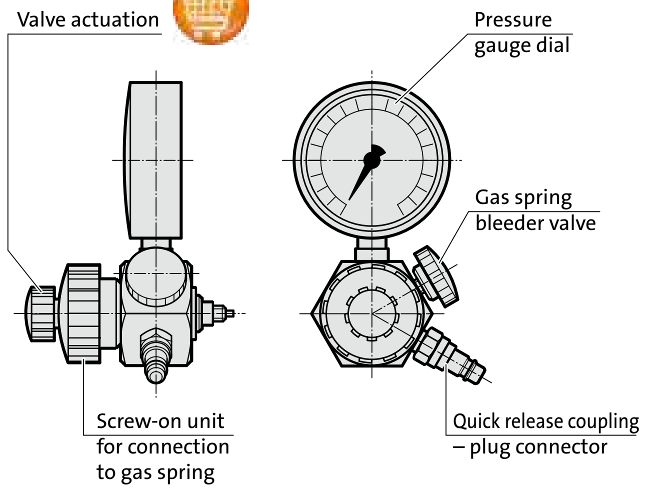
Description:

The filling and control fitting 2480.00.32.21 is used to fill, vary the pressure setting (e.g. when testing tools) and measure the gas pressure. The coupling enables the filling hose 2480.00.31.02 to be connected directly to the gas cylinder valve or the pressure regulator. If the fitting is used solely for checking purposes, a simplified arrangement without the filling hose 2480.00.31.02 is also possible. The fitting is equipped with an additional adapter 2480.00.32.10/.11 for connecting to gas springs with G 1/8 valve connection as standard.

Note:

2 m long filling hose with quick release coupling, shut-off valve and gas bottle connector, order no. 2480.00.31.02 (order separately). Other filling hose lengths to order.

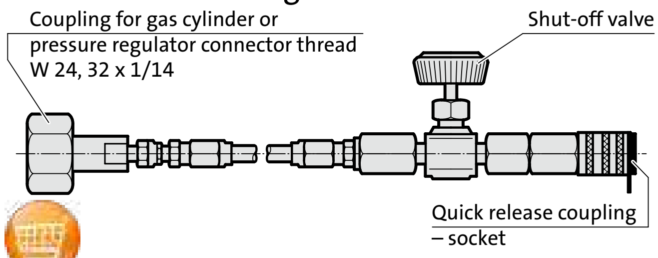
2480.00.32.21 Filling and control fitting



Connecting adapter for cylinder connector

Order No.	Country	For cylinder connector
2480.00.31.02.00.10	France	AFNOR C, W21,8x$^1/_{14}$
2480.00.31.02.00.11	China	G $^5/_8$-ISO228
2480.00.31.02.00.12	Great Britain	G $^5/_8$
2480.00.31.02.00.13	Korea	W24,32x1/4 Type 40f
2480.00.31.02.00.14	Russia	W24,32xG3/4 Type 40n
2480.00.31.02.00.15	USA	W24,32x1/4 Type 40c
2480.00.31.02.00.16	Italy	W24,32xW21,7x1/4 Type 40d

2480.00.31.02 Filling hose



Description:

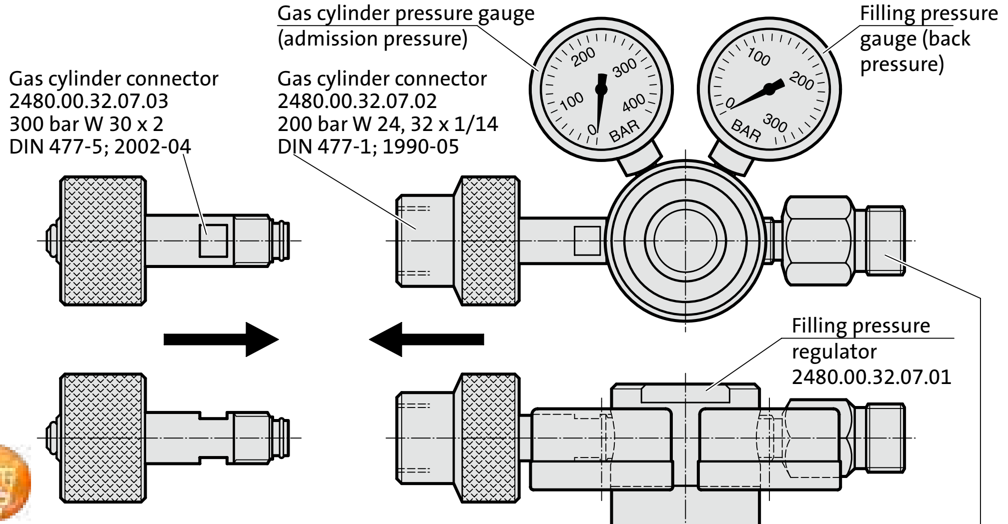
The pressure regulator 2480.00.32.07. is designed for 200 bar connections and for 300 bar gas cylinders. The filling and control fitting 2480.00.32.21 is connected to the cylinder pressure regulator for filling gas springs using filling hose 2480.00.31.02 and connector adaptor 2480.00.32.07.04. Depending on the type of gas cylinder, the gas cylinder connector used can either be the 2480.00.32.07.02 for 200 bar cylinders or the 2480.00.32.07.03 for 300 bar cylinders.

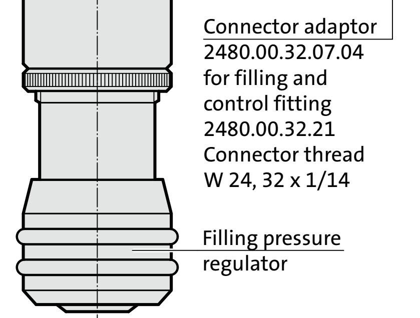
Max. admission pressure 300 bar
Back pressure range 10-200 bar

Other advantages:

- Hasty opening of the gate valve on the filling and control fitting 2480.00.32.21 cannot result in overfilling.
- It is not necessary to have the pressure display of the filling and control fitting 2480.00.32.21 in view.

2480.00.32.07. Gas cylinder pressure regulator





Order No.	for gas cylinder pressure 200/300 bar
2480.00.32.07.01	Pressure regulator
2480.00.32.07.02	Gas cylinder connector 200 bar
2480.00.32.07.03	Gas cylinder connector 300 bar
2480.00.32.07.04	Connecting adapter

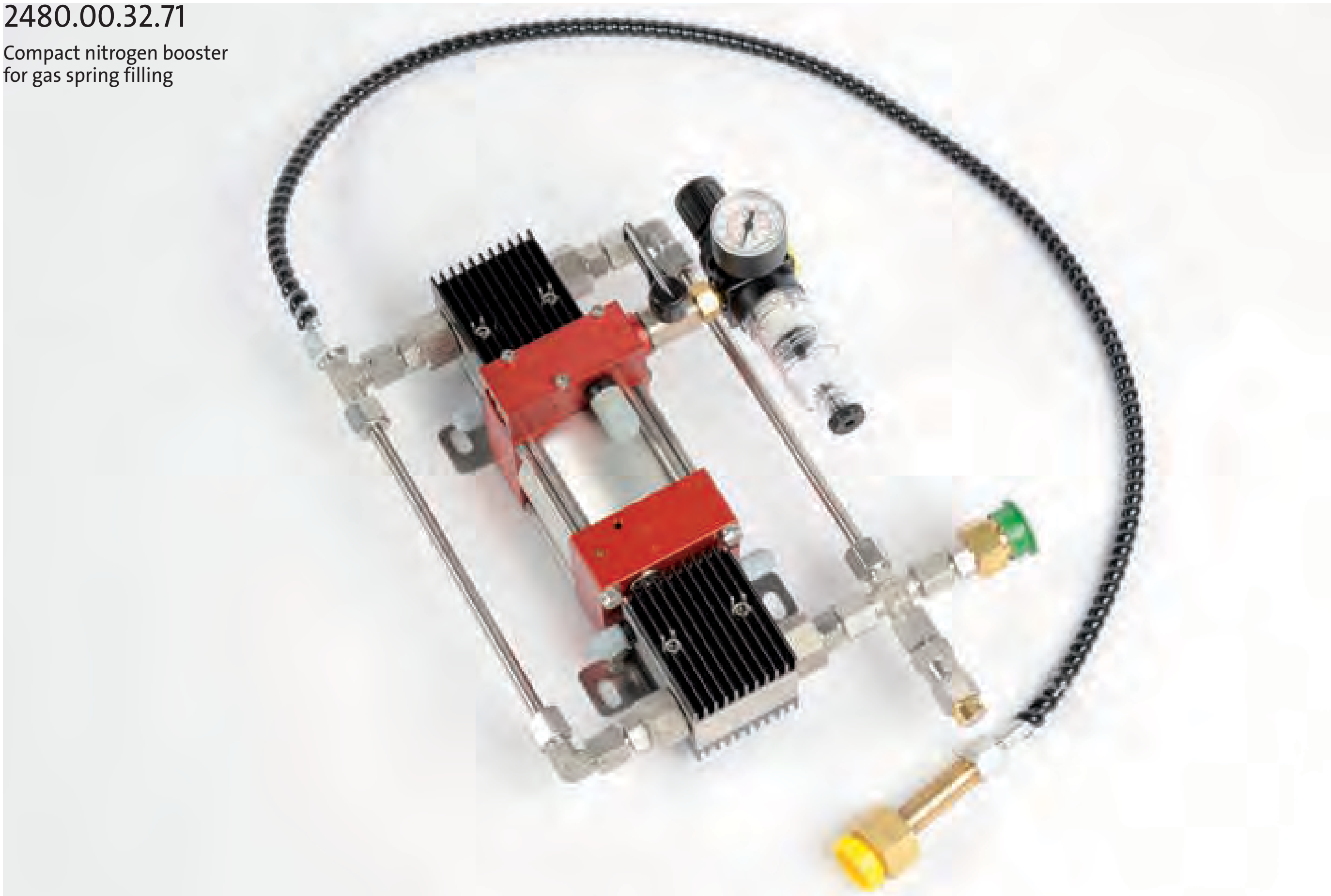
Order No.	for gas cylinder pressure 200 bar
2480.00.32.07.01	Pressure regulator
2480.00.32.07.02	Gas cylinder connector 200 bar
2480.00.32.07.04	Connecting adapter

Order No.	for gas cylinder pressure 300 bar
2480.00.32.07.01	Pressure regulator
2480.00.32.07.03	Gas cylinder connector 300 bar
2480.00.32.07.04	Connecting adapter

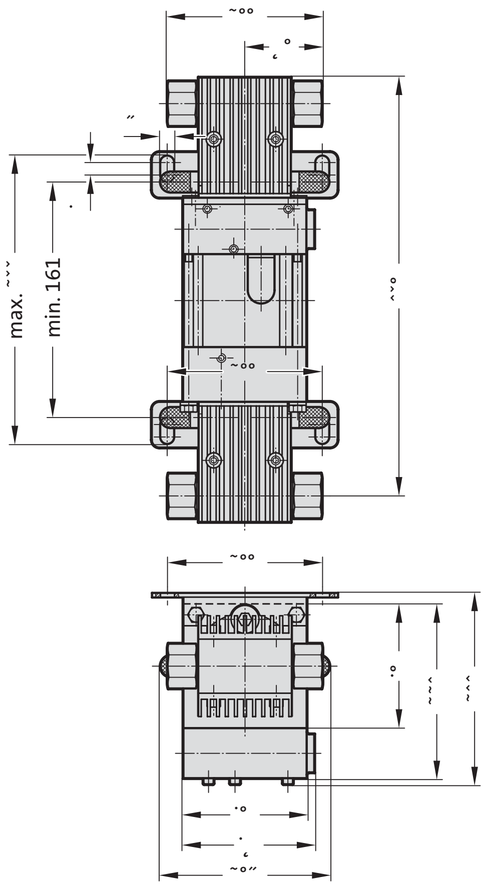
Compact nitrogen booster for gas spring filling

2480.00.32.71

Compact nitrogen booster
for gas spring filling



2480.00.32.71



Description:

The FIBRO compact nitrogen booster 2480.00.32.71 was developed to compress nitrogen gas. It increases the output pressure of the nitrogen cylinders considerably.

For example, when filling gas springs, the N_2 cylinders can be used up to a residual pressure of 30 bar.

Advantages:

- ▶ Increase in utilisation capacity
- ▶ Reduction in cylinder replacement time
- ▶ Minimisation of the number of cylinders
- ▶ Light weight (7.2 kg)
- ▶ Compact design
- ▶ Suitable for simple installation directly on all standard nitrogen cylinders (200 bar)

Function:

The FIBRO compact nitrogen booster works according to the principle of a pressure relay valve. Low pressure is applied to a large surface, which in turns applies high pressure to a small surface. Continuous delivery is achieved by means of an internally actuated 4/2-way valve.

Compressed air is used as the drive mechanism.

A holding plate is included to secure the compact nitrogen booster to the nitrogen cylinder. The compact nitrogen booster is simply hung over the nitrogen cylinder connection.

Compact Nitrogen Booster
Holding plate

Connection diagram

Compact Nitrogen Booster

2480.00.32.71.02 Holding plate

for re-order

① 2480.00.32.71 C ompact Nitrogen Booster

② Gas cylinder connection W24, 32 x $^1/_{14}$ for 200 bar nitrogen cylinder

③ Nitrogen N_2 inlet

④ Compressed air inlet $G^1/_4$ max. 10 bar

⑤ Overpressure protection 400 bar

⑥ Nitrogen N_2 outlet

⑦ Connecting thread W24, 32 x $^1/_{14}$

Technical data:

Drive compressed air: 1 – 6 bar

Calculated operating pressure at 6 bar air drive pressure: 192 bar + remaining pressure in the nitrogen cylinder

Transmission ratio: 1:32

Displaced volume/double stroke: 11.6 cm³

Connections:

Compressed air: $G^1/_4$" thread

Nitrogen inlet: Hose DN4, 1 m long with N_2 cylinder connection 200 bar

Nitrogen outlet: N_2 cylinder connection 200 bar W24, 32 x $^1/_{14}$

Max. operating temperature: 60 °C

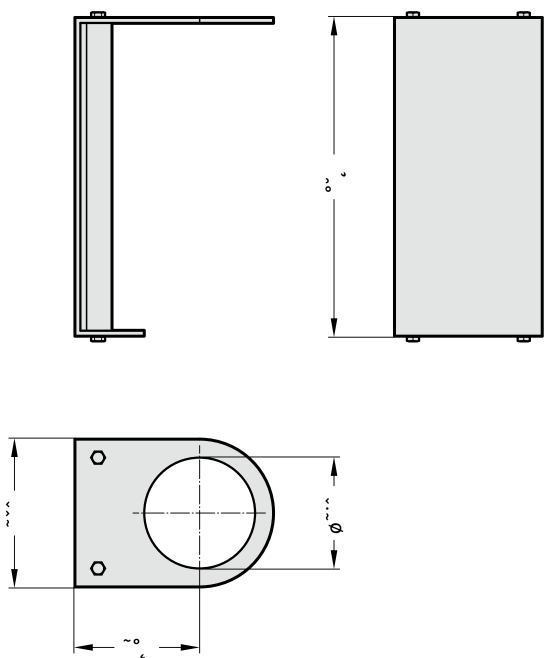
Weight: approx. 7.2 kg

Inlet pressure: 30-300 bar

Average supply rate*: 280 NL/min

* The delivery rate is dependent on the air drive and inlet pressure.

2480.00.32.71.02



Dynamometer for gas s prings

2480.00.35.021

Analogue display

2480.00.35.032

Digital display

Description:

The dynamometer with mechanical measuring device can be used to test the spring force of gas springs up to 8000 daN.
The dynamometer with digital measuring device can be used to test the spring force of gas springs up to 10 000 daN.

The dynamometer 2480.00.35.021 with analogue display is supplied with three interchangeable pressure measuring nozzles different ranges of values:

	up to 300 daN
from 300	to 1750 daN
from 1750	to 8000 daN

The dynamometer 2480.00.35.032 with digital display has a pressure measuring nozzle for forces ranging from 0 to 10 000 daN.

Maximum spring installation height	analogous	= 700 mm
	digital	= 760 mm

Dynamometer for gas springs

2480.00.35.04

Description:

The dynamometer with digital measuring device can be used to test the spring force of gas springs up to 2000 daN.

Max. spring installation height: 488 mm.

Max. spring diameter: 150 mm.

FIBRO

Toolkit for assembling gas springs

2480.00.50.11

Toolkit for all gas springs

The toolkit contains:

Pos.	Order No	Term	
1	2480.00.50.01.001	Assembly sleeve	Mini
2	2480.00.50.01.002	Assembly sleeve	00250
3	2480.00.50.01.003	Assembly sleeve	00500
3-1	2480.00.50.01.031	Assembly sleeve (2487.12.00500.)	X500
4	2480.00.50.01.004	Assembly sleeve	00750
5	2480.00.50.01.005	Assembly sleeve	01500
5-1	2480.00.50.01.051	Assembly sleeve (2487.12.01500.)	X1500
6	2480.00.50.01.006	Assembly sleeve	03000
7	2480.00.50.01.007	Assembly sleeve	05000
8	2480.00.50.01.008	Assembly sleeve	07500
9	2480.00.50.01.009	Assembly sleeve	10000
10-1	2480.00.50.01.101	Circlip tool	
13	2480.00.50.01.013	T-lever	M8
14-1	2480.00.50.01.141	T-lever	M16
15	2480.00.50.01.015	T-lever	G $^1/_8$”
16-2 replaces 16-1	2480.00.50.01.162	T-lever, extension	M6
17	2480.00.50.01.017	Valve pliers	
18	2480.00.50.01.018	Valve tool	M6
19	2480.00.50.01.019	Valve tool	G $^1/_8$“
29	2480.00.50.01.029	Special valve spanner	
30	2480.00.50.01.030	Valve tool	VG 5
33	2480.00.50.01.033	Valve tool (2480.00.41.1)	M6
34	2480.00.50.01.034	Handle for disassembling	M3
39-1	2480.00.50.01.391	Tool case	

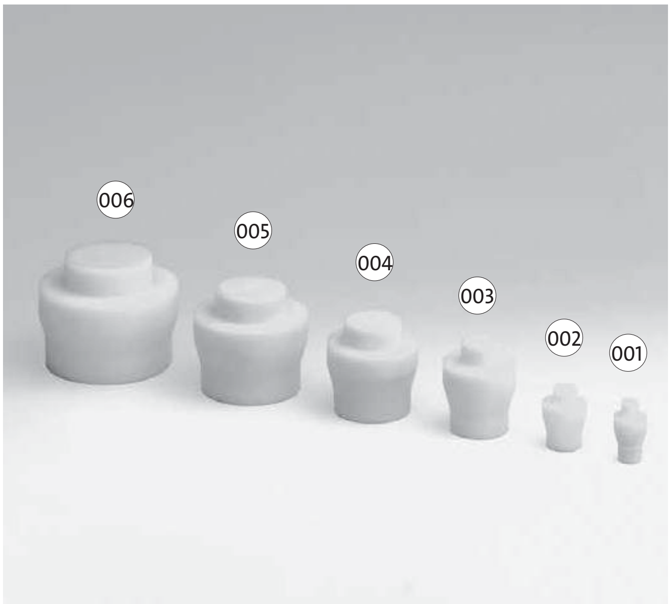
Description:

Toolkit for assembling and disassembling gas springs.

Note:

Read instructions for use before working on it.
Every tool can be ordered separately.

Assembling cone



2480.00.50.04.

Assembling cone for gas springs with through bore passage 2496.12.

Pos.	Order No	Term
001	2480.00.50.04.001	Assembling cone 00270
002	2480.00.50.04.002	Assembling cone 00490
003	2480.00.50.04.003	Assembling cone 01060
004	2480.00.50.04.004	Assembling cone 01750
005	2480.00.50.04.005	Assembling cone 03300
006	2480.00.50.04.006	Assembling cone 04250

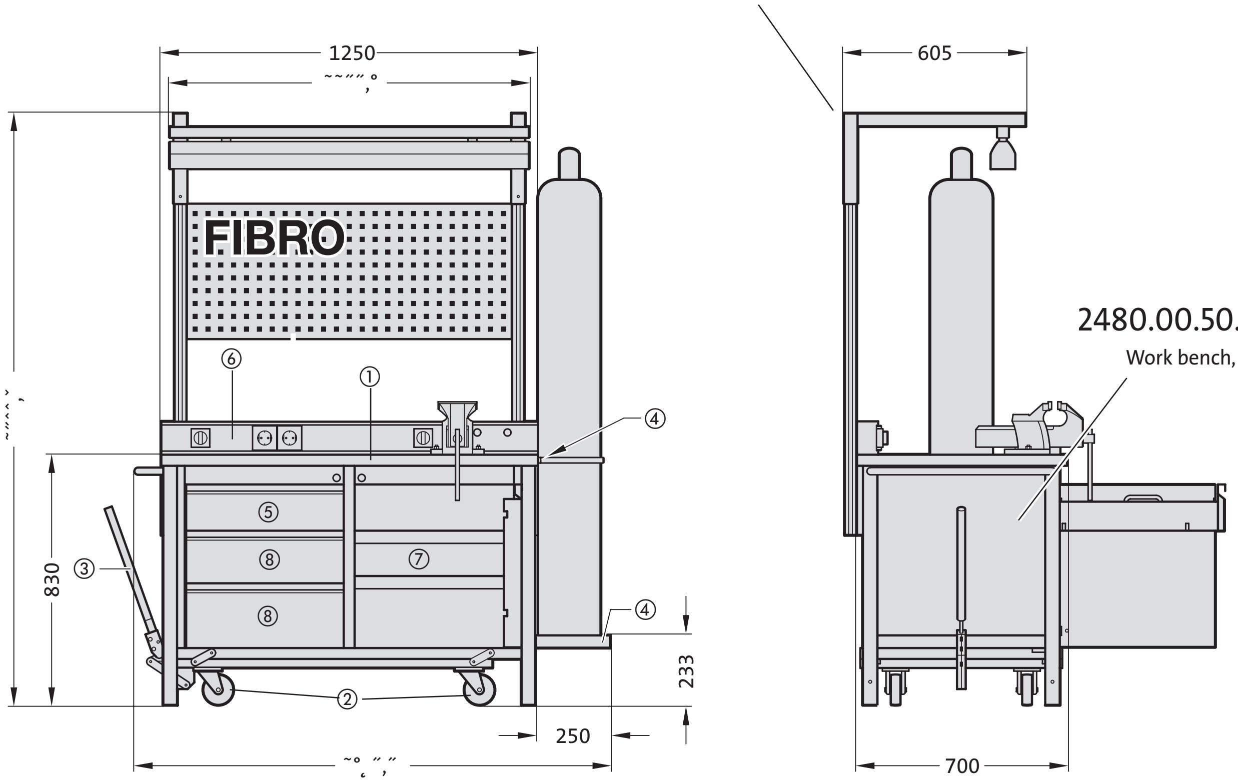
Service station, mobile, for gas springs

2480.00.50.20.

Service station, mobile, for gas springs

2480.00.50.20.2

Lighting unit, removable



Description:

The mobile service station for gas springs is an optimised solution for the filling/maintenance of gas springs directly on the press or tool.
The service station consists of a mobile work bench 2480.00.50.20.1 and a removable light unit 2480.00.50.20.2.

Advantages:

- "All in One" solution
- High mobility coupled with secure stability
- Clean handling of the gas spring components
- High user comfort

The mobile work bench 2480.00.50.20.1 is equipped with a 40 mm thick Trovidur work surface ①. The surface is hard-wearing and very easy to keep clean.

The height adjustable chassis with 4 castors ② allows for high mobility and provides secure stability for the service station. The chassis is easily moved up and down by way of an excenter lever ③ located on the left of the unit.

At the right of the unit, a loading receptacle with a locking clip ④ is located for 200 bar bottles.

A removable oil sump with a grate in the upper drawer ⑤ will ensure clean handling of the internal gas spring components.

The energy panel ⑥ offers great user comfort because of its integrated operating elements, like the compressed air connection, light switch and 3 x 230 V electric outlet.

The removable lighting unit 2480.00.50.20.2 is height adjustable to cater to the individual requirements of the user.

Technical data:

2480.00.50.20.1 Work bench, mobile:

Work surface, Tovidur (mm) 1250 x 700 x 40
Work bench chassis made from profile steel tubing (mm) 45 x 45 x 2
Parallel vices, jaw width = 100 mm

2480.00.50.20.2 Lighting unit, removable:

Elongated light (w = 1200 mm) with connection cable and plug
2 x 45 W, strip louvre with reflector
Electronic ballast
Protection type IP20

Connections

Input:

Central supply line on the right side of the cabinet (bottom rear) with electric supply line (protected energy supply plug)

$^1/_4$" internal thread for air infeed

Energy panel:

1 x $^1/_4$" internal thread for air connection

1 x On/OFF switch for air supply, rotary switch for Nitrogen Compact Booster

3 x 230 V socket (with hinged lid)

1 x ON/OFF switch for power supply, rotary switch

Accessory:

For optimised utilisation of the nitrogen bottle fill amount, a Compact Booster 2480.00.32.71 and a hose line DN4, 3 m 2480.00.32.71.05.03 can be integrated in specifically provided receiving braces in the cabinet ⑦. The two free drawers ⑧ offer additional space for specialist tool sets 2480.00.50.11 for the repair of gas springs.

Pneumatic hose crimping machine
Electric hand held hose crimping machine (battery operated)
Hose shears

FIBRO

2480.00.54.10

Hose crimping machine,
for pneumatic hose sizes DN2 and DN5

Description:

The FIBRO pneumatic hose crimping machine, 2480.00.54.10 is suited for crimping the following hose connection systems:

2480.00.23.	Minimess-system
2480.00.25.	24°-conus-system
2480.00.27.01.	Connector system, 24° conus micro

The pneumatic-hydraulic hose crimping machine drive enables simple and fast hose harnessing.

After connecting compressed air (max. 7 bar) on the G$^1/_4$" threaded fitting, the hose crimping machine is operated manually with the air-hydraulic pump (0.1 - 0.5 l/min. at 7 bar air pressure).

Technical data:

Crimp force	750 kN/ 75 t
max. crimp range	52 mm
Opening	+10 mm
Opening without press clamps	52 mm
Press clamps (included in the delivery scope)	2480.00.54.10.02 (DN2)
	2480.00.54.10.05 (DN5)
Drive	pneumatic
Oil	1.4 liters
Length x width x height	230 x 180 x 160 mm
Weight	16 kg

Lubricant-free
Sheetmetal glide pads on the press tool:
- improved performance due to reduced friction
- no press tool wear and no contamination from lubricants, 20% reduction in friction loss

2480.00.54.03

Hose shears

2480.00.54.20

Electric hand held hose crimping machine (battery operated)
for hose size DN2

Description:

The FIBRO electric hand held hose crimping machine, 2480.00.54.20 is suited for crimping the following hose connection systems:

2480.00.23.	Minimess-system
2480.00.27.01.	Connector system, 24° conus micro

The electric-hydraulic (battery operated) hand held hose crimping machine enables simple and fast hose crimping. The correct crimp force is ensured by a crimp force sensor and once correct force is reached an audible signal can be heard. The electric hand held hose crimping machine, is ideal for very quick crimping.

Technical data:

Crimp force	15 kN
Quantity of pressings	ca. 150 at 1.5 Ah
Head for crimping jaws	ca. 350° revolving
Drive	battery operated
Voltage	18 V
Power	1.5 Ah
Battery charging time	ca. 15 min
Length x width x height	377 x 75 x 116 mm
Weight	2.3 kg

Included: Electric hand held hose crimping machine, crimping jaws, battery, charger and case.

The following crimping fixtures and hoses can be ordered:

for the Minimess-system

2480.00.23.00.	Hose 630 bar dimpled, DN2 *
2480.00.23.01. V	Threaded connection, straight, packed, DN2 - 1215
2480.00.23.02.V	Threaded connection, 90°, packed, DN2 - 1215

for the connector system, 24° conus micro

2480.00.23.00.	Hose 630 bar dimpled, DN2 *
2480.00.27.01. V	Threaded connection, straight, packed

for the 24°-conus-system **

2489.00.02.	High-pressure hose, dimpled, DN5 *
2480.00.25.01	Hose fitting, straight
2480.00.25.02	Hose fitting, 90°
2480.00.25.04	Hose fitting, 45°

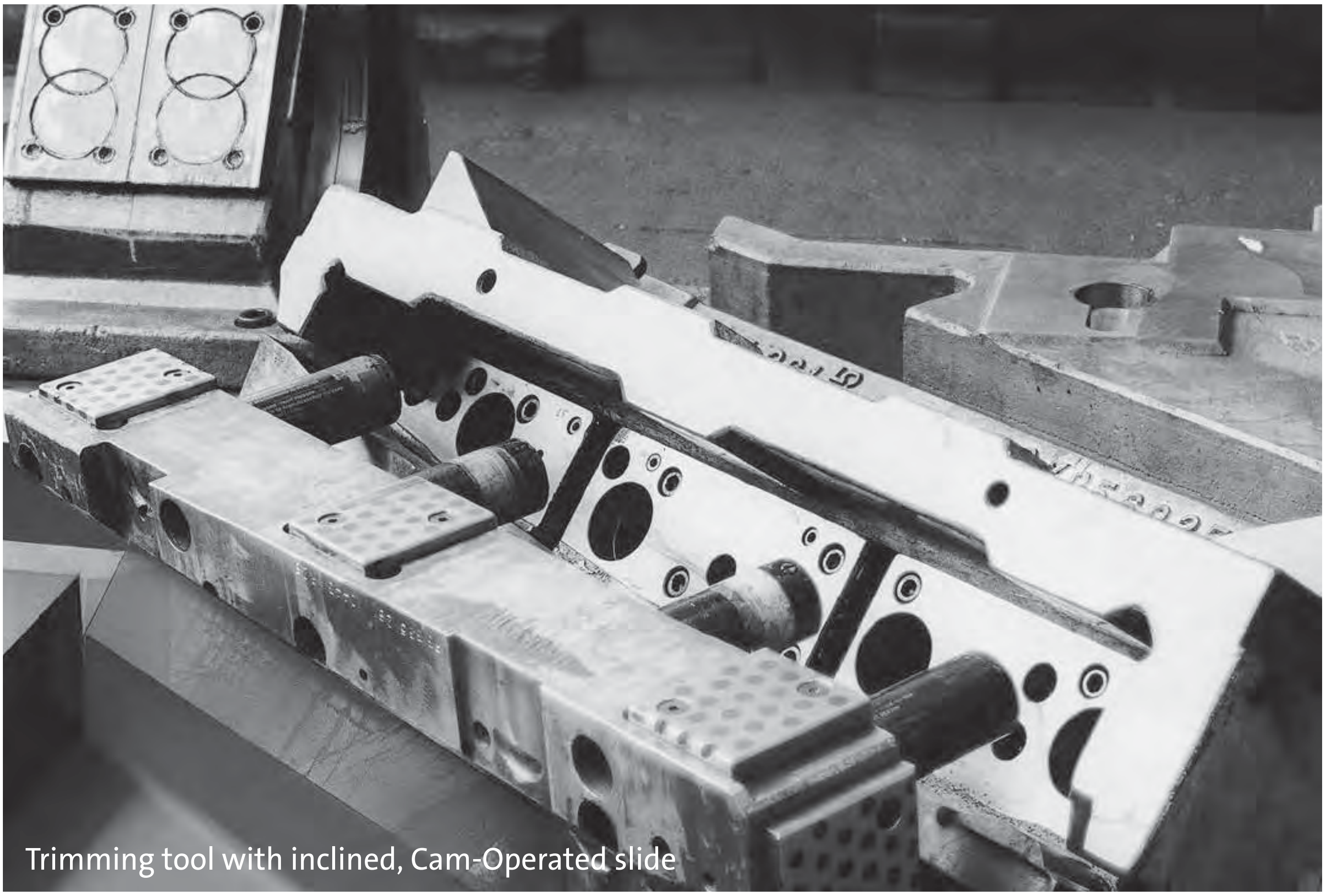
* Hoses to be ordered in 1 meter lengths,
e.g. ordering example for hose DN2, 10 meter lenght
= 2480.00.23.00.0010

** not for 2480.00.54.20 electric hand held hose crimping machine

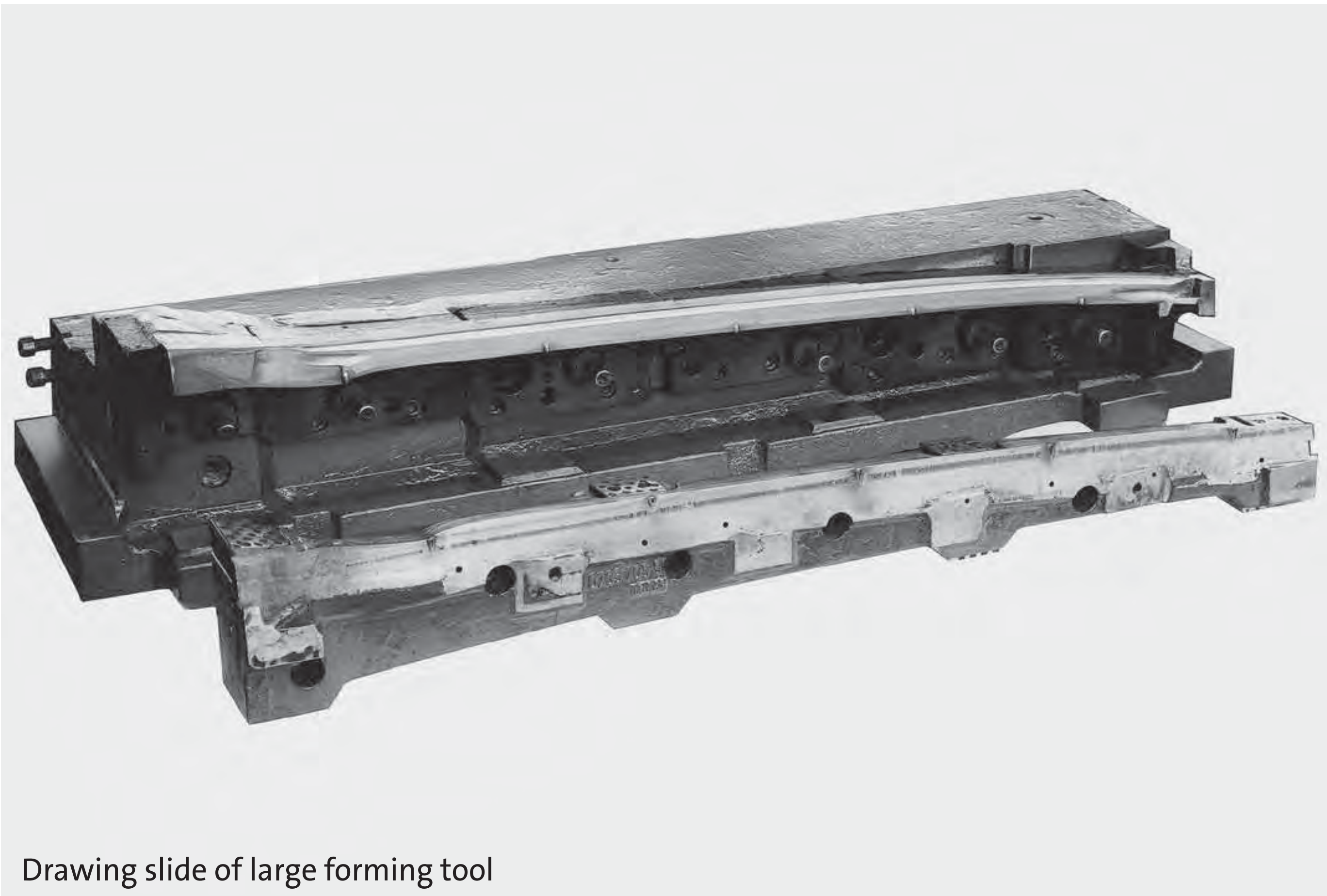
Application examples

FIBRO

Application examples



Trimming tool with inclined, Cam-Operated slide

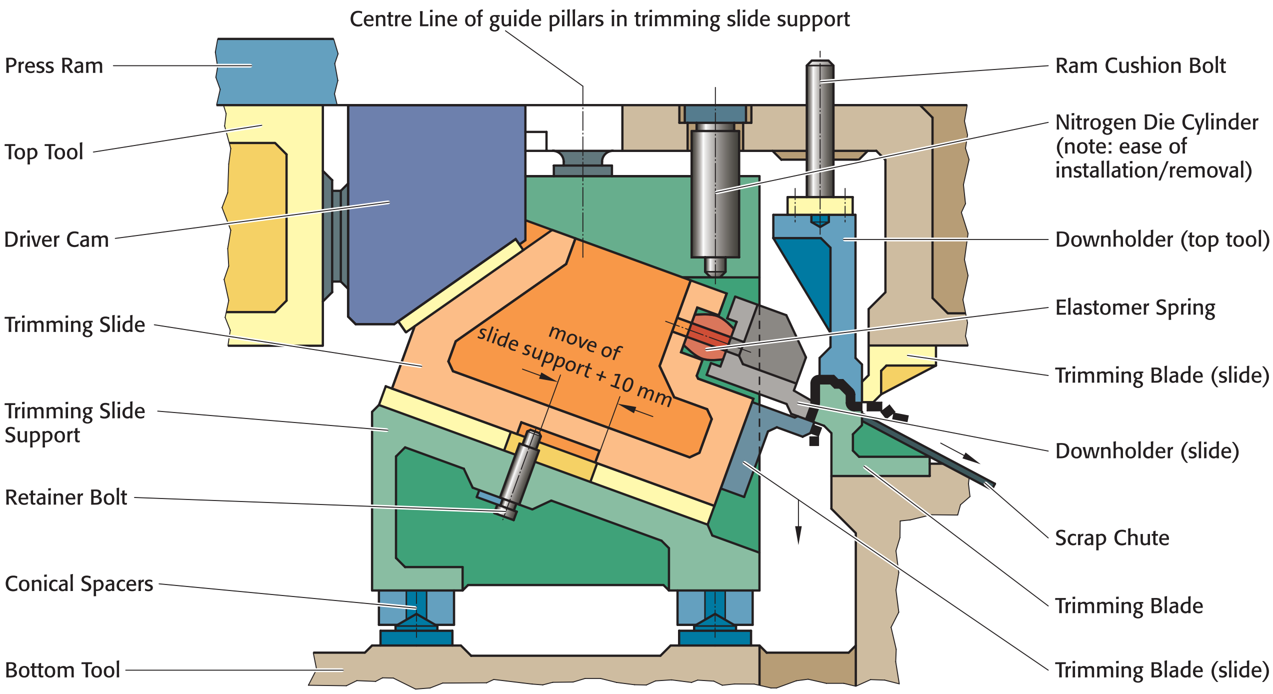


Drawing slide of large forming tool

Application examples

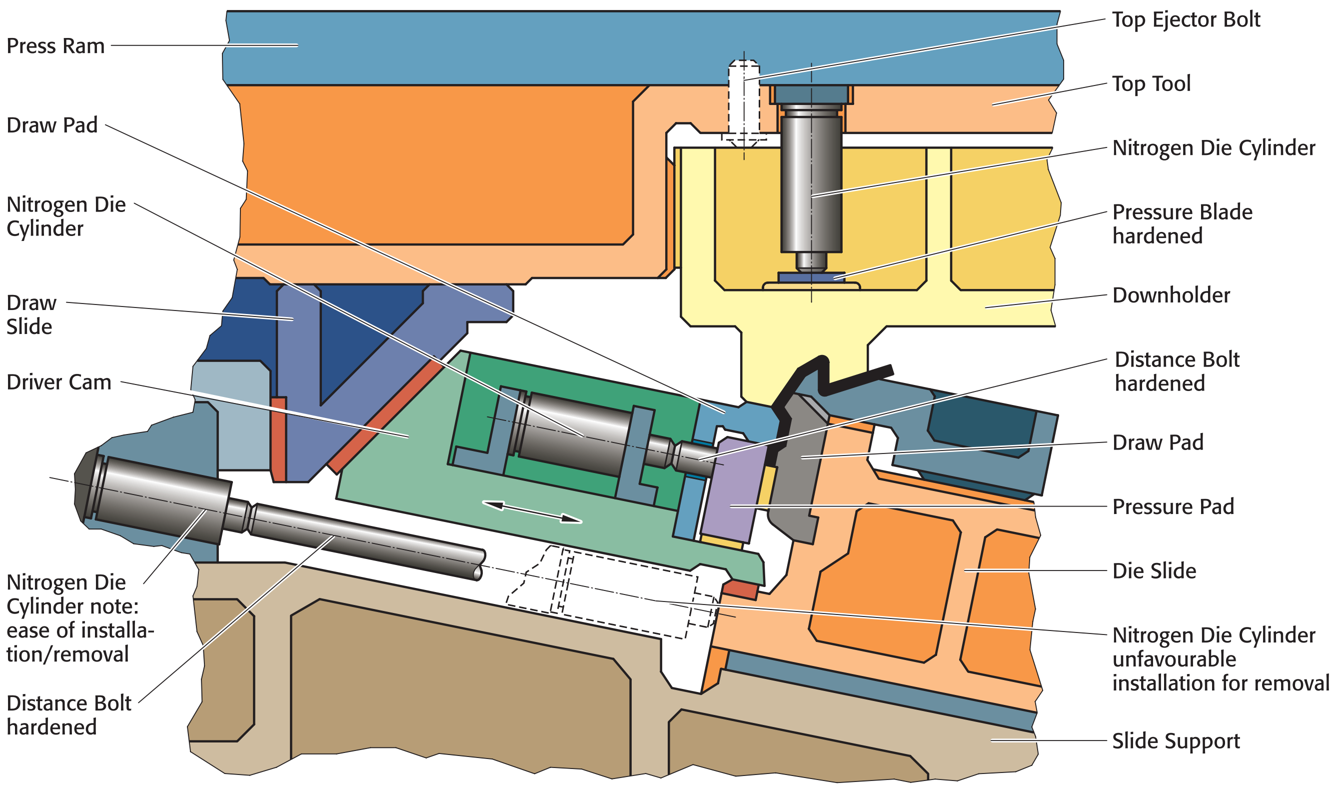
Trimming tool with inclined cam slide

Nitrogen die cylinders in the top ensure the positive centering of the trimming slide on the centering cones in the bottom tool section.



Drawing tool

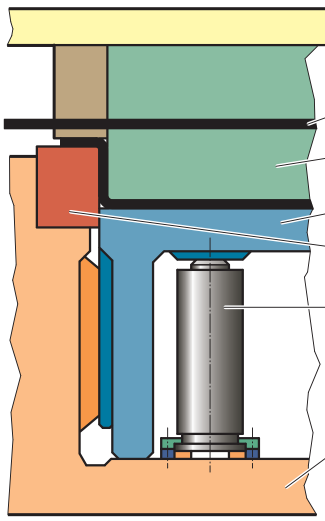
The nitrogen die cylinder for the drawing slide is easily placed into position; the safety lid secures it.
Very high forces are required in this tool for the draw pad in the slide.
The nitrogen die cylinders in the top tool serve as boosters for the insufficient ram cushion.



Application examples

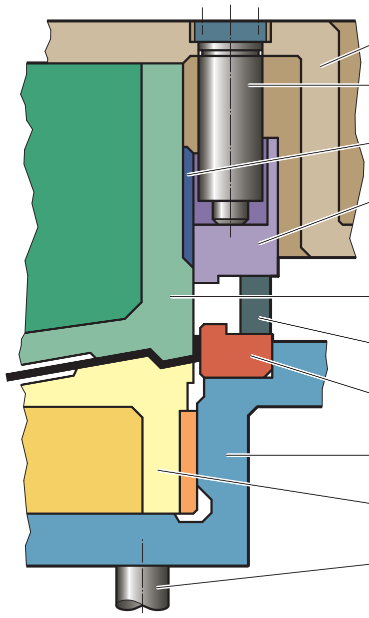
Flanging tool with nitrogen die cylinders

Where bottom ejection facilities are lacking, FIBRO Nitrogen die cylinders will provide reliable actuation of piece part ejectors.



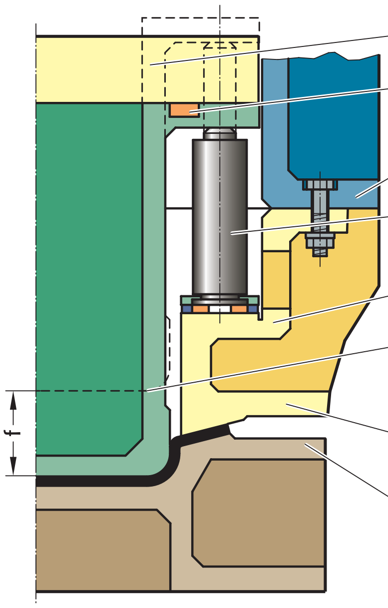
Flanging tool with ring stripper

The ring stripper is actuated by nitrogen die cylinders.



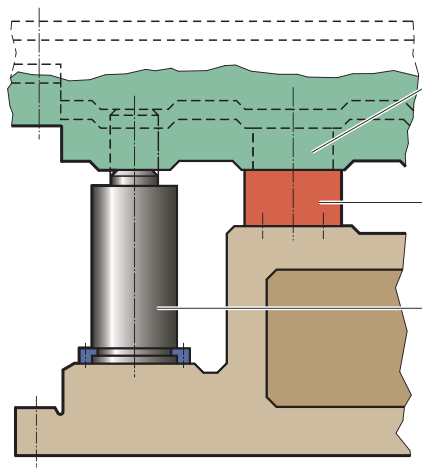
Double-Acting drawing tool

In order to obtain shorter setting times, only the downholder is boltet to the ram cushion. The drawing punch is raised through f + 20 mm by nitrogen die cylinders.



Blanking and piercing tool

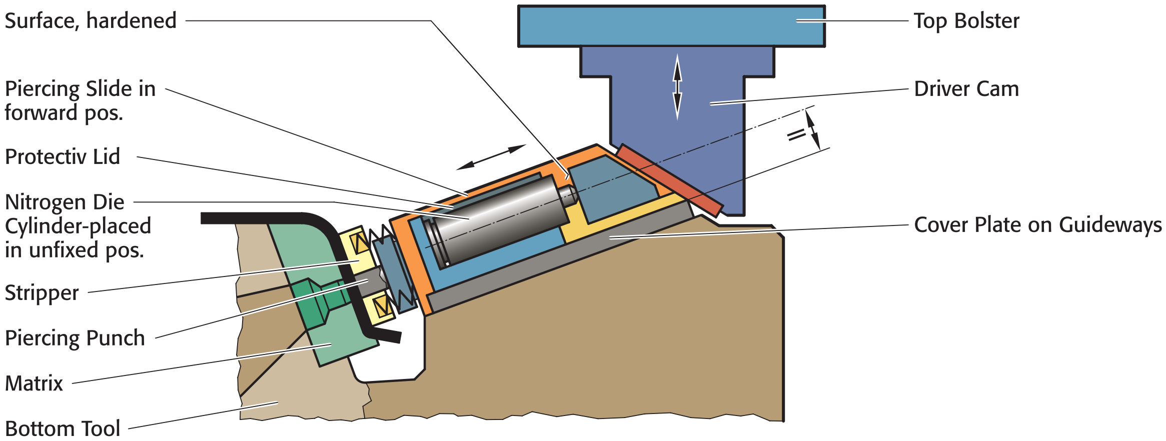
The application of nitrogen die cylinders instead of the usual elastomer bumpers results in a significant reduction of setting time. Moreover, injuries caused by “fly-out” elastomer bumpers are eliminated.



Application examples

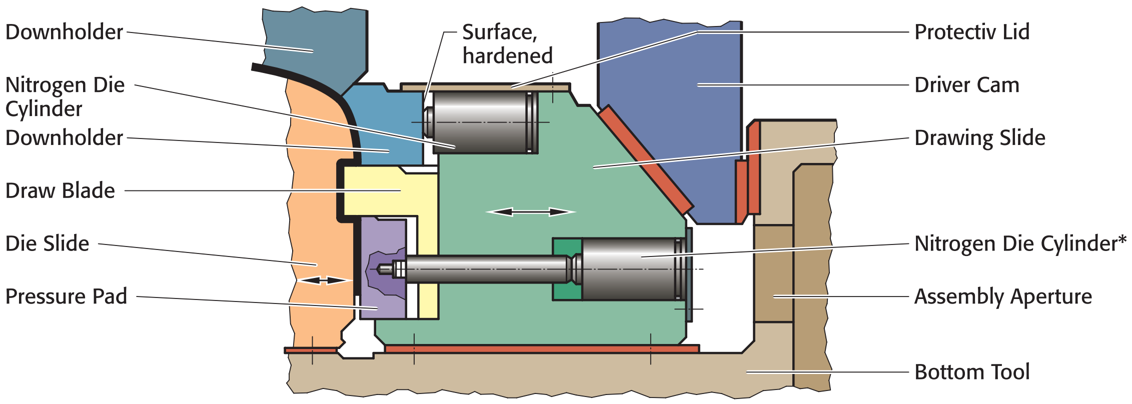
Retraction of piercing slide by nitrogen die cylinder

Die cylinder is mounted to bottom tool. It retracts the slide after completention of the piercing operation.
We recommend a “soft”-start on the cam shape in order to reduce impact and accerleration on the die cylinder.



Drawing slide

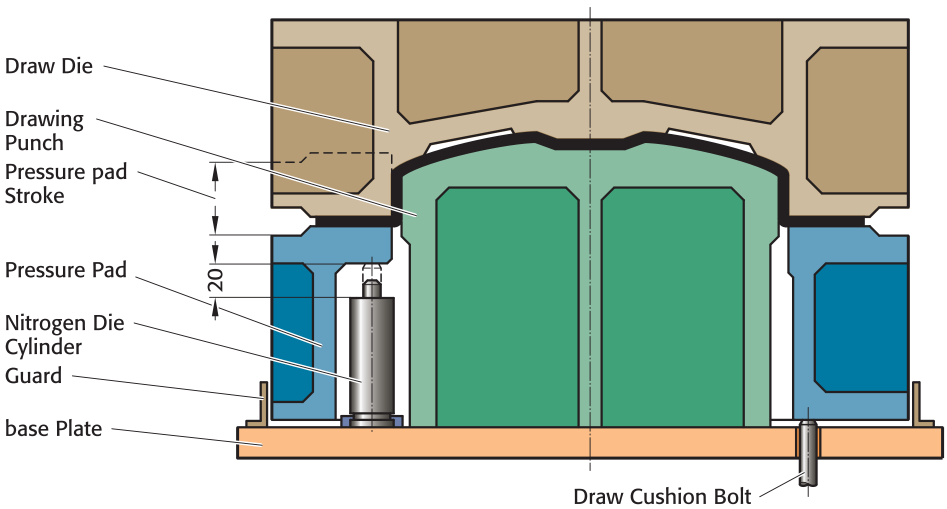
In order to prevent wrinkling, this tool requires high forces on the downholder and pressure pad.
An elegant solution was achieved with nitrogen die cylinders. Ease of cylinder installation was ensured.



*Must be secured with special flange.

Drawing tool

The pressure pad is actuated by nitrogen die cylinders during the final 20 mm of the draw.

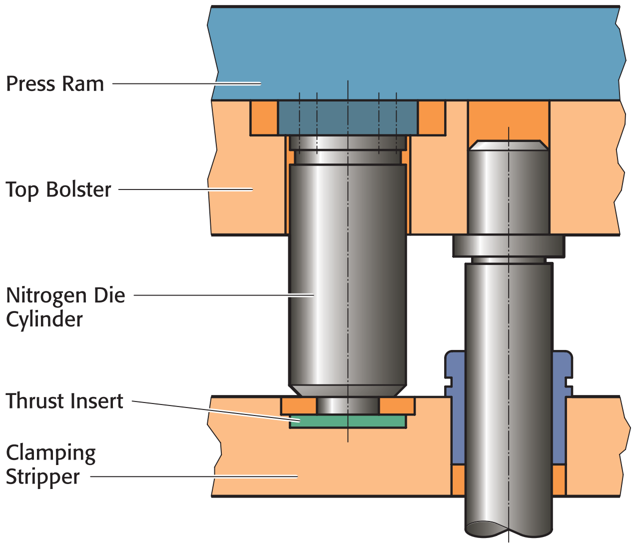


Application examples

Detail of progression compound tool

The clamping stripper is actuated by two nitrogen die cylinders 2480.12.01500.025.

The units provide an initial cylinder force of 15 kN each and a stroke capacity of 25 mm – of which 20 mm are utilized.

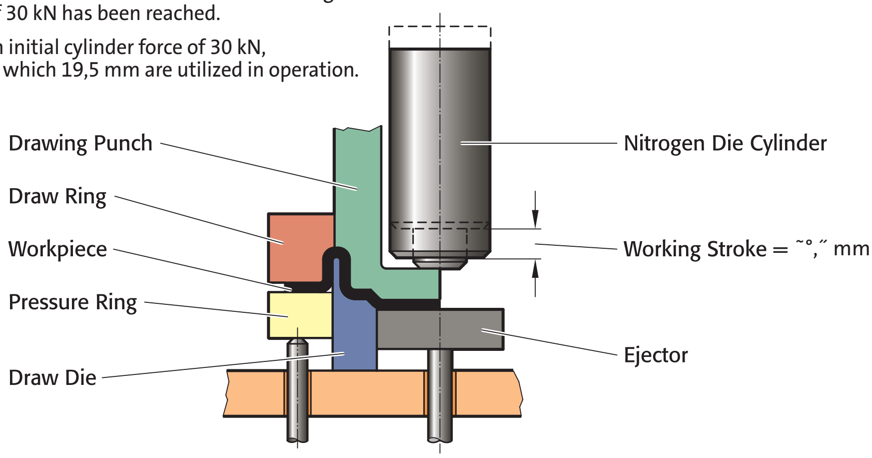


Drawing tool

Intended for use in a 100 ton hydraulic press, with one nitrogen die cylinder 2480.12.03000.025 mounted in the drawing punch.

In this application the die cylinder serves to accomplish the initial pre-draw of the internal shape, as well as for finish the draw over the draw ring – after the bottoming pressure of 30 kN has been reached.

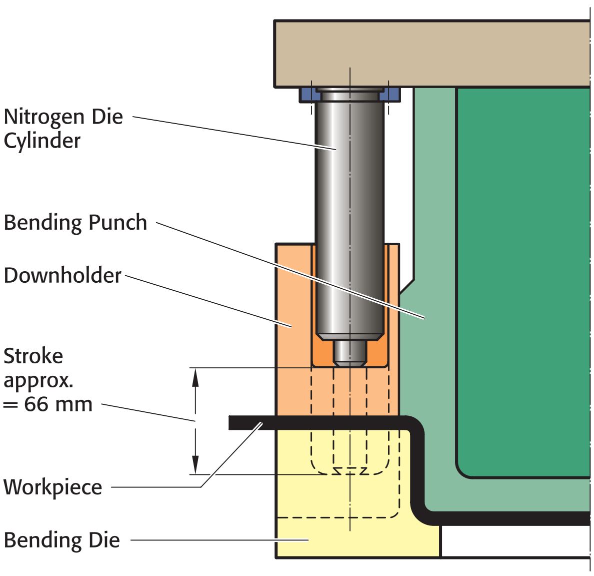
The nitrogen die cylinder has an initial cylinder force of 30 kN, a stroke capacity of 25 mm – of which 19,5 mm are utilized in operation. Stroking speed is 4 SPM.



Bending tool for round bars

This tool employs two nitrogen die cylinders 2480.13.00750.080 for actuating the downholder. Press stroke is 92 mm. The stroke of the downholder is approx. 66 mm.

Because of manual loading, press strokes vary from 36 to 40 SPM. Part ejection is automatic. The nitrogen die cylinders provide an initial force of 7,5 kN each, and a stroke capacity of 80 mm.

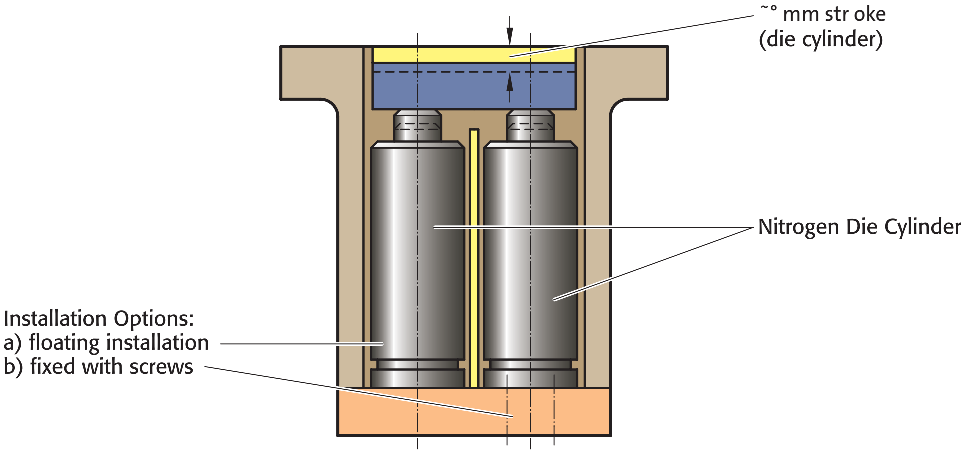


Application examples

Bottom ejector in progression compound tool

Two nitrogen die cylinders 2480.13.00750.025 are used, providing an initial force of 7,5 kN each, and a stroke capacity of 25 mm.

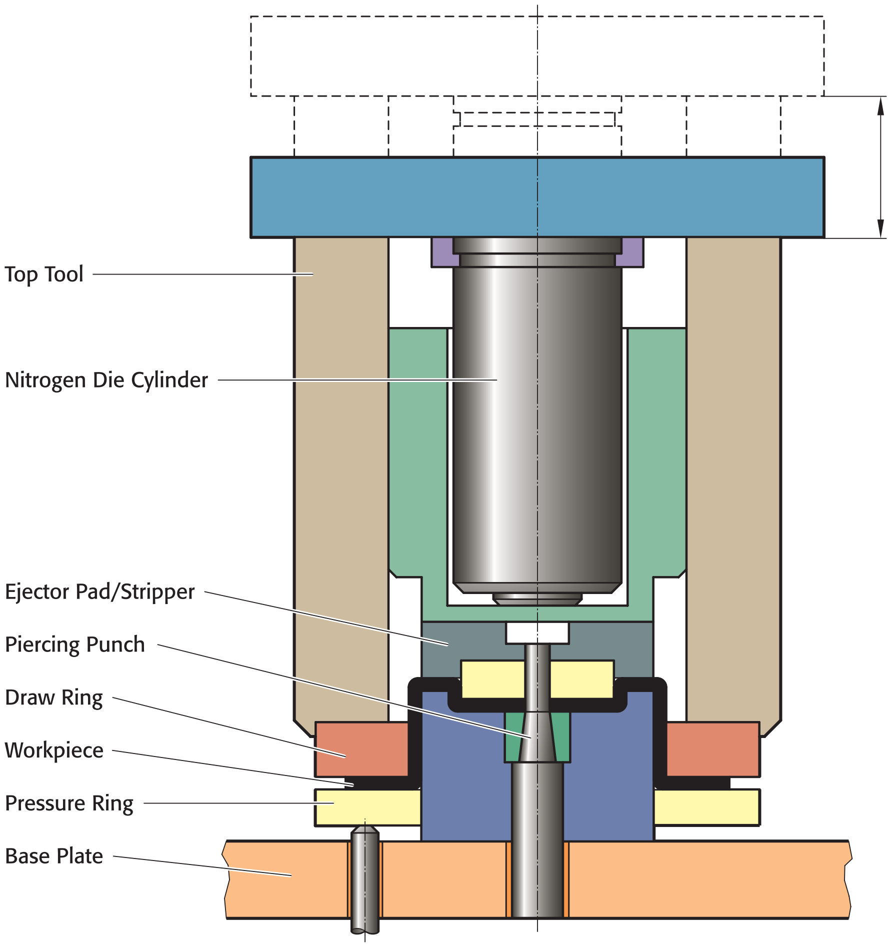
The actual working stroke is 10 mm. The tool is run at a speed of 150 SPM, with a ram stroke of 48 mm.



Drawing- and piercing tool

This tool is used in a 100 ton hydraulic press.

The nitrogen die cylinder is a 2480.13.03000.080, with a charge pressure of 130 bar – giving an initial cylinder force of 26 kN.
Stroke capacity is 80 mm. The actual working stroke is 76 mm.
The press is run at 14 SPM.



Application example of gas springs

Gas springs facilitate tools storage and tools preparation for production

Gas springs find increasing use in large press tools - in the sole role of aiding theier storage and production preparation.

The springs are bolted to either the upper or lower bolsters. They are activated only when the tool is being taken out of the press.

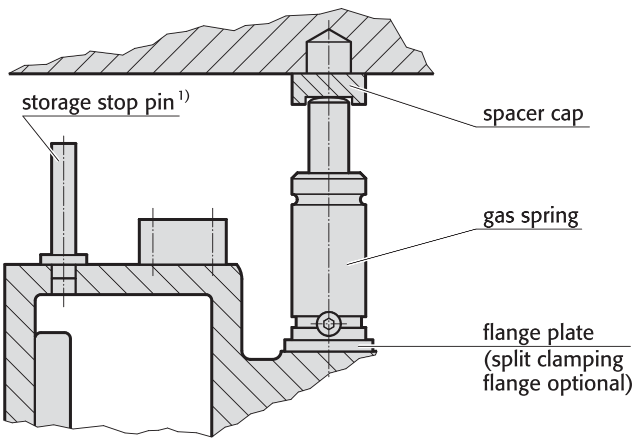
Application examples 1 and 2 show that special spacer caps are inserted prior to the tool being let down onto the gas springs – this being done whilst still in the press. During removal from the press and subsequent storage, the springs will keep the top tool elevated.

Storage stop pins are provided next to the springs; when tools are stacked one on top of the other, the increasing mass will force the springs to recade – and the tops will eventually abut against the storage pins. Once the stack is removed, the springs take over adain and push the top tool up.

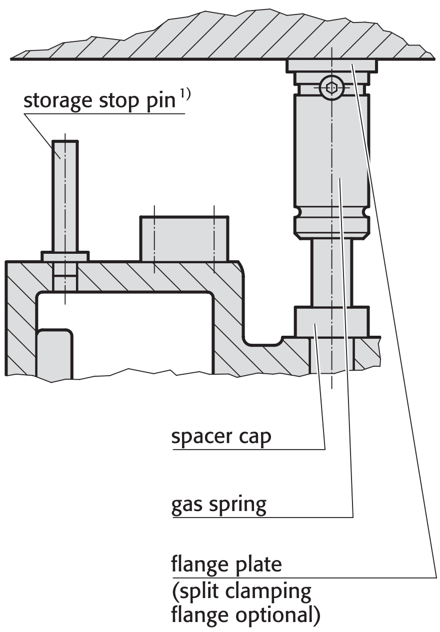
Upon being prepared for production, the springs facilitate access to the tool. Once back in the press, the spacer caps are removed and the storage springs remain inactive during the production run.

It is recommended to affix warning signs to the tools in a prominent position: the presence of gas springs in the tool often cannot be seen from the outside.

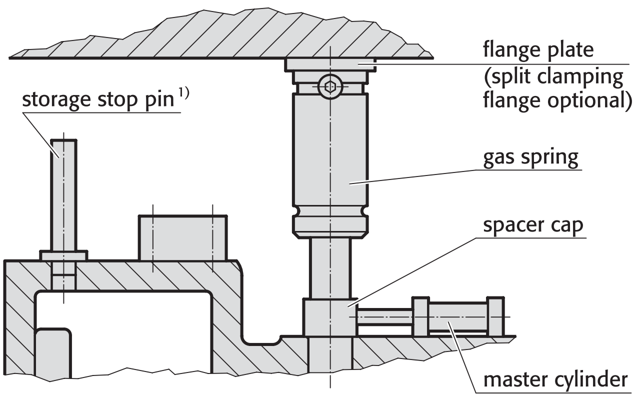
Example 1: Gas Spring fixed to bottom bolster



Example 2: Gas Spring fixed to top tool



Example 3: Gas Spring fixed to bottom bolster



1) storage stop pins are reversible - they are turned round and pushed down into their holes during getting the tool ready for production