Springs

Springs

Springs for dies, fixtures, moulds, machines, mechanisms. For various industrial uses. FIBRO Compression Springs – a comprehensive range, rooted in the resolute quality consciousness on which our reputation was built. Applied equally to the selection and inspection 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 Compression 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 Shore hardness 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.

Contents

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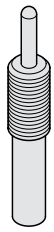
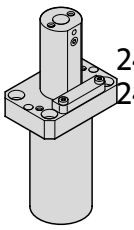
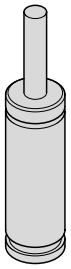






Compression Springs DIN/ISO 10243

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 50 Cr V4. 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 $t_{zul.}$ 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 $t_{zul.}$ of 800 N/mm². The associated stress differential during oscillations shoult not exceed 400 N/mm² (= τ_h).

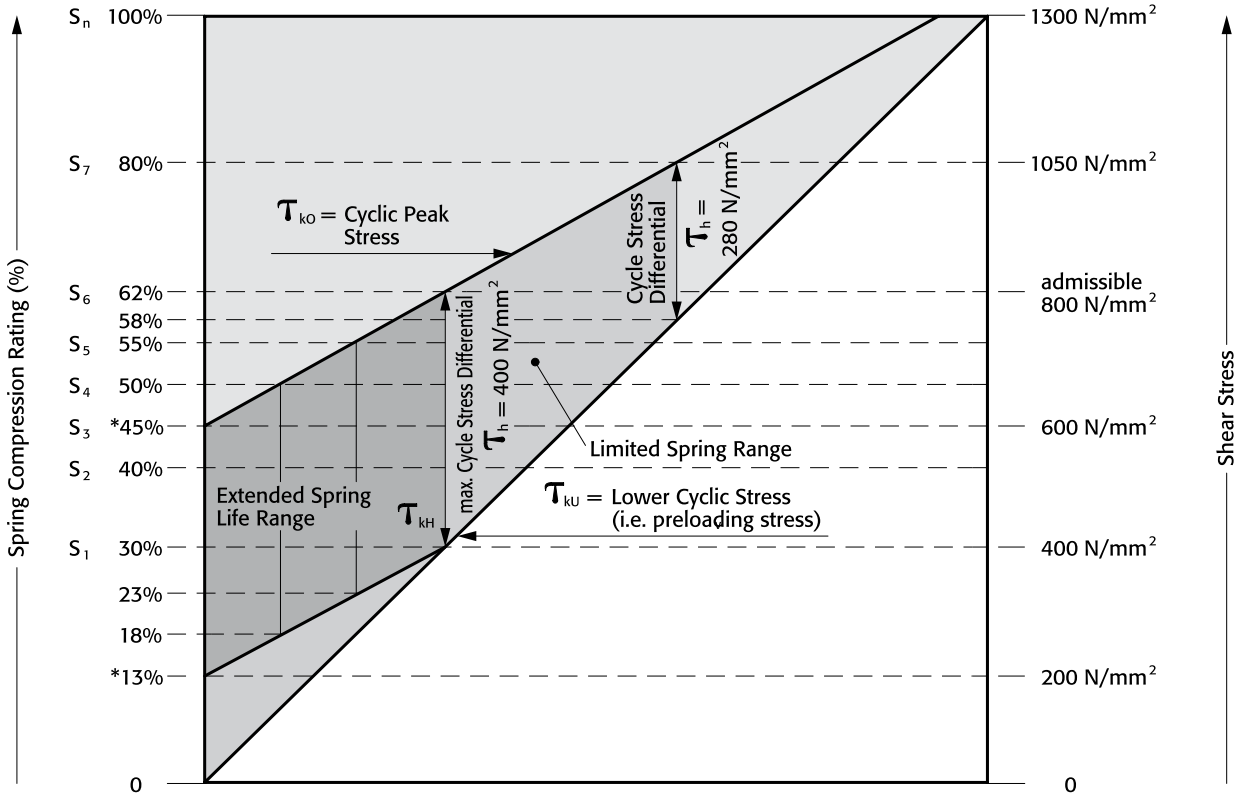
Calculation of Spring Forces

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

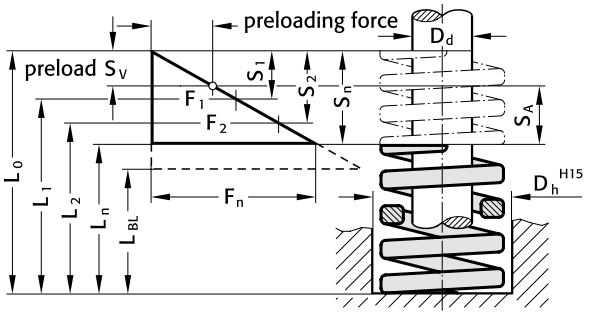
Spring Force versus Spring Displacement

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



* 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.

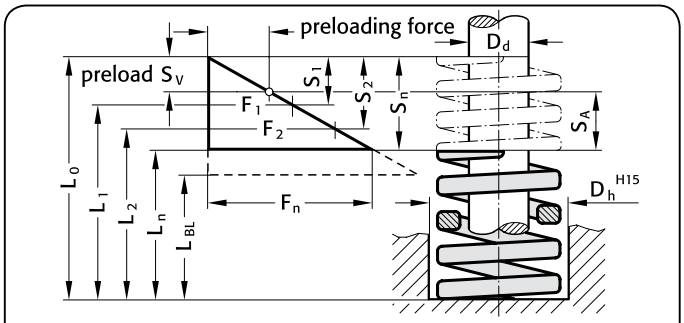


D_h	= diameter of guide sleeve	$F_1...F_n$	= forces (N) as related to lenght of spring L1...Ln
D_d	= diameter of guide pin	$S_{v1}...S_{v7}$	= recommended preload compression, as related to compress. S1...S7
L_0	= free length of spring	$S_1...S_n$	= compression, as related to spring forces F1...Fn
$L_1...L_n$	= length of loaded spring (mm), as related to spring	R	= spring rate (N/mm)
L_{BL}	= length of compacted spring (i.e. wire-to-wire)	$S_{A1}...S_{A7}$	= 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!

High Performance Compression Springs

241.14.
241.15.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour “Green”

241.15.
Colour “Blue”

241.14.

Order No green	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
241.14.10.025	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			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			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			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			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			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			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			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

Order No green	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
241.14.10.025	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			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			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			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			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			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			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			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.

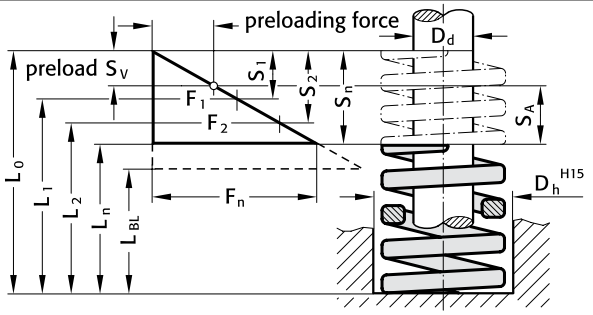
Order No blue	D_h	D_d	L_0	R	30% stroke S_1	S_{v1}	S_{A1}	F_1	40% stroke S_2	S_{v2}	S_{A2}	F_2	45% stroke S_3	S_{v3}	S_{A3}	F_3	50% stroke S_4	S_{v4}	S_{A4}	F_4
241.15.10.025	10,0	5,0	25	16,0	3,3	1,4	1,9	53	4,4	1,4	3,0	70	5,0	1,4	3,6	80	5,5	2,0	3,5	88
241.15.10.032			32	13,1	3,9	1,7	2,2	51	5,2	1,7	3,5	68	5,9	1,7	4,2	77	6,5	2,3	4,2	85
241.15.10.038			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			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			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			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			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			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

Order No blue	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
241.15.10.025	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			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			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			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			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			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			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			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

241.16.
241.17.
High Performance Compression Springs

241.16.
Colour: “Red”

241.17.
Colour: “Yellow”



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
red	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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
red	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			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			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			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			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			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			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			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

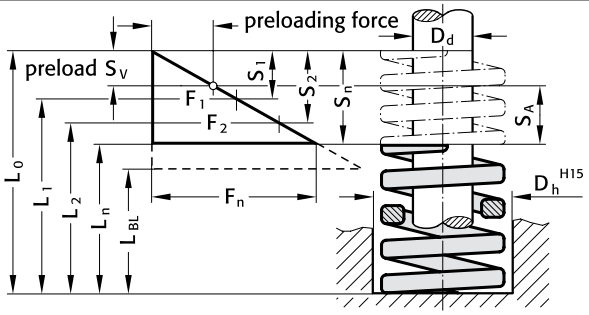
241.17.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
yellow	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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
yellow	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			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			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			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			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			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			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			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

241.14.
241.15.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour: “Green”
241.15.
“Colour: “Blue”

241.14.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
green	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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
green	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			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			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			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			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			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			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			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			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.

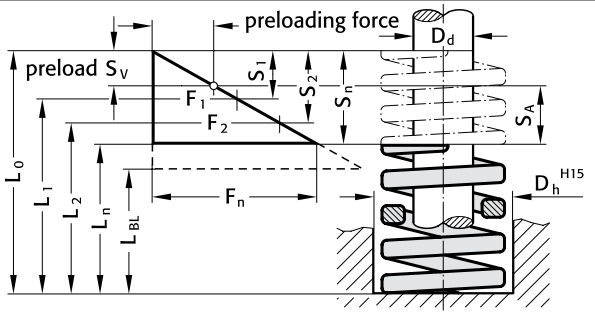
Order No					30% stroke				40% stroke				45% stroke				50% stroke			
blue	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.15.13.025	12,5	6,3	25	30,0	3,3	1,4	1,9	99	4,4	1,4	3,0	132	5,0	1,4	3,6	150	5,5	2,0	3,5	165
241.15.13.032			32	24,8	3,9	1,7	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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
blue	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			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			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			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			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			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			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			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			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

241.16.
241.17.
High Performance Compression Springs

241.16.
Colour: “Red”

241.17.
Colour: “Yellow”



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
red	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			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			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			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			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			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			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			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			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

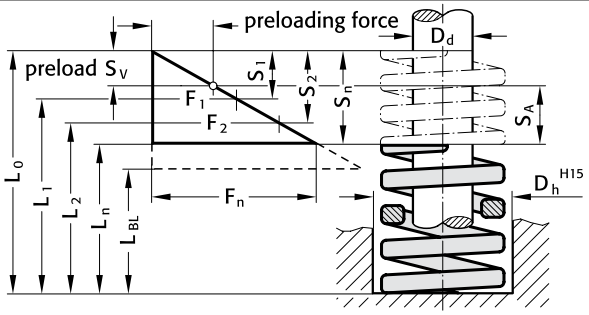
Order No					55% stroke				62% stroke				80% stroke				100% stroke		
red	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.13.025	12,5	6,3	25	42,2	4,8	2,0	2,8	203	5,4	2,6	2,8	228	7,0	5,0	2,0	295	8,7	16,3	367,1
241.16.13.032			32	33,4	6,1	2,5	3,6	204	6,8	3,3	3,5	227	8,8	6,4	2,4	294	11,0	21,0	367,4
241.16.13.038			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			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			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			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			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			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			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.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
yellow	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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
yellow	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			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			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			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			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			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			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			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			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

High Performance Compression Springs 241.14.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$Sv_1...Sv_7$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour: “Green”

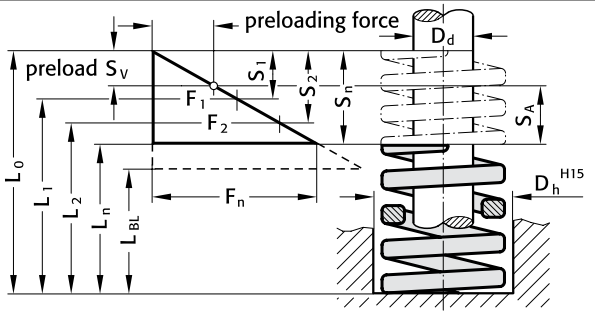
241.14.

Order No					30% stroke				40% stroke				45% stroke				50% stroke				
green	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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
green	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			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			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			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			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			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			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			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			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			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

241.15. High Performance Compression Springs

241.15.
Colour: “Blue”



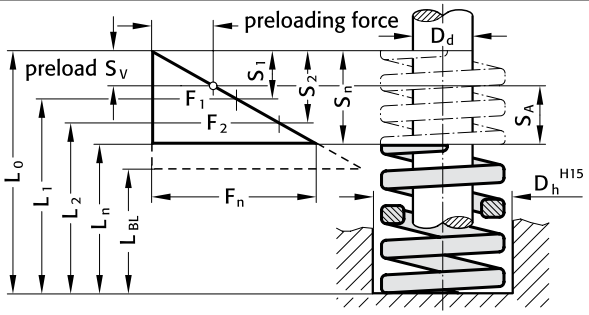
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.15.

Order No					30% Federweg				40% Federweg				45% Federweg				50% Federweg				
blue	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
241.15.16.025	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			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			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			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			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			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			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			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			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			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					55% Federweg				62% Federweg				80% Federweg				100% Federweg		
blue	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
241.15.16.025	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			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			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			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			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			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			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			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			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			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

High Performance Compression Springs 241.16.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.
Colour: „Red“

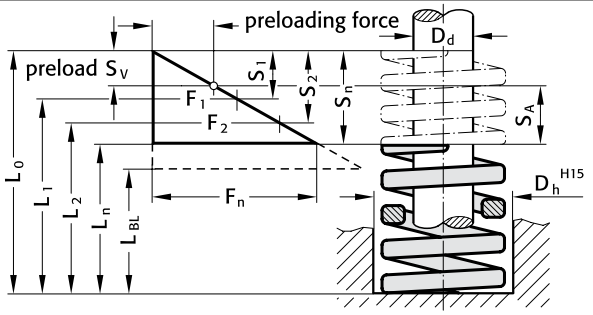
241.16.

Order No red	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
241.16.16.025	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			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			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			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			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			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			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			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			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			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

Order No red	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
241.16.16.025	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			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			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			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			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			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			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			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			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			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

241.17. High Performance Compression Springs

241.17.
Colour “Yellow”



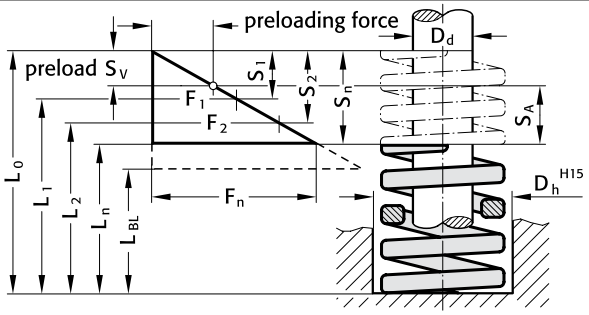
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.17.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
yellow	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
241.17.16.025	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			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			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			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			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			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			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			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			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			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					55% stroke				62% stroke				80% stroke				100% stroke		
yellow	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
241.17.16.025	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			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			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			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			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			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			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			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			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			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 241.14.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour “Green”

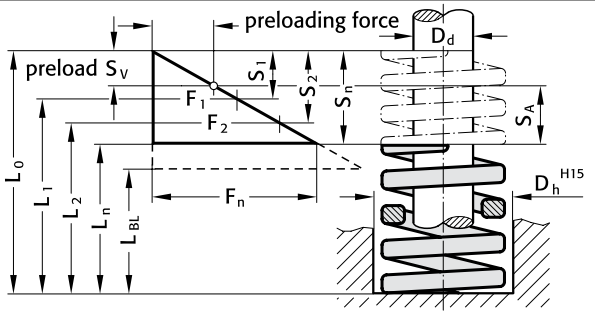
241.14.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
green	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			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			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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
green	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			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			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			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			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			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			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			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			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			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			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			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			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			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

241.15. High Performance Compression Springs

241.15.
Colour “Blue”



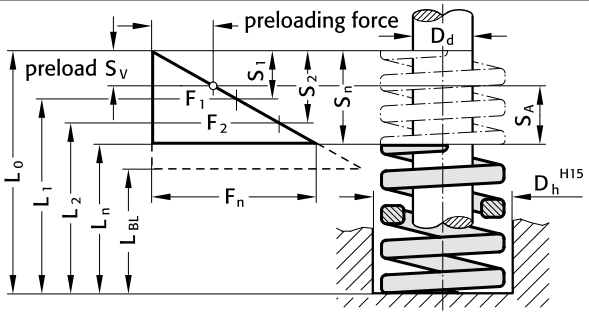
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.15.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
blue	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
241.15.20.025	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			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			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			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			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			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			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			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			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			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			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			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			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			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					55% stroke				62% stroke				80% stroke				100% stroke			
blue	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	
241.15.20.025	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			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			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			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			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			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			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			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			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			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			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			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			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			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 241.16.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.
Colour “Red”

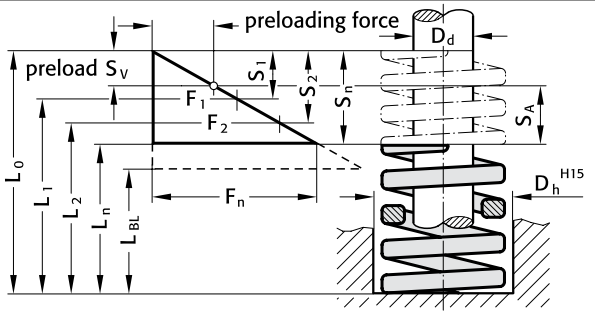
241.16.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
red	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			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			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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
red	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			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			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			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			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			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			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			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			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			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			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			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			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			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

241.17. High Performance Compression Springs

241.17.
Colour: “Yellow”



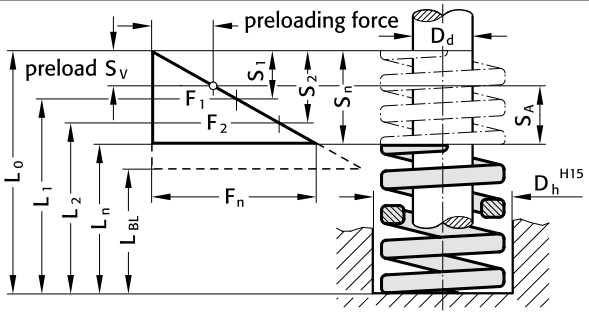
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.17.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
yellow	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			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			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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
yellow	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			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			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			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			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			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			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			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			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			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			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			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			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			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

High Performance Compression Springs 241.14.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour: “Green”

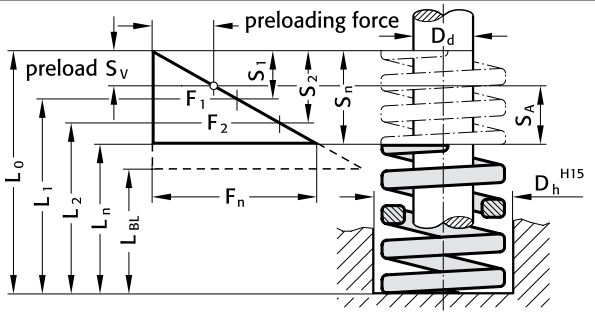
241.14.

Order No green	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
241.14.25.025	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

Order No green	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
241.14.25.025	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

241.15. High Performance Compression Springs

241.15.
Colour: “Blue”



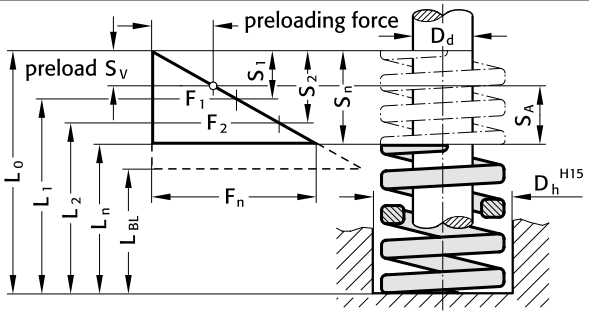
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.15.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
blue	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
241.15.25.025	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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			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					55% stroke				62% stroke				80% stroke				100% stroke		
blue	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
241.15.25.025	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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			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 241.16.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...Sv7$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.
Colour: “Red”

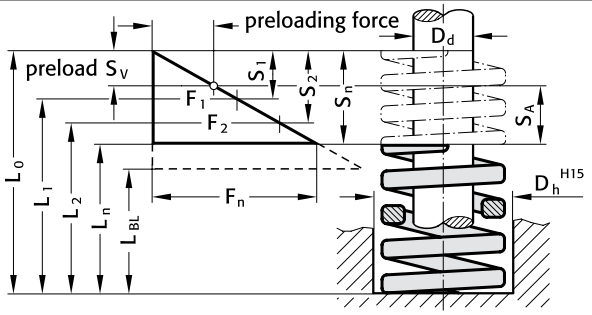
241.16.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
red	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
red	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

241.17. High Performance Compression Springs

241.17.
Colour: “Yellow”



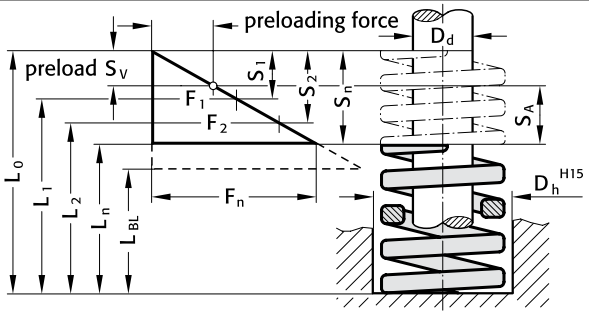
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.17.

Order No yellow	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
241.17.25.032	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			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			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			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			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			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			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			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			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			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
241.17.25.152			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			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			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			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

Order No yellow	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
241.17.25.032	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			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			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			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			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			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			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			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			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			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
241.17.25.152			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			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			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			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 241.14.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour: “Green”

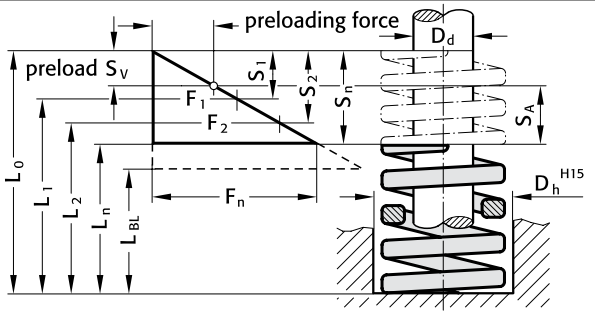
241.14.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
green	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
green	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

241.15. High Performance Compression Springs

241.15.
Colour: “Blue”



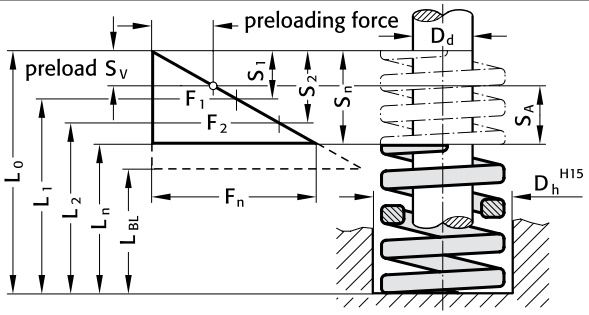
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.15.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
blue	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
241.15.32.038	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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					55% stroke				62% stroke				80% stroke				100% stroke			
blue	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
241.15.32.038	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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 241.16.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.
Colour: “Red”

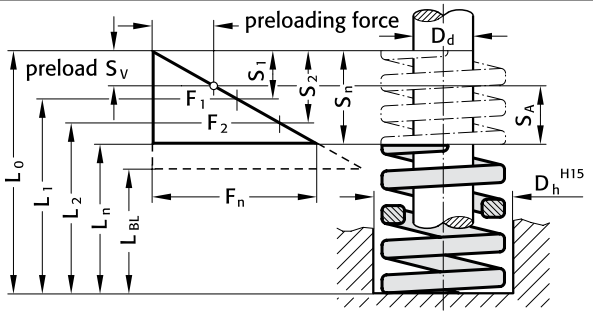
241.16.

Order No red	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
241.16.32.038	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

Order No red	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
241.16.32.038	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			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			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			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			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			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			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			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			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			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			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			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			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			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			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

241.17. High Performance Compression Springs

241.17.
Colour: “Yellow”



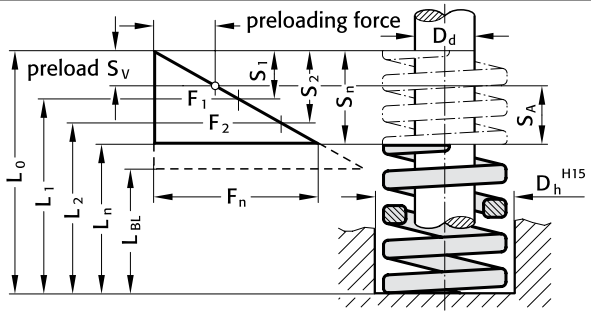
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.17.

Order No					30% stroke				40% stroke				45%stroke				50% stroke			
yellow	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
241.17.32.038	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			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			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			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			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			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			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			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			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
241.17.32.152			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			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			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			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			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					55% stroke				62% stroke				80% stroke				100% stroke			
yellow	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	
241.17.32.038	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			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			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			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			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			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			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			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			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	
241.17.32.152			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			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			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			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			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 241.14.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$Sv_1...Sv_7$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour: “Green”

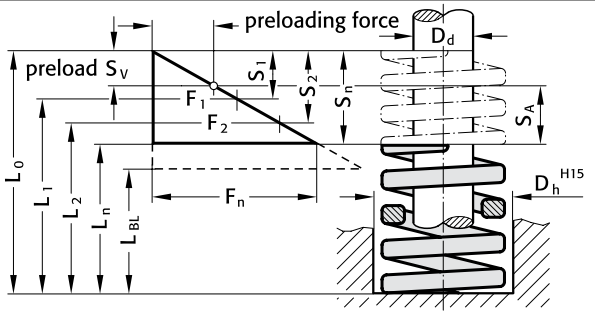
241.14.

Order No green	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
241.14.40.051	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			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			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			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			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			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			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			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			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			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			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			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			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

Order No green	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
241.14.40.051	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			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			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			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			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			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			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			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			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			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			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			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			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

241.15. High Performance Compression Springs

241.15.
Colour: “Blue”



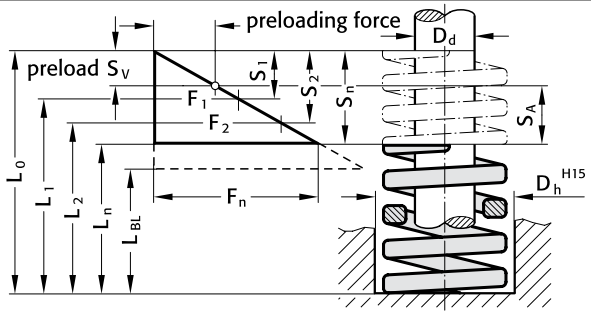
D_h	= dia. of guide sleeve	$F_1...F_n$	= forces (N) as related to length of spring L1...Ln
D_d	= diameter of guide pin	$S_{v1}...S_{v7}$	= recommend. preload. compression, as relat. to compress. S1...S7
L_0	= free length of spring	$S_1...S_n$	= compr. as related to spring forces F1...Fn
$L_1...L_n$	= length of loaded spring (mm) as related to spring forces F1...Fn	R	= spring rate (N/mm)
L_{BL}	= length of compacted spring (i.e. wire-to-wire)	$S_{A1}...S_{A7}$	= working stroke (mm)

241.15.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
blue	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
241.15.40.051	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			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			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			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			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			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			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			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			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			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			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			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			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					55% stroke				62% stroke				80% stroke				100% stroke			
blue	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	
241.15.40.051	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			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			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			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			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			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			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			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			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			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			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			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			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 241.16.



D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...Ln$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.
Colour: “Red”

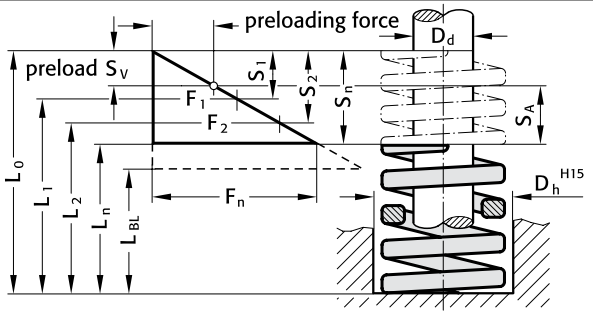
241.16.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
red	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			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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke			
red	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			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			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			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			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			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			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			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			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			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			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			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			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	

241.17. High Performance Compression Springs

241.17.
Colour: “Yellow”



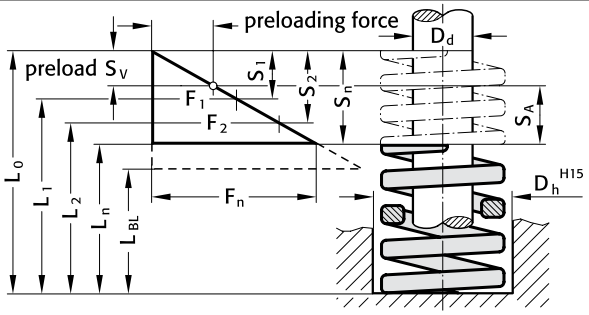
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.17.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
yellow	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			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			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			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			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			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			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
241.17.40.152			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
241.17.40.203			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke		
yellow	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			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			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			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			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			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			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
241.17.40.152			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
241.17.40.203			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			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			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 241.14.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour: “Green”

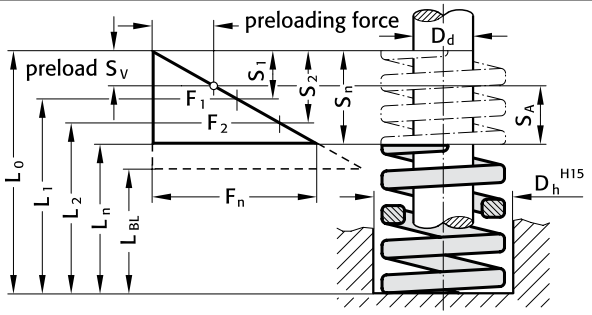
241.14.

Order No green	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
241.14.50.064	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			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			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			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			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			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			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			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			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			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			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			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

Order No green	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
241.14.50.064	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			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			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			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			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			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			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			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			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			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			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			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

241.15. High Performance Compression Spring

241.15.
Colour “Blue”



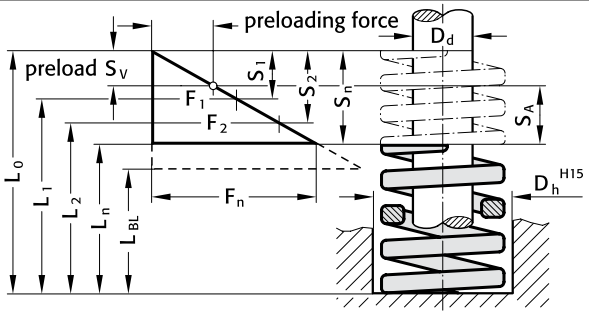
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.15.

Order No					30% stroke				40% stroke				45% stroke				50% stroke				
blue	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			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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke			
blue	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			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			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			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			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			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			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			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			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			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			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			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			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 241.16.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.16.
Colour “Red”

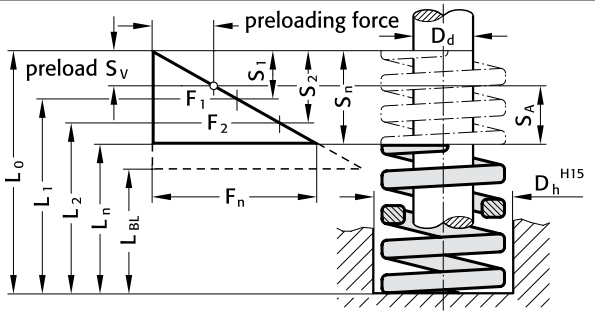
241.16.

Order No					30% stroke				40% stroke				45% stroke				50% stroke				
red	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			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			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			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			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			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			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			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			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			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke			
red	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			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			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			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			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			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			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			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			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			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			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			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	

241.17. High Performance Compression Springs

241.17.
Colour “Yellow”



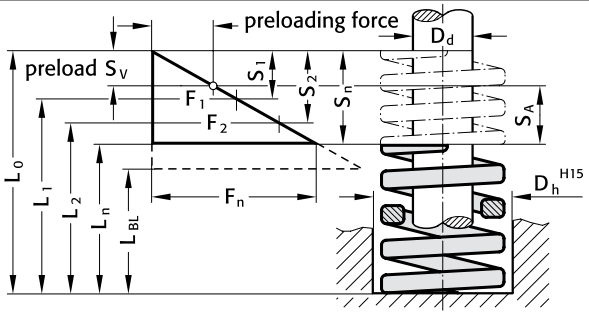
D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1...L_n$ = length of loaded spring (mm) as related to spring forces F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.17.

Order No					30% stroke				40% stroke				45% stroke				50% stroke			
yellow	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			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			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			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			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			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
241.17.50.152			152	239	14,1	6,1	8,0	3370	18,8	6,1	12,7	4493	21,2	6,1	15,1	5067	23,5	8,5	15,0	5617
241.17.50.203			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			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			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

Order No					55% stroke				62% stroke				80% stroke				100% stroke			
yellow	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			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			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			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			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			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	
241.17.50.152			152	239	25,9	10,8	15,1	6190	29,1	14,1	15,0	6955	37,6	27,3	10,3	8986	47,0	105,0	11233,0	
241.17.50.203			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			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			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 241.14.



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.14.
Colour “Green”

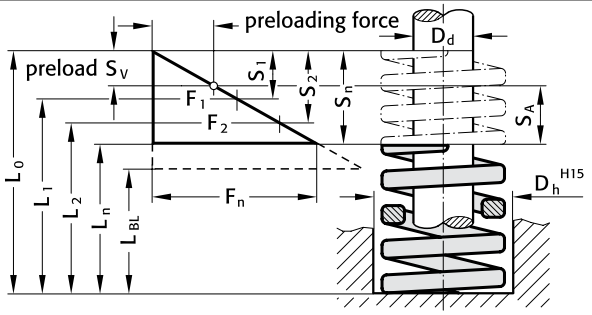
241.14.

Order No green	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
241.14.63.076	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			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			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			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			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			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			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			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			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			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

Order No green	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
241.14.63.076	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			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			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			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			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			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			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			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			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			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

241.15. High Performance Compression Springs

241.15.
Colour “Blue”



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 F1...Fn
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1...F_n$ = forces (N) as related to length of spring L1...Ln
$S_{v1}...S_{v7}$ = recommend. preload. compression, as relat. to compress. S1...S7
$S_1...S_n$ = compr. as related to spring forces F1...Fn
R = spring rate (N/mm)
$S_{A1}...S_{A7}$ = working stroke (mm)

241.15.

Order No blue	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			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			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			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			127	168,1	16,5	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			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			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			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			229	89,3	30,6	13,1	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			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			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 blue	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			89	260,1	20,4	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			102	221,1	23,7	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			115	187,0	27,0	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			127	168,1	30,3	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			139	136,0	33,0	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			152	114,0	36,3	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			178	100,0	42,4	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			203	89,3	48,4	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			254	78,5	60,5	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			305	64,8	73,2	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

Round Wire Compression Springs 241.02.

Material:

Spring Steel class C DIN 17.223 sheet 1, drawn and patented.

Manufacturing Tolerances:

to DIN 2095 class 2.

Applications:

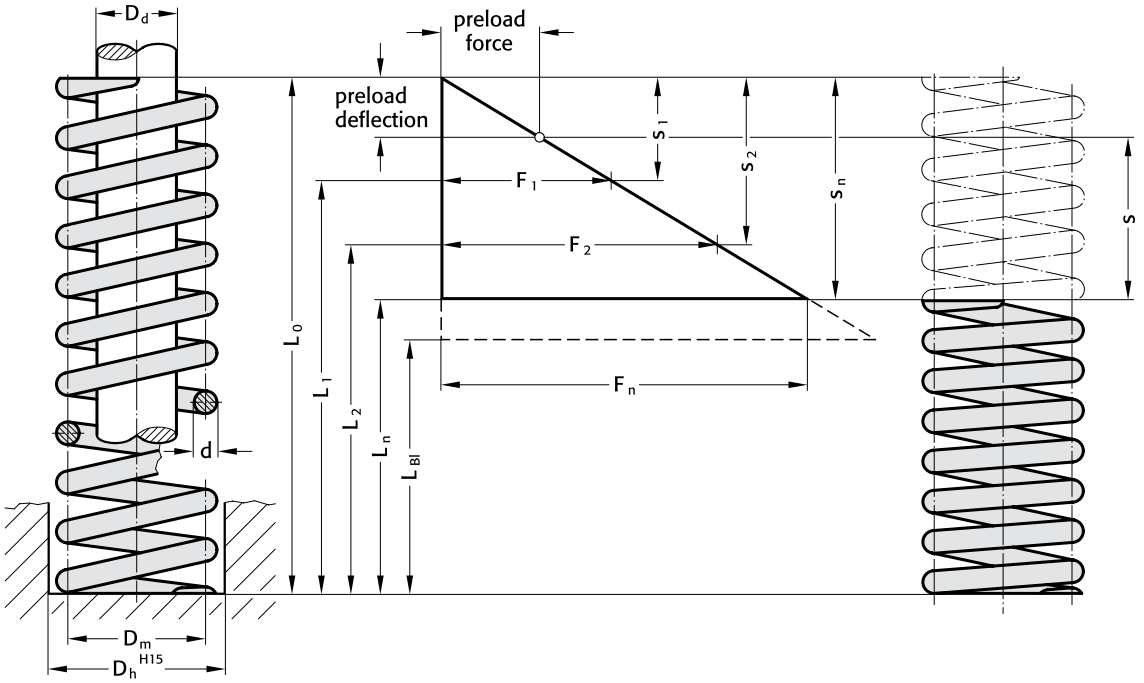
as highly stressed compression springs and for loads both static and oscillating.

End coils:

Flattened and ground end coils.

Surface treatment:

Ball shot treatment for surface homogenization. All springs are supplied oiled.



D_h = inside diameter of guide bush (mm)
D_m = mean diameter of coils (mm)
D_d = diameter of guide pin (mm)
L_0 = free length of spring (mm)
$L_1...L_n$ = compressed lengths (mm), under respective loads $F_1...F_n$
L_{Bl} = length of compacted spring (mm) (wire against wire)
d = diameter of spring wire
$F_1...F_n$ = loads (N) causing compressed lengths $L_1...L_n$
$s_1...s_n$ = deflection (mm), caused by loads $F_1...F_n$
c = spring coefficient (N/mm) – i. e. the force that causes deflection of 1 mm
s = working stroke of spring – i. e. working deflection

Preloading force and -deflection to be determined by the designer.

FIBRO

241.02. Round Wire Compression Springs

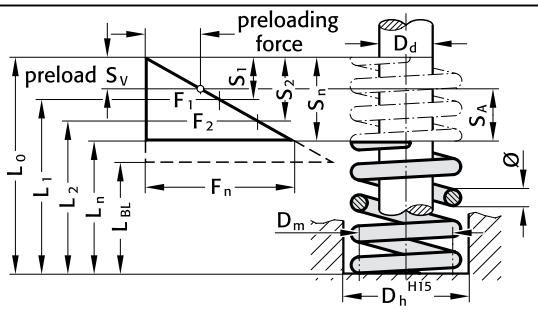
241.02.
Material:

Spring Steel Class C
DIN 17223 Sheet 1
drawn and patented

Manufacturing Tolerances:
to DIN 2095; load-stabilized, surface homogenized by ball-shot

max. working temperature:
100 °C

Applications: as highly stressed springs, for static and oscillating loads.



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

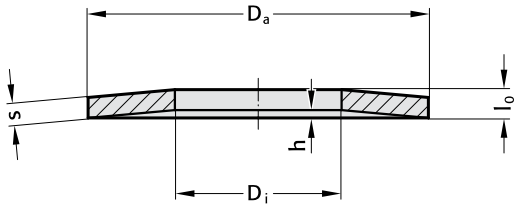
241.02.

							long spring life			medium spring life			max. spring loading			
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
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
15.040	15	9,5	12	2	40	11,93	12,3	146	27,7	15	178	25	17,6	210	22,4	8
15.050	15	9,5	12	2	50	10	17,5	175	32,5	21,2	212	28,8	25	250	25	9,5
16.040	16	10,5	13	2	40	11	14	154	26	17	187	23	20	220	20	7
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
19.045	19	11	14,5	3	45	35	9,8	343	35,2	11,9	416	33,1	14	490	31	8
19.050	19	11	14,5	3	50	30	11,2	336	38,8	13,6	408	36,4	16	480	34	8,5
19.083	19,5	9	14	4	83	75	12,6	945	70,4	15,3	1147	67,7	18	1350	65	16
20.035	20,5	10	15	4	35	170	5,6	952	29,4	6,8	1156	28,2	8	1360	27	4,5
20.090	20,5	9	14,5	4,5	90	97,8	12,3	1202	77,7	15	1467	75	17,6	1714	72,4	4
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
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
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
22.040	22,5	12	17	4	40	105,5	7,7	812	32,3	9,3	981	30,7	11	1160	29	5
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
23.050	23	12,5	17,5	4	50	74,3	11	817	39	13,3	988	36,7	15,6	1160	34,4	6,5
26.024	26,5	16	21	4	24	133,2	5	666	19	6,1	812	17,9	7,2	960	16,8	2
30.070	30	13	20,8	7	70	341	7,7	2625	62,3	9,3	3171	60,7	11	3750	59	8
32.070	32	21	26	4	70	24,2	23,8	575	46,2	28,9	700	41,1	34	822	36	6
32.150	32	16	23,5	6,5	150	103,6	19,6	2030	130,4	23,8	2465	126	28	2900	122	14
34.125	34	19	26	6	125	67,2	22,4	1505	102,6	27,2	1827	97,8	32	2150	93	11,5
44.130	44	25	34	8	130	108,2	25,2	2726	104,8	30,6	3310	99,4	36	3895	94	10
44.200	44	25	34	8	200	62,7	43,4	2721	156,6	52,7	3304	147,3	62	3887	137,7	17
48.067	48	25	36	10	67	640	6,3	4032	60,7	7,6	4864	59,4	9	5760	58	3,5
49.050	49	29	38,5	8,5	50	337	7,7	2594	42,3	9,3	3134	40,7	11	3707	39	2,5
55.200	55	30	42	11	200	157	30,1	4725	169,9	36,6	5746	163,4	43	6750	157	13
58.050	58	39	48	8	50	151,2	9,8	1481	40,2	11,9	1799	38,1	14	2117	36	2,5
63.180	63	38	50	11	180	121	30,1	3642	149,9	36,6	4428	143,4	43	5203	137	10

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

Disc Springs DIN 2093

242.01.



D_a = outside diameter of spring (mm)

D_i = diameter of hole (mm)

s = crossectional thickness of spring (mm)

h = concavity of free spring (mm)

l_0 = total height of free spring (mm)

f = deflection (mm) of spring, caused by load F

F = load F (N), causing deflection f

Material:

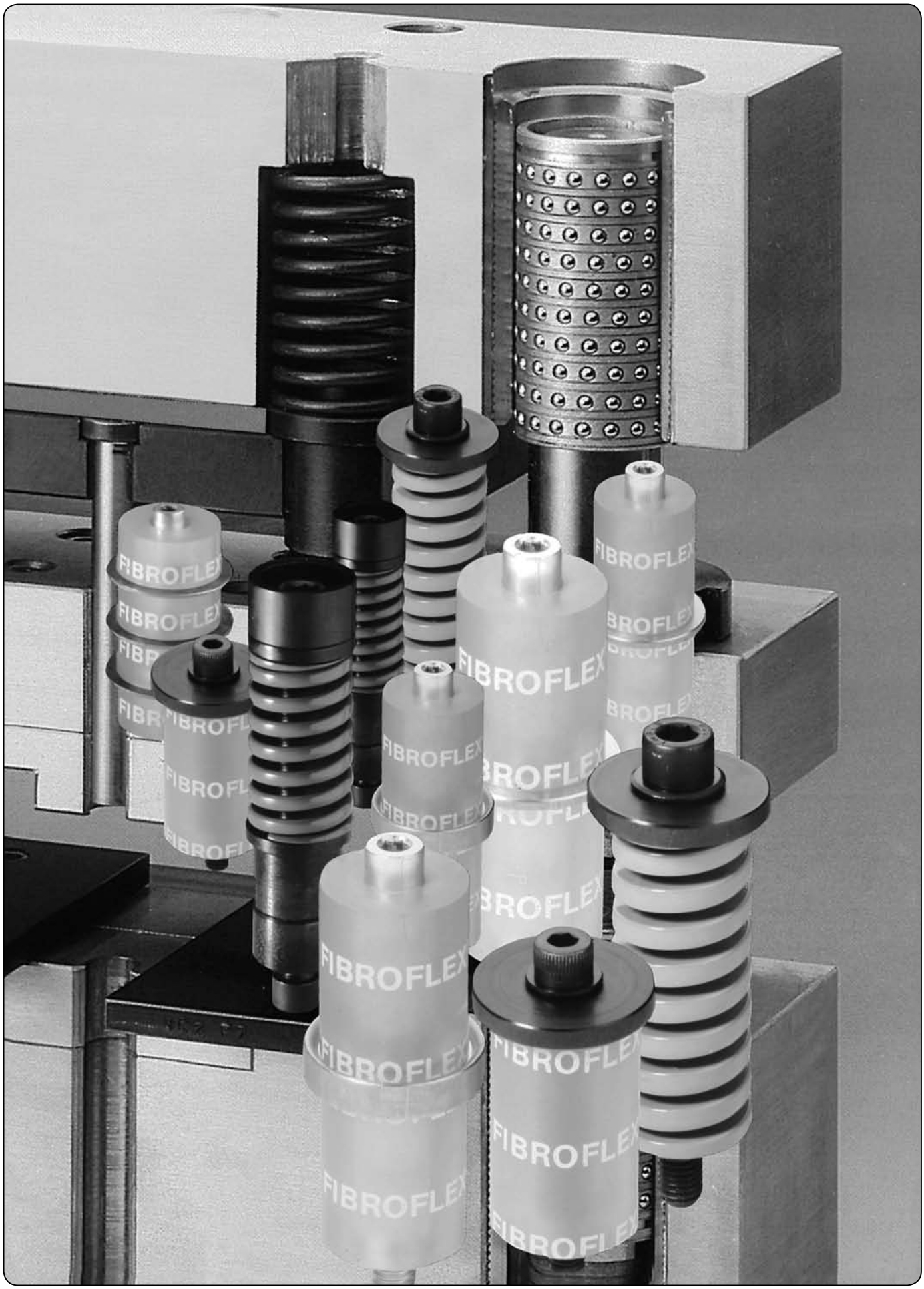
50 CrV 4 Vanadium Spring Steel

Note:

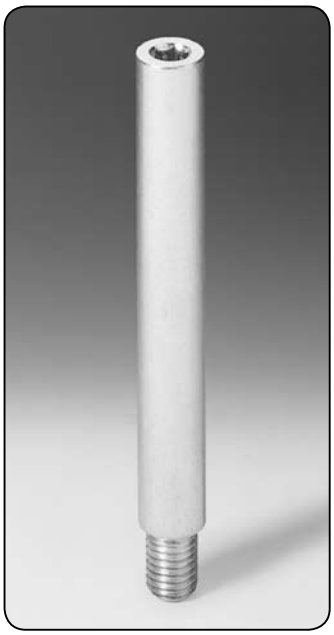
FIBRO Disc Springs 242.01. are made from 50 CrV 4 premier grade spring steel.
This "classic" spring material guarantes optimal performance levels within the temperature range from –15 °C to +150 °C. "Hot pressetting" allows working temperatures from –25 °C to +200 °C.

242.01.

Order No	in accordance with DIN 2093 Series	D_a h 12 mm	D_i H 12 mm	s mm	h mm	l_0 mm	f 0,2 h mm	F N	f 0,4 h mm	F N	f 0,6 h mm	F N	f 0,7 h mm	F N	f 0,8 h mm	F 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
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
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
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
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
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
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
180.092.100	A	18	9,2	1,0	0,4	1,4	0,08	370	0,16	720	0,24	1050	0,28	1200	0,32	1350
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
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
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
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
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
250.122.100		25	12,2	1,0	0,6	1,6	0,12	320	0,24	600	0,36	840	0,42	950	0,48	1050
280.142.100	B	28	14,2	1,0	0,8	1,8	0,16	400	0,32	720	0,48	970	0,56	1100	0,64	1200
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
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
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
355.183.200	A	35,5	18,3	2,0	0,8	2,8	0,16	1550	0,32	3000	0,48	4300	0,56	5000	0,64	5600
400.143.150		40	14,3	1,5	1,25	2,75	0,25	950	0,50	1700	0,75	2200	0,87	2500	1,00	2700
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
450.224.250	A	45	22,4	2,5	1	3,5	0,20	2300	0,40	4500	0,60	6400	0,70	7400	0,80	8500
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
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
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
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
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


FIBROFLEX

Individual Spring Unit Elements
Combination Spring- and Spacer Units – Complete



246.
FIBROFLEX®-Springs

244.4.
Stacking Washer, flat

2441.3.
Stacking Washer, dished

244.5.
Guide Pin

Order Nos and technical data – see page F 48– F 62

244.14.
Preloaded Spring Units for Dies, employing FIBROFLEX®-Springs

244.15.
Preloaded Spring Units for Dies, employing High-Performance Compression Springs

246.
FIBROFLEX®-Springs

241.14.–17.
High-Performance Compression Springs

FIBROFLEX®-Springs and High-Performance Compression Springs have to be ordered separately.

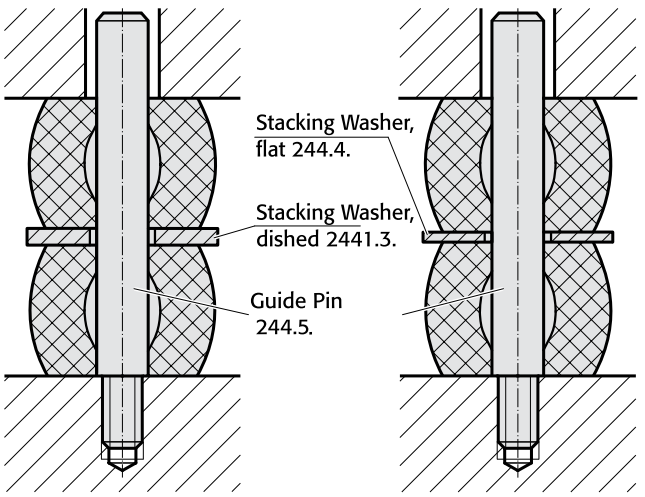
Order Nos and technical data – see F 63.

244.20.–25.
244.32.–40.
Combination Spring- and Spacer Unit

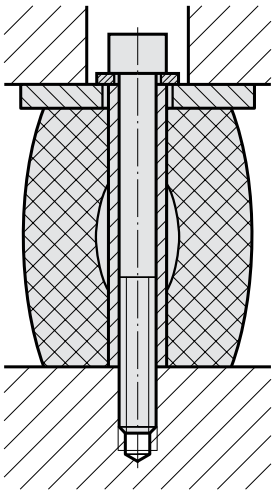
241.14.–17.
High-Performance Compression Springs

Order Nos and technical data – see F 64.

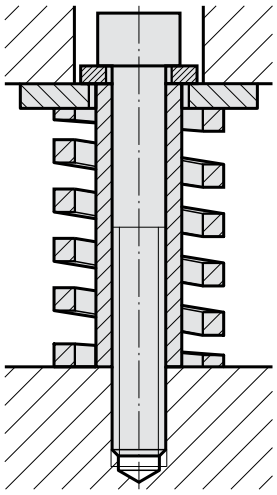
Examples of Applications:
Spring Units
Combination Spring- and Spacer Units

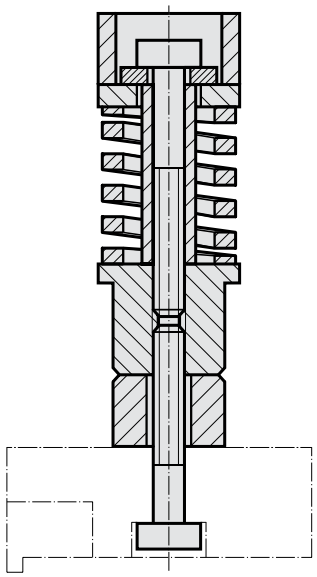


244.14.

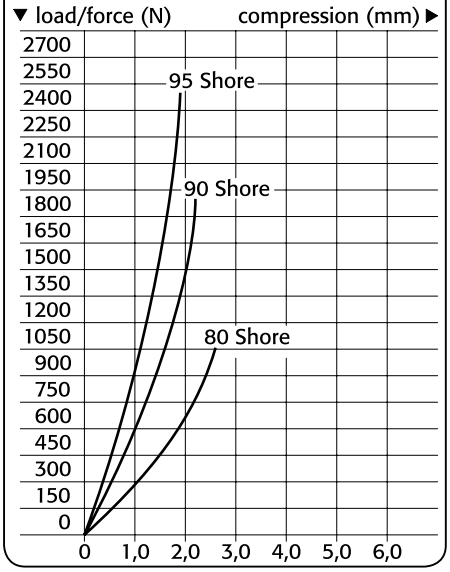


244.15.

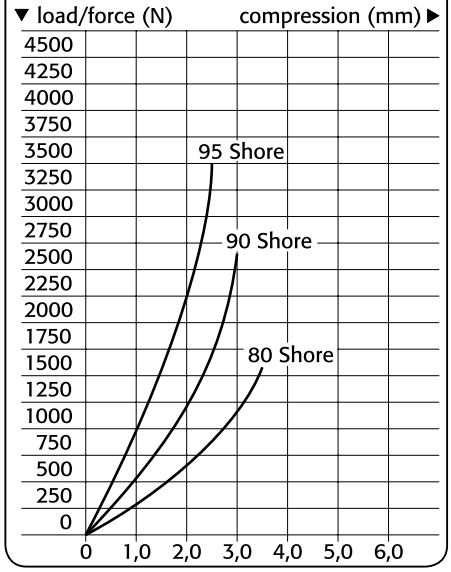




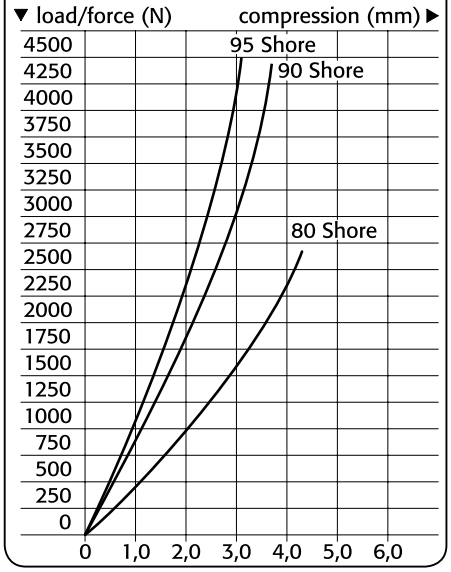
244.1.16. – ∅ 16



244.1.20. – ∅ 20



244.1.25. – ∅ 25



244.1.

Order No		d_1	d_2	d_3	L_o	f max.	F max. N
244.1.16.5	80 Shore A	6,5	16	20	7,5	2,6	1060
20.5	green	8,5	20	26	10	3,5	1580
25.5		10,5	25	32	12,5	4,3	2670
32.5		13,5	32	40	15	5,2	4500
40.5		13,5	40	50	17,5	6,1	7200
244.1.16.6	90 Shore A	6,5	16	20	7,5	2,2	1900
20.6	yellow	8,5	20	26	10	3	2650
25.6		10,5	25	32	12,5	3,7	4400
32.6		13,5	32	40	15	4,5	6550
40.6		13,5	40	50	17,5	5,2	11200
244.1.16.7	95 Shore A	6,5	16	20	7,5	1,9	2500
20.7	red	8,5	20	26	10	2,5	3500
25.7		10,5	25	32	12,5	3,1	4500
32.7		13,5	32	40	15	3,9	7800
40.7		13,5	40	50	17,5	4,4	13500

Physical and chemical properties of FIBROFLEX® Elastomer – see pages G 6 and G 7.

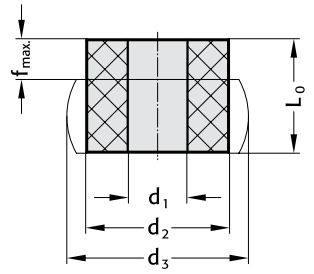
Dowel Pins 235.1, or Guide Pins 244.5, recommended for stacks higher than $1,5 \times d_2$.

FIBRO

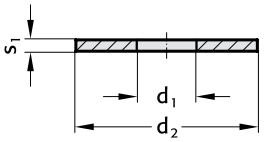
244.1. 244.4. 244.5.

FIBROFLEX® Spring Systems: Stacking Washers Guide Pins

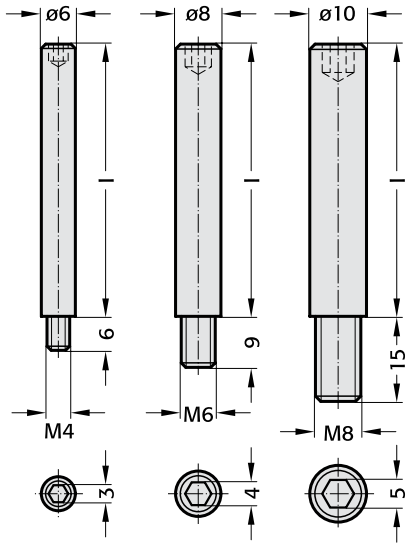
244.1.



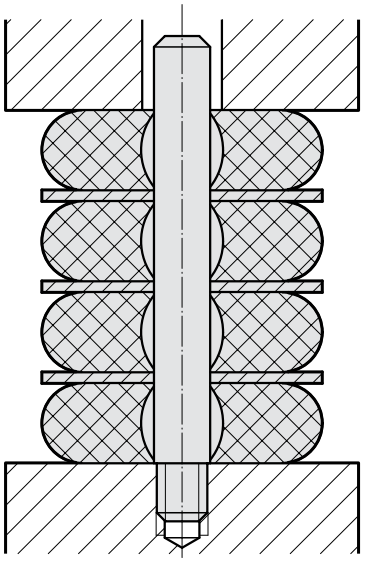
244.4.



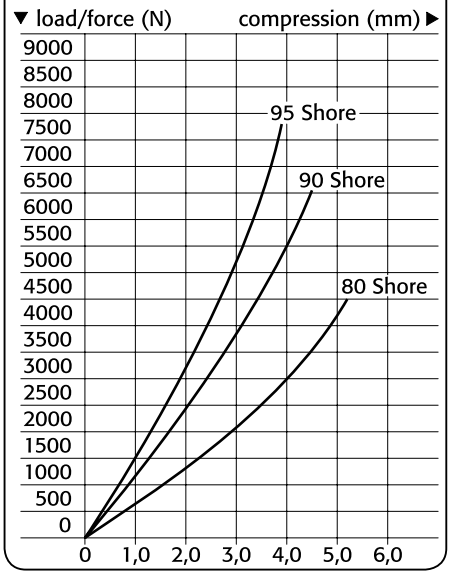
244.5.06. 244.5.08. 244.5.10.



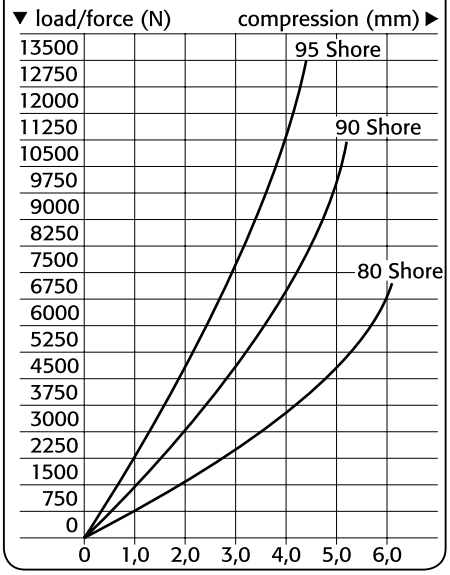
Application Example:



244.1.32. – ∅ 32



244.1.40. – ∅ 40



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.

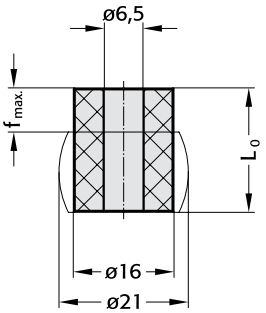
The 244.-Systems comprise FIBROFLEX® Spring Elements 244.1., available in three Shore hardnesses. With the aid of Stacking Washers 244.4. and Guide Pins 244.5., the elements can be stacked.
Note that stacking with interposed stacking washers results in the addition of the individual spring deflections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

244.4./244.5.

	Order No	d_1	d_2	s_1
Stacking	244.4.016	6,5	20	1
Washer	244.4.020	8,5	26	1,5
	244.4.025	10,5	32	2
	244.4.032	13,5	40	2,5
	244.4.040	13,5	50	2,5

	Order No	l
Guide Pin	244.5.06.020	20
	244.5.06.025	25
	244.5.06.032	32
	244.5.06.040	40
Guide Pin	244.5.08.025	25
	244.5.08.032	32
	244.5.08.040	40
	244.5.08.050	50
Guide Pin	244.5.10.032	32
	244.5.10.040	40
	244.5.10.050	50
	244.5.10.063	63

246.



FIBROFLEX® Spring Elements are made from highly elastic polyurethane elastomers

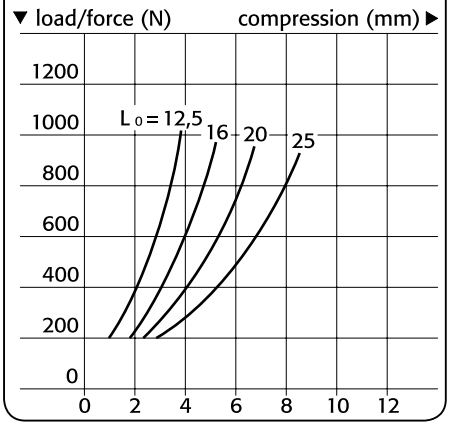
Shore hardness is the most significant rating of the various FIBROFLEX® elements. Shore hardness ratings are symbolized by distinctive colour coding.

Correct selection of Shore hardness has a fundamental bearing on the success of FIBROFLEX®-applications.

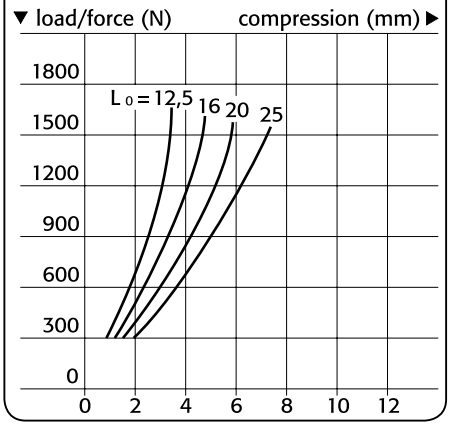
Because of their physical properties, polyurethane elastomers exhibit a certain fendency towards initial sagging.

Depending on such factors as internal working temperature, frequency and number of load changes etc., sagging may amount to 4–7 % of the original spring length.

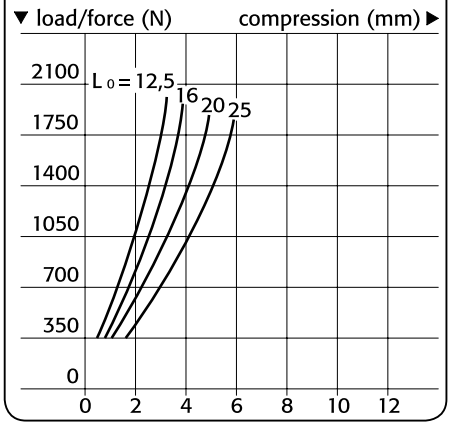
246.5.016.
∅ 16/80 Shore A



246.6.016.
∅ 16/90 Shore A



246.7.016.
∅ 16/95 Shore A



246.

Order No		F max. in N	L_o	f max.
246.5.016.012	80 Shore A	1020	12,5	4,3
246.5.016.016	green	980	16	5,6
246.5.016.020		950	20	7
246.5.016.025		940	25	8,7
246.6.016.012	90 Shore A	1680	12,5	3,6
246.6.016.016	yellow	1650	16	4,8
246.6.016.020		1620	20	6
246.6.016.025		1580	25	7,5
246.7.016.012	95 Shore A	2000	12,5	3,1
246.7.016.016	red	1920	16	4
246.7.016.020		1900	20	5
246.7.016.025		1870	25	6,2

Accessories	Order No.	see Spring Accessories, page F62.
Stacking Washer	2441.3.016	
Stacking Washer	244.4.016	
Guide Pins	244.5.06.020	
	025	
	032	
	040	

FIBROFLEX® Tubular Spring Elements DIN ISO 10069-1

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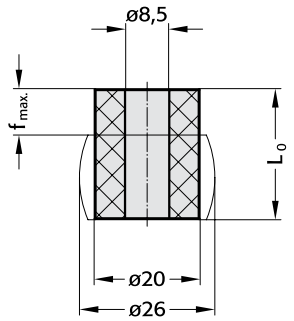
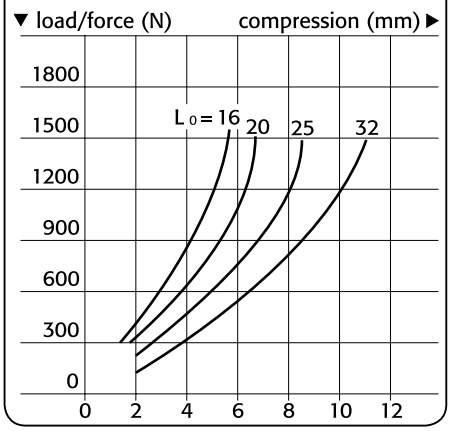
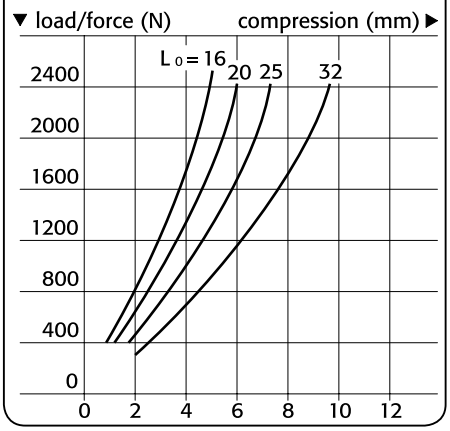
246.



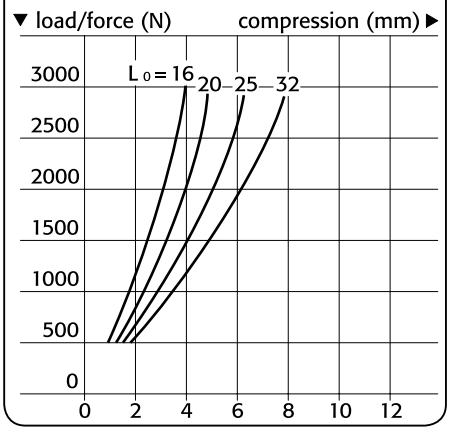
246.5.020. ∅ 20/80 Shore A



246.6.020. ∅ 20/90 Shore A



246.7.020. ∅ 20/95 Shore A

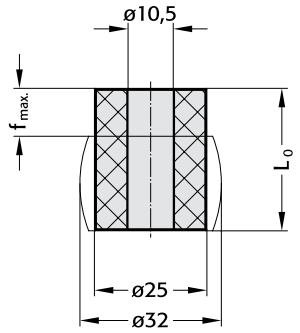


246.

Order No		F max. in N	L_o	f max.
246.5.020. 016	80 Shore A	1530	16	5,6
020	green	1510	20	7
025		1500	25	8,7
032		1490	32	10,6
246.6.020. 016	90 Shore A	2600	16	4,8
020	yellow	2550	20	6
025		2530	25	7,5
032		2500	32	9,6
246.7.020. 016	95 Shore A	3050	16	4
020	red	3000	20	5
025		2980	25	6,2
032		2950	32	8

Accessories	Order No	see spring accessories
		page F62.
Stacking Washer	2441.3.020	
Stacking Washer	244.4.020	
Guide Pins	244.5.08. 025	
	032	
	040	
	050	

246.



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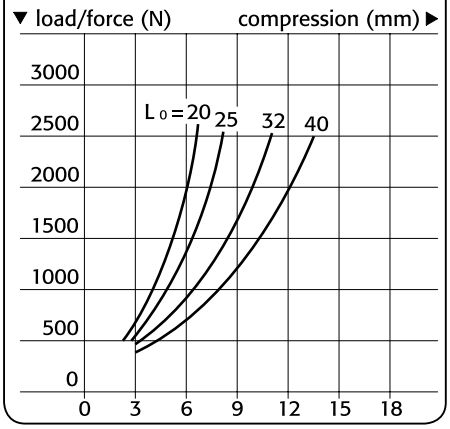
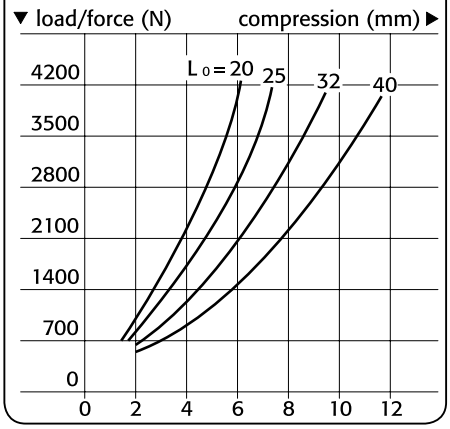
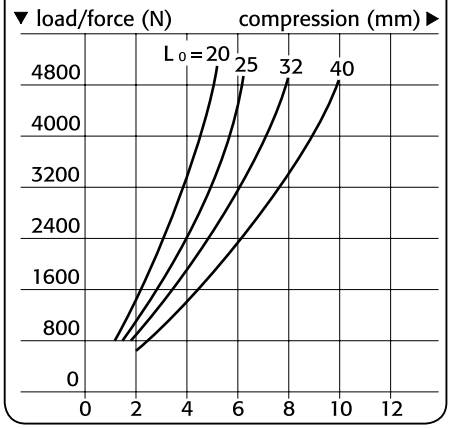
246.5.025.
∅ 25/80 Shore A



246.6.025.
∅ 25/90 Shore A



246.7.025.
∅ 25/95 Shore A



246.

Order No		F max. in N	L_o	f max.
246.5.025. 020	80 Shore A	2600	20	7
025	green	2550	25	8,7
032		2520	32	10,6
040		2500	40	14
246.6.025.020	90 Shore A	4300	20	6
025	yellow	4200	25	7,5
032		4150	32	9,6
040		4120	40	12
246.7.025. 020	95 Shore A	5100	20	5
025	red	5080	25	6,2
032		5020	32	8
040		5000	40	10

Accessories	Order No	see Spring Accessories page F62.
Stacking Washer	2441.3.025	
Stacking Washer	244.4.025	
Guide Pins	244.5.10.032	
	040	
	050	
	063	

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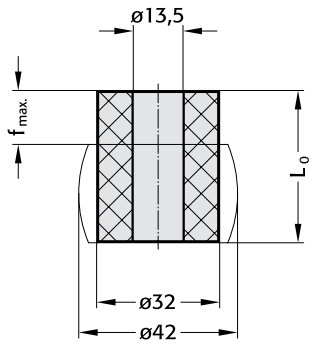
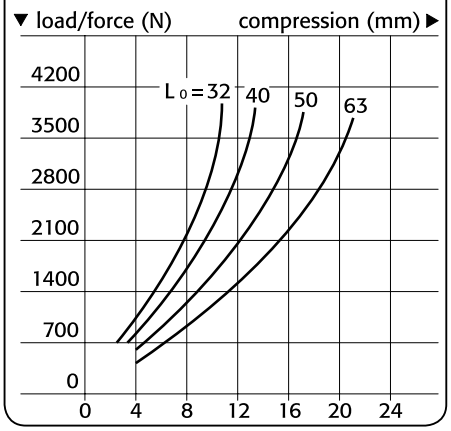
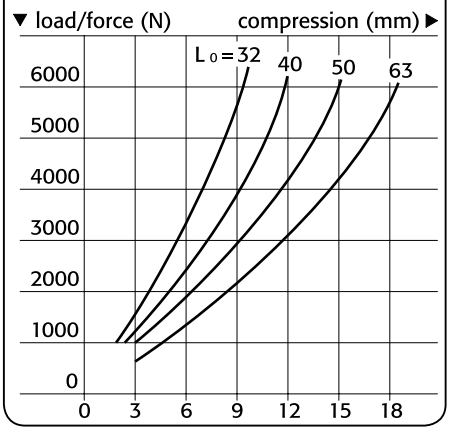
246.



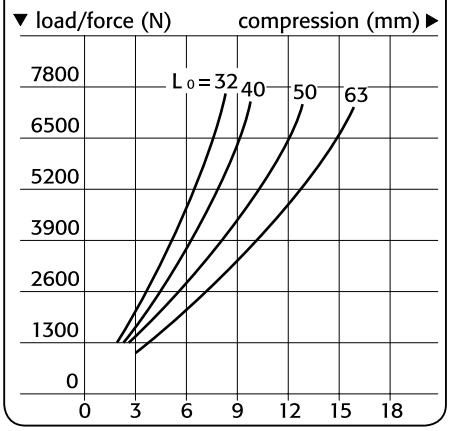
246.5.032.
∅ 32/80 Shore A



246.6.032.
∅ 32/90 Shore A



246.7.032.
∅ 32/95 Shore A

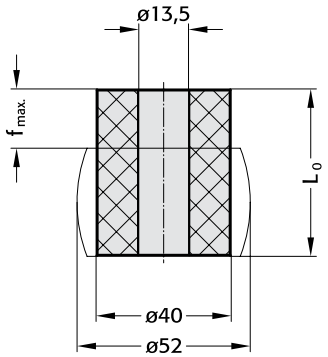


246.

Order No		F max. in N	L_o	f max.
246.5.032. 032	80 Shore A	3900	32	10,6
040	green	3850	40	14
050		3820	50	17,5
063		3800	63	22
246.6.032. 032	90 Shore A	6400	32	9,6
040	yellow	6350	40	12
050		6300	50	15
063		6250	63	18,9
246.7.032. 032	95 Shore A	7600	32	8
040	red	7500	40	10
050		7480	50	12
063		7450	63	15,7

Accessories	Order No	see Spring Accessories
		page F62.
Stacking Washer	2441.3.032	
Stacking Washer	244.4.032	
Guide Pins	244.5.13. 040	
	050	
	063	
	080	
	095	

246.



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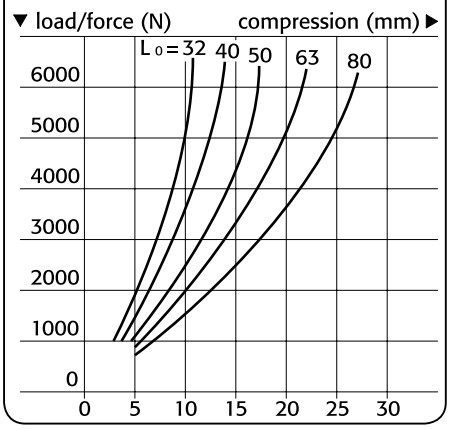
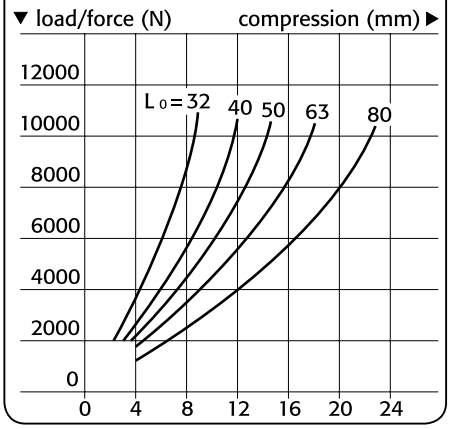
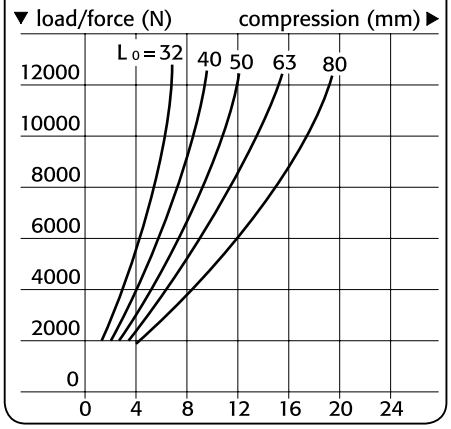
246.5.040.
∅ 40/80 Shore A



246.6.040.
∅ 40/90 Shore A



246.7.040.
∅ 40/95 Shore A



246.

Order No		F max. in N	L_o	f max.
246.5.040.032	80 Shore A	6700	32	10,6
040	green	6600	40	14
050		6550	50	17,5
063		6500	63	22
080		6480	80	28
246.6.040.032	90 Shore A	11000	32	9,6
040	yellow	10900	40	12
050		10800	50	15
063		10750	63	18,9
080		10700	80	24
246.7.040. 032	95 Shore A	13000	32	8
040	red	12700	40	10
050		12500	50	12,5
063		12450	63	15,7
080		12430	80	20

Accessories	Order No	see Spring Accessories page F62.
Stacking Washer	2441.3.040	
Stacking Washer	244.4.040	
Guide Pins	244.5.13. 040	
	050	
	063	
	080	
	095	

FIBROFLEX®-
Tubular Spring Elements
DIN ISO 10069-1

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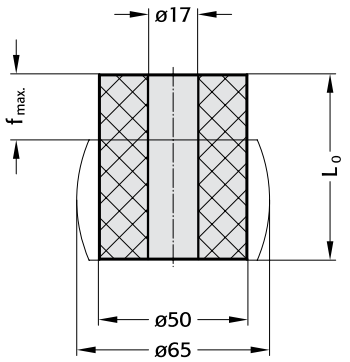
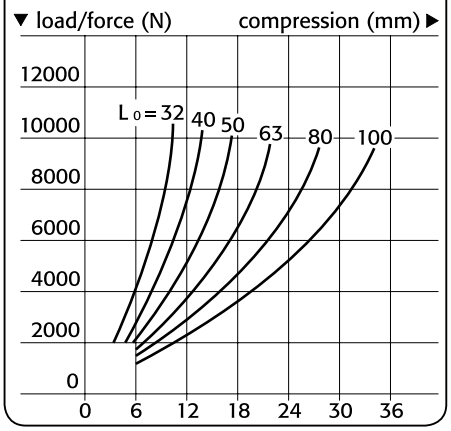
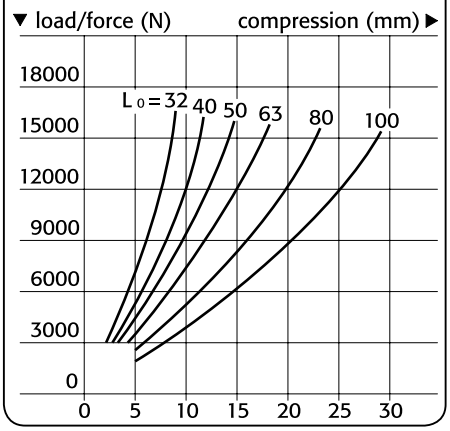
246.



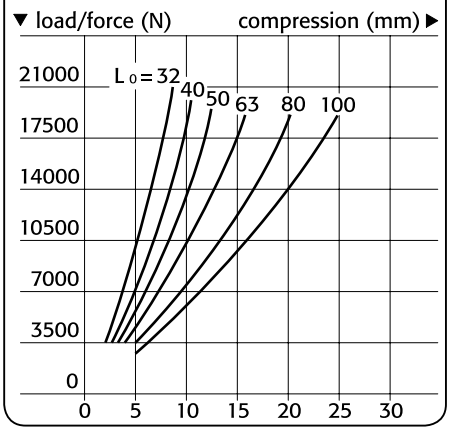
246.5.050.
∅ 50/80 Shore A



246.6.050.
∅ 50/90 Shore A



246.7.050.
∅ 50/95 Shore A

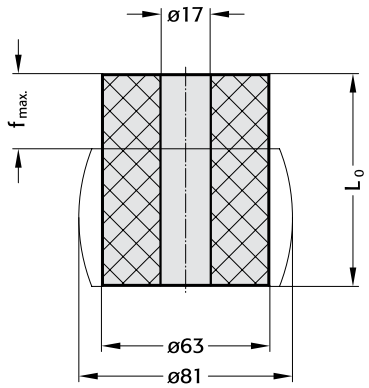


246.

Order No		F max. in N	L_o	f max.
246.5.050. 032	80 Shore A	10800	32	10,6
040	green	10400	40	14
050		10200	50	17,5
063		10000	63	22
080		9950	80	28
100		9900	100	35
246.6.050. 032	90 Shore A	17400	32	9,6
040	yellow	17300	40	12
050		17000	50	15
063		16650	63	18,9
080		16500	80	24
100		16400	100	30
246.7.050. 032	95 Shore A	21000	32	8
040	red	20100	40	10
050		19600	50	12,5
063		19200	63	15,7
080		19100	80	20
100		19050	100	25

Accessories	Order No	see Spring Accessories page F62.
Stacking Washer	2441.3.050	
Stacking Washer	244.4.050	
Guide Pins	244.5.16. 063	
	080	
	095	
	118	
	140	

246.



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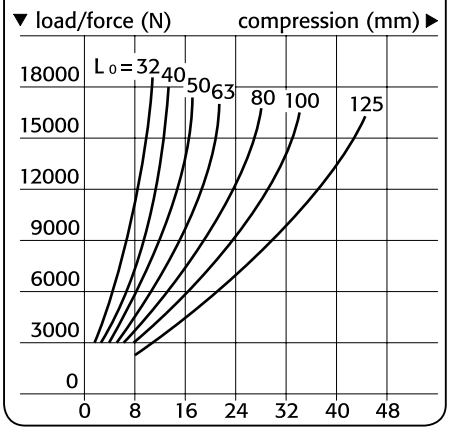
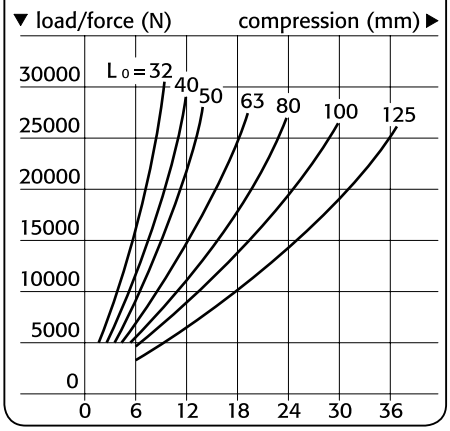
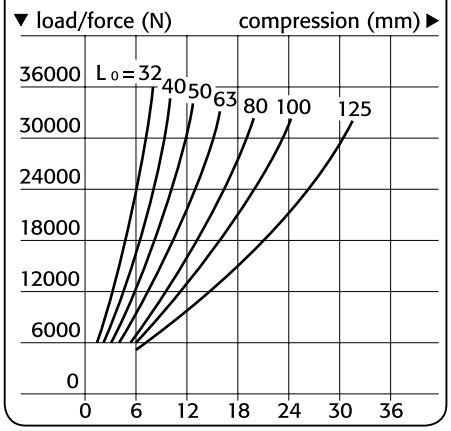
246.5.063.
∅ 63/80 Shore A



246.6.063.
∅ 63/90 Shore A



246.7.063.
∅ 63/95 Shore A



246.

Order No		F max. in N	L_o	f max.
246.5.063.032	80 Shore A	18650	32	11,2
040	green	18000	40	14
050		17500	50	17,5
063		17000	63	22
080		16500	80	28
100		16200	100	35
125		16000	125	43,7
246.6.063.032	90 Shore A	30100	32	9,6
040	yellow	29500	40	12
050		28900	50	15
063		28000	63	18,9
080		27500	80	24
100		27300	100	30
125		26800	125	37,5

Order No		F max. in N	L_o	f max.
246.7.063.032	95 Shore A	37000	32	8
040	red	35900	40	10
050		34000	50	12,5
063		33000	63	15,7
080		32000	80	20
100		31800	100	25
125		31600	125	31,2

Accessories	Order No	see Spring Accessories page F62.
Stacking Washer	2441.3.063	
Stacking Washer	244.4.063	
Guide Pins	244.5.16.063	
	080	
	095	
	118	
	140	

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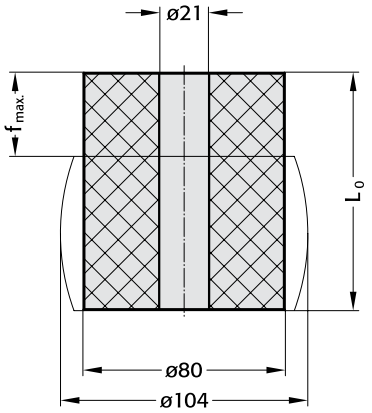
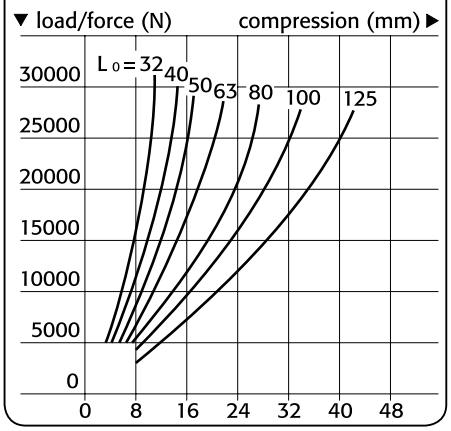
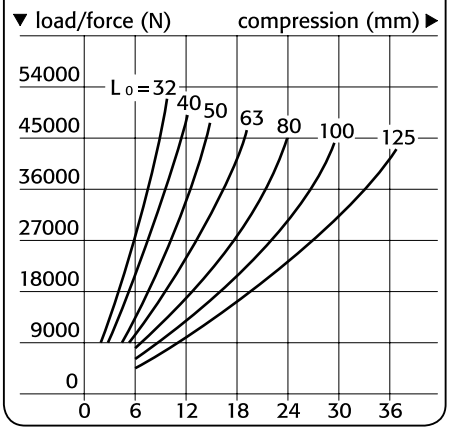
246.



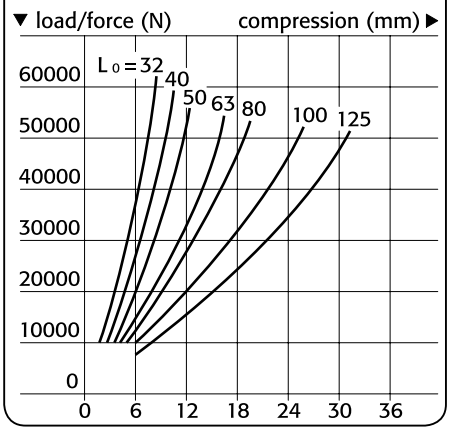
246.5.080. ∅ 80/80 Shore A



246.6.080. ∅ 80/90 Shore A



246.7.080. ∅ 80/95 Shore A



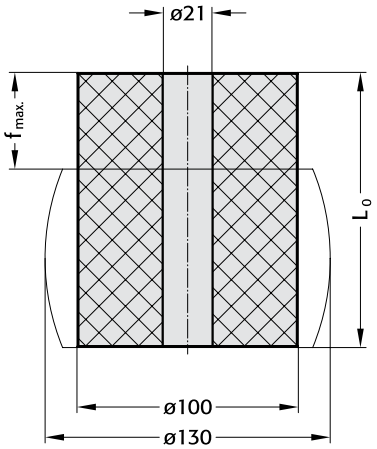
246.

Order No		F max. in N	L_o	f max.
246.5.080.032	80 Shore A	31500	32	11,2
040	green	30100	40	14
050		29900	50	17,5
063		28800	63	22
080		28300	80	28
100		28100	100	35
125		28000	125	43,7
246.6.080. 032	90 Shore A	53000	32	9,6
040	yellow	50500	40	12
050		48000	50	15
063		46500	63	18,9
080		45500	80	24
100		44900	100	30
125		44000	125	37,5

Order No		F max. in N	L_o	f max.
246.7.080. 032	95 Shore A	62500	32	8
040	red	59000	40	10
050		58000	50	12,5
063		55000	63	15,7
080		54000	80	20
100		53000	100	25
125		52000	125	31,2

Accessories	Order No	see Spring Accessories. page F62
Stacking Washer	2441.3.080	
Stacking Washer	244.4.080	
Guide Pins	244.5.20. 095	
	118	
	140	

246.



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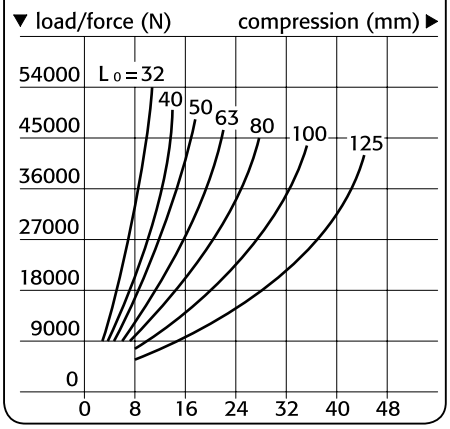
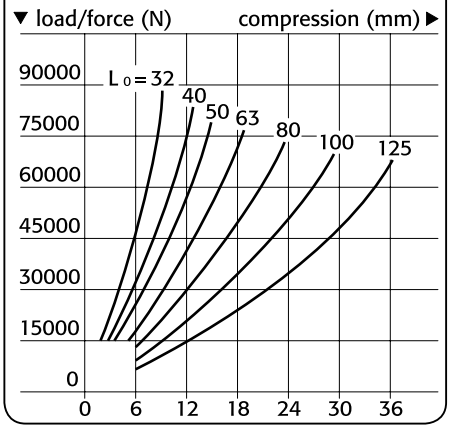
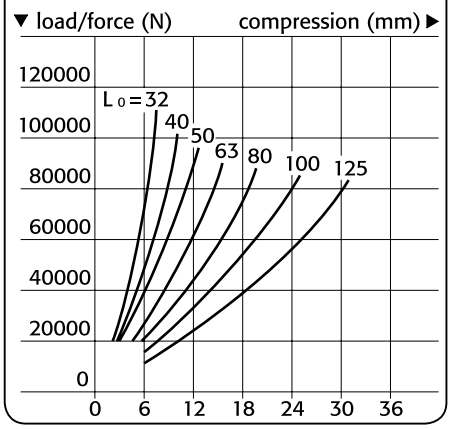
246.5.100.
∅ 100/80 Shore A



246.6.100.
∅ 100/90 Shore A



246.7.100.
∅ 100/95 Shore A



246.

Order No		F max. in N	L_0	f max.
246.5.100. 032	80 Shore A	56000	32	10,6
040	green	52000	40	14
050		50000	50	17,5
063		47500	63	22
080		45000	80	28
100		43300	100	35
125		41500	125	43,7
246.6.100.032	90 Shore A	90000	32	9,6
040	yellow	84800	40	12
050		81000	50	15
063		78000	63	18,9
080		75000	80	24
100		73000	100	30
125		71000	125	37,5

Order No		F max in N	L_0	f max
246.7.100.032	95 Shore A	110000	32	8
040	red	102500	40	10
050		95000	50	12,5
063		92000	63	15,7
080		89000	80	20
100		87000	100	25
125		86000	125	31,2

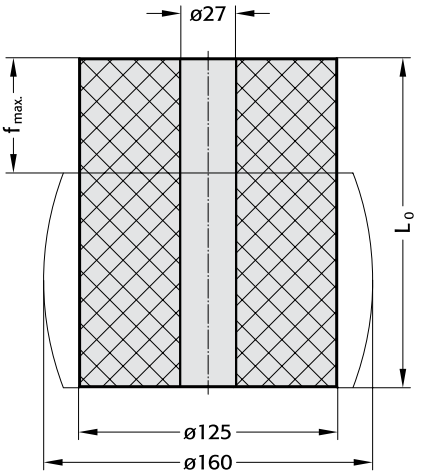
Accessories	Order No	see Spring Accessories page F62.
Stacking Washer	2441.3.100	
Stacking Washer	244.4.100	
Guide Pins	244.5.20.095	
	118	
	140	

FIBROFLEX® Tubular Spring Elements DIN ISO 10069-1

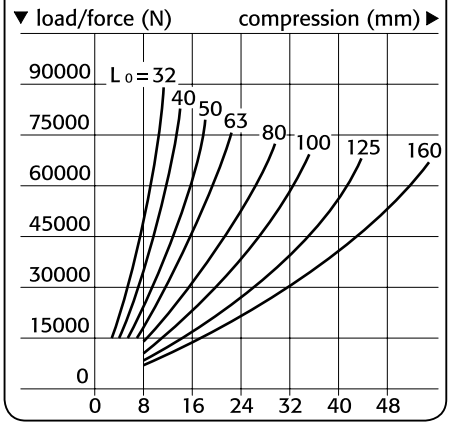
FIBROFLEX® Spring Elements are made from highly elastic polyurethane elastomers

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.
Because of their physical properties, polyurethane elastomers exhibit a certain tendency towards initial sagging. Depending on such factors as internal working temperature, frequency and number of load changes etc., sagging may amount to 4–7% of the original spring length.

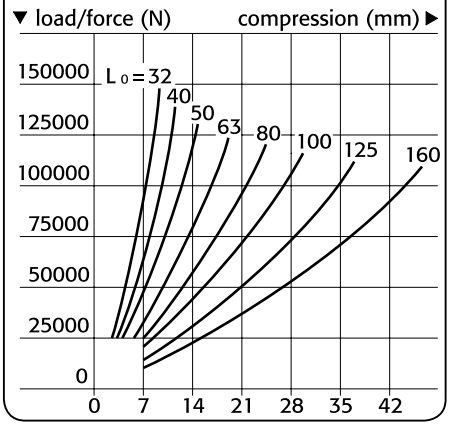
246.



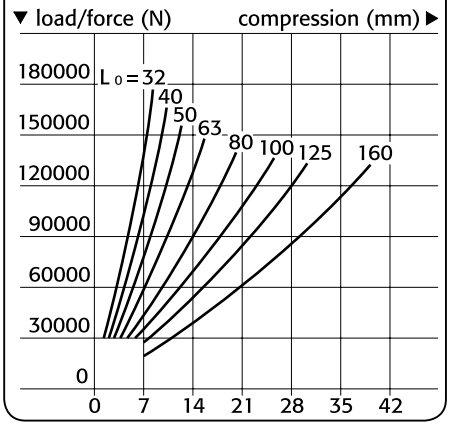
246.5.125. ∅ 125/80 Shore A



246.6.125. ∅ 125/90 Shore A



246.7.125. ∅ 125/95 Shore A



246.

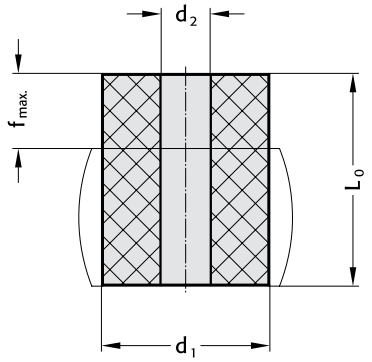
Order No		F max. N	L_o	f max.
246.5.125. 032	80 Shore A	92000	32	10,6
040	green	85000	40	14
050		80000	50	17,5
063		75000	63	22
080		71000	80	28
100		70500	100	35
125		70000	125	43,7
160		68000	160	56
246.6.125. 032	90 Shore A	150000	32	9,6
040	yellow	142500	40	12
050		132000	50	15
063		125000	63	18,9
080		118000	80	24
100		115000	100	30
125		113000	125	37,5
160		111300	160	48

Order No		F max. N	L_o	f max.
246.7.125. 032	95 Shore A	178000	32	8
040	red	168000	40	10
050		157000	50	12,5
063		150000	63	15,7
080		142000	80	20
100		135000	100	25
125		133000	125	31,2
160		130000	160	40

Accessories	Order No	see Spring Accessories. page F62
Stacking Washer	2441.3.125	
Stacking Washer	244.4.125	
Guide Pins	244.5.25.140	
	180	

FIBROELAST® Tubular Spring Elements 2461.4.

2461.4.



Material:

Polyester-based polyurethane
Shore hardness A 70

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.

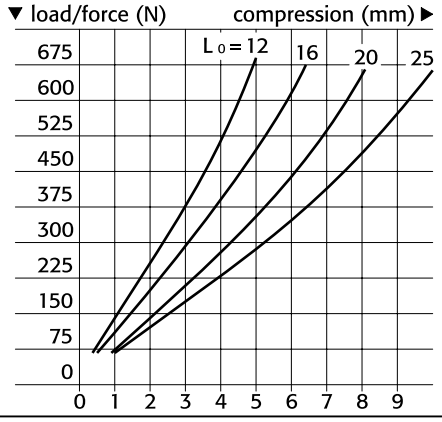
Settlement may be as much as 4 to 7% of the spring length L_0

2461.4.

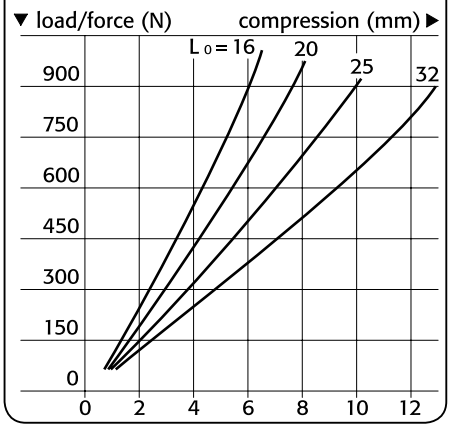
Order No	L_0	d_1	d_2	$f_{max.}$
2461.4.016.012	12	16	6,5	4,8
016	16			6,4
020	20			8,0
025	25			10,0
2461.4.020.016	16	20	8,5	6,4
020	20			8,0
025	25			10,0
032	32			12,8
2461.4.025.020	20	25	10,5	8,0
025	25			10,0
032	32			12,8
040	40			16,0
2461.4.032.032	32	32	13,5	12,8
040	40			16,0
050	50			20,0
063	63			25,2
2461.4.040.032	32	40	13,5	12,8
040	40			16,0
050	50			20,0
063	63			25,2
080	80			32,0
2461.4.050.032	32	50	17	12,8
040	40			16,0
050	50			20,0
063	63			25,2
080	80			32,0
100	100			40,0
2461.4.063.032	32	63	17	12,8
040	40			16,0
050	50			20,0
063	63			25,2
080	80			32,0
100	100			40,0
125	125			50,0
2461.4.080.032	32	80	21	12,8
040	40			16,0
050	50			20,0
063	63			25,2
080	80			32,0
100	100			40,0
125	125			50,0
2461.4.100.032	32	100	21	12,8
040	40			16,0
050	50			20,0
063	63			25,2
080	80			32,0
100	100			40,0
125	125			50,0

Order No	L_0	d_1	d_2	$f_{max.}$
2461.4.125.032	32	125	27	12,8
040	40			16,0
050	50			20,0
063	63			25,2
080	80			32,0
100	100			40,0
125	125			50,0
160	160			64,0

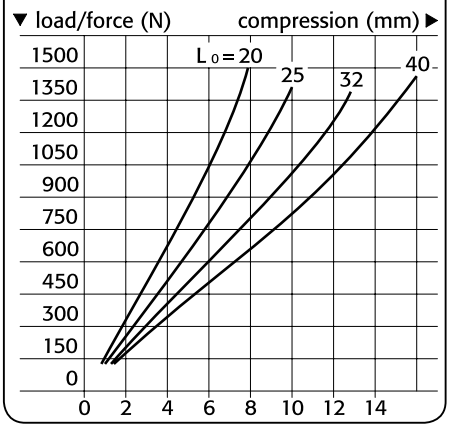
2461.4.016.
∅16



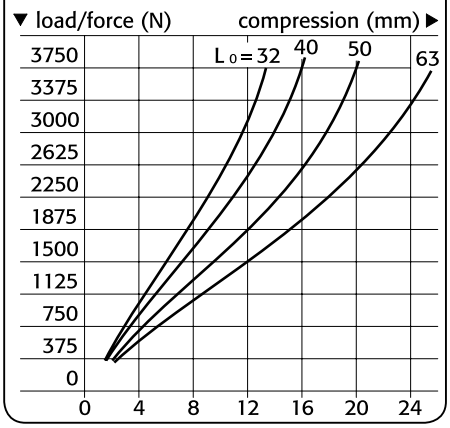
2461.4.020.
∅20



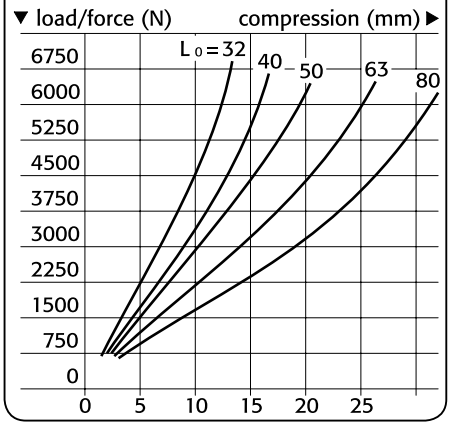
2461.4.025.
∅25



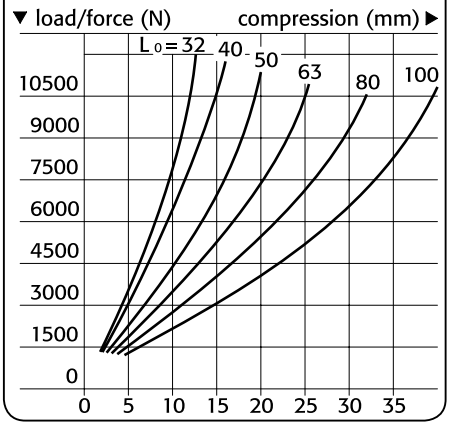
2461.4.032.
∅32



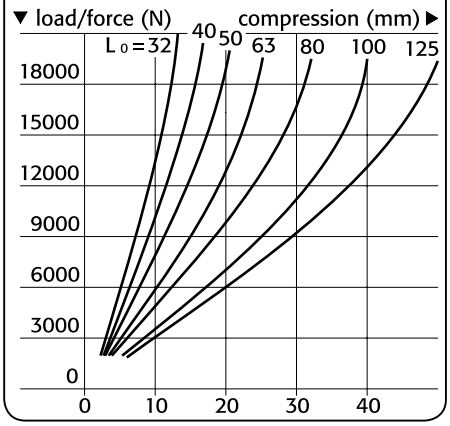
2461.4.040.
∅40



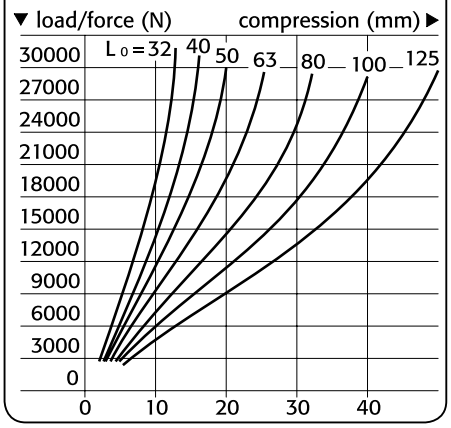
2461.4.050.
∅50



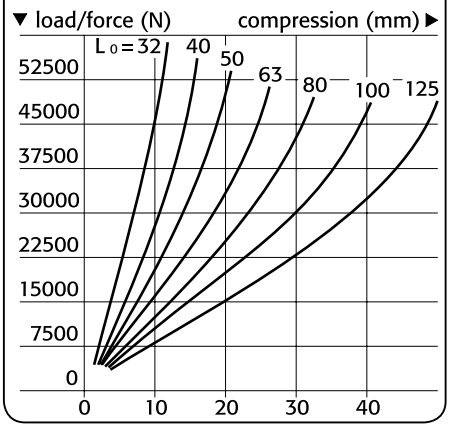
2461.4.063.
∅63



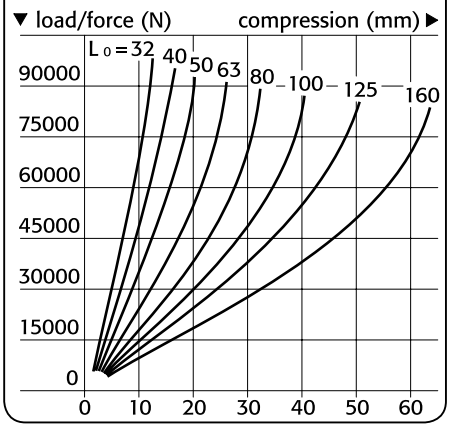
2461.4.080.
∅80

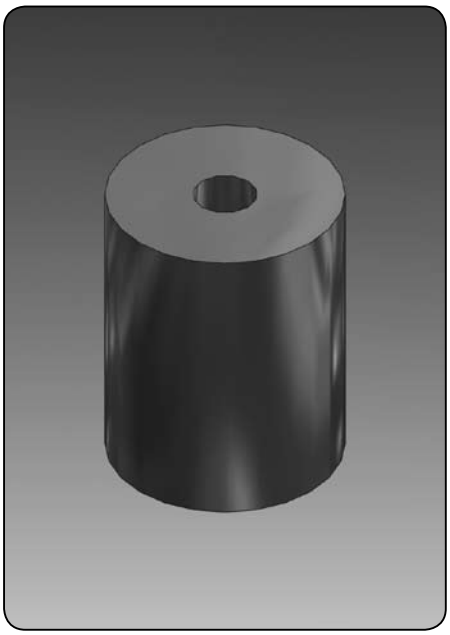


2461.4.100.
∅100

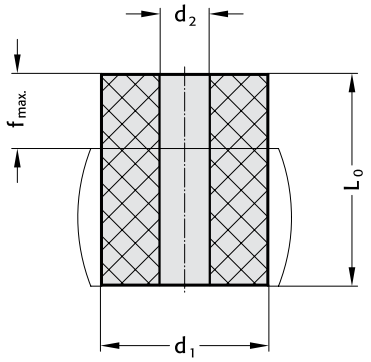


2461.4.125.
∅125





2461.2.



Material:

Chloroprene rubber
70 shore A
colour: black

Note:

Due to their physical characteristics, elastomere springs tend to settle.

This process is dependent on internal friction heat, the speed and number of load changes, and shore hardness.
It can amount to 3-5 % of spring length L_0.

Physical characteristics:

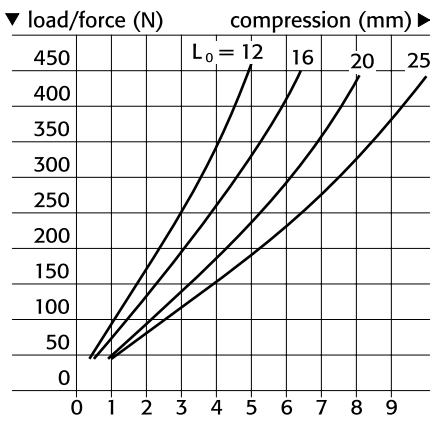
Tensile strength according to DIN 53504	≥ 12 N/mm²
elongation at break (DIN 53504)	≥ 250 %
Bulk density (DIN 53479)	1.37 g/cm³
Compression set (DIN 53517)	≤ 20 % (24 h/70 °C)
Temperature scope:	−20 °C to 80 °C short-term to max. 120 °C

2461.2.

Order No	L_0	d_1	d_2	$f_{max.}$
2461.2.016.012	12	16	6.5	4.8
2461.2.016.016	16	16	6.5	6.4
2461.2.016.020	20	16	6.5	8.0
2461.2.016.025	25	16	6.5	10.0
2461.2.020.016	16	20	8.5	6.4
2461.2.020.020	20	20	8.5	8.0
2461.2.020.025	25	20	8.5	10.0
2461.2.020.032	32	20	8.5	12.8
2461.2.025.020	20	25	10.5	8.0
2461.2.025.025	25	25	10.5	10.0
2461.2.025.032	32	25	10.5	12.8
2461.2.025.040	40	25	10.5	16.0
2461.2.032.032	32	32	13.5	12.8
2461.2.032.040	40	32	13.5	16.0
2461.2.032.050	50	32	13.5	20.0
2461.2.032.063	63	32	13.5	25.2
2461.2.040.032	32	40	13.5	12.8
2461.2.040.040	40	40	13.5	16.0
2461.2.040.050	50	40	13.5	20.0
2461.2.040.063	63	40	13.5	25.2
2461.2.040.080	80	40	13.5	32.0
2461.2.050.032	32	50	17	12.8
2461.2.050.040	40	50	17	16.0
2461.2.050.050	50	50	17	20.0
2461.2.050.063	63	50	17	25.2
2461.2.050.080	80	50	17	32.0
2461.2.050.100	100	50	17	40.0
2461.2.063.032	32	63	17	12.8
2461.2.063.040	40	63	17	16.0
2461.2.063.050	50	63	17	20.0
2461.2.063.063	63	63	17	25.2
2461.2.063.080	80	63	17	32.0
2461.2.063.100	100	63	17	40.0
2461.2.063.125	125	63	17	50.0
2461.2.080.032	32	80	21	12.8
2461.2.080.040	40	80	21	16.0
2461.2.080.050	50	80	21	20.0
2461.2.080.063	63	80	21	25.2
2461.2.080.080	80	80	21	32.0
2461.2.080.100	100	80	21	40.0
2461.2.080.125	125	80	21	50.0

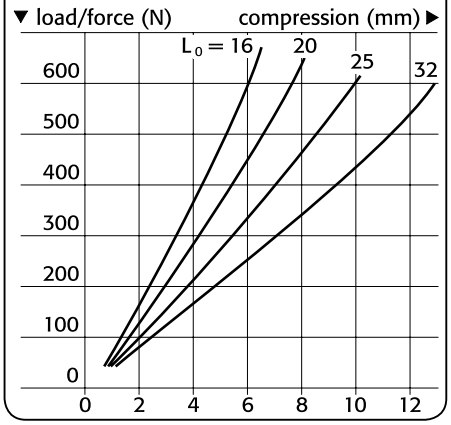
Order No	L_0	d_1	d_2	$f_{max.}$
2461.2.100.032	32	100	21	12.8
2461.2.100.040	40	100	21	16.0
2461.2.100.050	50	100	21	20.0
2461.2.100.063	63	100	21	25.2
2461.2.100.080	80	100	21	32.0
2461.2.100.100	100	100	21	40.0
2461.2.100.125	125	100	21	50.0
2461.2.125.032	32	125	27	12.8
2461.2.125.040	40	125	27	16.0
2461.2.125.050	50	125	27	20.0
2461.2.125.063	63	125	27	25.2
2461.2.125.080	80	125	27	32.0
2461.2.125.100	100	125	27	40.0
2461.2.125.125	125	125	27	50.0
2461.2.125.160	160	125	27	64.0

2461.2.016.
∅16

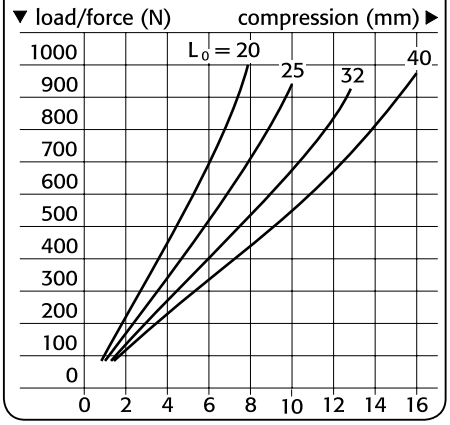


2461.2. Tubular Spring Elements, Rubber

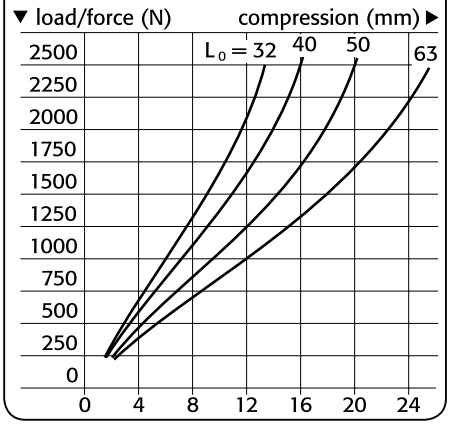
2461.2.020.
∅20



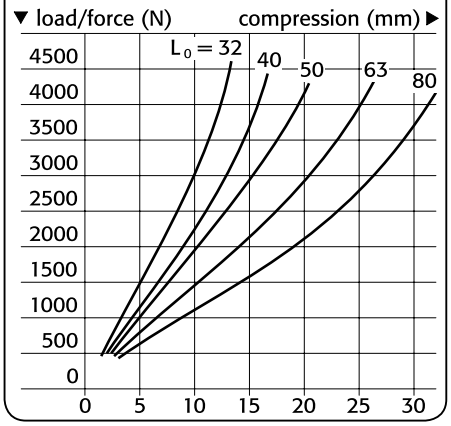
2461.2.025.
∅25



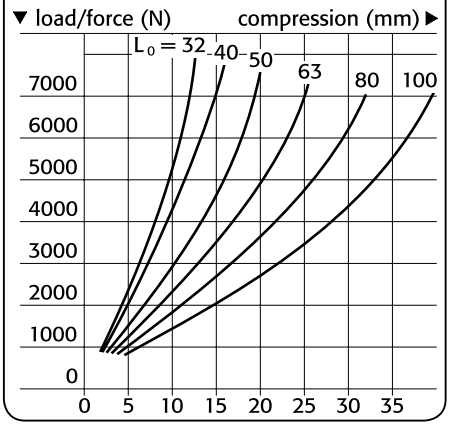
2461.2.032.
∅32



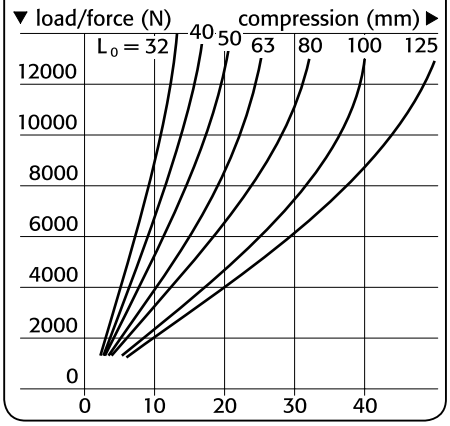
2461.2.040.
∅40



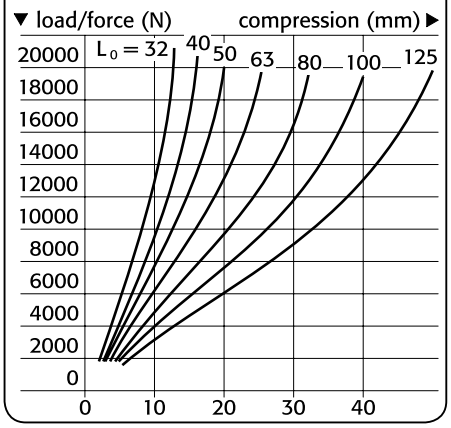
2461.2.050.
∅50



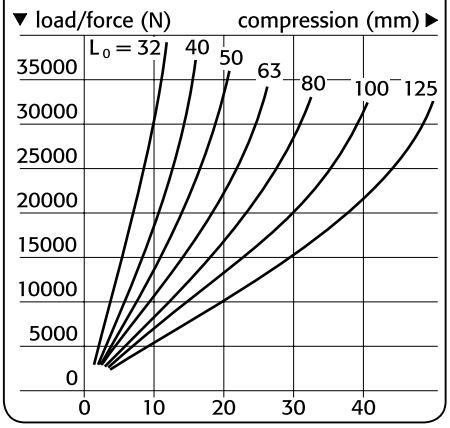
2461.2.063.
∅63



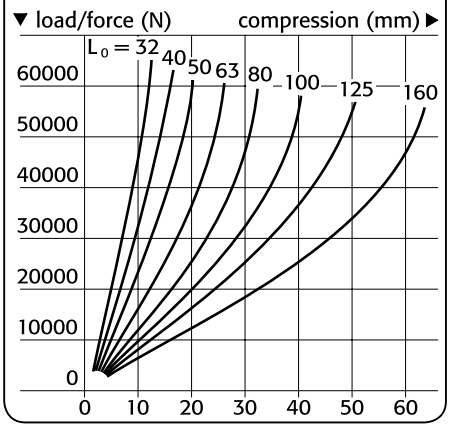
2461.2.080.
∅80



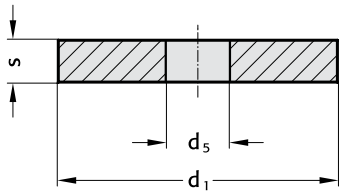
2461.2.100.
∅100



2461.2.125.
∅125



2441.3.



2441.3. Stacking Washers, DIN ISO 10069-2

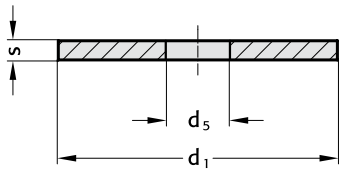
Material: Brass

Spring Element ∅	16	20	25	32	40	50	63	80	100	125
d_1	20	25	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	4	4	5	5	5	6	6	8	8	8

Ordering Code (example):

Stacking Washer	=	2441.3.
Spring Element =∅ 40 mm	=	040
Order No	=	2441.3.040

244.4.



244.4. Stacking Washers

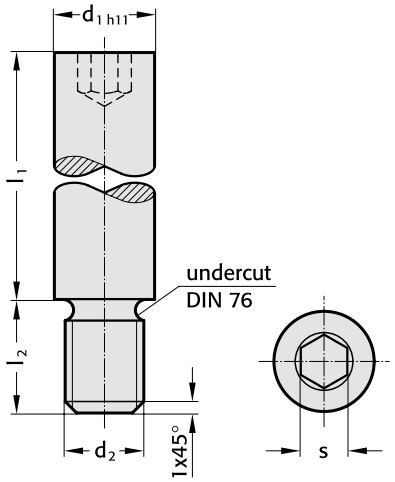
Material: St 37

Spring Element ∅	16	20	25	32	40	50	63	80	100	125
d_1	20	25	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

Ordering Code (example):

Stacking Washer	=	244.4.
Spring Element =∅20 mm	=	020
Order No	=	244.4.020

244.5.



244.5. Guide Pins Material: C 15

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					●	●	●

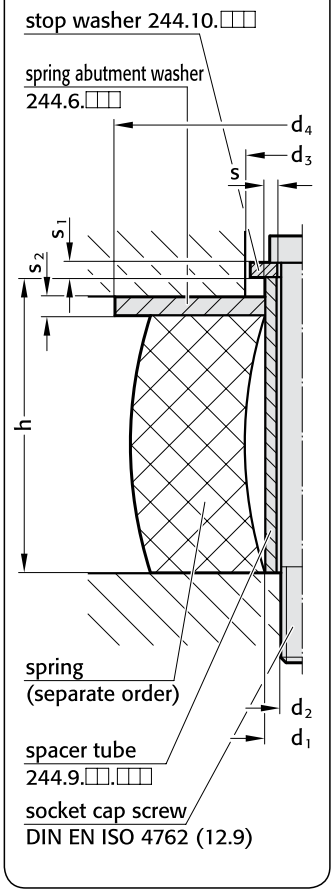
Ordering Code (example):

Guide Pins	=	244.5.
d_1 = 16 mm	=	16.
l_1 = 80 mm	=	080
Order No	=	244.5. 16. 080

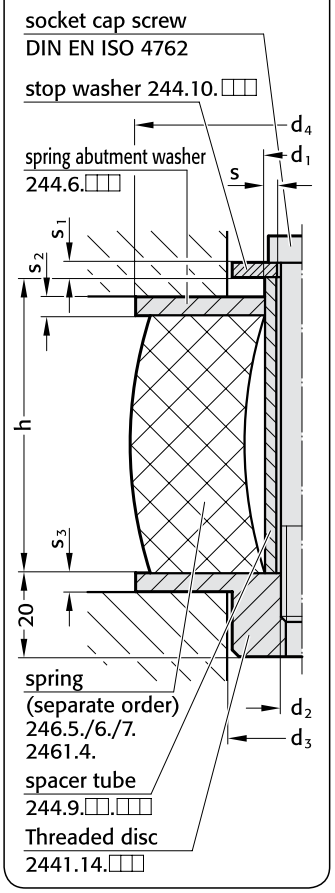
FIBRO

244.14.0. 2441.14.1.
244.15.0. 2441.15.1. Spring Units

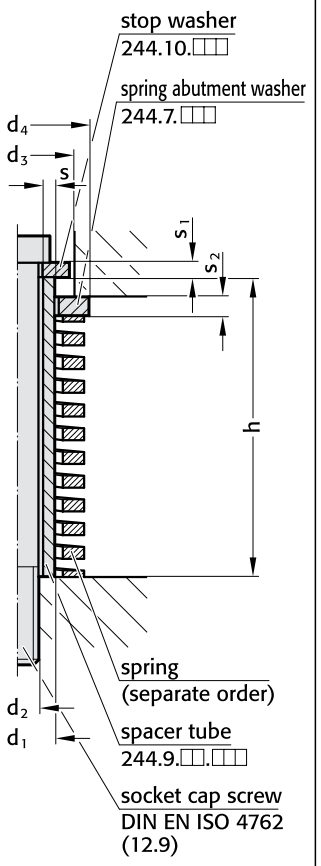
244.14.0.



2441.14.1.

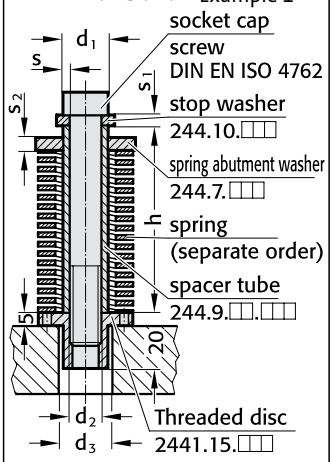


244.15.0.

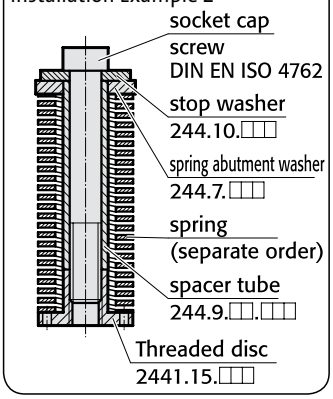


2441.15.1.

Installation Example 1



Installation Example 2



244.14.0.

spring dia.	$d_1 \times s$	h	d_2	d_3	d_4	s_1	s_2
25	10 × 1,8	see selection chart 244.9. page F65 and Spring Data	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

Ordering Code (example):

Spring Unit (FIBROFLEX-Spring)	=	244.14.
not loaded	=	0.
for spring dia. = 40 mm	=	040.
spacer tube length h = 48 mm	=	048
Order No	=	244.14.0.040.048

244.15.0.

spring dia.	$d_1 \times s$	h	d_2	d_3	d_4	s_1	s_2
20	10 × 1,8	see selection chart 244.9. page F65 and Spring Data	M 6	18	25	3	4
25	12 × 1,8		M 8				
32	16 × 2,5		M 10	30	38	4	5
40	20 × 3,5		M 12				
50	25 × 4,0		M 16	39	50	6	6
63	35 × 6,0		M 20	52	65		8

Ordering Code (example):

Spring Unit (Steel comp. spring)	=	244.15.
not loaded	=	0.
for spring dia. = 40 mm	=	040.
spacer tube length h = 61 mm	=	061
Order No	=	244.15.0.040.061

2441.14.1.

spring dia	$d_1 \times s$	h	d_2	d_3	d_4	s_1	s_2	s_3
25	10 × 1,8	see selection chart 244.9. page F65 and Spring Data	M 6	20	32	3	4	5
32	12 × 1,8		M 8	20	40		5	
40				20	50	4		
50	16 × 2,5		M 10	22	60		6	6
63				22	80		8	8
80	20 × 3,5		M 12	28	100		10	10
100				28	120		12	12

Ordering Code (example):

Spring Unit (FIBROFLEX-Spring)	=	244.14.
preloaded	=	1.
for spring dia. = 40 mm	=	040.
spacer tube length h = 48 mm	=	048
Order No	=	2441.4.1.040.048

2441.15.1.

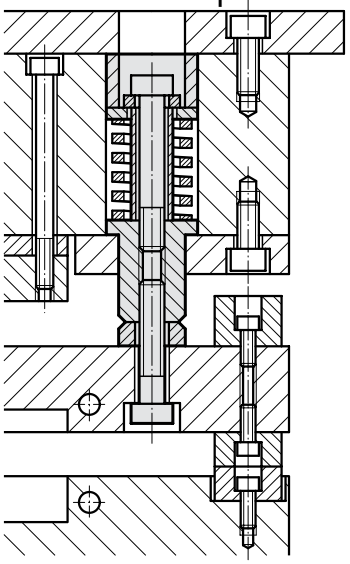
spring dia.	$d_1 \times s$	h	d_2	d_3	d_4	s_1	s_2
20	10 × 1,8	see selection chart 244.9. page F65 and Spring Data	M 6	11	25	3	4
25	12 × 1,8		M 8	14			
32	16 × 2,5		M 10	18	38	4	5
40	20 × 3,5		M 12	22			
50	25 × 4,0		M 16	27	50	6	6

Ordering Code (example):

Spring Unit (Steel comp. spring)	=	2441.15.
preloaded	=	1.
for spring dia. = 40 mm	=	040.
spacer tube length h = 48 mm	=	048
Order No	=	2441.15.1.040.048

Combination Spring- and Spacer Units

Installation Example:



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.

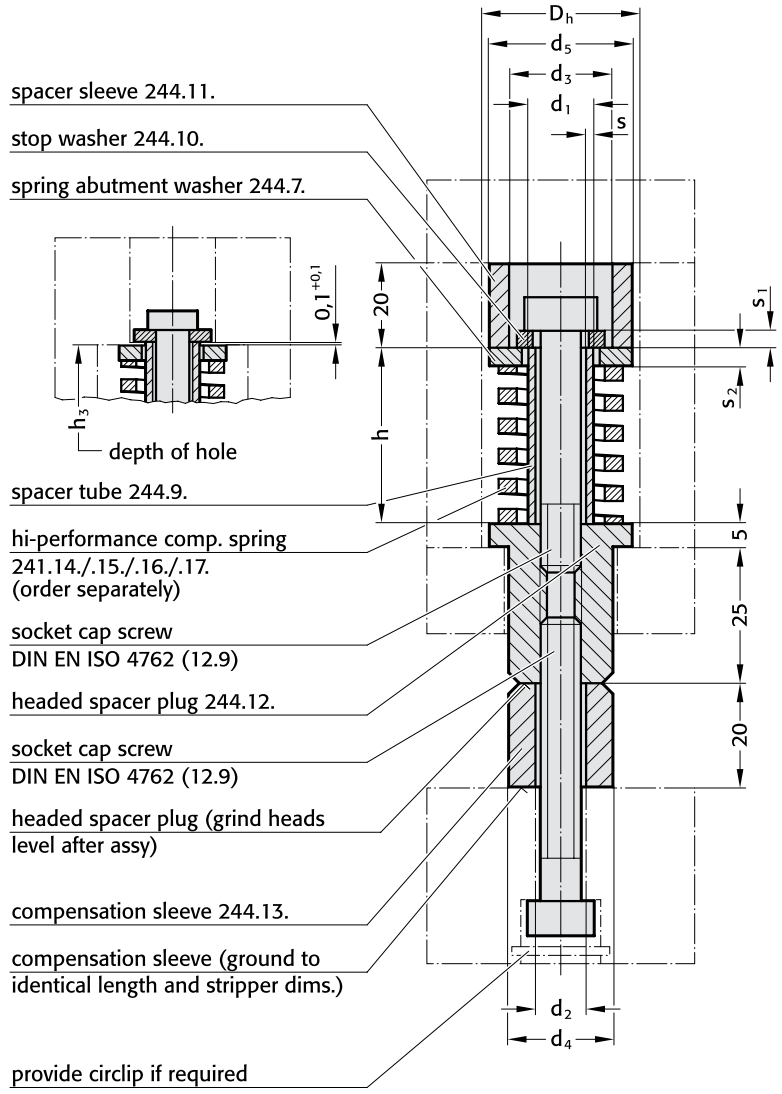
Adjust depth of c'bore h_3 or height of spacer sleeve so that spacer tube cap screw is relieved by about 0,1 mm.

244. □ . □□ .10

Application without Spacer Sleeve (c'bored hole)

244. □ . □□ .11

Application with Spacer Sleeve (straight hole)



244.20./.25./.32./.40.

spring dia.	socket cap screw $d_1 \times s$	h	d_2	d_3	d_4	d_5	D_h	s_1	d_2
20	10 × 1,8	spacer tube length 244.9.	M 6	18	20	25	26	3	4
25	12 × 1,8	on page F65	M 8						
32	16 × 2,5	spring selection chart on pages	M 10	30	32	38	40	4	5
40	20 × 3,5	F18–F33	M 12						

Ordering Code (example):

Spring + Spacer unit for spring dia. = 20 mm	= 244.20.
spacer tube length h = 38 mm with screw	= 038.
with spacer sleeve 244.11.	= 11
Order No	= 244.20.038.11

FIBRO

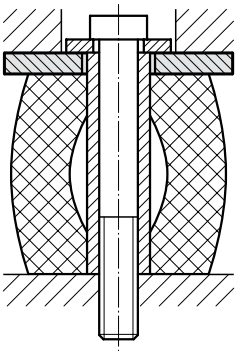
244.6. 244.7. 244.9. Spring Accessories

244.6. Thrust Washer Material: St 37

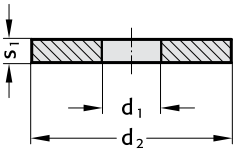
Spring ∅	25	32	40	50	63	80	100	125
d_1	10,5	13,5	13,5	16,5	16,5	20,5	20,5	26
d_2	32	40	50	60	80	100	120	150
s_1	4	5	5	6	8	10	12	15

Ordering Code (example):

Thrust washer for FIBROFLEX-springs	= 244.6.
Spring-∅ = 25 mm	= 025
Order No	= 244.6.025



244.6.

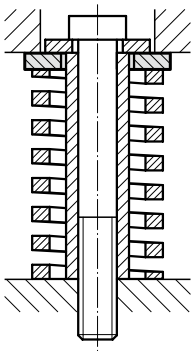


244.7. Thrust Washers Material: No 1.7131 case-hardened

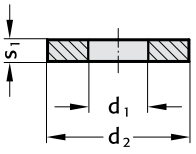
Spring ∅	20	25	32	40	50	63
d_1	10,5	12,5	16,5	20,5	25,5	35,5
d_2	25	25	38	38	50	65
s_1	4	4	5	5	6	8

Ordering Code (example):

Thrust washer for FIBROFLEX-springs	= 244.7.
Spring-∅ = 25 mm	= 025
Order No	= 244.7.025

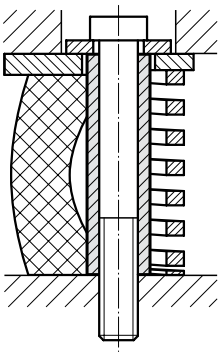


244.7.

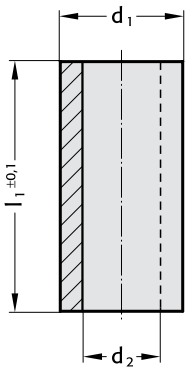


244.9. Spacer Tubes Material: St 35.4 case-hardened

d_1		10	12	13	16	19	20	25	30	32	35	36
d_2		6,4	8,4	9	11	13	13	17	22	22	23	26
l_1	27	●	●									
	30			●	●	●		Other lengths on request!				
	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							●				



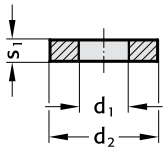
244.9.

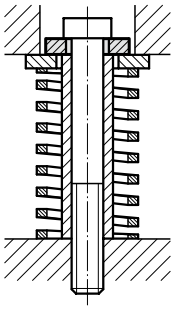


Ordering Code (example):

Spacer Tube	= 244.9.
d_1 = 16 mm	= 16.
l_1 = 38 mm	= 038
Order No	= 244.9.16.038

244.10.





244.10. Stop Washer Material: C 45, heat treated

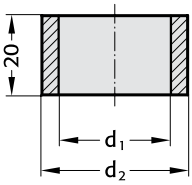
d_1	6,4	8,4	8,4	8,5	9	10,5	10,5	10,5	10,5	11	12,5	13	13	13	13,4	16,4	17	17	17	17
d_2	17	17	23	20	26	25	25	26	28	36	28	30	30	46	23	26	35	35	36	36
s_1	3	3	4	4	4	4	5	4	4	6	4	5	6	8	4	4	4	6	4	13

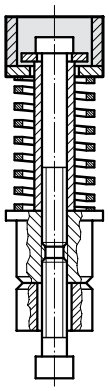
d_1	17	17	17	17	20,4	21	21	21	21	21	21	22	25	25	25	26	26	31	37
d_2	37	38	40	58	30	42	44	45	45	46	49	68	46	55	56	58	80	68	80
s_1	6	6	6	10	5	8	8	8	16	6	6	12	10	10	10	6	12	8	8

Ordering Code (example):

Stop Washer	= 244.10.
d_1 = 8,4 mm	= 084.
d_2 = 23 mm	= 23.
s_1 = 4 mm	= 04
Order No	= 244.10.084.23.04

244.11.





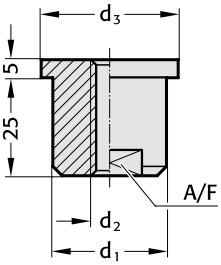
244.11. Spacer Sleeve Material: St 35.4, case-hardened

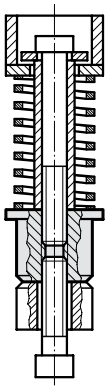
Spring ∅	20 u. 25	32 u. 40	50	63
d_1	20	30	–	–
d_2	25	38	–	–

Ordering Code (example):

Spacer Sleeve	= 244.11.
Spring ∅ = 25 mm or 20 mm resp.	= 25
Order No	= 244.11.25

244.12.





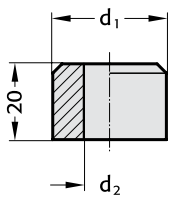
244.12. Spacer Plug Material: No. 1.7131, case-hardened

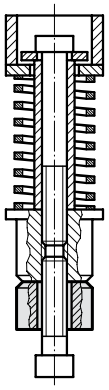
Spring ∅	20	25	32	40	50	63
d_1	20	20	32	32	–	–
d_2	M6	M8	M10	M12	–	–
d_3	25,3	25,3	38	38	–	–
sw	15	15	27	27	–	–

Ordering Code (example):

Spacer Plug	= 244.12.
Spring-∅ = 25 mm	= 25
Order No	= 244.12.25

244.13.





244.13. Compensation Disc Material: No. 1.7131

Spring-∅	20	25	32	40	50	63
d_1	20	20	32	32	–	–
d_2	7	9	11	14	–	–

Ordering Code (example):

Compensation Disc	= 244.13.
Spring-∅ = 20 mm	= 20
Order No	= 244.13.20

FIBRO

2441.14. 2441.15. 2450. Spring Accessories

2441.14. Threaded disc

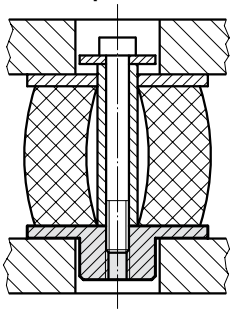
for FIBROFLEX®-/FIBROELAST®-Springs
Material: St 60

Spring-∅	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

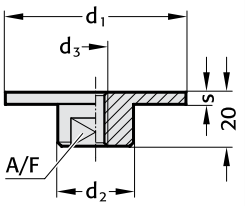
Ordering Code (example):

Threaed disc für FIBROFLEX®-Springs	= 2441.14.
Spring-∅ = 25 mm	= 025
Order No	= 2441.14.025

Mounting example:



2441.14.



2441.15. Threaded disc

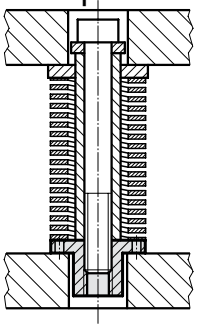
for helical Springs
Material: Ck 45 heat treated

Spring-∅ 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

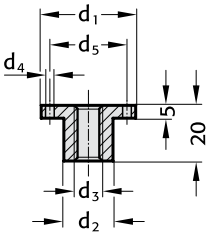
Ordering Code (example):

Threaded disc for helicalSprings	= 2441.14.
Spring-∅ = 25 mm	= 025
Order No	= 2441.14.025

Mounting example:



2441.15.



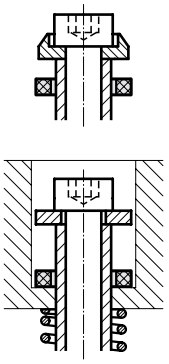
2450. Damping Discs Material: FIBROFLEX®

d_1	10,5	6,4	11	13	8,5	14	15,5	12	10,5	13	14	17	18	22	21	13,5	25	18	23,5	21	26	17
d_2	15	16	17	19	20	23	23	24	25	25	26	26	27	28	30	32	32	32	34	35	35	38
s	4	3	3	4	3	4	4	5	4	4	5	4	4	6	5	4	6	7	4	7	6	5

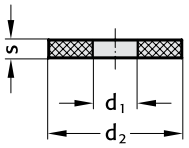
d_1	21	13,5	32	27	31	37	32	17	26	37	32	17	37	42	21	21	27
d_2	38	40	40	41	42	46	49	50	50	53	60	63	65	70	80	100	125
s	6	5	6	7	6	6	8	6	6	8	10	6	10	10	10	10	10

Ordering Code (example):

Damping Disc	= 2450.	
Hardness Shore (90 Shore A = 6.)	= 6.	(80 Shore A = 5.)
d_1 = 21 mm	= 21.	(95 Shore A = 7.)
d_2 = 80 mm	= 080.	on request
s = 10 mm	= 10	
Order No	= 2450.6.21.080.10	



2450.

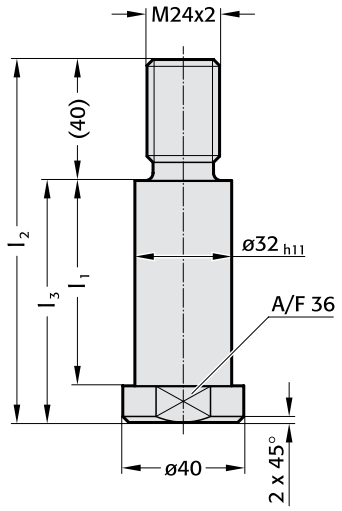


Retaining Bolts
Thrust Washers
FIBROFLEX®-Tubular Spring Elements

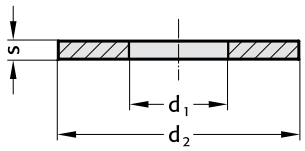
FIBRO

2441.18. 2441.16.
246.6.

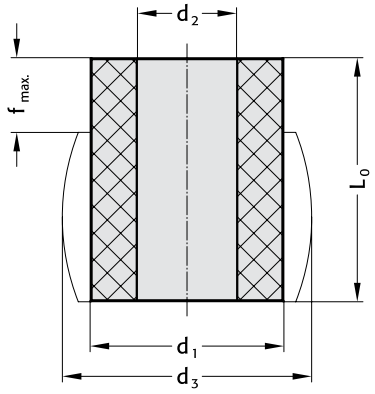
2441.18.



2441.16.



246.6.



2441.18. Retaining Bolts

Material: 1.7225,heat treated

Order No	l_1	l_2	l_3
2441.18.032.048	48	100	60
068	68	120	80
088	88	140	100
108	108	160	120
128	128	180	140
148	148	200	160
168	168	220	180
188	188	240	200
208	208	260	220
228	228	280	240
248	248	300	260
268	268	320	280
288	288	340	300

Ordering Code (example):

Retaining bolt	= 2441.18.
ø32 h_{11}	= 032.
l_1 = 88 mm	= 088
Order No	= 2441.18.032.088

2441.16. Thrust Washers

Material: 1.0570

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

Ordering Code (example):

Thrust washer	= 2441.16.
d_1 = 33 mm	= 330.
d_2 = 80 mm	= 080.
s = 6 mm	= 06
Order No	= 2441.16.330.080.06

246.6. FIBROFLEX®-Tubular Spring Elements

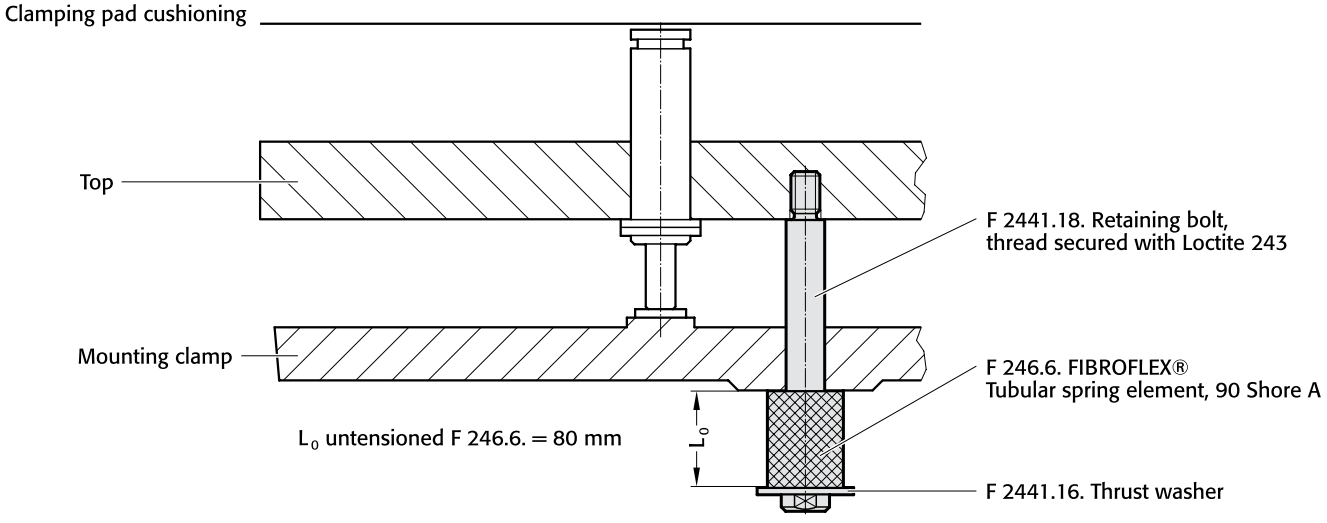
Hardness: 90 Shore A = yellow

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

Ordering Code (example):

FIBROFLEX®-Tubular spring elements	= 246.
90 Shore A,yellow	= 6.
d_1 = 63 mm	= 063.
d_2 = 33 mm	= 033.
l_0 = 80 mm	= 080
Order No	= 246.6.063.033.080

Installation example:



FIBRO

244.16. Spring-, Fit- and Spacer Units

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.

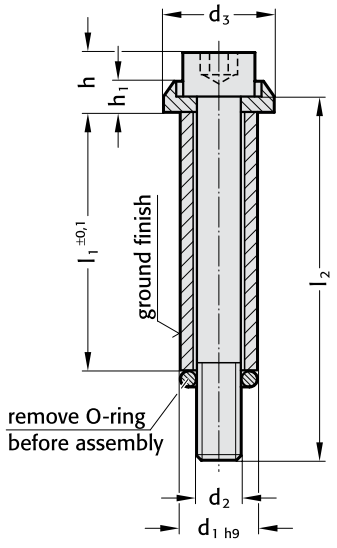
Execution:

Spacer tube:
tensile strength 1200–1300 N/mm²
Outside diameter ground to tolerance h_9
Supplied with socket cap screw
DIN EN ISO 4762 (12.9)

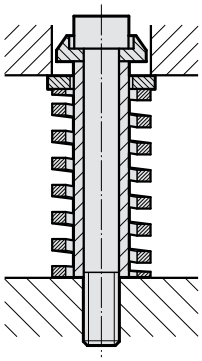
Note:

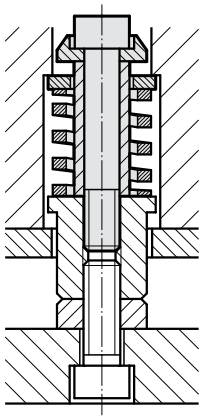
The units are supplied with a retaining O-ring which must be removed before application.

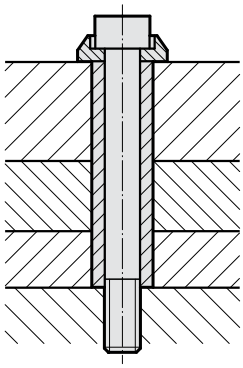
244.16.



Installation Examples:







d_1	10		12,5		15		17,5		23	
d_2	M 6		M 8		M 10		M 12		M 16	
d_3	15		19		23		27		34	
h	10		13		15		18		24	
h_1	5,5	l_2	6,5	l_2	7,5	l_2	9	l_2	11	l_2
l_1 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	●	75	●	80		
60	●	80	●	80	●	80	●	90	●	90
70	●	90	●	90	●	90	●	100	●	100
80	●	100	●	100	●	100	●	110	●	110
90	●	110	●	110	●	110	●	120	●	120
100			●	120	●	120	●	130	●	130
110							●	140	●	140
120					●	140	●	150	●	150
140							●	180	●	180
150									●	180
160									●	200
tightening torque Nm	13		32		65		120		290	

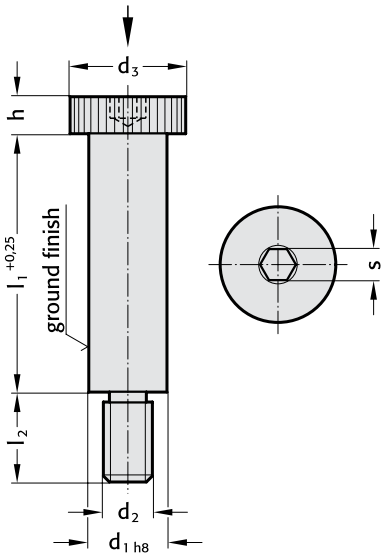
Ordering Code (example):

Spring-, Fit- and spacer Unit	= 244.16.
d_1 = 12,5 mm	= 125.
l_1 = 55 mm	= 055
Order No	= 244.16.125.055

Shoulder Screws

244.17.

244.17.



Execution:

Material:
high tensile steel
heat treated to 12.9 ISO 898-1.
Heads knurled.

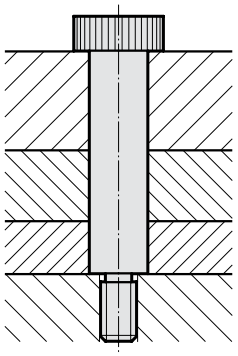
Ordering Code (example):

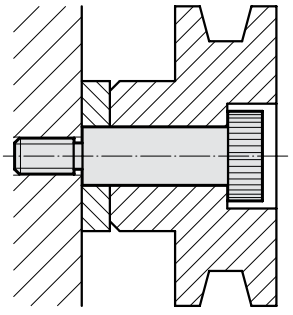
Shoulder Screw	= 244.17.
d_1 = 12 mm	= 120.
l_1 = 60 mm	= 060
Order No	= 244.17.120.060

244.17.

	d_1	6	8	10	12	16	20	24
	d_2	M 5	M 6	M 8	M 10	M 12	M 16	M 20
	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					●	●	●
tightening torque Nm		7	13	32	65	120	290	500

Installation Examples:





FIBRO

244.20. 244.32. 244.25. 244.40.

Combination Spring- and Spacer Units: Application Examples Spring Characteristics

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 pages F 10 – F 39.

With Spacer Sleeve

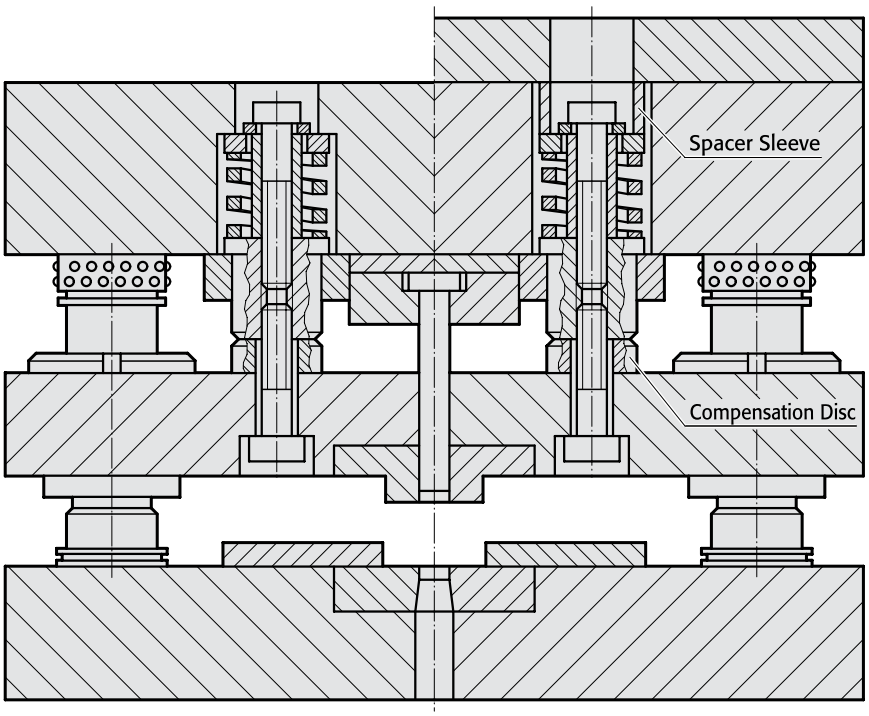
(with c`bored hole)

244. □. □□.10

With Spacer Sleeve

(with straight hole)

244. □. □□.11



Spring Characteristics:

Order No	spring sizes $D_h \times l_o$	preload Com pres-sion	spring preload forces (N) Typ 241.14	241.15	241.16	241.17	max. working stroke of spring (excl. preload) Typ .14	.15	.16	.17	spring coefficient (N/mm) Typ .14	.15	.16	.17	max. spring forces (N) at 80% max. deflection s_2 Type .14	.15	.16	.17
244.20. 027.	20×25	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
033.	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
038.	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
044.	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
048.	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.	25×25	2	200,0	294,0	750,0	–	10,4	8,8	7,2	–	100,0	147,0	375,0	–	1040	1294	2700	–
033.	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
038.	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
044.	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
048.	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.	32×38	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
044.	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
048.	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
061.	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
072.	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.	40×51	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
061.	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
072.	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

Ordering Code (example):

Spring and spacer Unit		
Spring dia. =20 mm	=	244.20.
spacer tube length h = 38 mm, with screw	=	038.
with spacer sleeve 244.11.	=	11
Order No	=	244.20.038.11

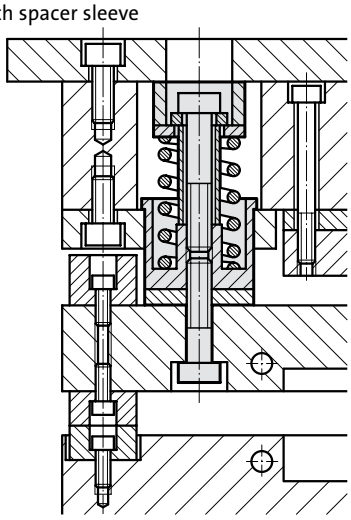
Combination Spring- and Spacer Units for low Installation Space and long Displacement

FIBRO

244.20.3. 244.25.3.
244.32.3. 244.40.3.

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.

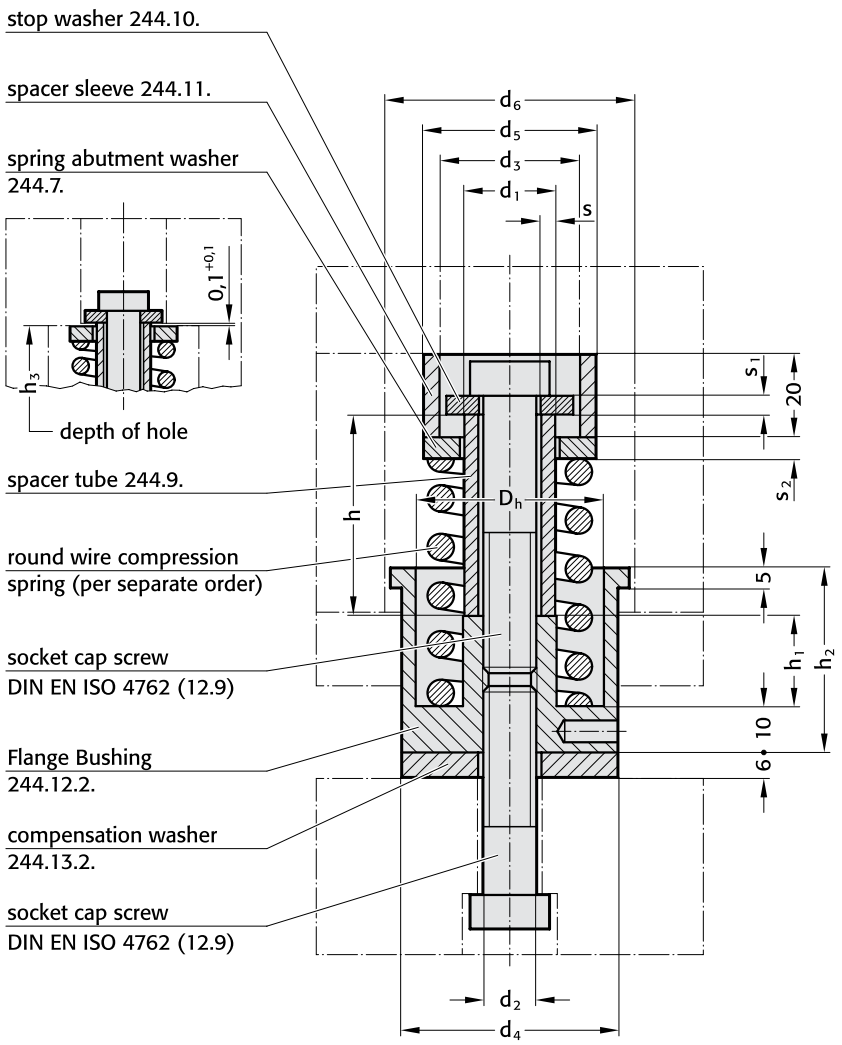
Adjust depth of c´bore or spacer sleeve length resp. so that spacer tube cap screw is relieved by about 0,1 mm.

244. □ .3. □□ .10

Application without spacer sleeve (c'bored hole)

244. □ .3. □□ .11

Application with spacer sleeve (through-hole)



244.20.3./244.25.3./244.32.3./244.40.3.

Spring dia	$d_1 \times s$	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	spacer tube length 244.9. on page F65. Spring selection on pages F18 – F33	M 6	18	25	25	31	20	3	4	5	36
25	12 × 1,8		M 8		32		38	25			10	
32	16 × 2,5		M 10	30	38	38	44	32	4	5	16	40
40	20 × 3,5		M 12		47		54	40			18	

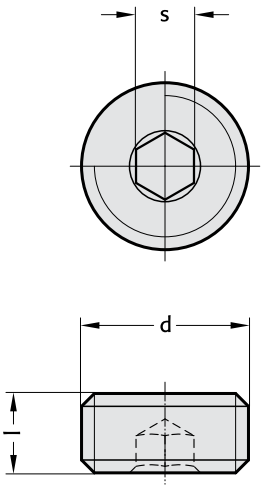
Ordering Code (example):

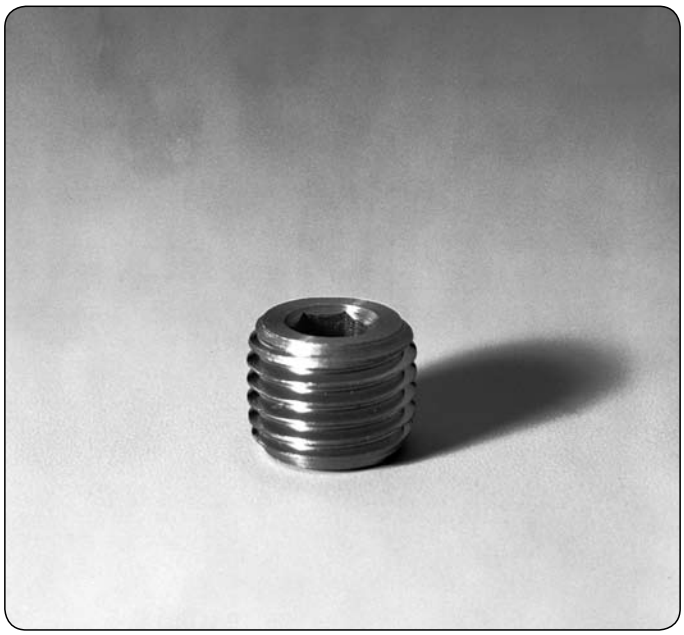
Spring- and Spacer Unit - for low installation space	
for spring-∅ = 20 mm	= 244.20.3.
spacer tube length h = 33 mm	= 033.
with spacer sleeve 244.11.	= 11
Order No	= 244.20.3.033.11

FIBRO

241.00.1. Set Screws for Compression Spring Adjustment

241.00.1.





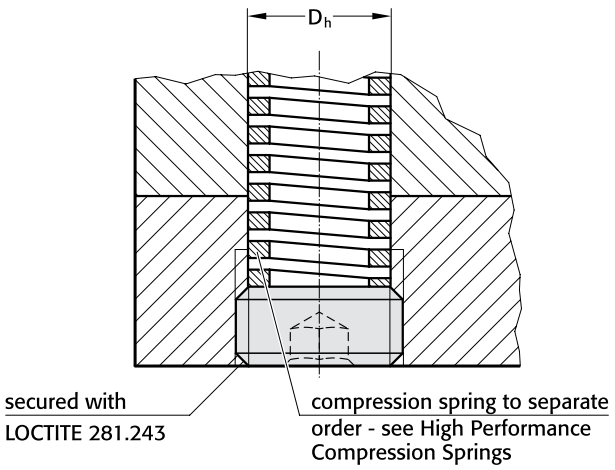
Description:

These set screws can be used as adjustable spring stops. They are available for all customary spring sizes from Ø 10 to Ø 40. The set screws are suitable for springs 241.14. to .26.

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.

Installation Example:



241.00.1.

d	M 12 × 1,5	M 14 × 1,5	M 18 × 1,5	M 22 × 1,5	M 28 × 1,5	M 35 × 1,5	M 42 × 1,5
l	10	10	10	10	12	12	12
s	6	6	8	8	10	10	10
spring dia.	10	12,5	16	20	25	32	40
D_h	10,5	12,5	16,5	20,5	26,5	33,5	40,5

Ordering Code (example):

Compression Spring Set Screw	= 241.00.1.
Thread size M 12 x 1,5	= 12
Order No	= 241.00.1.12

FIBROFLEX® Elastomer Strippers
Disc
FIBROFLEX® Shedder Inserts

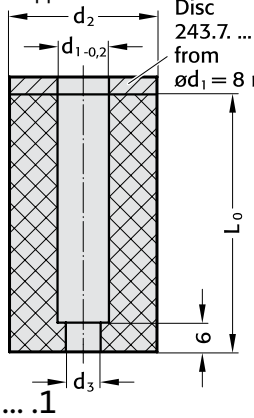
FIBRO

243.7. / 243.7. ... .1.
247.6.

243.7.

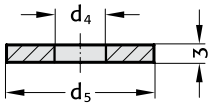
Elastomer Strippers

order separately
Disc
243.7. 1
from
ød$_1$ = 8 mm on



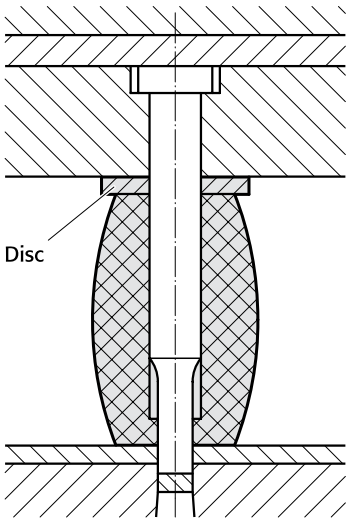
243.7. 1

Disc, steel:



243.7.

Installation Example



243.7.

Advantages:

Repairs, sharpening and modifications on dies equipped with elastomer strippers do not necessitate the dismantling of a stripper plate, thus becoming very expedient.
Any marring of delicate part surfaces is precluded. This makes elastomer strippers ideal for all painted, anodized, plastic-coated and polished parts.
FIBROFLEX® Elastomer Strippers are resistant against oils and greases.

Installation:

Push stripper over punch, where it will stay put on account of its elasticity. No other form of retention will be required.
A single press stroke will then pierce a hole through the bottom portion of the stripper that matches the punch shape exactly.

Applications:

especially in large dies, where the use of elastomer strippers does away with the need of huge stripper plates.

243.7.

d_1	d_2	d_3	L_0
			stock length
4	17	1,6	39 – 47 – 56
5	17		
6	19		other length are
6,3	19		available on request
8	21	3	(max. 56 mm)
10	23		
12,5	26		
13	26		
16	30		
20	38		
25	50		
32	55		
38	60		
40	63		95 Shore A

Ordering Code (example):

FIBROFLEX®-Stripper	= 243.7.
d_1 = 8 mm	= 080.
L_0 = 56 mm	= 056
Order No	= 243.7.080.056

243.7. 1

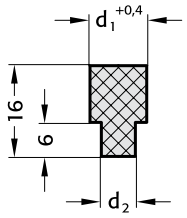
d_4	d_5
8,5	21
10,5	23
13	26
13,5	26
16,5	30
20,5	38
25,5	50
32,5	55
38,5	60
40,5	63

Ordering Code (example):

Disc	= 243.7. .1
d_4 = 32,5 mm	= 325
Order No	= 243.7.325.1

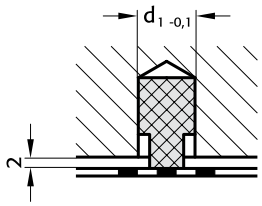
247.6.

Shedder Inserts



247.6.

Installation Example



247.6.

Instead of conventional shedder pins and their springs as well as set screws, FIBROFLEX® Shedder Inserts are simply pressed into matching holes. They are made from material with a hardness of 90 Shore A.

Order No	d_1	d_2	stripping force (kg)
247.6.008.016	8	4	20
247.6.010.016	10	6	25
247.6.012.016	12	8	30

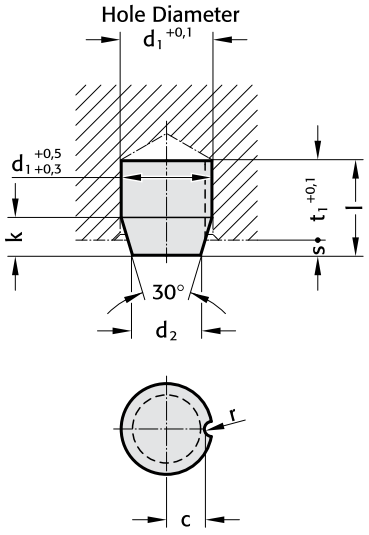
FIBRO

2471.6. FIBROFLEX®-Compression Pads

Material:

FIBROFLEX®
Hardness 90 Shore A

2471.6.



2471.6.

Order No	d_1	d_2	l	k	t_1	r	c	Compressive force (N)	at s
2471.6.006	6	3,6	9,5	4,5	8	–	–	100	1,5
010	10	6	15,5	7,5	13	1	4	450	2,5
016	16	9,5	25	12	21	1,5	6,5	1500	4
024	24	18	25	10	21	2	10	3000	4
030	30	20	35	19	30	2,5	12,5	3000	5
032	32	24	32	14	26	3	13	12000	6
039	39,5	30	40	16	34	3	16,8	25000	6

Ordering Code (example):

FIBROFLEX® Compression Pad	=	2471.6.
d_1 = 16 mm	=	016
Order No	=	2471.6.016

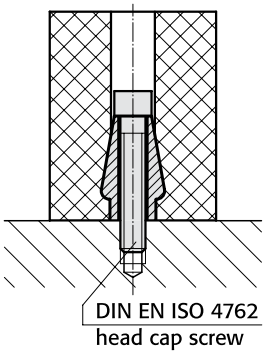
Locating Bolts
Locating Bolts, threaded
for FIBROFLEX® round Springs and FIBROELAST®

FIBRO

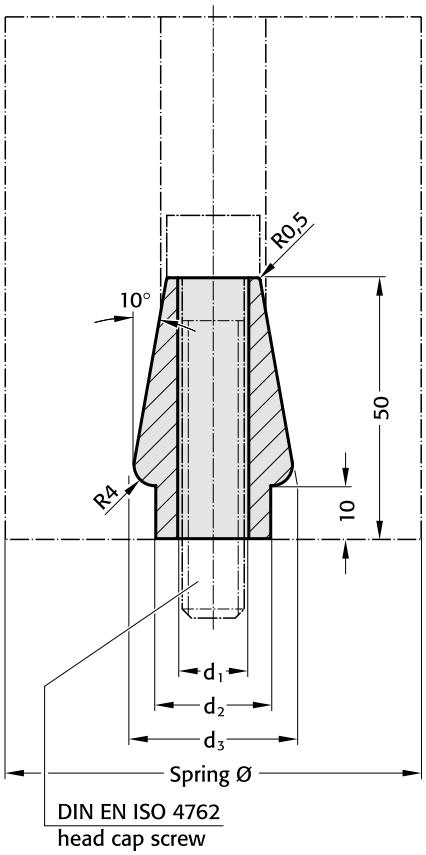
2441.5.
2441.6.

Installation Example:

Tool: discharging spring



2441.5.



2441.5.

Order No	Spring Ø	d_1	d_2	d_3	DIN EN ISO 4762 head cap screw
2441.5.10	63	11	18	28	M10 × 65
12	80	13,5	22	32	M12 × 70
	100				
16	125	17,5	28	38	M16 × 70

Ordering Code (example):

Locating bolts	=	2441.5.
Screw size M16	=	16
Order No	=	2441.5.16

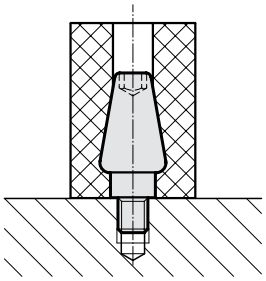
Note:

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

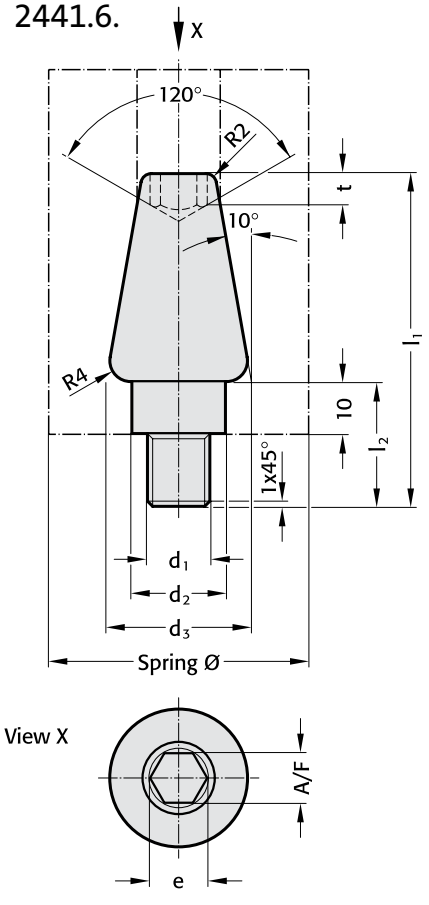
Supplied without screws.

Installation Example:

Tool: discharging spring



2441.6.



2441.6.

Order No	Spring Ø	d_1	d_2	d_3	l_1	l_2	SW	e	t
2441.6.12	63	M12	18	28	64	24	10	11,4	6
16	80	M16	22	32	68	28	10	11,4	6
	100								
20	125	M20	28	38	72	32	14	16	8
	140								

Ordering Code (example):

Locating bolts, threaded	=	2441.6.
d_1 = M16	=	16
Order No	=	2441.6.16

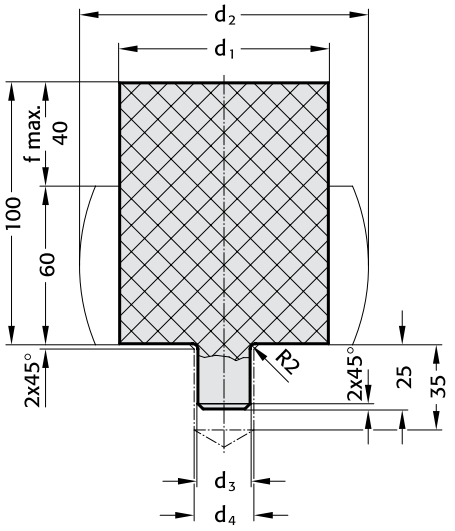
Note:

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

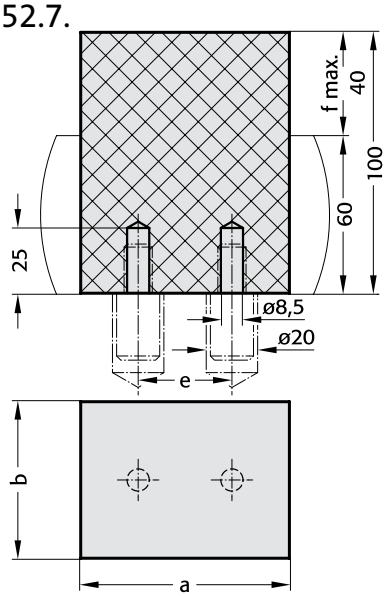
FIBRO

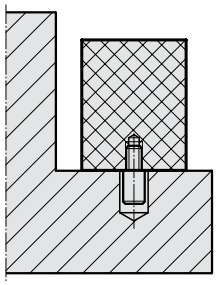
2531.7. FIBROFLEX® Setting-up Bumpers, round
252.7. FIBROFLEX® Setting-up Bumpers, square

2531.7.



252.7.





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

Application

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

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 (e.g. guide screw, order no 244.5.13.040, see diagram).

Warning!

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).

2531.7.

Shore hardness 95 A

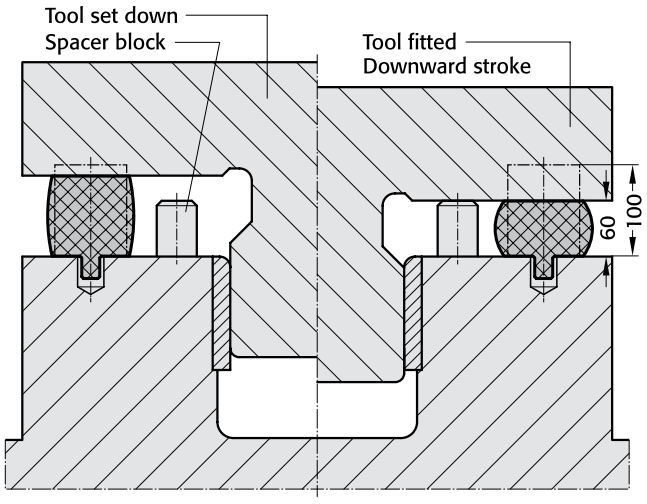
Order No	d_1	d_2	d_3	d_4	Load-bearing capacity in daN for f=20	f=25	f=40	Admissible tool weight in kg for 4 setting up bumpers f=20/Safety factor 1,5
2531.7.063	63	86	16	18	2200	2800	4800	5800
080	80	111	20	22	3500	4600	8500	9300
100	100	136	20	22	5000	6700	11700	13300
125	125	171	25	28	7600	9400	18900	20200

252.7.

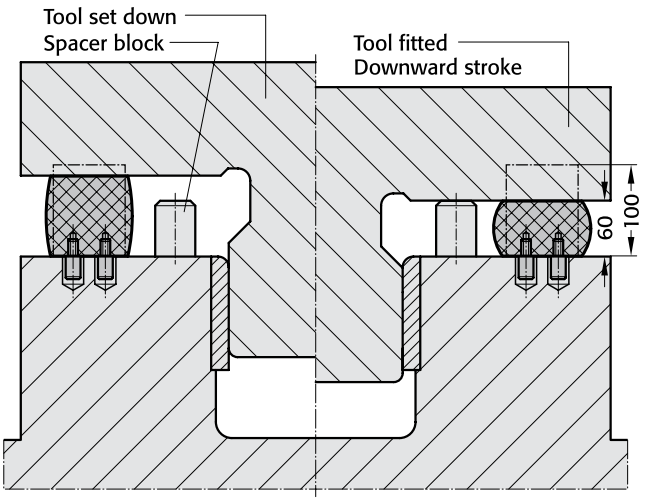
Shore hardness 95 A

Order No	a	b	e	Load-bearing capacity in daN for f = 20 mm	Admissible tool weight in kg for 4 setting up bumpers Safety factor 1,5
252.7.080.060	80	60	36	2700	7100
100.080	100	80	50	6200	16500
125.100	125	100	60	8600	22900
180.100	180	100	100	13600	36200

2531.7. Installation Example:



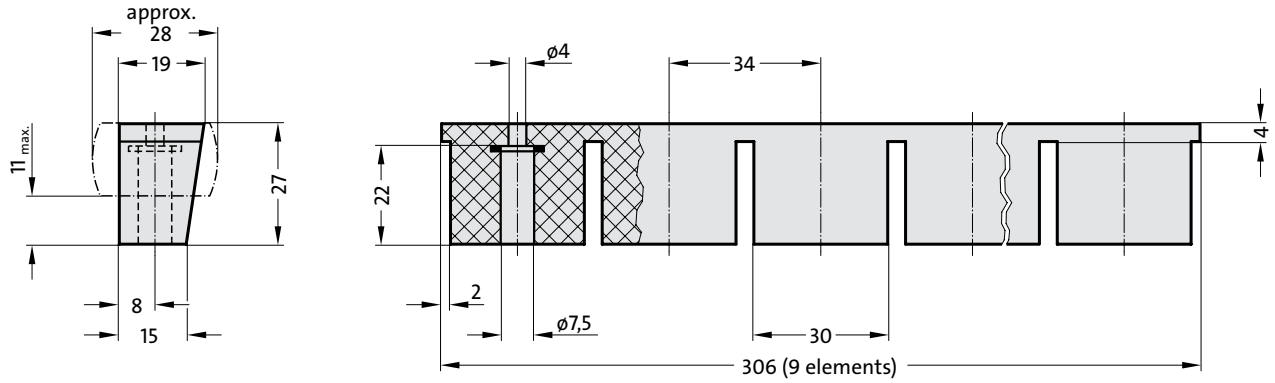
252.7. Installation Example:



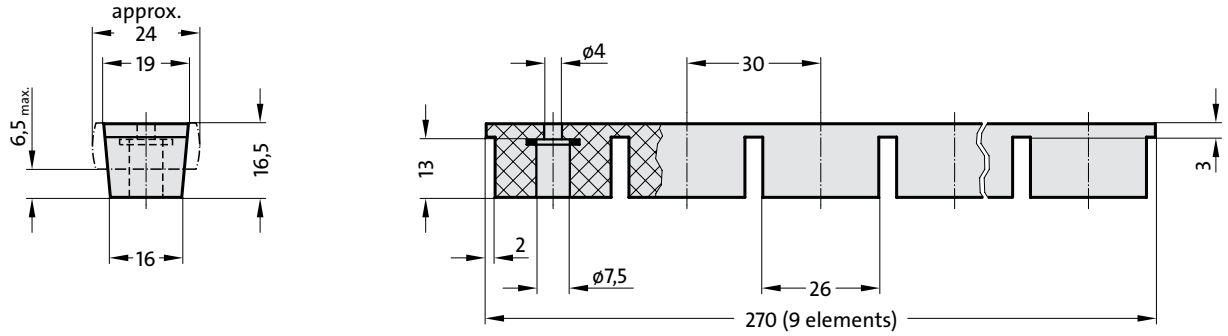
Strippers for Blanking Dies to Daimler / VW Standard / VDI 3362

2532.2.

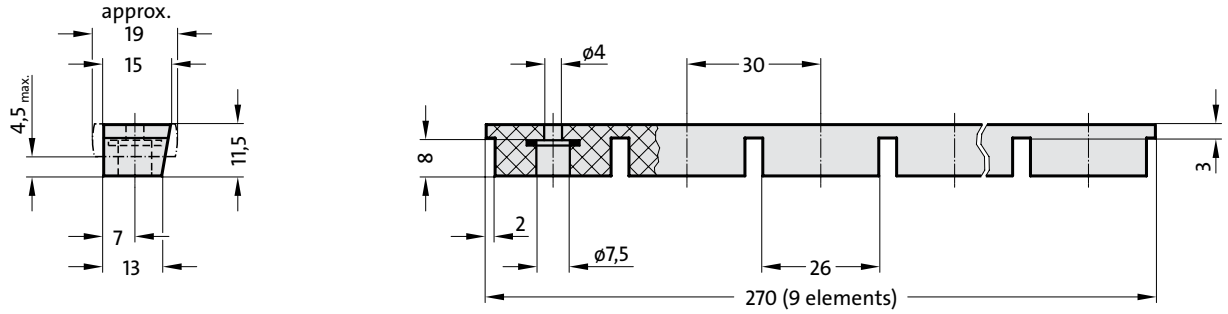
2532.2.190.270.0306



2532.2.190.165.0270



2532.2.150.115.0270



Material:

Perbunan
Hardness to DIN 53505: Shore A65±5

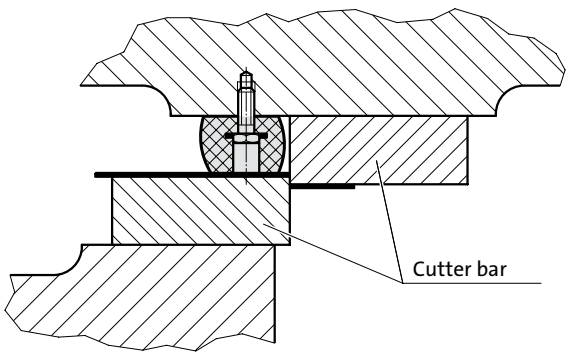
Construction:

Surface quality to DIN ISO 3302-1

Application:

For blanking die tools
Supplied without screws

Installation example:

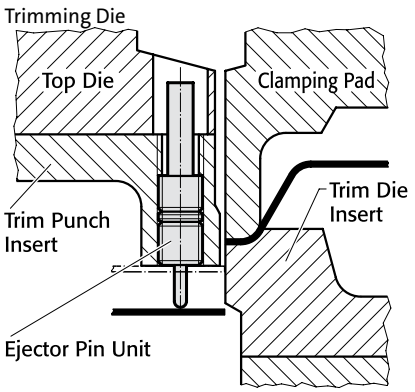


Spring Plungers with hexagon
VDI 3004
Insertion Tool

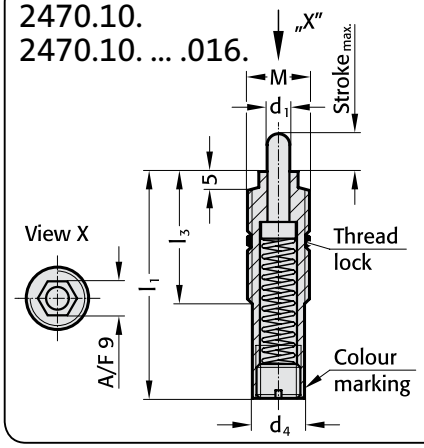
FIBRO

2470.10. 2470.10. ... .016.
2470.10.11

Installation Example



2470.10.
2470.10. ... .016.

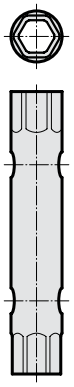


Description:

Spring ejectors 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.
The spring-loaded pins are hardened.

2470.10.11

(A/F 9)



2470.10. 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	M16	60	35	10	0,95	3,8	13,3
2470.10.015.060.1						15	2	10	40,0
2470.10.020.080.1				80		20	1,38	6,9	34,5
2470.10.030.080.1						30	1,30	6,5	45,5
2470.10.030.120.1				120			0,73	18	40,0
2470.10.040.150.1				150		40	0,6	13,2	37,2
2470.10.050.150.1						50			43,2
2470.10.060.150.1						60			49,2
2470.10.070.200.1				200		70	0,44	9,68	40,5
2470.10.080.200.1						80			44,8

2470.10. 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	M16	60	35	10	3,25	13	45,5
2470.10.015.060.2						15	2,60	15	56,0
2470.10.020.080.2				80		20	6,90	34,5	172,5
2470.10.030.120.2				120		30	2,90	20	80,0
2470.10.030.150.2				150			2,55	56,1	132,2
2470.10.040.150.2				150		40			158,1
2470.10.050.200.2				200		50	1,61	19,3	99,9
2470.10.060.200.2						60			116,1
2470.10.070.200.2						70			132,1
2470.10.080.200.2						80	0,94	25	100,1

2470.10. 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	M16	80	35	20	3,02	15,1	75,6

2470.10. ... 016. 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
2470.10.010.016.060.1	6	13,4	M16×1,5	60	35	10	0,95	3,8	13,3
2470.10.015.016.060.1						15	2	10	40,0
2470.10.020.016.080.1				80		20	1,38	6,9	34,5
2470.10.030.016.080.1						30	1,30	6,5	45,5
2470.10.030.016.120.1				120			0,73	18	40,0
2470.10.040.016.150.1				150		40	0,6	13,2	37,2
2470.10.050.016.150.1						50			43,2
2470.10.060.016.150.1						60			49,2
2470.10.070.016.200.1				200		70	0,44	9,68	40,5
2470.10.080.016.200.1						80			44,8

2470.10. ... 016. 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
2470.10.010.016.060.2	6	13,4	M16×1,5	60	35	10	3,25	13	45,5
2470.10.015.016.060.2						15	2,60	15	56,0
2470.10.020.016.080.2				80		20	6,90	34,5	172,5
2470.10.030.016.120.2				120		30	2,90	20	80,0
2470.10.030.016.150.2				150			2,55	56,1	132,6
2470.10.040.016.150.2				150		40			158,1
2470.10.050.016.200.2				200		50	1,61	19,3	99,9
2470.10.060.016.200.2						60			116,1
2470.10.070.016.200.2						70			132,1
2470.10.080.016.200.2						80	0,94	25	100,1

2470.10. ... 016. 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
2470.10.020.016.080.3	6	13,4	M16x1,5	80	35	20	3,02	15,1	75,6

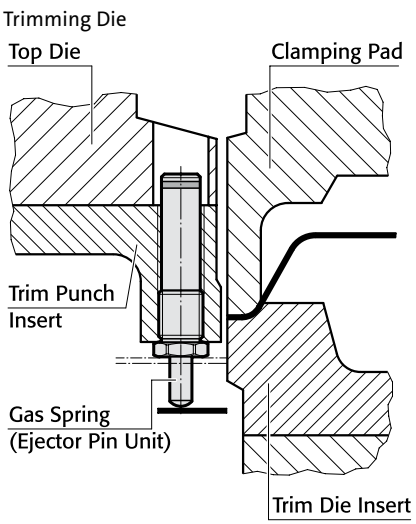
FIBRO

2479.034.

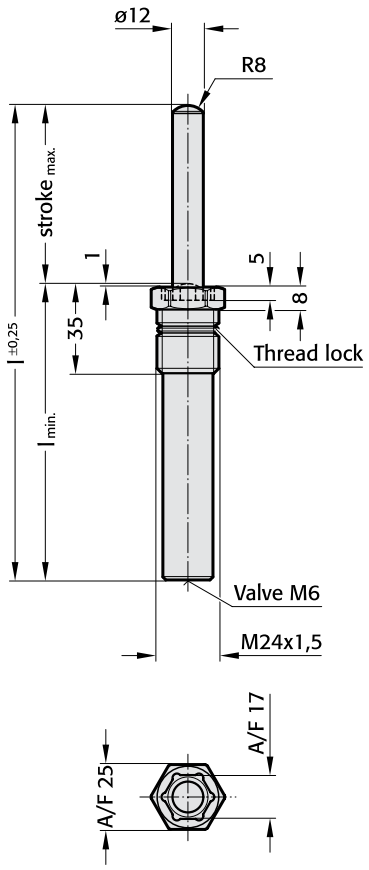
Spring Plungers with Gas Spring (Ejector Pin Units) to WDX

APPROVED PED 97/23/EC

Installation Example



2479.034.



Description:

Spring ejectors are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries.

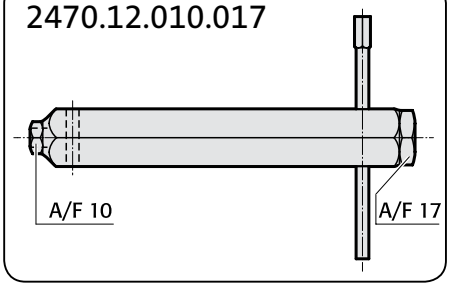
Note:

Do not repair worn springs; they have to be replaced completely

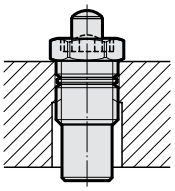
Pressure medium:	Nitrogen N2
Max. filling pressure:	150 bar (at 20°C)
Min. filling pressure:	20 bar
Working temperature:	0°C to +80°C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 30 to 80 (at 20°C)
Max. piston speed:	1.6 m/s

Warning:
Different colour coding for spring force used in WDX standard

2470.12.010.017



Mounting example



2479.034.00020./.00040./.00080./.00170.

		stroke			spring force (daN)							
					.00020.		.00040.		.00080.		.00170.	
Order No		max.	$l_{min.}$	l	initial	final	initial	final	initial	final	initial	final
2479.034.	.010	10	55	65	23	32,5	45	65,0	85	122,0	170	243,5
	016	16	61	77		36,6		73,3		137,4		274,8
	020	20	65	85		36,0		72,0		134,5		269,0
	025	25	70	95		38,9		77,8		145,9		291,8
	030	30	75	105		37,5		75,0		141,0		281,5
	038	38	83	121		40,7		81,4		152,7		305,4
	040	40	85	125		38,5		77,0		144,5		289,0
	050	50	95	145		42,0		83,5		156,5		313,0
	060	60	105	165		42,0		84,0		157,0		314,0
	070	70	115	185		42,0		84,0		157,5		315,0
	080	80	125	205		42,0		84,0		158,0		315,5
	100	100	145	245		42,0		84,5		158,0		316,5
	125	125	170	295		42,0		84,5		158,5		317,0

Ordering Code (example):

Spring Plunger with Gas Spring (Ejector Pin Unit)		
M24 X 1,5 to WDX	=	2479.034.
Force 20 daN	=	00020.
Stroke 20 mm	=	020
Order No	=	2479.034.00020.020

Spring Force Colour Markings:

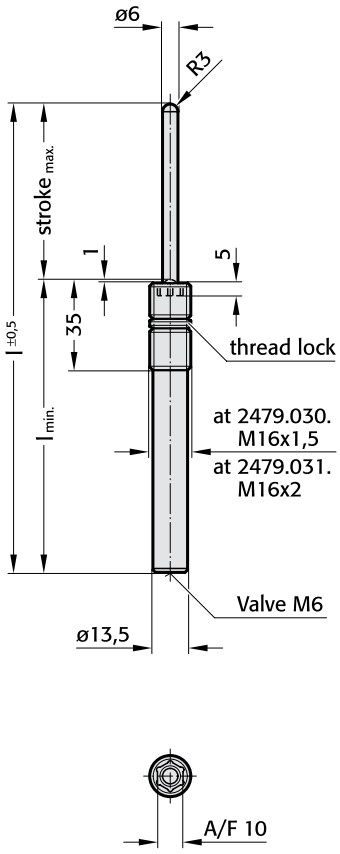
Order No	Colour	initial spring force daN	pressure (bar)
2479.034. 00020.	green	23	20
00040.	blue	45	40
00080.	red	85	75
00170.	yellow	170	150
00000.	black, upon customers request; also available unfilled		

Spring Plungers with Gas Spring (Ejector Pin Units) with hexagon socket VDI 3004

FIBRO

2479.030.
2479.031.

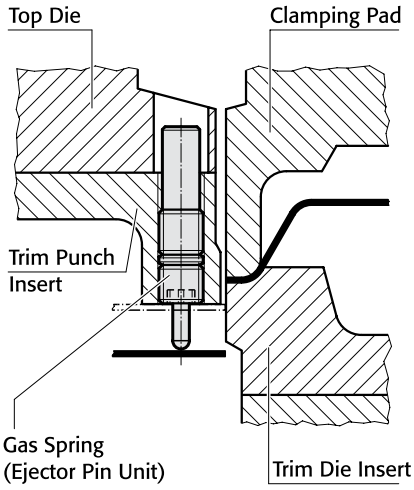
2479.030.
2479.031.



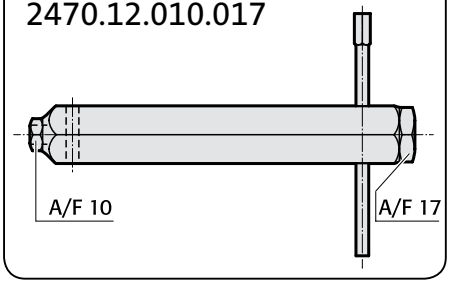
[2] Hexagon nut order supplementary:
2480.004.00040.1 (M16 x 1,5)
2480.004.00040.2 (M16 x 2)

Installation Example

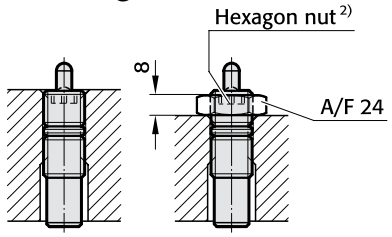
Trimming Die



2470.12.010.017



Mounting Variations :



Description:

Spring ejectors 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:

Do not repair worn springs; they have to be replaced completely

Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar (at 20 °C)
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

2479.030.00005./ 00010./ 00020./ 00040.
2479.031.00004.[1]/ 00005./ 00010./ 00020./ 00040.

[1] Spring forces for 2479.031. only

Order No	stroke max.	$l_{min.}$	l	spring force (daN) (violet) .00004.[1] initial	final	(green) .00005. initial	final	(blue) .00010. initial	final	(red) .00020. initial	final	(yellow) .00040. initial	final
2479. . .010	10	55	65	3,4	6,0	6	10,3	11	19,0	21	36,1	42	73,0
020	20	65	85		5,2		9,4		17,2		32,8		66,1
030	30	75	105		5,2		9,1		16,7		31,9		64,5
040	40	85	125		5,2		9,0		16,5		31,5		63,7
050	50	95	145		5,4		9,6		17,6		33,6		67,7
060	60	105	165		5,4		9,4		17,3		33,0		66,5
070	70	115	185		5,4		9,3		17,0		32,5		65,7
080	80	125	205		5,2		9,2		16,8		32,1		65,1
100	100	145	245		5,2		9,1		16,7		31,9		64,3
125	125	170	295		5,2		9,0		16,5		31,5		63,8

Ordering Code (example):		
Gas Spring		
(Ejector Pin Unit) M16 x 1,5	=	2479.030.
Force 6 daN	=	00005.
Stroke 10 mm	=	010
Order No	=	2479.030.00005.010

Spring Force Colour Markings:

Order No	Colour	initial spring force daN	pressure (bar)
2479.031.00004.	violet	4	12
2479. . .00005.	green	6	20
00010.	blue	11	40
00020.	red	21	75
00040.	yellow	42	150
00000.	black, upon customers request; also available unfilled		

FIBRO

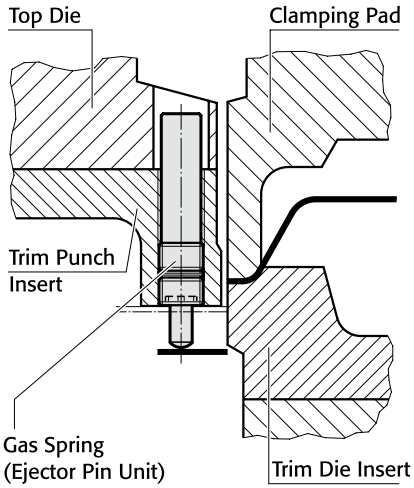
2479.032.

Spring Plungers with Gas Spring (Ejector Pin Units) with hexagon socket VDI 3004

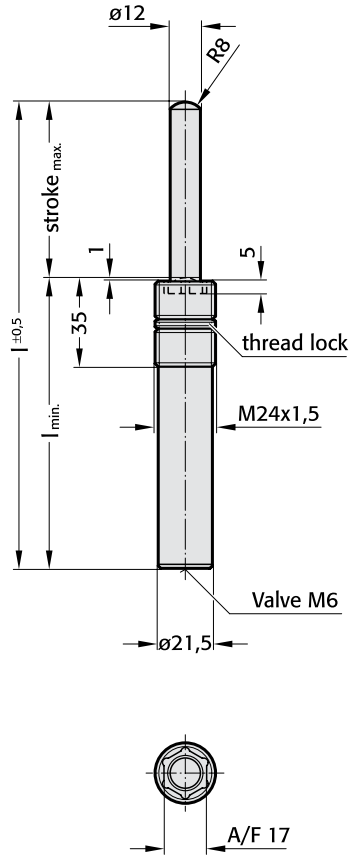
APPROVED PED 97/23/EC

Installation Example

Trimming Die



2479.032.



[2] Hexagon nut order supplementary: 2480.004.00170

Description:

Spring ejectors are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries.

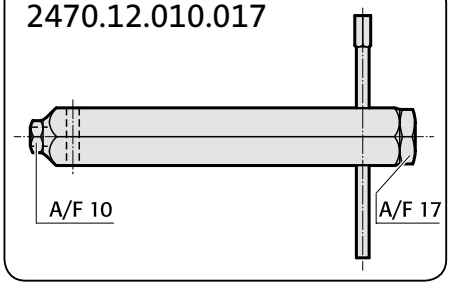
Assembly requires the use of special FIBRO insertion tool (2470.12.010.017)

Note:

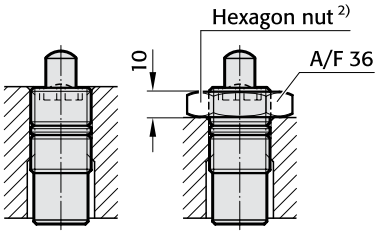
Do not repair worn springs; they have to be replaced completely

Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar (at 20 °C)
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

2470.12.010.017



Mounting Variations :



2479.032.00020./ 00040./ 00080./ 00170.

		stroke			spring force (daN) .00020.		.00040.		.00080.		.00170.	
Order No		max.	$l_{min.}$	l	initial	final	initial	final	initial	final	initial	final
2479.032.	. 010	10	55	65	23	33,1	45	64,8	85	122,4	170	244,8
	020	20	65	85		36,3		71,1		134,3		268,6
	030	30	75	105		38,2		74,7		141,1		282,2
	040	40	85	125		39,3		76,9		145,4		290,7
	050	50	95	145		42,5		83,2		157,3		314,5
	060	60	105	165		42,5		83,2		157,3		314,5
	070	70	115	185		42,8		83,7		158,1		316,2
	080	80	125	205		42,8		83,7		158,1		316,2
	100	100	145	245		43,0		84,1		159,0		318,0
	125	125	170	295		43,0		84,1		159,0		318,0

Ordering Code (example):

Gas Spring with hexagon socket		
(Ejector Pin Unit) M24 × 1,5	=	2479.032.
Force 20 daN	=	00020.
Stroke 20 mm	=	020
Order No	=	2479.032.00020.020

Spring Force Colour Markings:

Order No	Colour	initial spring force daN	pressure (bar)
2479.032. 00020.	green	23	20
00040.	blue	45	40
00080.	redt	85	75
00170.	yellow	170	150
00000.	black, upon customers request; also available unfilled		

FIBRO

2471.01./.02. 2471.31./.32.
2471.03./.04. 2471.33./.34.

Spring Plungers with Spring Loaded Ball
with slot
with hexagon socket head

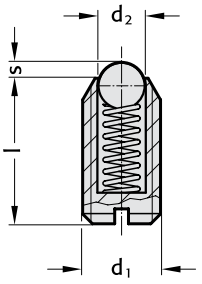
Material:

2471.01. Sleeve: Free-maching steel, burnished
Ball: Hardened ball bearing steel
Spring: Nirosta
2471.02. Sleeve: Free-maching steel, burnished
Ball: Hardened ball bearing steel/ ball yellow
Spring: Nirosta
2471.31. Sleeve: Nirosta 1.4305
Ball: Nirosta, hardened
Spring: Nirosta
2471.32. Sleeve: Nirosta 1.4305/end of sleeve yellow
Ball: Nirosta, hardened
Spring: Nirosta

Note:

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

2471.01./2471.02.
2471.31./2471.32.



2471.01./.31. Normal spring force

Order No		d_1	l	s	d_2	Spring force in N* Start	End
2471.	.003	M 3	7	0,4	1,5	3	4,5
	004	M 4	9	0,8	2,5	8,5	14
	005	M 5	12	0,9	3	8	14
	006	M 6	14	1	3,5	11	18
	008	M 8	16	1,5	4,5	18	31
	010	M 10	19	2	6	24	45
	012	M 12	22	2,5	8	26	49
	016	M 16	24	3,5	10	41	86
	020	M 20	30	4,5	12	56	111
	024	M 24	34	5,5	15	81	151

* statistical average

2471.02./.32. Increased spring force

Order No		d_1	l	s	d_2	Spring force in N* Start	End
2471.	.005	M 5	12	0,9	3	15	22
	006	M 6	14	1	3,5	19	28
	008	M 8	16	1,5	4,5	36	62
	010	M 10	19	2	6	57	104
	012	M 12	22	2,5	8	61	110
	016	M 16	24	3,5	10	68	142
	020	M 20	30	4,5	12	84	166
	024	M 24	34	5,5	15	127	237

* statistical average

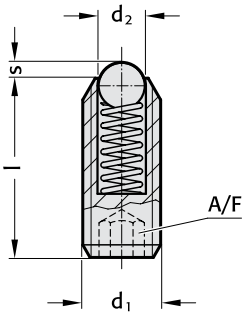
Material:

2471.03. Sleeve: Free-maching steel, burnished
Ball: Hardened ball bearing steel
Spring: Nirosta
2471.04. Sleeve: Free-maching steel, burnished
Ball: Hardened ball bearing steel/ ball yellow
Spring: Nirosta
2471.33. Sleeve: Nirosta 1.4305
Ball: Nirosta, hardened
Spring: Nirosta
2471.34. Sleeve: Nirosta 1.4305/ end of sleeve yellow
Ball: Nirosta, hardened
Spring: Nirosta

Note:

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

2471.03./2471.04.
2471.33./2471.34.



2471.03./.33. Normal spring force

Order No		d_1	d_2	l	s	A/F	Spring force in N* Start	End
2471.	.003	M 3	1,5	8	0,4	1,5	3	4,5
	004	M 4	2,5	12	0,8	2	8,5	14
	005	M 5	3	14	0,9	2,5	8	14
	006	M 6	3,5	15	1	3	11	18
	008	M 8	4,5	18	1,5	4	18	31
	010	M 10	6	23	2	5	24	45
	012	M 12	8	26	2,5	6	26	49
	016	M 16	10	33	3,5	8	41	86
	020	M 20	12	43	4,5	10	56	111
	024	M 24	15	48	5,5	12	81	151

* statistical average

2471.04./.34. Increased spring force

Order No		d_1	d_2	l	s	A/F	Spring force in N* Start	End
2471.	.005	M 5	3	14	0,9	2,5	15	22
	006	M 6	3,5	15	1	3	19	28
	008	M 8	4,5	18	1,5	4	36	62
	010	M 10	6	23	2	5	57	104
	012	M 12	8	26	2,5	6	61	110
	016	M 16	10	33	3,5	8	68	142
	020	M 20	12	43	4,5	10	84	166
	024	M 24	15	48	5,5	12	127	237

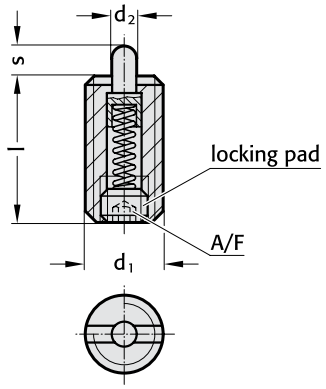
* statistical average

Spring Plungers
with Spring Loaded Pin,
with slot, with hexagon socket head

FIBRO

2472.01./.02. 2472.31./.21./.22.
2472.03./.04./.33./.34.

2472.01./.02./.31./.21./.22.



Material:

2472.01.	Sleeve:	Free-maching steel, burnished
	Pin:	Free machining steel hardened, burnished
	Spring:	Nirosta
2472.02.	Sleeve:	Free-maching steel, burnished
	Pin:	Free machining steel hardened, burnished/ threaded pin shining
	Spring:	Nirosta
2472.31.	Sleeve:	Nirosta 1.4305
	Pin:	Nirosta 1.4305
	Spring:	Nirosta
2472.21.	Sleeve:	Free-maching steel, burnished
	Pin:	Delrin white (FOM)
	Spring:	Nirosta
2472.22.	Sleeve:	Nirosta 1.4305
	Pin:	Delrin white(FOM)
	Spring:	Nirosta

Note:

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

2472.01./.31./.21./.22. Normal spring force

Order No		d_1	d_2	l	s	A/F	Spring force in N* Start	End
2472.[ ][ ][ ]	003	M 3	1	12	1	0,7	2,0	4
	004	M 4	1,5	15	1,5	1,3	4,5	16
	005	M 5	2,4	18	2,3	1,5	6,0	19
	006	M 6	2,7	20	2,5	2	6,0	19
	008	M 8	3,5	22	3	2,5	10	39
	010	M 10	4	22	3	3	10	39
	012	M 12	6	28	4	4	12	53
	016	M 16	7,5	32	5	5	45	100
	020	M 20	10	40	7	6	52	125
	024	M 24	12	52	10	8	70	170

* statistical average

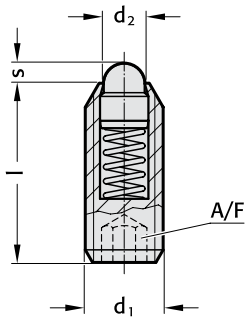
Execution: 2472.31.– d_1 = M4 to M20
2472.21.– d_1 = M4 to M16
2472.22.– d_1 = M4 to M16

2472.02. Increased spring force

Order No	d_1	d_2	l	s	A/F	Spring force in N* Start	End
2472.02.005	M 5	2,4	18	2,3	1,5	11	40
006	M 6	2,7	20	2,5	2	15	43
008	M 8	3,5	22	3	2,5	20	75
010	M 10	4	22	3	3	20	75
012	M 12	6	28	4	4	45	120
016	M 16	7,5	32	5	5	64	160
020	M 20	10	40	7	6	75	195
024	M 24	12	52	10	8	75	245

* statistical average

2472.03./.04./33./.34.



Material:

2472.03.	Sleeve:	Free-machining steel, burnished
	Pin:	Free machining steel hardened, burnished
	Spring:	Nirosta
2472.04.	Sleeve:	Free-machining steel, burnished
	Pin:	Free machining steel hardened, burnished/ pin - blue galvanised
	Spring:	Nirosta
2472.33.	Sleeve:	Nirosta 1.4305
	Pin:	Nirosta 1.4305
	Spring:	Nirosta
2472.34.	Sleeve:	Nirosta 1.4305/end of sleeve yellow
	Pin:	Nirosta 1.4305
	Spring:	Nirosta

Note:

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

2472.03./.33. Normal spring force

Order No		d_1	d_2	l	s	A/F	Spring force in N* Start	End
2472.[ ][ ][ ]	004	M 4	1,8	12	1,5	2	4,5	12,5
	005	M 5	2,4	14	2	2,5	5	13
	006	M 6	2,7	15	2	3	6	17
	008	M 8	3,8	18	2	4	16	33
	010	M 10	4,5	23	2,5	5	19	42
	012	M 12	6,2	26	3,5	6	22	57
	016	M 16	8,5	33	4,5	8	38	78
	020	M 20	10,0	43	6,5	10	39	81
	024	M 24	13,0	48	8	12	72	155

* statistical average

2472.04./.34. Increased spring force

Order No		d_1	d_2	l	s	A/F	Spring force in N* Start	End
2472.[ ][ ][ ]	006	M 6	2,7	15	2	3	11	25
	008	M 8	3,8	18	2	4	23	59
	010	M 10	4,5	23	2,5	5	20	54
	012	M 12	6,2	26	3,5	6	38	96
	016	M 16	8,5	33	4,5	8	50	100
	020	M 20	10,0	43	6,5	10	52	133
	024	M 24	13,0	48	8	12	91	223

* statistical average

FIBRO

2472.05./.06./.35./.36.
2471.05. 2471.35.

Spring Plungers
with Spring Loaded Pin, with slot
Plastic, with Spring Loaded Ball, with slot

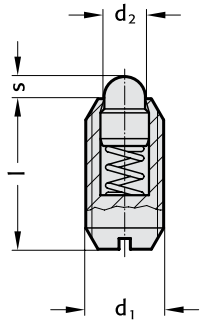
Material:

2472.05.	Sleeve:	Free machining steel, burnished
	Pin:	Free machining steel, burnished
	Spring:	Nirosta
2472.06.	Sleeve:	Free machining steel, burnished
	Pin:	Free machining steel, hardened, burnished/Pin blue galvanised
	Spring:	Nirosta
2472.35.	Sleeve:	Nirosta 1.4305
	Pin:	Nirosta 1.4305
	Spring:	Nirosta
2472.36.	Sleeve:	Nirosta 1.4305
	Pin:	Nirosta 1.4305/end of sleeve yellow
	Spring:	Nirosta

Note:

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

2472.05./2472.06.
2472.35./2472.36.



2472.05./.35. Normal spring force

Order No		d1	d2	l	s	Spring force in N* Start	End
2472. .	004	M 4	1,8	9	1,5	4,5	12,5
	005	M 5	2,4	12	2	5	13,0
	006	M 6	2,7	14	2	6	17
	008	M 8	3,8	16	2	16	33
	010	M 10	4,5	19	2,5	19	42
	012	M 12	6,2	22	3,5	22	57
	016	M 16	8,5	24	4,5	38	78
	020	M 20	10	30	6,5	39	81
	024	M 24	13	34	8	72	155

* statistical average

2472.06./.36. Increased spring force

Order No		d1	d2	l	s	Spring force in N* Start	End
2472. .	006	M 6	2,7	14	2	11	25
	008	M 8	3,8	16	2	23	59
	010	M 10	4,5	19	2,5	20	54
	012	M 12	6,2	22	3,5	38	96
	016	M 16	8,5	24	4,5	50	100
	020	M 20	10	30	6,5	52	133
	024	M 24	13	34	8	91	223

* statistical average

Material:

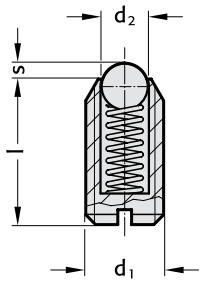
2471.05.	Sleeve:	Delrin blue (POM)
	Ball:	Delrin white (POM)
	Spring:	Nirosta
2471.35.	Sleeve:	Delrin blue (POM)
	Ball:	Nirosta, hardened
	Spring:	Nirosta

Note:

For locking and for pressing upwards or downwards.

Admissible temperature range
–30 °C to +50 °C.

2471.05./2471.35.



2471.05./.35.

Order No		d1	d2	l	s	Spring force in N* Start	End
2471. .	006	M 6	14	0,9	3,5	12	17
	008	M 8	16	1,5	5	20	35
	010	M 10	19	1,9	6	25	45

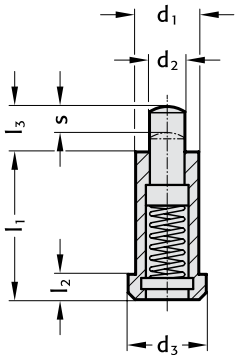
* statistical average

Spring Plungers
straight version with shoulder
Thrust pad driver

FIBRO

2473.01. 2475.01./.02./.03./.04.
2472.11.

2473.01.



Material:

2473.01.

Sleeve: Free-machining steel, burnished

Pin: Steel, case hardened, burnished

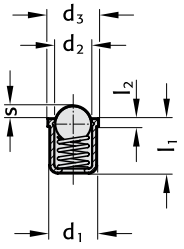
Spring: Nirosta

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

2475.01./.02. 2475.03./.04.



Material:

2475.01.	Sleeve:	Delrin blue (POM)
	Ball:	Delrin white (POM)
	Spring:	Nirosta
2475.02.	Sleeve:	Delrin blue (POM)
	Ball:	Nirosta, hardened
	Spring:	Nirosta
2475.03.	Sleeve:	Brass
	Ball:	Nirosta, hardened
	Spring:	Nirosta
2475.04.	Sleeve:	Nirosta 1.4303
	Ball:	Nirosta, hardened
	Spring:	Nirosta

Note:

For locking and for pressing upwards or downwards.

Admissible temperature range: –30°C to +50°C (2475.01./.02.)
max. 250°C (2475.03./.04.)

2473.01./ 2475.01./.02.

Order No	d_1	d_2	d_3	l_1	l_2	l_3	s	Spring force* Start	End
2473.01.006	6	2,7	8	20	3,2	6	3,5	10	22
008	8	3,9	10	24	3,2	8	4,5	30	88
010	10	5,9	13	30	4	10	5,5	42	110
012	12	7,9	16	36	5	12	6,5	50	130
2475. . 004	4	3	4,6	5	1		0,8	2,5	6,5
005	5	4	5,6	6	1		1	4,5	9
006	6	5	6,5	7	1		1,6	6,5	13
008	8	6,5	8,5	9	1		1,9	8	18
010	10	8	11	13,5	1,5		2,4	12	23
012	12	10	13	16	1,5		3,3	13	25

* statistical average

2475.03./.04.

Order No	d_1	d_2	d_3	l_1	l_2	s	Spring force* Start	End
2475.03. 004	4	2,5	4,5	5	1	0,8	2,5	6
005	5	3,5	5,5	6	1	1	3	6,5
006	6	4,5	6,5	7	1	1,6	5,5	11,5
008	8	6	8,5	9	1	1,9	7	12,5
2475.04. 004	4	3	4,6	5	0,9	1	2,5	6
005	5	4	5,6	6	0,9	1,4	3	6,5
006	6	5	6,5	7	1	1,8	5,5	11,5
008	8	6,5	8,5	9	1,1	2,4	7	12,5
010	10	8,5	11	13	1,7	3,3	8,5	18,5
012	12	10	13	16	2,3	4,0	12	26,5

* statistical average

2472.11.003 up to 2472.11.020

2472.11.024

2472.11. Thrust pad driver

for 2472.01./.02.

Order No	for thread
2472.11. 003	M 3
004	M 4
005	M 5
006	M 6
008	M 8
010	M 10
012	M 12
016	M 16
020	M 20
024	M 24

FIBRO

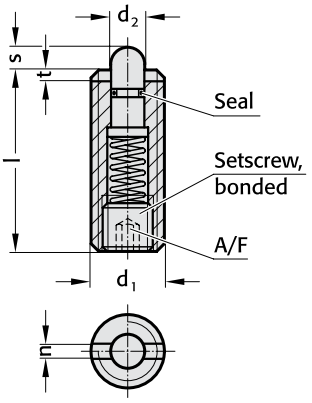
2472.07./.08./.37.
2473.02.

Spring Plungers
with hexagon socket head and seal
straight version without shoulder

Material:

2472.07.
Sleeve: Free-machining steel, burnished
Pin: Free-machining steel hardened, burnished
Spring: Nirosta
2472.08.
Sleeve: Free-machining steel, burnished
Pin: Free-machining steel hardened, burnished/threaded pin shining
Spring: Nirosta
2472.37.
Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

2472.07./.08./.37.



2472.07./.08./.37.

Order No		d_1	d_2	l	n	s	t	A/F	Spring force* Start	End
2472.	008	M 8	3,8	26	1,5	3	1,4	2,5	9	24
	010	M10	4	28	1,5	3,5	1,4	3	15	30
	012	M12	6	35	2,7	4	2	4	24	50
	016	M16	7,5	40	3,2	5	2,5	5	36	58
2472.08.	008	M 8	3,8	26	1,5	3	1,4	2,5	17	39
	010	M10	4	28	1,5	3,5	1,4	3	22	43
	012	M12	6	35	2,7	4	2	4	40	80
	016	M16	7,5	40	3,2	5	2,5	5	44	113

* statistical average

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

Material:

2473.02.

Sleeve: Nirosta 1.4305

Ball: Nirosta, hardened

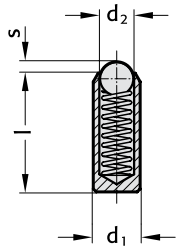
Spring: Nirosta

Note:

For locking and for pressing upwards or downwards.

Admissible temperature range: max. 250°C

2473.02.



2473.02.

Order No	d_1	d_2	l	s	Spring force Start	Ende
2473.02.030	3	2	7	0,65	4,5	7,5
035	3,5	2,5	9	0,80	6	14,5
040	4	3	11	0,90	8	14
045	4,5	3,2	12	0,95	9,5	16,5
050	5	3,5	13	1	11	18
055	5,5	4	14	1,20	15,5	25
060	6	4,5	15	1,5	18	31

* statistical average

Stripping Units
Wall and Bottom mounting
Flanged mounting

FIBRO

2477.□□□.□□□□□.1.01
2477.□□□.□□□□□.1.02

2477.□□□.□□□□□.1.01

Stroke	l	l_1	a	e	e_1
50	200	113	177	103	83
80	260	143	237	133	113

with four different initial spring forces	
in daN =	00050
	00100
	00150
	00200

Ordering Code (example):

Stripping Unit	= 2477.
Stroke 50 mm	= 050.
Force 200 daN	= 00200.
Gas Spring	= 1.
W-B-mounting.	= 01
Order No	= 2477.050.00200.1.01

2477.□□□.□□□□□.1.02

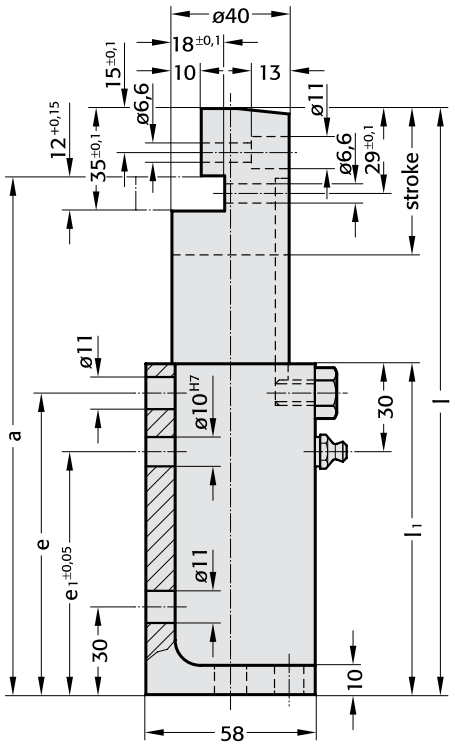
Stroke	l	l_1	a
50	200	107	84
80	260	137	114

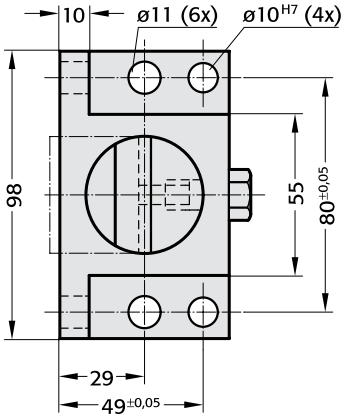
with four different initial spring forces	
in daN =	00050
	00100
	00150
	00200

Ordering Code (example):

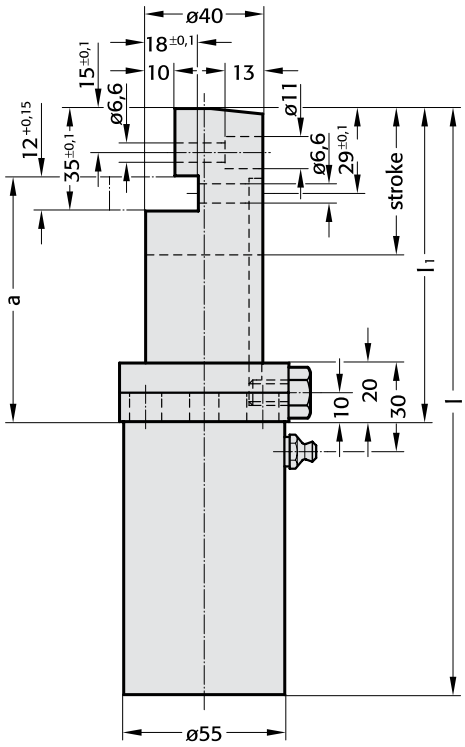
Stripping Unit	= 2477.
Stroke 50 mm	= 050.
Force 200 daN	= 00200.
Gas spring	= 1.
Flanged mounting	= 02
Order No	= 2477.050.00200.1.02

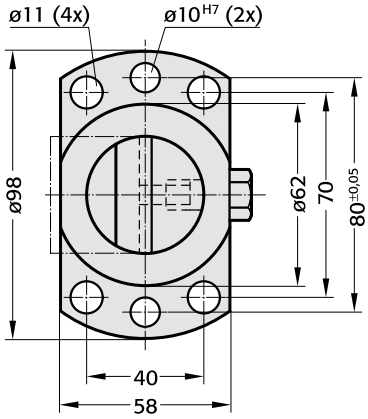
2477.□□□.□□□□□.1.01



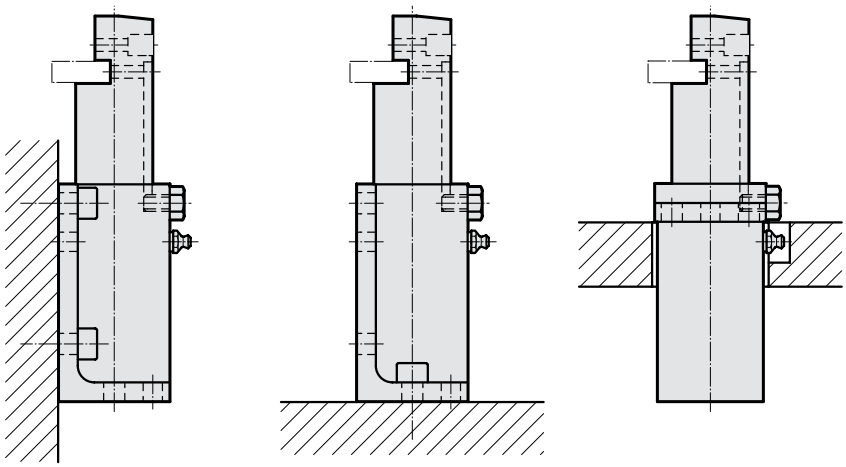


2477.□□□.□□□□□.1.02





Mounting Examples



FIBRO

2478.10. Stock lifters

2478.10. 00050.
00100.
00150.
00200.
00250.
00320.

Order No		Stroke	$l_{min.}$	l
2478.10.	. 025	25	121	146
	050	50	146	196
	080	80	176	256
	100	100	196	296
	125	125	221	346
	150	150	246	396

Spring forces as per Spring Diagram

Order No for spare parts kit:
2478.10.00320

Description:

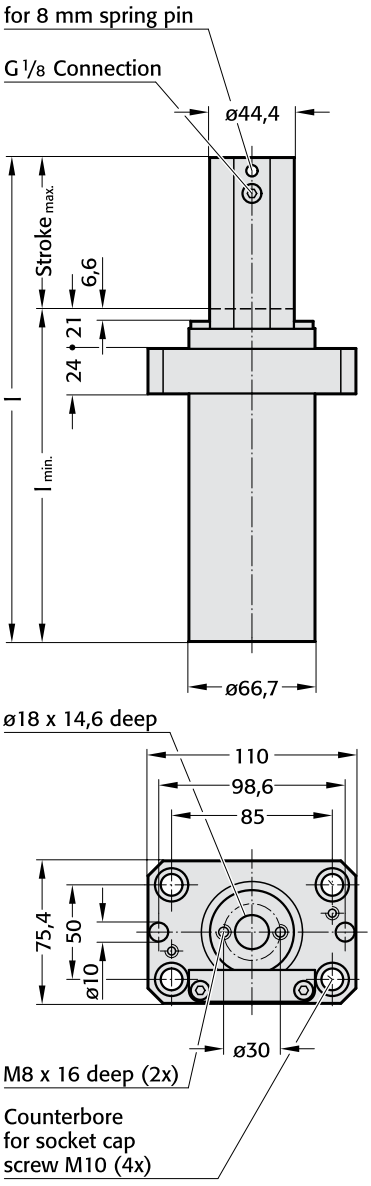
All component lifters in the various gas spring classes are of the same design and the different spring forces are achieved solely by means of different gas pressures. The pressure can be topped up or reduced via the piston rod.

Spring Force Colour Markings

Order No	initial spring force daN	pressure bar
2478.10.00050.	50	28
00100.	100	56
00150.	150	84
00200.	200	113
00250.	250	141
00320.	320	180
00000.*		

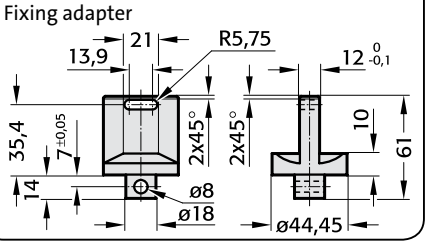
* upon customers request, also available unfilled

2478.10.

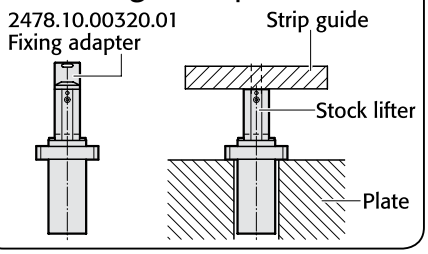


2478.10.00320.01

Fixing adapter

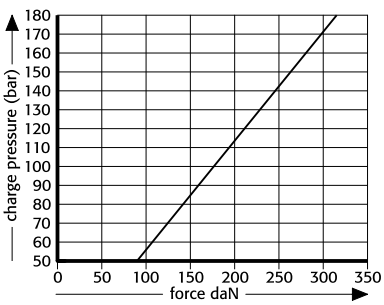


Mounting example:



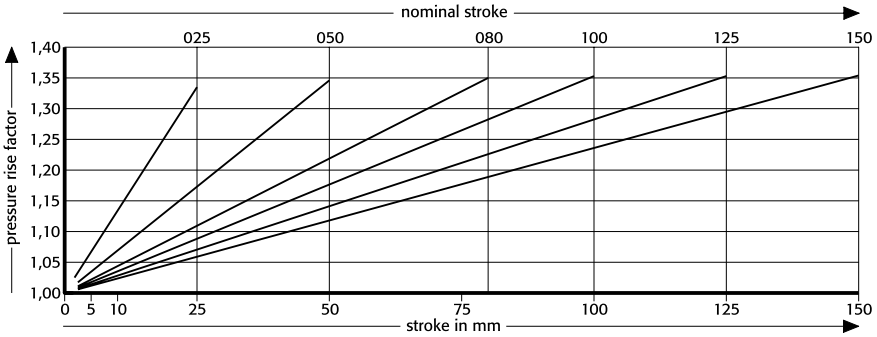
2478.10.

Initial spring force
versus charge pressure



2478.10.

Spring force Diagram displacement
versus stroke rise



Pressure medium:	Nitrogen N_2
Max. filling pressure:	180 bar
Min. filling pressure:	25 bar
Working temperature:	0 °C to +80 °C
Temp. 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

Pressure rise factor accounts for displacement but not external influences!

Stock lifters
Stock lifters with attachment lug

2478.30.00170. □□ .1
2478.30.00170. □□ .2

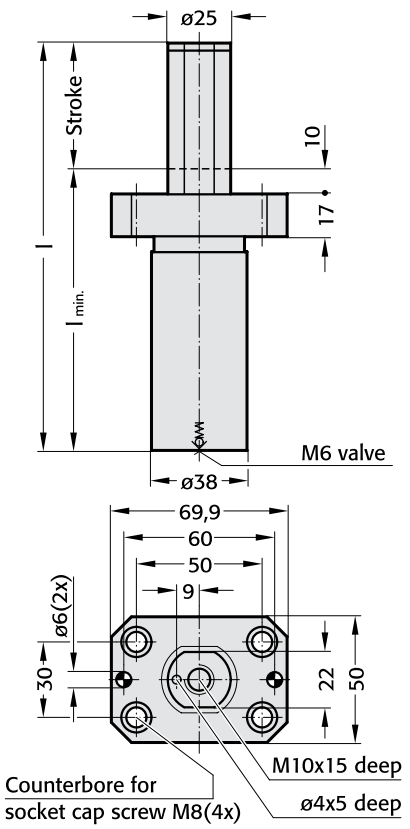
Description:

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

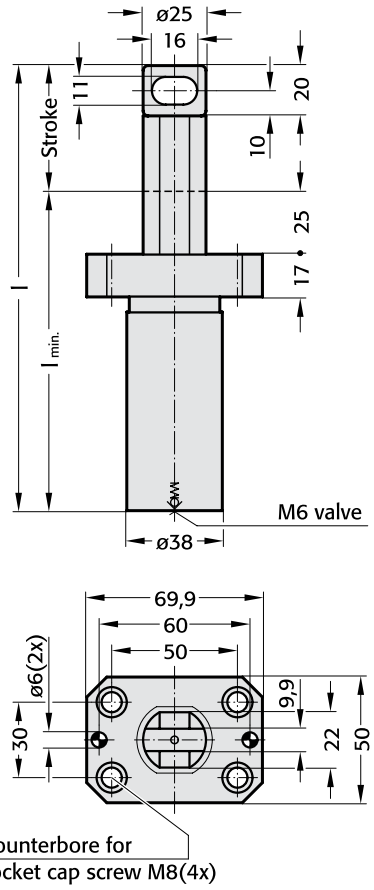
Note:

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

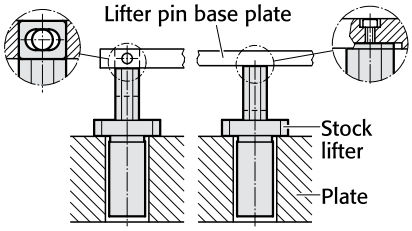
2478.30.00170. □□ .1



2478.30.00170. □□ .2



Mounting examples:



2478.30.00170. □□ .1

Order No	Stroke	l_{min}	l
2478.30.00170.025.1	25	87	112
038.1	38	100	138
050.1	50	112	162
080.1	80	145	225
100.1	100	165	265
125.1	125	190	315

Refer to diagrams for spring forces

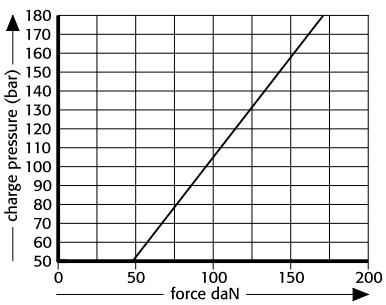
2478.30.00170. □□ .2

Order No	Stroke	l_{min}	l
2478.30.00170.025.2	25	102	127
038.2	38	115	153
050.2	50	127	177
080.2	80	160	240
100.2	100	180	280
125.2	125	205	330

Refer to diagrams for spring forces

2478.30.

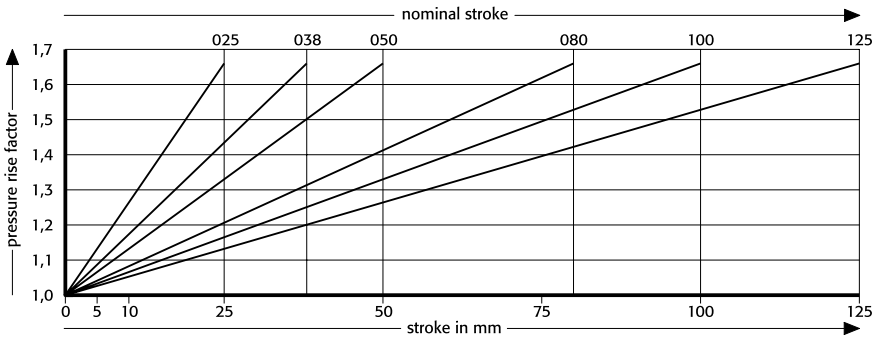
Initial spring force
versus charge pressure



2478.30.

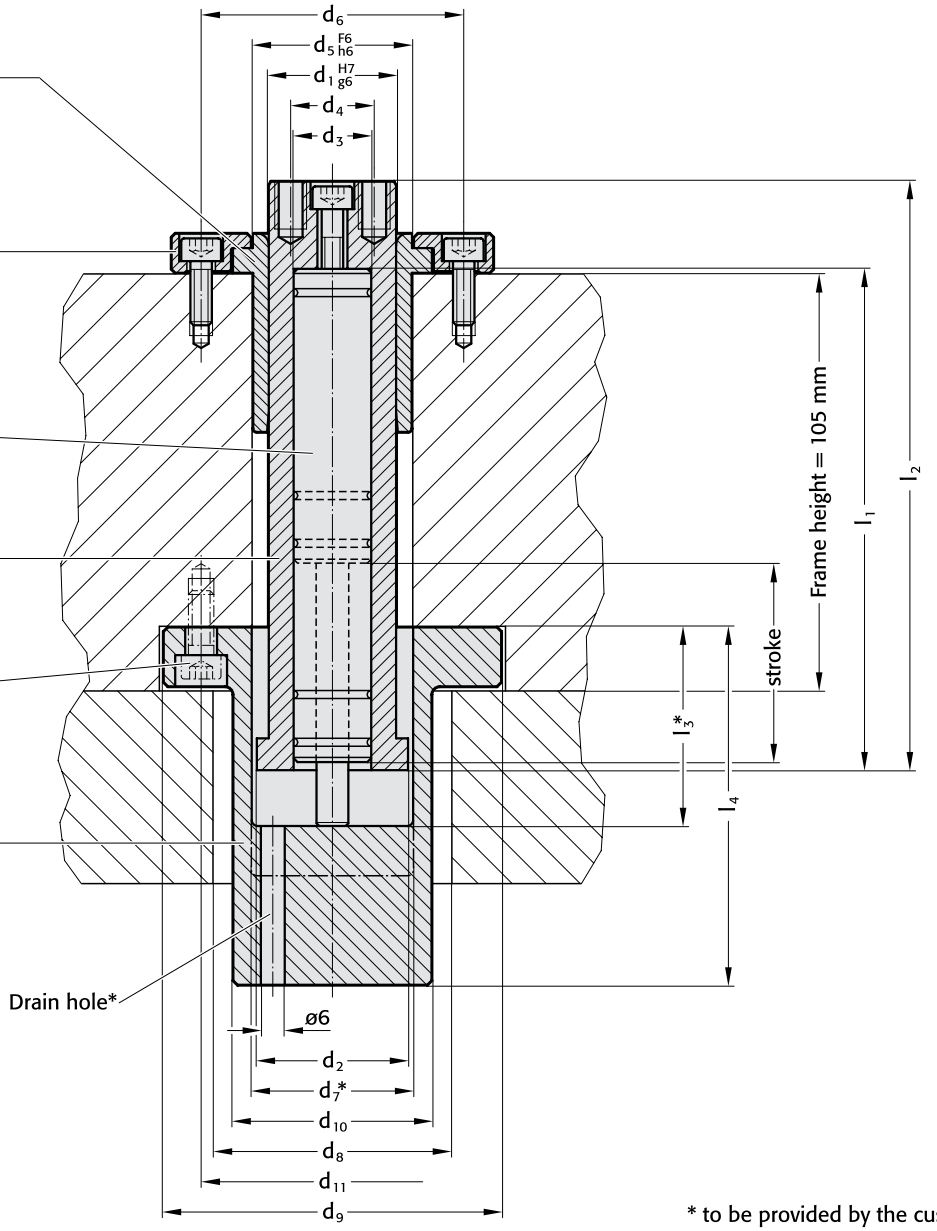
Spring force Diagram displacement
versus stroke rise

Pressure medium:	Nitrogen N_2
Max. filling pressure:	180 bar
Min. filling pressure:	25 bar
Working temperature:	0 °C to +80 °C
Temp. 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. effective travel	100 %



Pressure rise factor accounts for displacement but not external influences!

Mounting example:



* 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	Stroke	d_1	d_2	d_3	d_4	d_5	d_6	d_7*	d_8	d_9	d_{10}	d_{11}	l_1	l_2	l_3*	l_4
1	min. 5	32	38	19.5	21	40	66	40	60	85	50	67	81	113	–	–
	max. 35															
2	min. 40	32	38	19.5	21	40	66	40	60	85	50	67	126	148	–	90
	max. 70															
3	min. 75	32	38	19.5	21	40	66	40	60	85	50	67	176	208	–	150
	max. 115															

* 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

FIBRO

2478.20.20.1
2478.20.20.2

Guide pillars and Sleeves for lifting units to Daimler standard

Material:

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

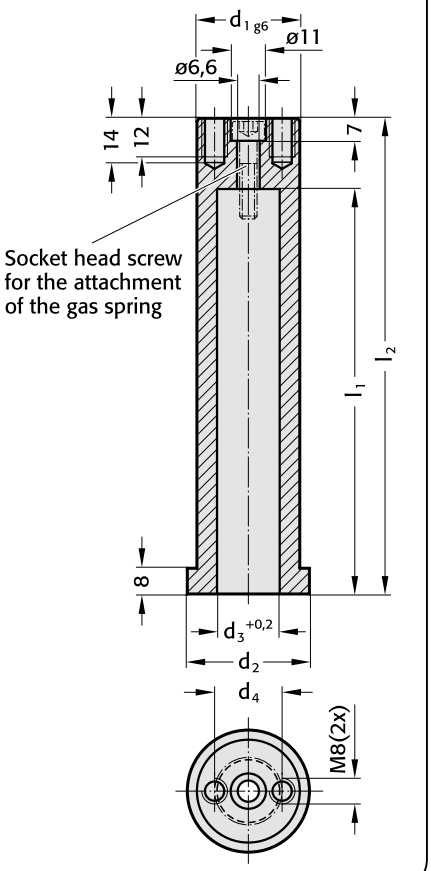
Note:

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

2478.20.20.1

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

2478.20.20.1



Material:

Steel

Note:

The sleeve is supplied without countersink. Integrating countersink l_3 (to be provided by the customer) determines the lifting path.

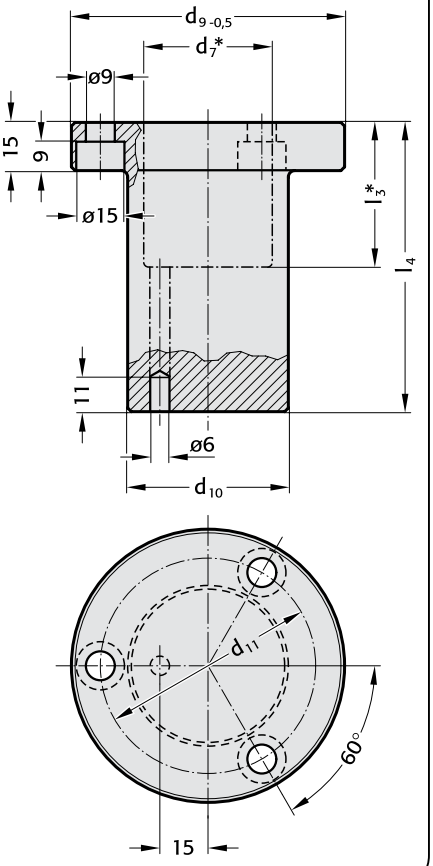
The drain hole is pre-drilled as a blind hole with a ∅ of 6 mm and must also be modified.

2478.20.20.2

Order No	Size	d_7*	d_9	d_{10}	d_{11}	l_3*	l_4
2478.20.20.2.02	2	40	85	50	67	–	90
2478.20.20.2.03	3	40	85	50	67	–	150

* to be provided by the customer

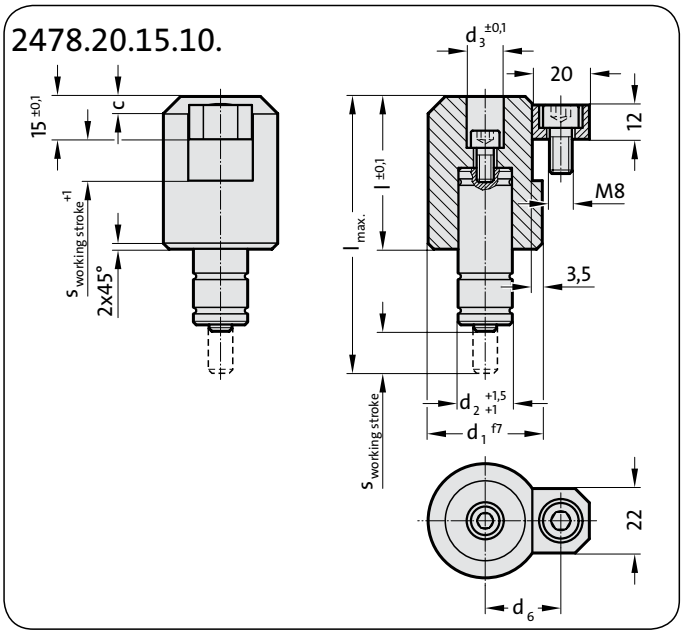
2478.20.20.2



Lifters, round with pilot pin hole to BMW Standard

2478.20.15.10.

2478.20.15.10.



Execution:

Assembly consisting of:

- Lifter
- Gas spring
  - ∅ 19 mm (1) = 2482.74.00030.
    Spring force 30 daN
    Filling pressure 60 bar

  or
  - ∅ 25 mm (2) = 2480.21.00050.
    Spring force 50 daN
    Filling pressure 45 bar
- Screw clamp with screw M6x12 (ISO 4762)
- Socket cap screw M8x16 (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.

2478.20.15.10.

			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
ø19 mm - 2482.74.00030. = (1)
ø25 mm - 2480.21.00050. = (2)

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

FIBRO

2478.20.15.20.

Lifter Units with Installation Block according to BMW standard

Material:

Steel

Execution:

Lifter unit with installation block comprises:

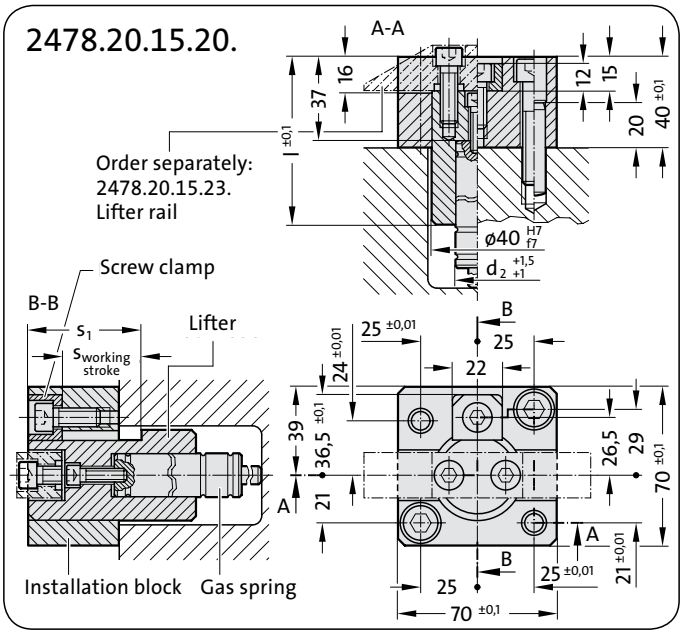
- Installation block
- Lifter
- Screw clamp
- Gas spring 2482.74.00030. or 2480.21.00050.
- Socket cap screw according to ISO 4762
  M6 x 20 (1x), M8 x 20 (1x), M8 x 25 (2x), M10 x 45 (2x)
- Dowel pin according to ISO 8735 Ø 10 x 40 (2x)

Note:

Order separately (see installation example)

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

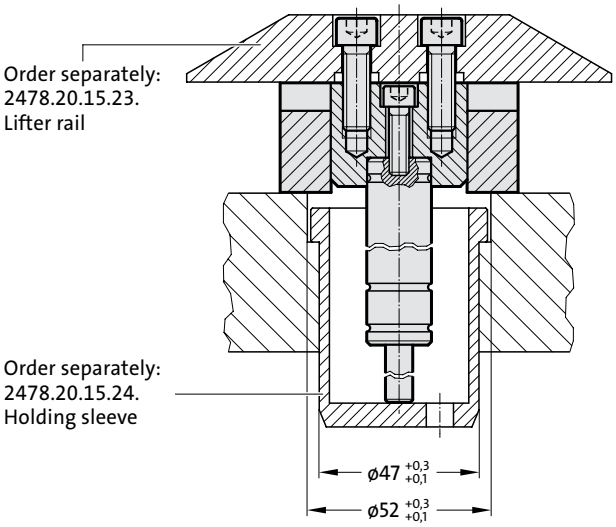
2478.20.15.20.



2478.20.15.20.

l	$s_{working\ stroke}$	s_1	d_2 = Ø 19 gas spring	Order No.	d_2 = Ø 25 gas spring	Order No.
49	9	25	2482.74.00030.010	2478.20.15.20.14.009	2480.21.00050.010	2478.20.15.20.24.009
53.5	13.5	29.5	2482.74.00030.015	2478.20.15.20.14.014	2480.21.00050.015	2478.20.15.20.24.014
62.5	22.5	38.5	2482.74.00030.025	2478.20.15.20.14.023	2480.21.00050.025	2478.20.15.20.24.023
74	34	50	2482.74.00030.038	2478.20.15.20.14.034	2480.21.00050.038	2478.20.15.20.24.034
85	45	61	2482.74.00030.050	2478.20.15.20.14.045	2480.21.00050.050	2478.20.15.20.24.045
98.5	58.5	74.5	2482.74.00030.063.1	2478.20.15.20.14.059	2480.21.00050.063	2478.20.15.20.24.059
115	75	91	2482.74.00030.080.1	2478.20.15.20.14.075	2480.21.00050.080	2478.20.15.20.24.075
135	95	111	2482.74.00030.100	2478.20.15.20.14.095	2480.21.00050.100	2478.20.15.20.24.095
160	120	136	2482.74.00030.125	2478.20.15.20.14.120	2480.21.00050.125	2478.20.15.20.24.120

Installation example:



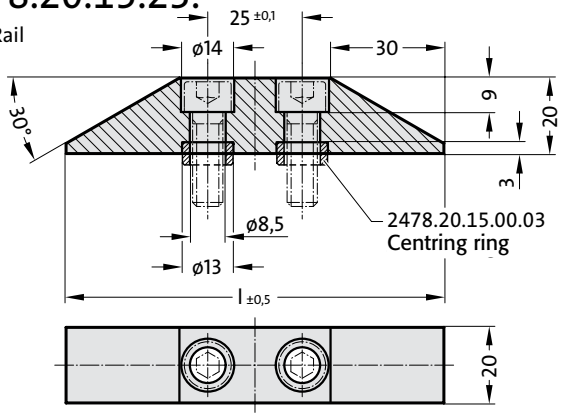
Lifter Rails and Holding Sleeves for Lifter Units with Installation Block and Universal Lifter Units according to BMW Standard

FIBRO

2478.20.15.23.
2478.20.15.24.

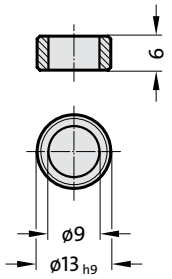
2478.20.15.23.

Lifter Rail



2478.20.15.00.03

Centring ring
(Order No. for reordering)



Material:

Steel

Note:

Delivery without screws and centring rings

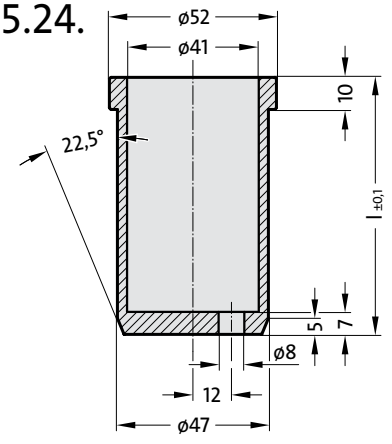
Screws and centring rings are already included in the scope of delivery for the lifter units 2478.20.15.20./30.

2478.20.15.23.

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

2478.20.15.24.

Holding sleeve



Material:

Steel

Note:

Holding sleeve 2478.20.15.24. can only be used for lifter 2478.20.15.20. / 2478.20.15.30. Ø40 mm.

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

2478.20.15.24.

Order No.	l
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

FIBRO

2478.20.15.30. Universal Lifter Units according to BMW standard

Material: Steel

Design:

Universal lifter unit comprises

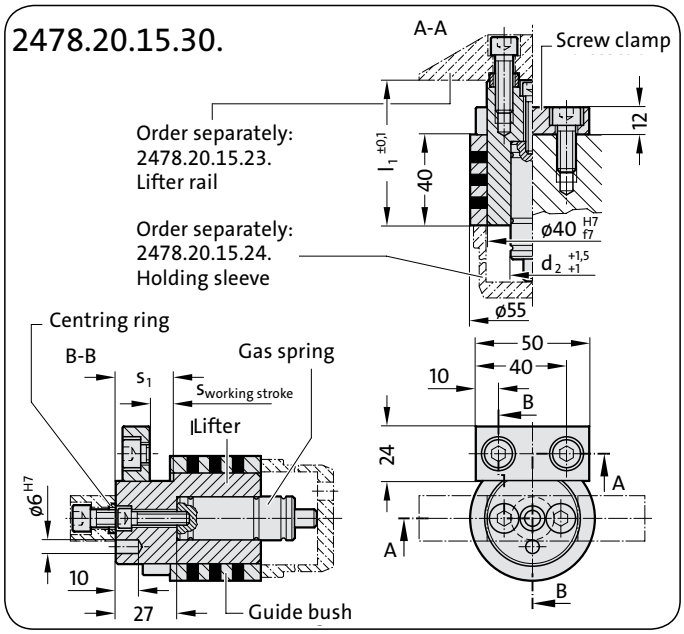
- Lifter
- Screw clamp
- Centring rings
- Guide bush
- Gas spring 2482.74.00030. or 2480.21.00050.
- Socket cap screw according to ISO 4762
  M6 x 25 (1x), M8 x 20 (2x), M8 x 25 (2x)

Note:

Order separately (see installation example)

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

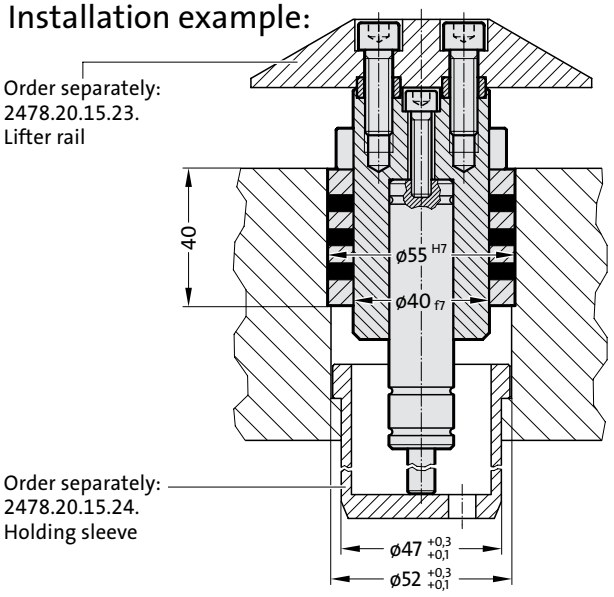
2478.20.15.30.



2478.20.15.30.

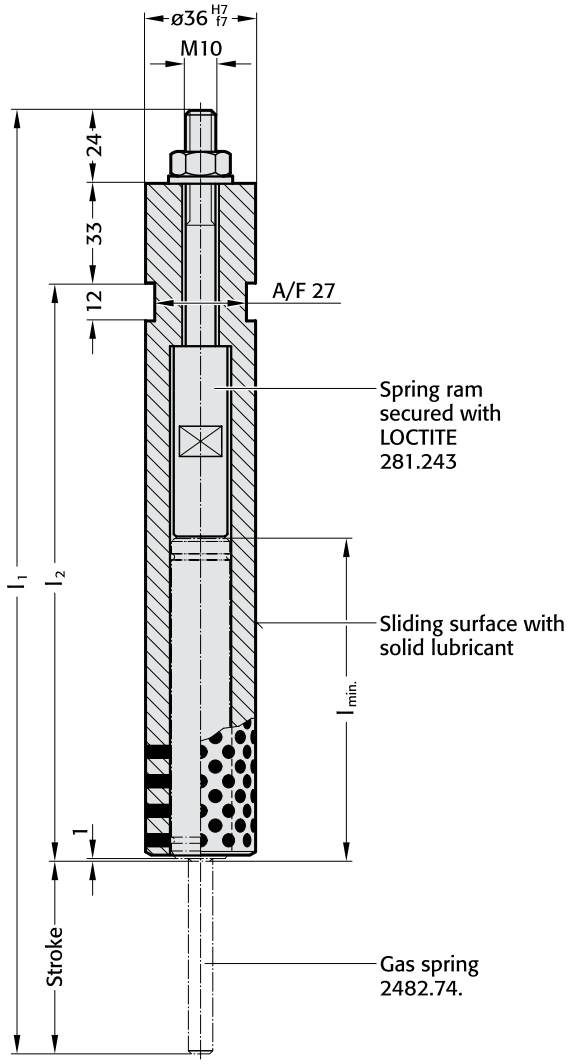
			d_2 = Ø 19		d_2 = Ø 25	
l	$s_{working\ stroke}$	s_1	Gas spring	Order No.	Gas spring	Order No.
64	9	25	2482.74.00030.010	2478.20.15.30.14.009	2480.21.00050.010	2478.20.15.30.24.009
68.5	13.5	29.5	2482.74.00030.015	2478.20.15.30.14.014	2480.21.00050.015	2478.20.15.30.24.014
77.5	22.5	38.5	2482.74.00030.025	2478.20.15.30.14.023	2480.21.00050.025	2478.20.15.30.24.023
89	34	50	2482.74.00030.038	2478.20.15.30.14.034	2480.21.00050.038	2478.20.15.30.24.034
100	45	61	2482.74.00030.050	2478.20.15.30.14.045	2480.21.00050.050	2478.20.15.30.24.045
113.5	58.5	74.5	2482.74.00030.063.1	2478.20.15.30.14.059	2480.21.00050.063	2478.20.15.30.24.059
130	75	91	2482.74.00030.080.1	2478.20.15.30.14.075	2480.21.00050.080	2478.20.15.30.24.075
150	95	111	2482.74.00030.100	2478.20.15.30.14.095	2480.21.00050.100	2478.20.15.30.24.095
175	120	136	2482.74.00030.125	2478.20.15.30.14.120	2480.21.00050.125	2478.20.15.30.24.120

Installation example:

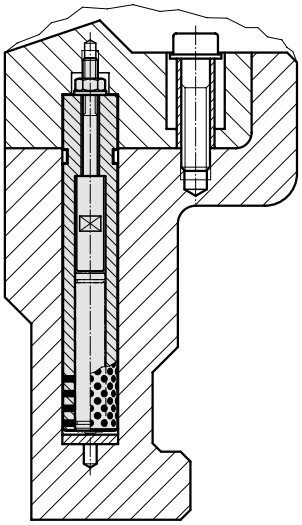


2478. Spring Rams for Workpiece Lifters (Gas Springs)

2478.



Mounting example:



Material:

Spring ram:
C45
induction hardened to HRC 58+4
Hardness penetration ≧ 0,8+0,4

Sleeve:
Sliding surface with non-liquid lubricant

2478. Spring Rams for Workpiece Lifters (Gas Springs)

Order No	stroke	$l_{min.}$	l_1	l_2	Initial spring force in daN	Final spring force in daN	Gas spring	Spring force colour markings of gas spring
2478.050.00030.1	50	92	257	150	30	40	2482.74.00030.050	green
00050.1					50	67	00050.050	blue
00070.1					70	94	00070.050	red
00090.1					90	120	00090.050	yellow
2478.063.00030.1	63	109	310	190	30	40	00030.063.1	green
00050.1					50	67	00050.063.1	blue
00070.1					70	94	00070.063.1	red
00090.1					90	120	00090.063.1	yellow
2478.080.00030.1	80	125	360	223	30	40	00030.080.1	green
00050.1					50	67	00050.080.1	blue
00070.1					70	94	00070.080.1	red
00090.1					90	120	00090.080.1	yellow

Order Code (example):

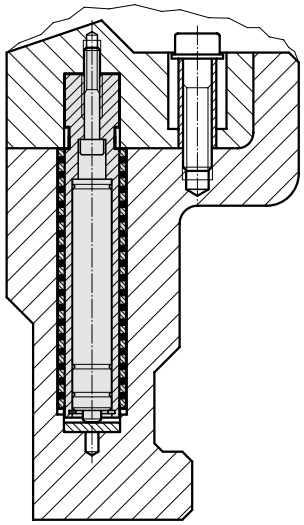
Spring Ram for Workpiece Lifter (Gas Spring)	= 2478.
Stroke = 50 mm	= 050.
Initial spring force = 30 daN	= 00030.
Gas spring	= 1
Order No	= 2478.050.00030.1

Spring Rams
with Gas Springs to VW standard
Guide Bushes for Spring Rams

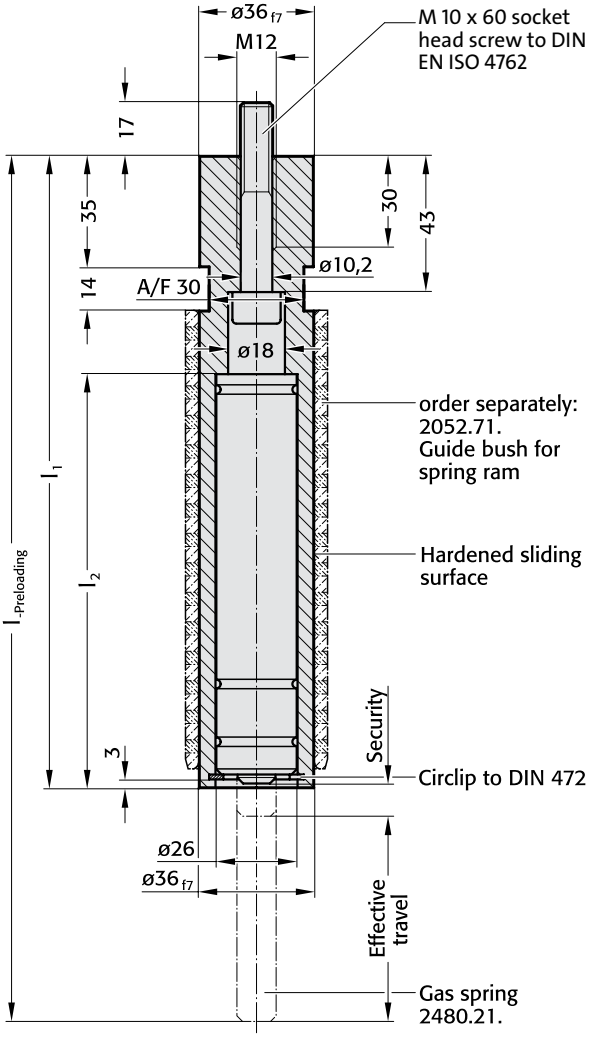
FIBRO

2478.20.
2052.71.

Mounting example:



2478.20. Spring Rams



Note:

Spring bolt installed preloaded.

Material:

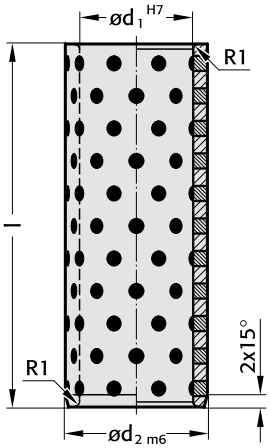
Spring ram:
C 45
Induction hardened
to 58+4 HRC
Hardess penetation depth
= 0,8+0,4

Guide bushes:
Bronze with non-liquid lubricant, oilless lubricating.

Note:

Recommended locating socket for bonding G7

2052.71. Guide bushes



2478.20. Spring Rams with Gas Springs

Order No	Effective travel	l	l_1	l_2	Initial spring force in daN	Final spring force in daN	Gas spring	Spring force colour markings of gas spring
2478.20.050.00050.1	50	240	182	114	50	68	2480.21.00050.063	grün
00100.1					100	137	00100.063	blau
00150.1					150	206	00150.063	rot
00200.1					200	275	00200.063	gelb
2478.20.065.00050.1	65	274	200	131	50	69	00050.080	grün
00100.1					100	139	00100.080	blau
00150.1					150	208	00150.080	rot
00200.1					200	278	00200.080	gelb
2478.20.080.00050.1	80	314	220	151	50	69	00050.100	grün
00100.1					100	138	00100.100	blau
00150.1					150	207	00150.100	rot
00200.1					200	276	00200.100	gelb

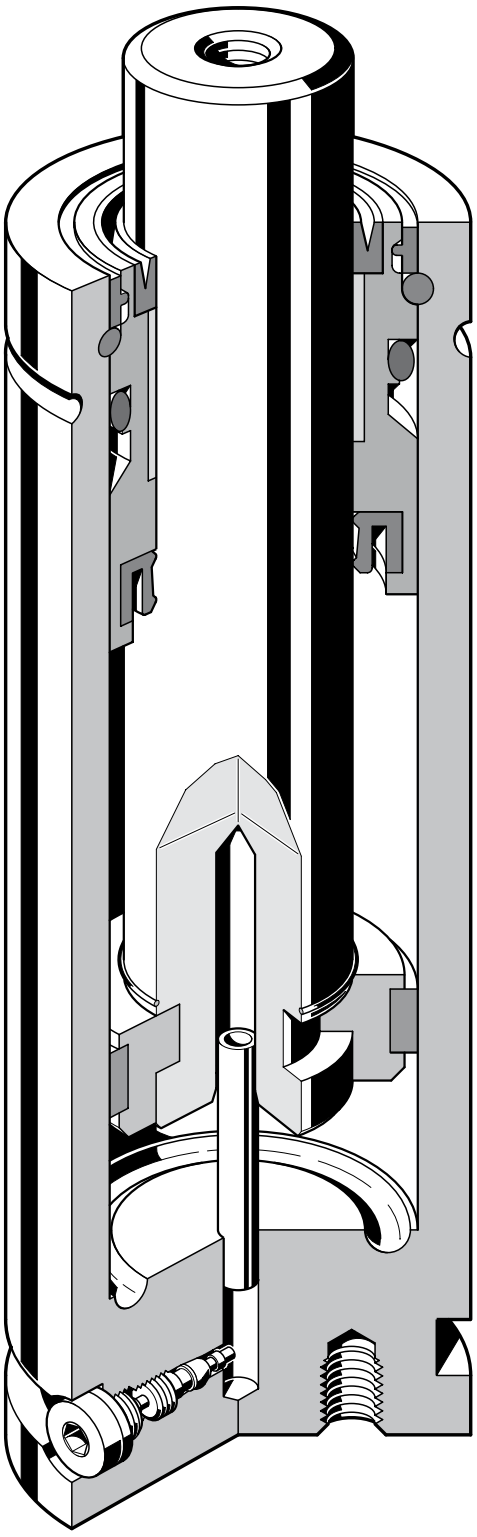
Ordering Code (example):

Spring Ram with Gas Spring	= 2478.20
Effective travel = 50 mm	= 050.
Initial spring force = 150 daN	= 00150.
Gas spring	= 1
Order No	= 2478.20.050.00150.1

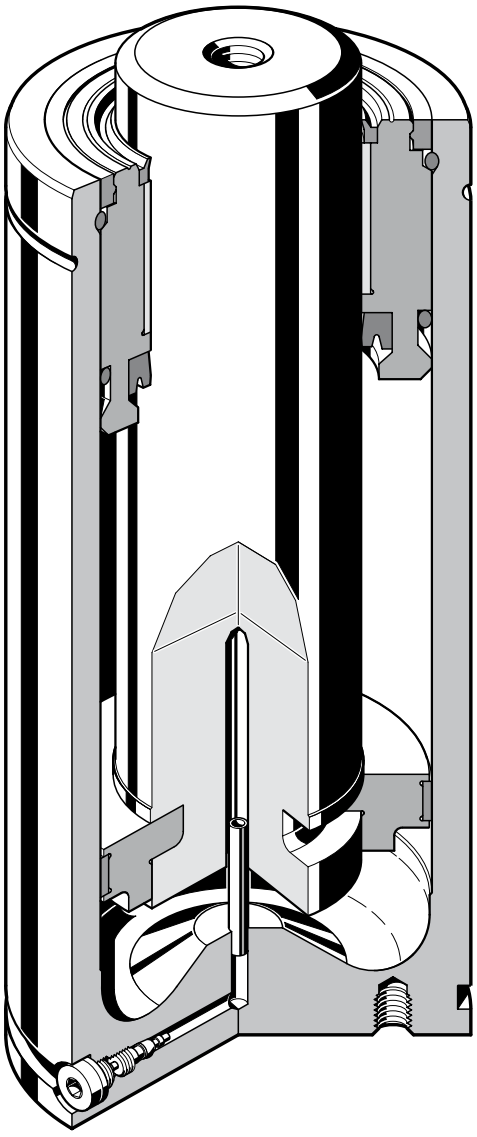
Guide bushes

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

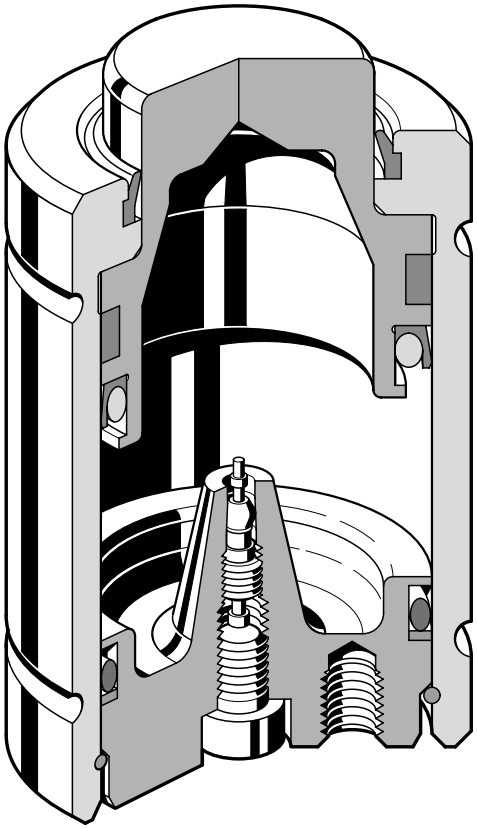
Nitrogen Gas Springs



2480.12.



2480.13.



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.

On pages F 329 to F 336 a number of interesting installation examples are illustrated in detail.

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.

All FIBRO Gas Springs meet the requirements of the Pressure Equipment Directive 97/23/EC.

The Pressure Equipment Directive (97/23/EC) has been ratified by the European Parliament and the Council of Europe. The requirements of the Pressure Equipment Directive came into force throughout the EC 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 (97/23/EC) 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.

Warning

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

Accessories

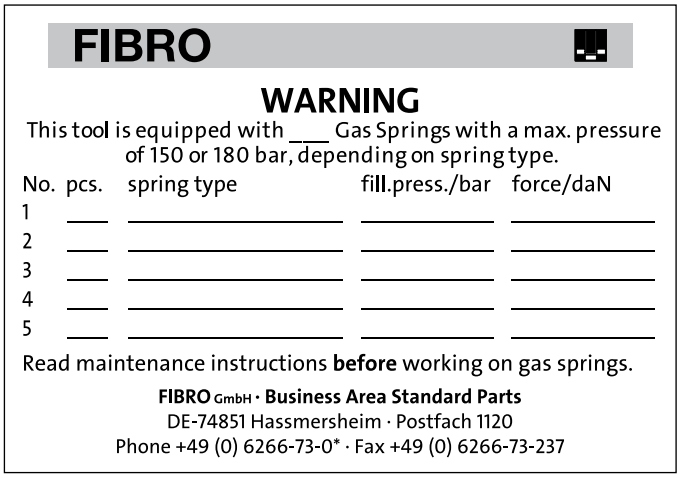
The accessories range for Gas Springs comprises fastening devices, charge- and control units, screw connections for these, and connecting lines for compound installations.

Warning Signs

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

Size 35×50 mm

Language	Order No
german	2480.00.035.050.1
english	2480.00.035.050.2
french	2480.00.035.050.3
italien	2480.00.035.050.4
spanish	2480.00.035.050.5



Size 75×105 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

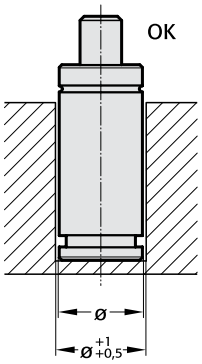
Size 110×150 mm

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

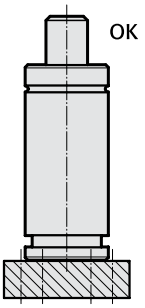
Mounting Directions for Gas Springs

Mounting Examples

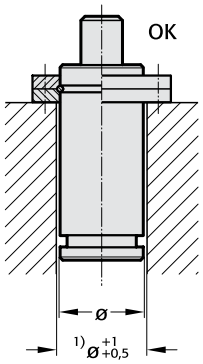
Below are the various gas spring mounting possibilities, which differ from model to model.



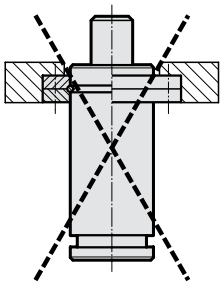
Installed loose in the bore.

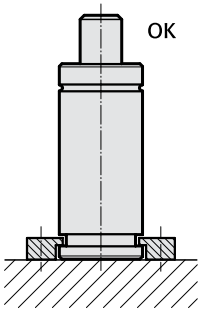


Screw mounted at the base with 2480.011.

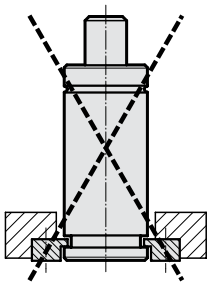


Fixed with 2480.055./057./058./064.
1)from ø38 - ø +2 +0,5

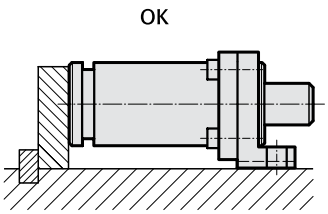


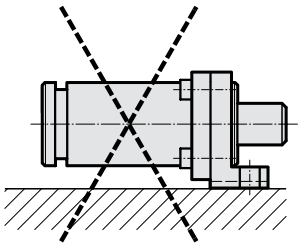


Fixed with 2480.007./008.

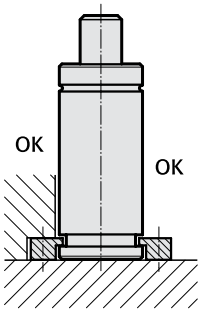


Fixed with 2480.007./008.





Fixed with 2480.044./045./047.

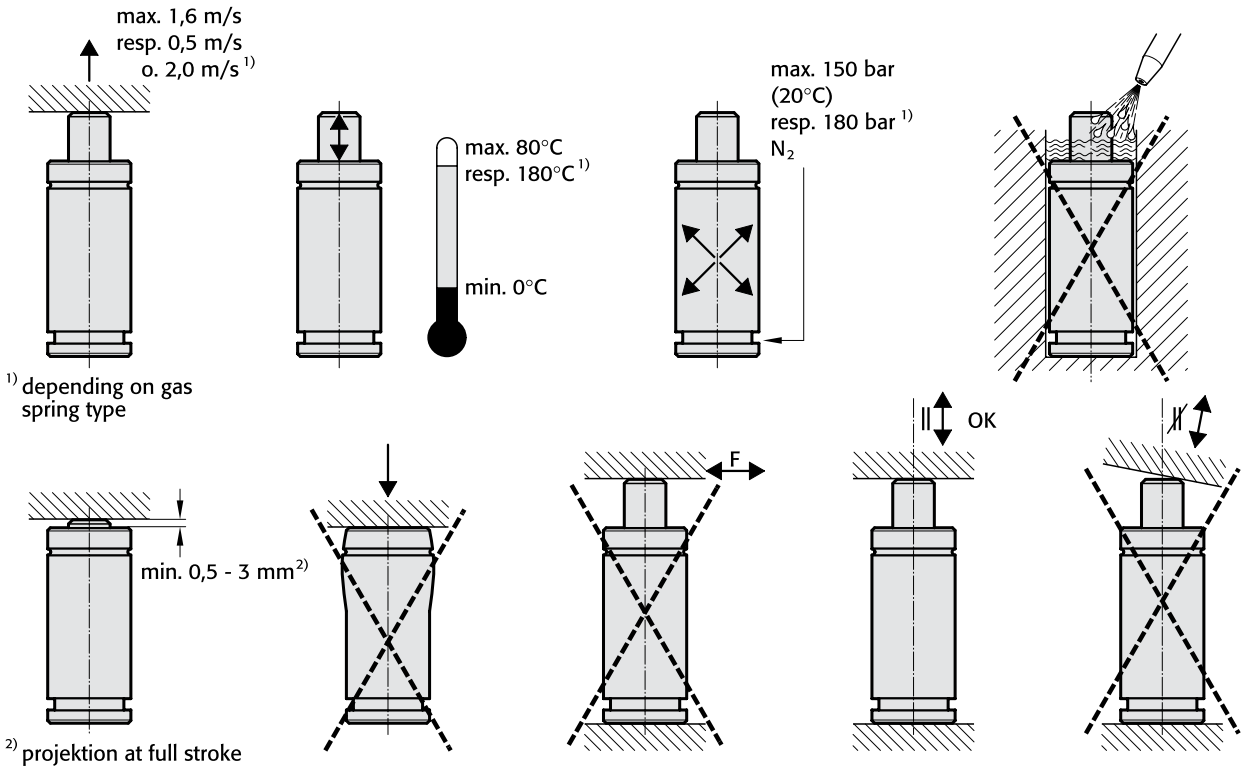


Fixed with 2480.022.

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



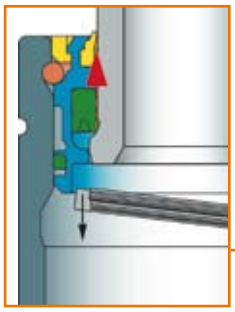
- Secure the gas spring to the tool/machine whenever possible, using the threaded hole(s) in the base of the gas spring or a suitable flange. Never exceed the maximum torque values for the threads in the base of the gas spring: (M6 = 10 Nm; M8 = 24 Nm; M10 = 45 Nm; M12 = 80 Nm)
- The threaded hole in the piston rod top should not be used for mounting purposes. It is only to be used when 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-% of 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 2480.00.20 from spring 2490.12. until all gas pressure has been discharged.

FIBRO Gas Springs – The Safer Choice

At FIBRO, safety has always been a top priority.
Below is what we do to help you provide a safer working environment.

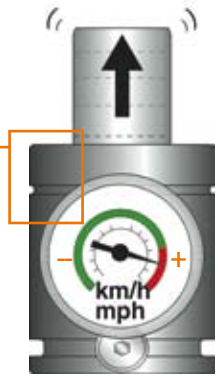
FIBRO Safety Features

Excessive Return Speed Protection System

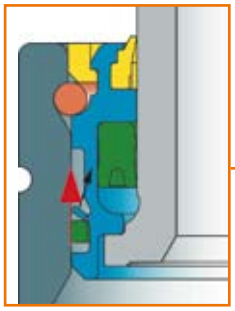


Designed for controlled gas venting through piston rods with integral safety stops and specially designed guides.

Excessive Return Speed



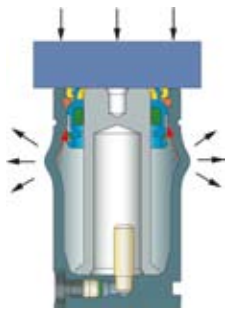
Over-Pressure Protection System



FIBRO Over-Pressure Protection System is designed to vent excessive gas pressure in a controlled manner.

Over-Pressure Condition

Over-Stroke Protection System



FIBRO has a developed unique System.
The cylinder wall is designed to deform in a predefined way, venting the internal gas pressure in a controlled manner.

Over-Pressure Condition

Advice to Gas Spring Buyers

Safety should have always be a top priority. Therefore, we believe gas springs for metal forming tools should (unless the maximum allowable pressure PS is less than or equal to 0.5 bar) be ordered with the following **safety requirements:**

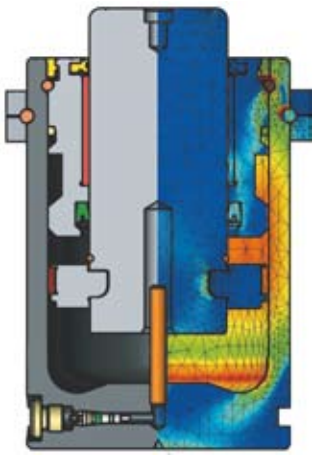
1) **Piston rods with an integral safety stop.**
2) **Designed, produced and tested according to Pressure Equipment Directive, PED 97/23/EC for a minimum of 2'000'000 full cycles*:**
   - **at highest allowed charging pressure**
   - **at highest allowed running temperature**
   - **for all specified mounting methods****

   ** **including top mount, Type C Flange Mounts, according to ISO 11901-2**

Please Note: Unless the maximum pressure is less than or equal to 0.5 bar, all gas springs produced, sold, installed and/or used within the EU should be designed, produced and tested in accordance with PED 97/23/EC.

Pressure Vessel Approval

FIBRO Gas Springs are designed, produced and tested according to PED 97/23/EC for 2'000'000 full cycles* at the highest allowed charging pressure, the highest allowed running temperature, and for all specified mounting methods.



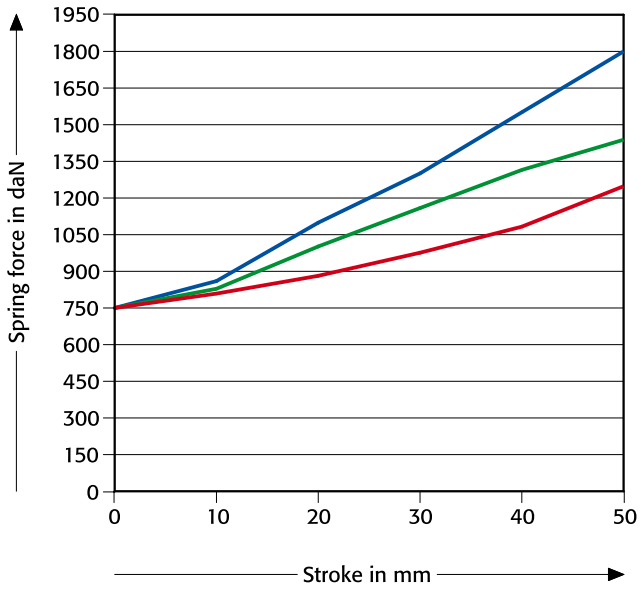
* unless other value stated on the springs

Please note!!! – The safety features mentioned here have not been realized for all FIBRO gas springs to date. By consulting the respective data sheets, please make certain you have the accurate safety standard of the gas spring available that you are interested in; otherwise, direct your inquiry to FIBRO GmbH.

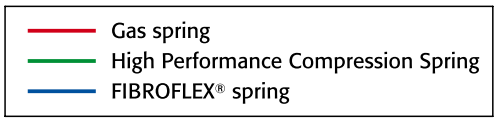
FIBRO

General overview of

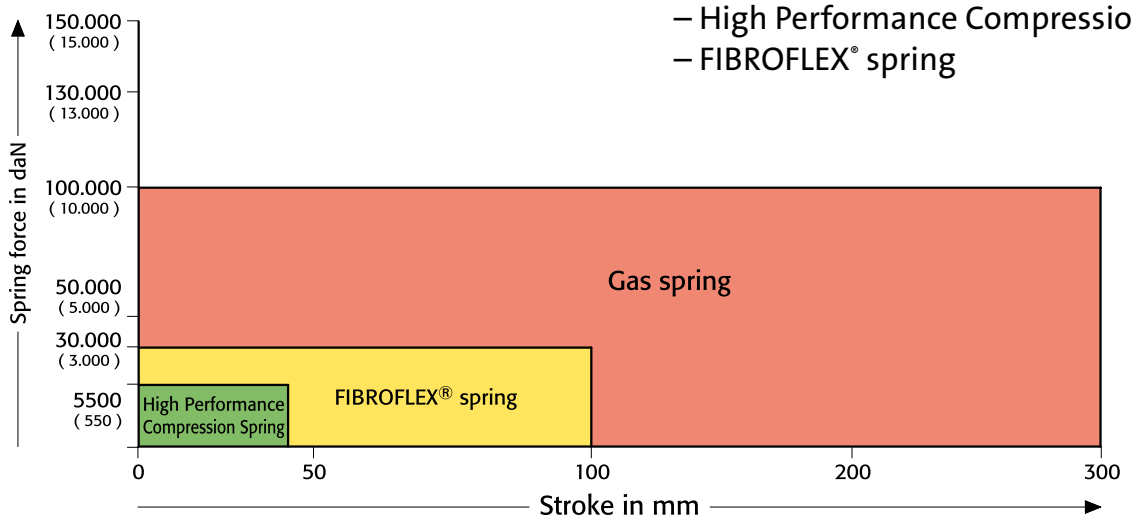
Gas springs
High Performance Compression Springs
FIBROFLEX®-springs



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



Range of applications
– Gas spring
– High Performance Compression Spring
– FIBROFLEX® spring



Gas Springs
Synopsis

Nominal force in daN	Outside-∅ in mm	Stroke in mm	Built-in lenght in mm	Standard	Note	Order No	Page
Gas Springs, Ejector Pin Units							**F117–121**
20	M24x1,5	10 – 125	65 – 295	WDX		2479.034.00020.	F119
40	M24x1,5	10 – 125	65 – 295	WDX		2479.034.00040.	F119
80	M24x1,5	10 – 125	65 – 295	WDX		2479.034.00080.	F119
170	M24x1,5	10 – 125	65 – 295	WDX		2479.034.00170.	F119
5	M16x1,5	10 – 125	65 – 295	VDI		2479.030.00005.	F120
10	M16x1,5	10 – 125	65 – 295	VDI		2479.030.00010.	F120
20	M16x1,5	10 – 125	65 – 295	VDI		2479.030.00020.	F120
40	M16x1,5	10 – 125	65 – 295	VDI		2479.030.00040.	F120
4	M16x2	10 – 125	65 – 295	VDI		2479.031.00004.	F120
5	M16x2	10 – 125	65 – 295	VDI		2479.031.00005.	F120
10	M16x2	10 – 125	65 – 295	VDI		2479.031.00010.	F120
20	M16x2	10 – 125	65 – 295	VDI		2479.031.00020.	F120
40	M16x2	10 – 125	65 – 295	VDI		2479.031.00040.	F120
20	M24x1,5	10 – 125	65 – 295	VDI		2479.032.00020.	F125
40	M24x1,5	10 – 125	65 – 295	VDI		2479.032.00040.	F125
80	M24x1,5	10 – 125	65 – 295	VDI		2479.032.00080.	F125
170	M24x1,5	10 – 125	65 – 295	VDI		2479.032.00170.	F125
Gas springs, small dimensions							**F123–129**
13	12	7 – 125	56 – 295			2482.72.00013.	F124–125
25	12	7 – 125	56 – 295			2482.72.00025.	F124–125
38	12	7 – 125	56 – 295			2482.72.00038.	F124–125
50	12	7 – 125	56 – 295			2482.72.00050.	F124–125
18	15	7 – 125	56 – 295			2482.73.00018.	F126–127
35	15	7 – 125	56 – 295			2482.73.00035.	F126–127
50	15	7 – 125	56 – 295			2482.73.00050.	F126–127
70	15	7 – 125	56 – 295			2482.73.00070.	F126–127
30	19	7 – 125	56 – 295			2482.74.00030.	F128–129
50	19	7 – 125	56 – 295			2482.74.00050.	F128–129
70	19	7 – 125	56 – 295			2482.74.00070.	F128–129
90	19	7 – 125	56 – 295			2482.74.00090.	F128–129
50	24,9	10 – 125	62 – 295			2480.21.00050.	F130–131
50	32	10 – 125	70 – 300			2480.22.00050.	F130–131
100	24,9	10 – 125	62 – 295			2480.21.00100.	F130–131
100	32	10 – 125	70 – 300			2480.22.00100.	F130–131
150	24,9	10 – 125	62 – 295			2480.21.00150.	F130–131
150	32	10 – 125	70 – 300			2480.22.00150.	F130–131
200	24,9	10 – 125	62 – 295			2480.21.00200.	F130–131
200	32	10 – 125	70 – 300			2480.22.00200.	F130–131
	24,9	10 – 125	62 – 295			2480.23.	F132–133
Standard-Gas Springs							**F135–151**
250	38	10 – 125	70 – 300	V, I, C*		2480.12.00250.	F136–137
500	45,2	10 – 160	105 – 405	V, I, C*		2480.12.00500.	F138–139
750	50,2	13 – 300	120,4 – 695	V, I, C*		2480.13.00750.	F140–141
1500	75,2	25 – 300	160 – 710	V, I, C*		2480.12.01500.	F142–143
3000	95,2	25 – 300	170 – 720	V, I, C*		2480.13.03000.	F144–145
5000	120,2	25 – 300	190 – 740	V, I, C*		2480.13.05000.	F146–147
7500	150,2	25 – 300	205 – 755	V, I, C*		2480.13.07500.	F148–149
10000	195	25 – 300	210 – 760	V, I, C*		2480.12.10000.	F150–151
Standard-Gas Springs – HEAVY DUTY							**F152–163**
1000	50,2	13 – 300	121 – 695			2488.13.01000.	F154–155
2400	75,2	25 – 300	160 – 710			2488.13.02400.	F156–157
4200	95,2	25 – 300	170 – 720			2488.13.04200.	F158–159
6600	120,2	25 – 300	190 – 740			2488.13.06600.	F160–161
9500	150,2	25 – 300	205 – 755			2488.13.09500.	F162–163
Gas Springs with Reduced Pressure Rise							**F165–173**
750	75,2	13 – 300	120,4 – 695			2481.12.00750.	F166–167
1500	95,2	25 – 300	160 – 710			2481.13.01500.	F168–169
3000	120,2	25 – 300	170 – 720			2481.13.03000.	F170–171
5000	150,2	25 – 300	190 – 740			2481.13.05000.	F172–173
Gas Springs with through bore passage							**F175–181**
270	38	16 – 80	108 – 236			2496.12.00270.	F176–177
490	50,2	16 – 80	112 – 240			2496.12.00490.	F178–179
1060	75,2	16 – 100	122 – 290			2496.12.01060.	F180–181

* V = VDI I = ISO C = CNOMO

Gas Springs
Synopsis

Gas Springs and Accessories
Synopsis

Gas Springs and accessories
Synopsis, numerical

Spring Plungers with Gas Spring (Ejector Pin Units)

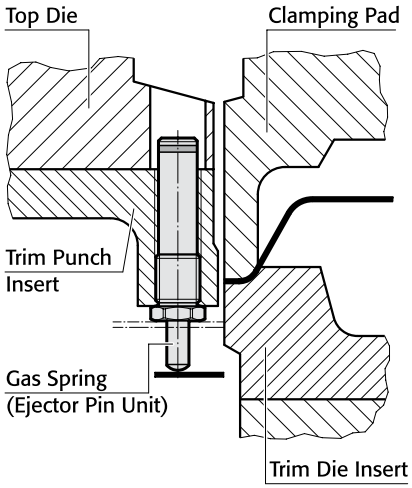
FIBRO

2479.034.

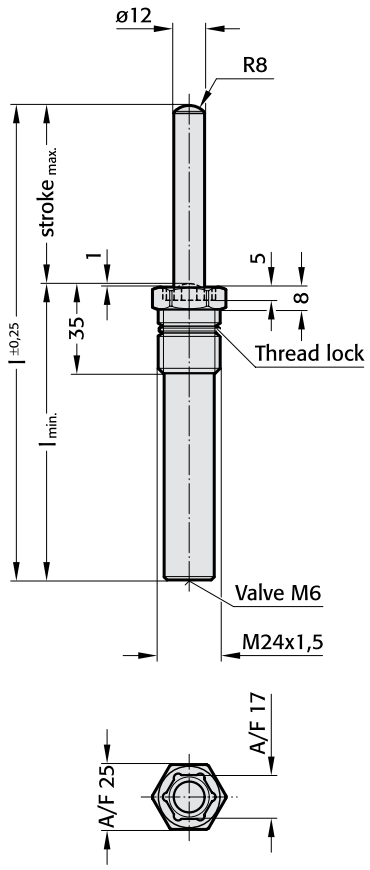
Spring Plungers with Gas Spring (Ejector Pin Units) to WDX

Installation Example

Trimming Die



2479.034.



Description:

Spring ejectors are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries.

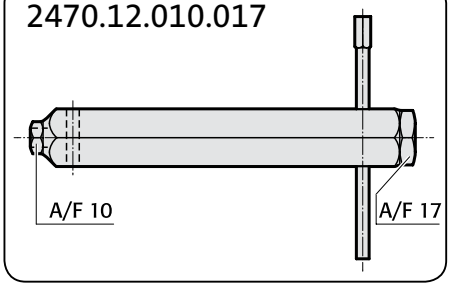
Note:

Do not repair worn springs; they have to be replaced completely

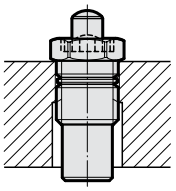
Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar (at 20 °C)
Min. filling pressure:	20 bar
Working temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 30 to 80 (at 20 °C)
Max. piston speed:	1.6 m/s

Warning:
Different colour coding for spring force used in WDX standard

2470.12.010.017



Mounting variations



2479.034.00020./.00040./.00080./.00170.

		stroke		spring force (daN)									
				.00020.		.00040.		.00080.		.00170.			
Order No	max.	$l_{min.}$	l	initial	finish	initial	finish	initial	finish	initial	finish		
2479.034. .	010	10	55	65	23	32,5	45	65,0	85	122,0	170	243,5	
	016	16	61	77		36,6		73,3		137,4		274,8	
	020	20	65	85		36,0		72,0		134,5		269,0	
	025	25	70	95		38,9		77,8		145,9		291,8	
	030	30	75	105		37,5		75,0		141,0		281,5	
	038	38	83	121		40,7		81,4		152,7		305,4	
	040	40	85	125		38,5		77,0		144,5		289,0	
	050	50	95	145		42,0		83,5		156,5		313,0	
	060	60	105	165		42,0		84,0		157,0		314,0	
	070	70	115	185		42,0		84,0		157,5		315,0	
	080	80	125	205		42,0		84,0		158,0		315,5	
	100	100	145	245		42,0		84,5		158,0		316,5	
	125	125	170	295		42,0		84,5		158,5		317,0	

Ordering Code (example):

Spring Plunger with Gas Spring (Ejector Pin Unit)		
M24 × 1,5 nach WDX-Norm	=	2479.034.
Force 20 daN	=	00020.
Stroke 20 mm	=	020
Order No	=	2479.034.00020.020

Spring Force Colour Markings:

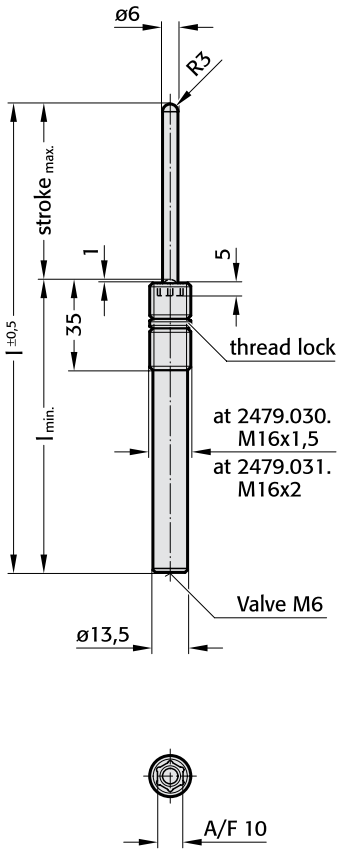
Order No	Colour	initial spring force daN	pressure (bar)
2479.034. 00020.	green	23	20
00040.	blue	45	40
00080.	red	85	75
00170.	yellow	170	150
00000.	black, upon customers request; also available unfilled		

Spring Plungers with Gas Spring (Ejector Pin Units) with hexagon socket VDI 3004

FIBRO

2479.030.
2479.031.

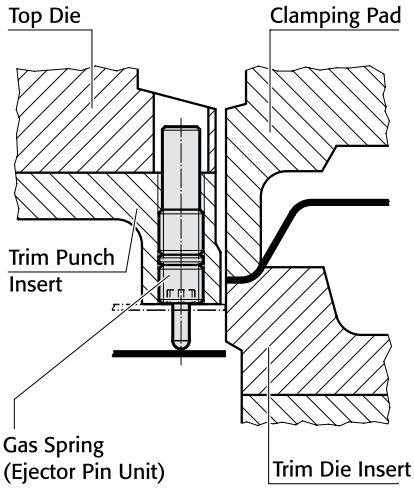
2479.030.
2479.031.



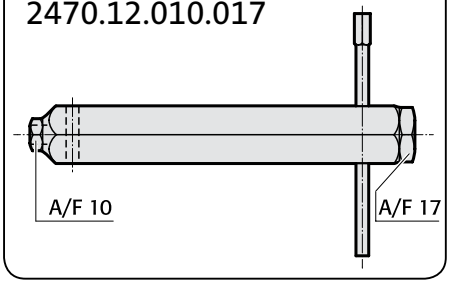
[2] Hexagon nut order supplementary:
2480.004.00040.1 (M16 x 1,5)
2480.004.00040.2 (M16 x 2)

Installation Example

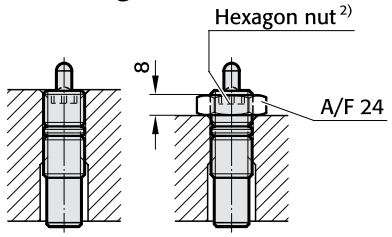
Trimming Die



2470.12.010.017



Mounting Variations:



Description:

Spring ejectors 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:

Do not repair worn springs; they have to be replaced completely

Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar (at 20 °C)
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

2479.030.00005./ 00010./ 00020./ 00040.
2479.031.00004.[1]/ 00005./ 00010./ 00020./ 00040.

[1] Spring forces for 2479.031. only

Order No	stroke max.	$l_{min.}$	l	spring force (daN) (violet) .00004.[1] initial	final	(green) .00005. initial	final	(blue) .00010. initial	final	(red) .00020. initial	final	(yellow) .00040. initial	final
2479. . .010	10	55	65	3,4	6,0	6	10,3	11	19,0	21	36,1	42	73,0
020	20	65	85		5,2		9,4		17,2		32,8		66,1
030	30	75	105		5,2		9,1		16,7		31,9		64,5
040	40	85	125		5,2		9,0		16,5		31,5		63,7
050	50	95	145		5,4		9,6		17,6		33,6		67,7
060	60	105	165		5,4		9,4		17,3		33,0		66,5
070	70	115	185		5,4		9,3		17,0		32,5		65,7
080	80	125	205		5,2		9,2		16,8		32,1		65,1
100	100	145	245		5,2		9,1		16,7		31,9		64,3
125	125	170	295		5,2		9,0		16,5		31,5		63,8

Ordering Code (example):		
Gas Spring		
(Ejector Pin Unit) M16 x 1,5	=	2479.030.
Force 6 daN	=	00005.
Stroke 10 mm	=	010
Order No	=	2479.030.00005.010

Spring Force Colour Markings:

Order No	Colour	initial spring force daN	pressure (bar)
2479.031.00004.	violet	4	12
2479. . .00005.	green	6	20
00010.	blue	11	40
00020.	red	21	75
00040.	yellow	42	150
00000.	black, upon customers request; also available unfilled		

FIBRO

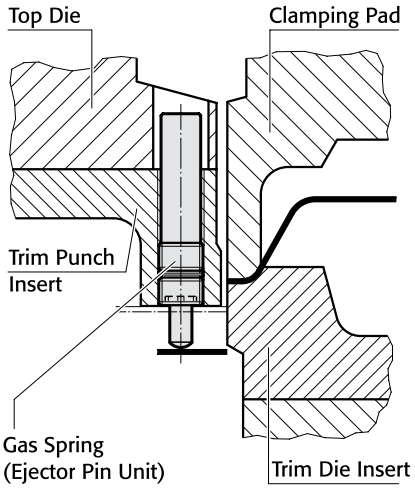
2479.032.

Spring Plungers with Gas Spring (Ejector Pin Units) with hexagon socket VDI 3004

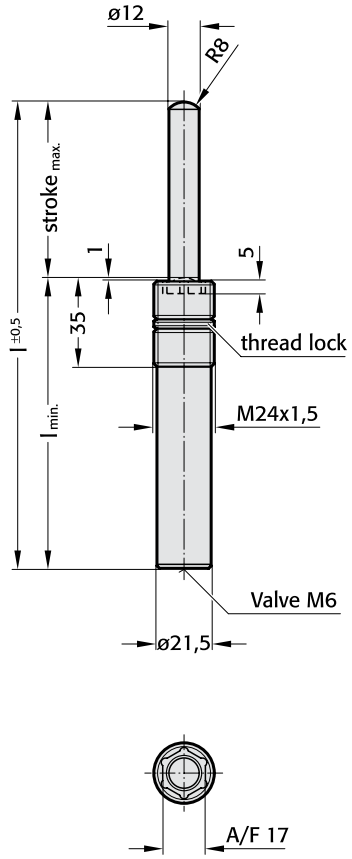
APPROVED PED 97/23/EC

Installation Example

Trimming Die



2479.032.



2) Hexagon nut order supplementary: 2480.004.00170

Description:

Spring ejectors are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries.

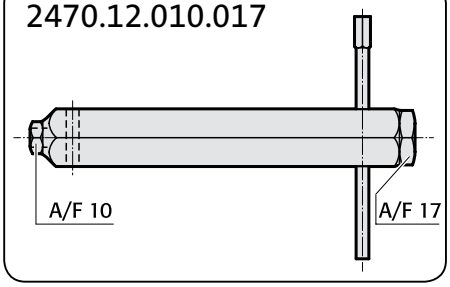
Assembly requires the use of special FIBRO insertion tool (2470.12.010.017)

Note:

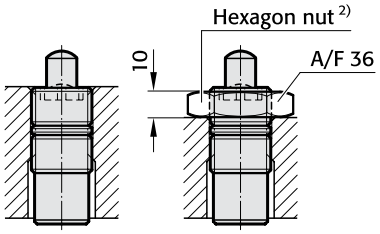
Do not repair worn springs; they have to be replaced completely

Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar (at 20 °C)
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

2470.12.010.017



Mounting Variations :



2479.032.00020./ 00040./ 00080./ 00170.

		stroke			sping force (daN)							
					.00020.		.00040.		.00080.		.00170.	
Order No		max.	$l_{min.}$	l	initial	finish	initial	finish	initial	finish	initial	finish
2479.032.	. 010	10	55	65	23	33,1	45	64,8	85	122,4	170	244,8
	020	20	65	85		36,3		71,1		134,3		268,6
	030	30	75	105		38,2		74,7		141,1		282,2
	040	40	85	125		39,3		76,9		145,4		290,7
	050	50	95	145		42,5		83,2		157,3		314,5
	060	60	105	165		42,5		83,2		157,3		314,5
	070	70	115	185		42,8		83,7		158,1		316,2
	080	80	125	205		42,8		83,7		158,1		316,2
	100	100	145	245		43,0		84,1		159,0		318,0
	125	125	170	295		43,0		84,1		159,0		318,0

Ordering Code (example):

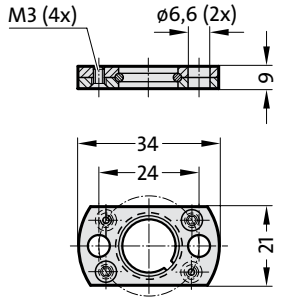
Gas Spring with hexagon socket		
(Ejector Pin Unit) M24 × 1,5	=	2479.032.
Force 20 daN	=	00020.
stroke 20 mm	=	020
Order No	=	2479.032.00020.020

Spring Force Colour Markings:

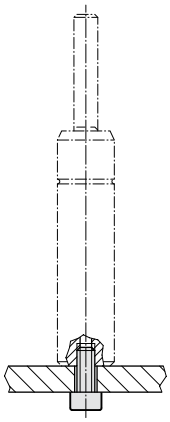
Order No	Colour	initial spring force daN	pressure(bar)
2479.032. 00020.	green	23	20
00040.	blue	45	40
00080.	red	85	75
00170.	yellow	170	150
00000.	black, upon customers request; also available unfilled		

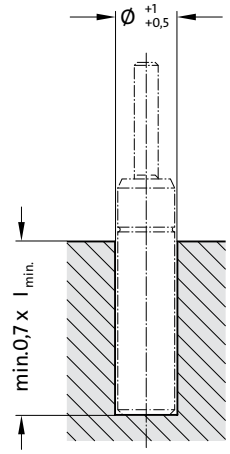
Gas Springs
small dimensions

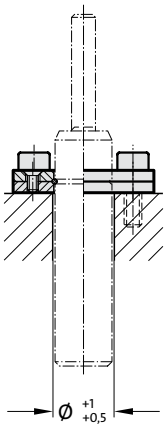
2480.051.00013



Mounting Examples:







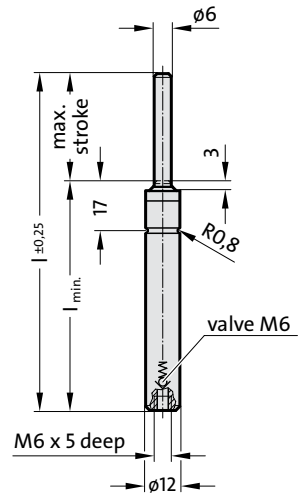
FIBRO

2482.72.

Gas Springs small dimensions and low forces

APPROVED PED 97/23/EC

2482.72.



Spring Force Colour Markings

Order No	initial spring force daN	pressure bar	Colour
2482.72.00013.	13	45	green
00025.	25	90	blue
00038.	38	135	red
00050.	50	180	yellow
00000.*			black

* upon customers request; also available unfilled!

2482.72. 00013. 00025. 00038. 00050.

Order No		stroke max.	$l_{min.}$	l
2482.72.	.007	7	49	56
	010	10	52	62
	013	12,7	54,7	67,4
	015	15	57	72
	019	19	61	80
	025	25	67	92
	038	38	80	118
	050	50	92	142
	063	63,5	108,5	172
	075	75	120	195
	080	80	125	205
	100	100	145	245
	125	125	170	295

Spring forces as per Spring Diagram

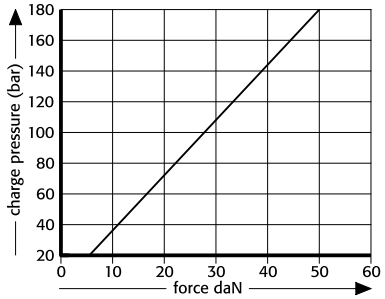
Description:

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.
Do not repair worn springs; 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 min.:	approx. 40 to 100 (at 20°C)
Max. piston speed	1.6 m/s

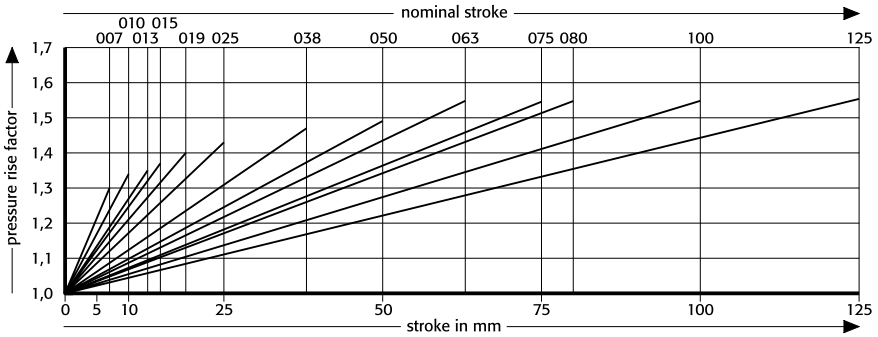
2482.72.

Initial spring force versus charge pressure



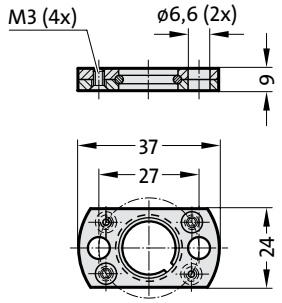
2482.72.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

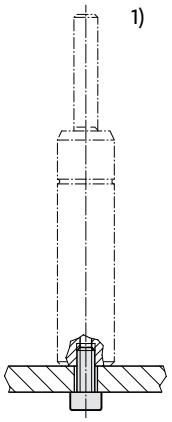
2480.051.00018

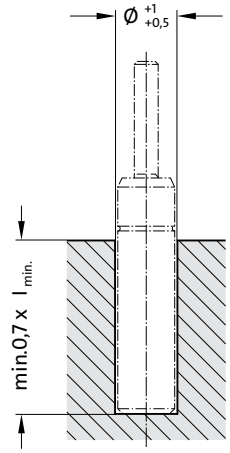


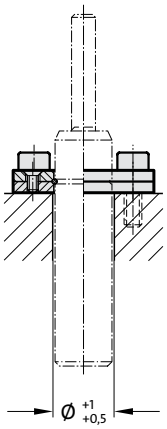
Note:

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

Mounting Examples:







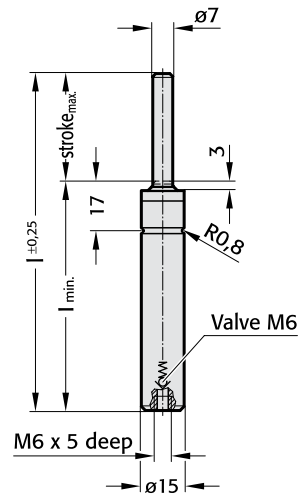
FIBRO

2482.73. .1

Gas Springs small dimensions and low forces

APPROVED PED 97/23/EC

2482.73. .1



Spring Force Colour Markings

Order No	initial spring force daN	pressure bar	Colour
2482.73.00018. .1	18	45	green
00035. .1	35	90	blue
00050. .1	50	135	red
00070. .1	70	180	yellow
00000. .1*			black

* upon customers request; also available unfilled!

2482.73. 00018. .1
00035. .1
00050. .1
00070. .1

Order No	stroke max.	$l_{min.}$	l
2482.73. .007.1	7	49	56
010.1	10	52	62
013.1	12,7	54,7	67,4
015.1	15	57	72
019.1	19	61	80
025.1	25	67	92
038.1	38,1	80,1	118,2
050.1	50	92	142
063.1	63,5	108,5	172
075.1	75	120	195
080.1	80	125	205
100.1	100	145	245
125.1	125	170	295

Spring forces as per Spring Diagram

Description:

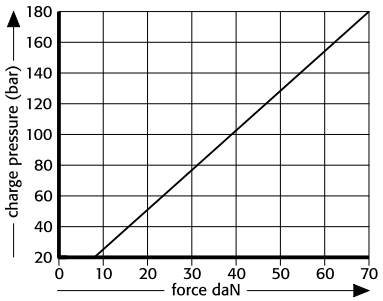
The gas springs are colour-coded according to the spring force rating ranges 18-35-50-70 daN.
All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Gas can be added or reduced from below.

Do not repair worn springs; 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 min.:	approx. 40 to 100 (at 20°C)
Max. piston speed	1.6 m/s

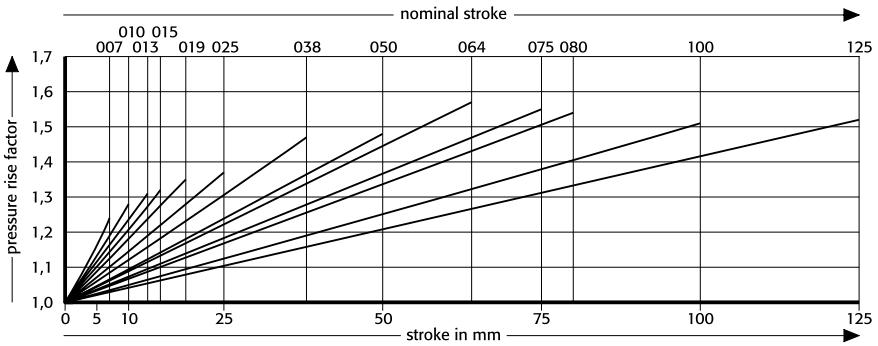
2482.73. .1

Initial spring force versus charge pressure



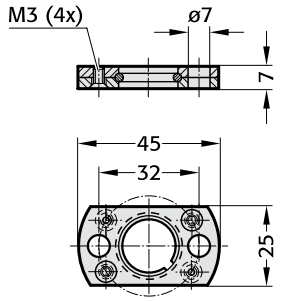
2482.73. .1

Spring force Diagram displacement versus stroke rise

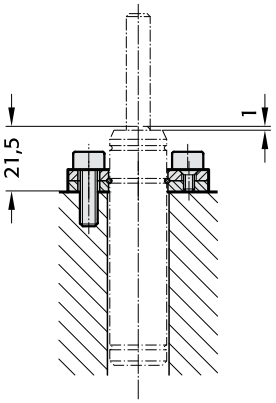


Pressure rise factor accounts for displacement but not external influences!

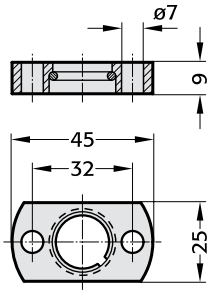
2480.051.00030



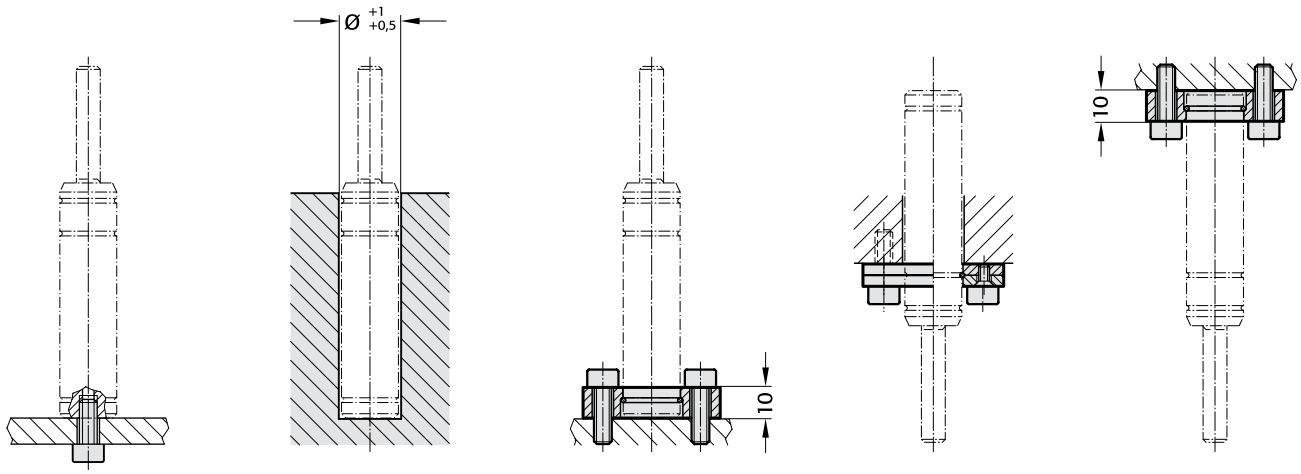
2480.051.00030



2480.052.00030



Mounting Examples:



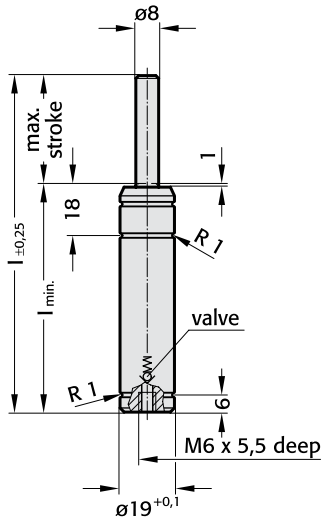
FIBRO VDI 3003/ISO 11901

2482.74.

Gas Springs small dimensions and low forces

APPROVED PED 97/23/EC

2482.74.



Spring Force Colour Markings

Order No	initial spring force daN	pressure bar	Colour
2482.74. 00030.	30	60	green
00050.	50	100	blue
00070.	70	140	red
00090.	90	180	yellow
00000.*			black

* upon customers request; also available unfilled!

2482.74. 00030. 00050. 00070. 00090.

Order No	stroke max.	$l_{min.}$	l
2482.74. .007	7	49	56
010	10	52	62
015	15	57	72
025	25	67	92
038	38,1	79,9	118
050	50	92	142
063.1	63,5	108,5	172
080.1	80	125	205
100	100	145	245
125	125	170	295

Spring forces as per Spring Diagram

Description:

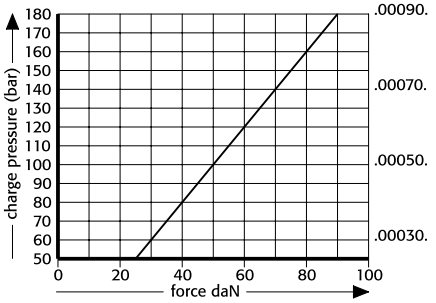
The gas springs are colour-coded according to the spring force rating ranges 30–50–70–90 daN.
All springs, regardless of their spring force ratings, are of the same design. The differing force ratings result exclusively from the differing charge pressures.
Gas can be added from below.

Do not repair worn springs; they have to be replaced completely.

Pressure medium:	Nitrogen N_2
Max. filling pressure:	180 bar
Min. filling pressure:	45 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

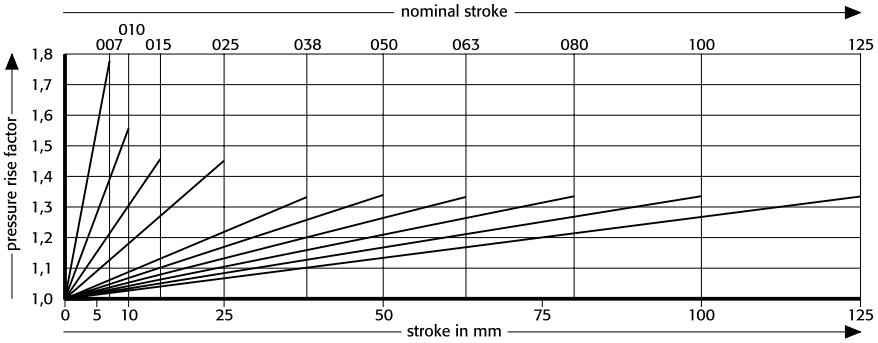
2482.74.

Initial spring force versus charge pressure



2482.74.

Spring force Diagram displacement versus stroke rise



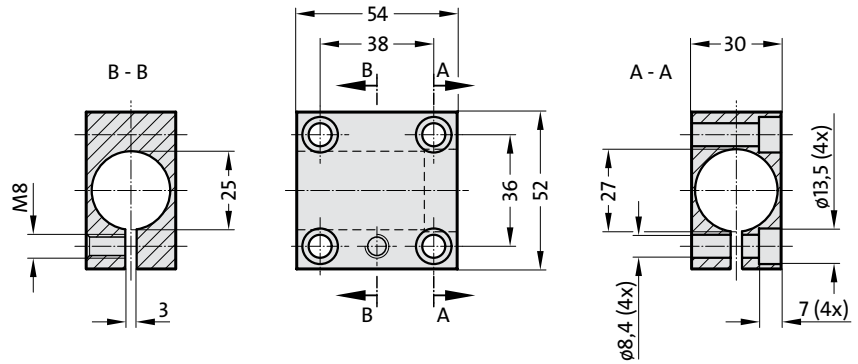
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
small dimensions and low forces
Mounting Variations

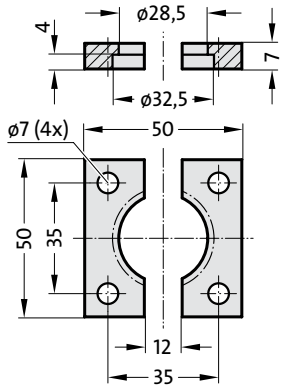
FIBRO

2480.21.
2480.22.

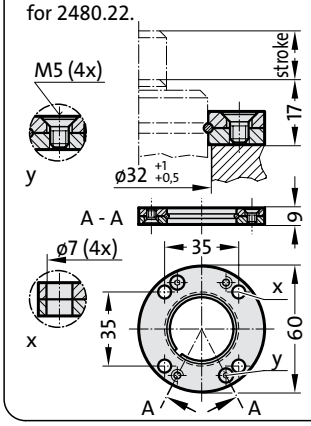
2480.053.00150
for 2480.21.



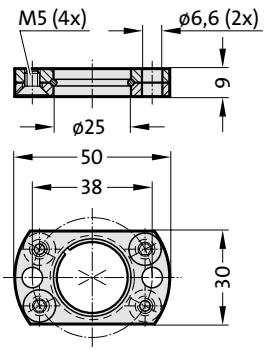
2480.022.00150
for 2480.22.



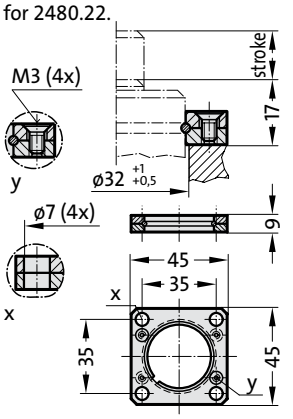
2480.055.00150
for 2480.22.



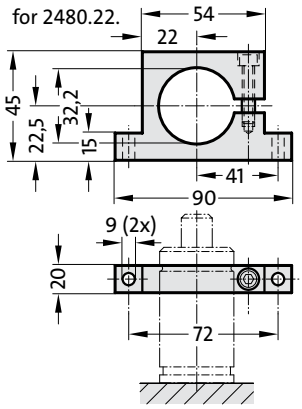
2480.051.00150
for 2480.21.



2480.057.00150
for 2480.22.

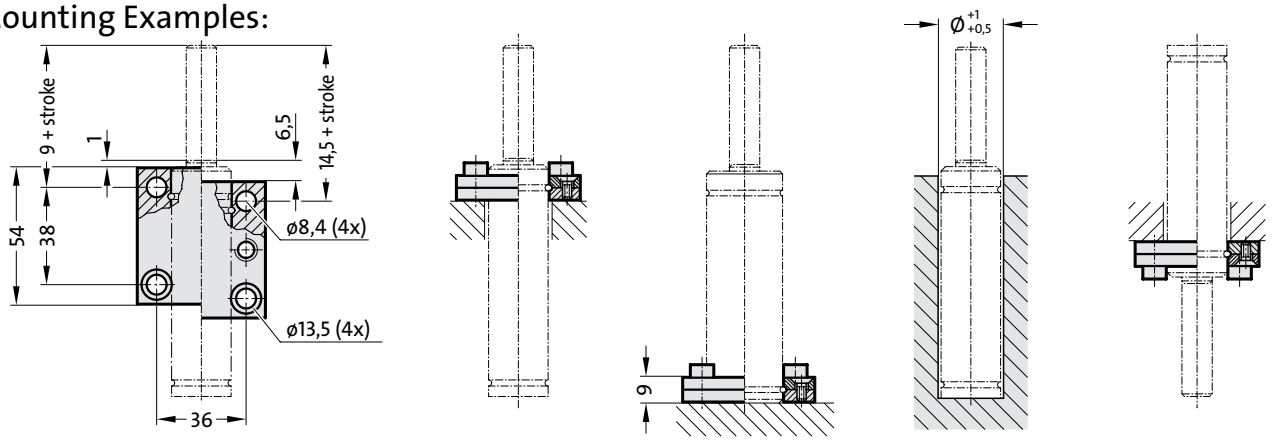


2480.044.00150 [2)]
for 2480.22.



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

Mounting Examples:



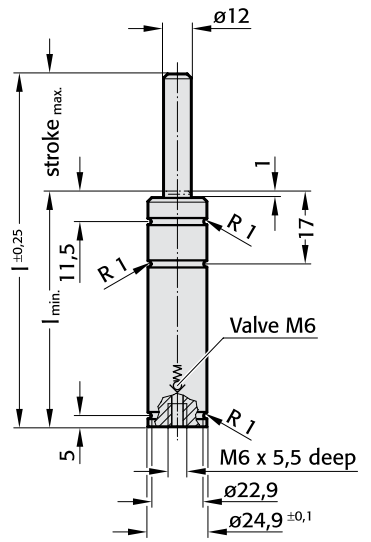
FIBRO ISO 11901/CNOMO E.24.54.815.N/VDI 3003

2480.21.
2480.22. .1

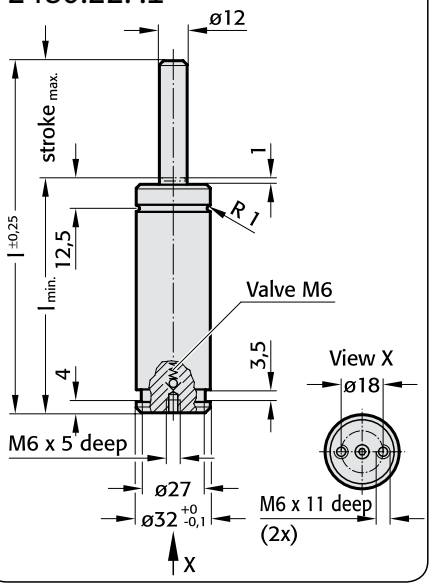
Gas Springs small dimensions and low forces

APPROVED PED 97/23/EC

2480.21.



2480.22. .1



2480.21. 00050.
00100.
00150.
00200.

Order No	stroke max.	$l_{min.}$	l
2480.21. .010	10	52	62
013	12,7	54,7	67,4
015	15	57	72
016	16	58	74
025	25	67	92
038	38,1	80,1	118,2
050	50	92	142
063	63,5	108,5	172
080	80	125	205
100	100	145	245
125	125	170	295

Spring forces as per Spring Diagram

Order No for spare parts kit:
2480.21.00150

2480.22. 00050. .1
00100. .1
00150. .1
00200. .1

Order No	stroke max.	$l_{min.}$	l
2480.22. .010.1	10	60	70
013.1	12,7	62,7	75,4
016.1	16	66	82
025.1	25	75	100
038.1	38,1	88,1	126,2
050.1	50	100	150
063.1	63,5	113,5	177
080.1	80	130	210
100.1	100	150	250
125.1	125	175	300

Order No for spare parts kit:
2480.21.00150

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.

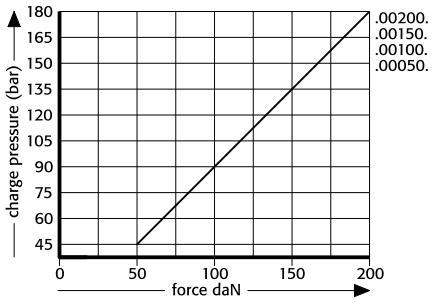
Spring Force Colour Markings

Order No	initial spring force daN	pressure (bar)	Colour
2480. .00050.	50	45	green
00100.	100	90	blue
00150.	150	135	red
00200.	200	180	yellow
00000.			black*

* upon customers request; also available unfilled!

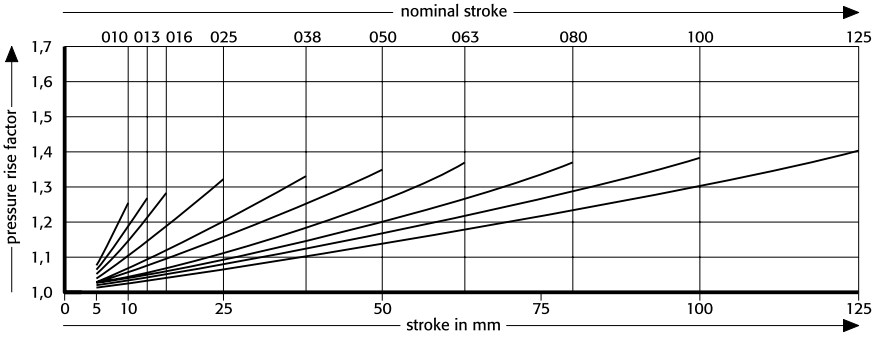
2480.21./2480.22. .1

Initial spring force versus charge pressure



2480.21./2480.22. .1

Spring force Diagram displacement versus stroke rise

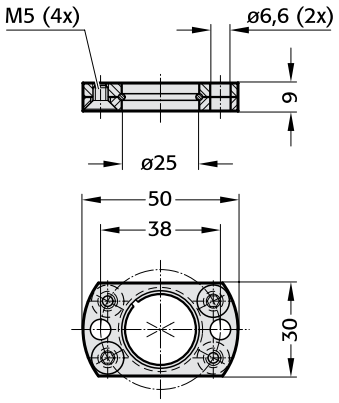


Pressure medium:	Nitrogen N2
Max. filling pressure:	180 bar
Min. filling pressure:	25 bar
Working temperature:	0°C to +80°C
Temperature related force increase:	±0.3%/°C
Max. recom. extensions per min.:	approx. 80 to 100 (at 20°C)
Max. piston speed:	1.6 m/s

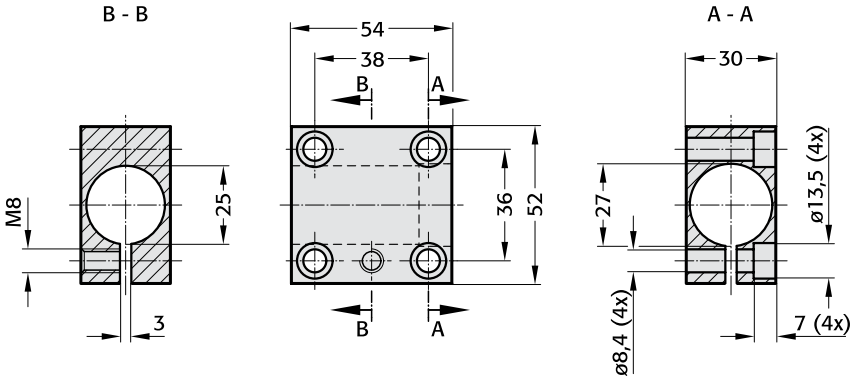
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
Mounting Variations

2480.051.00150

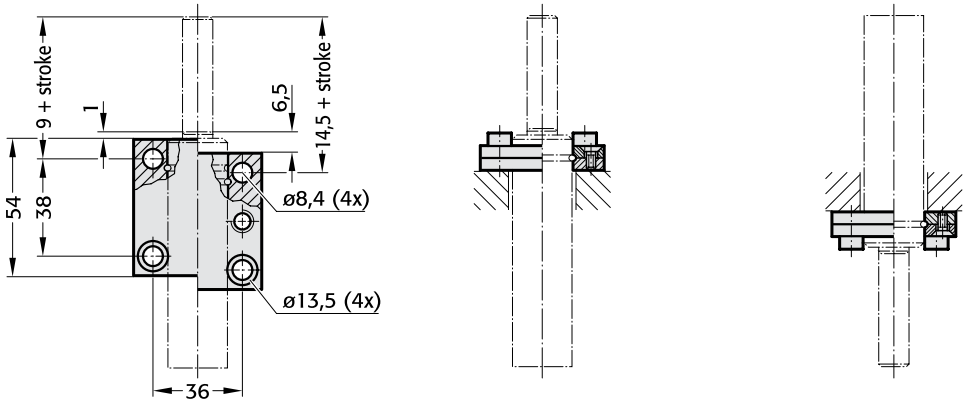


2480.053.00150



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 example:



FIBRO

2480.23.

Gas Springs with Side Connection

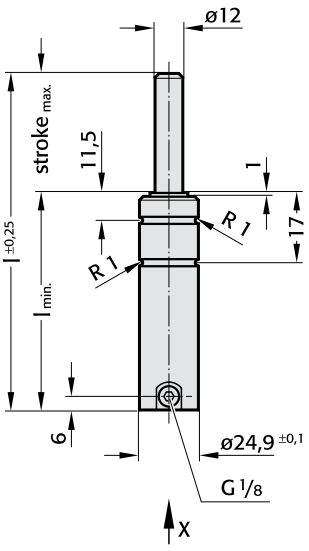
APPROVED PED 97/23/EC

2480.23.

Initial spring force at 180 bar = 200 daN

Order No		stroke max.	$l_{min.}$	l
2480.23.00000.	010	10	52	62
	013	12,7	54,7	67,4
	016	16	58	74
	025	25	67	92
	038	38,1	80,1	118,2
	050	50	91	142
	063	63,5	108,5	172
	080	80	125	205
	100	100	145	245
	125	125	170	295

2480.23.



View X

Note:

Order No for spare parts kit:
2480.21.00150

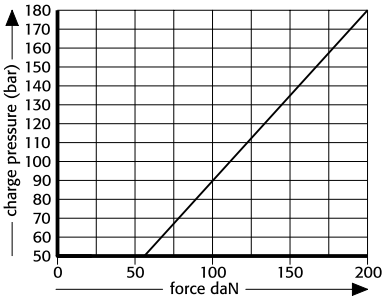
max. charge pressure 180 bar

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

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

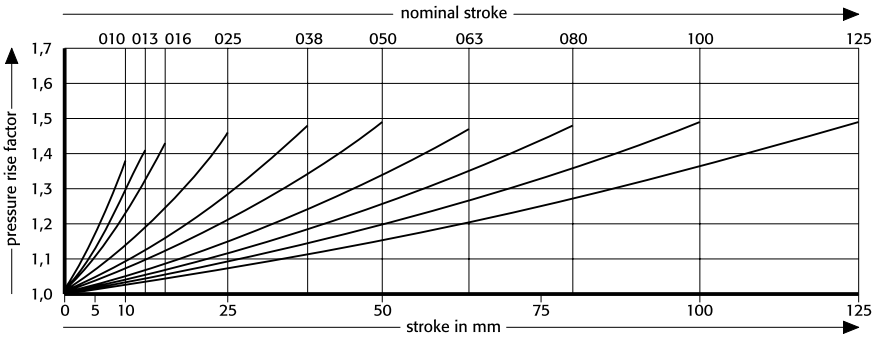
2480.23.

Initial spring force versus charge pressure



2480.23.

Spring force Diagram displacement versus stroke rise



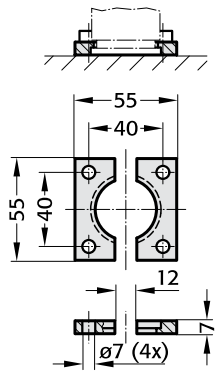
Pressure rise factor accounts for displacement but not external influences!

Gas Springs Standard

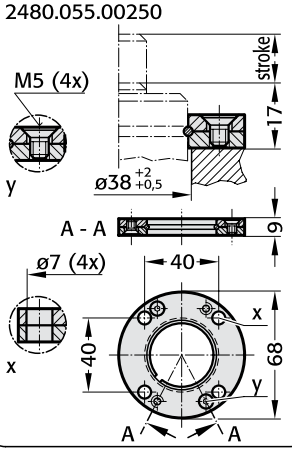
Gas Springs
Mounting Variations

2480.12.00250.

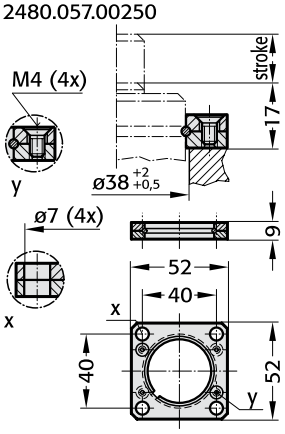
2480.022.00250



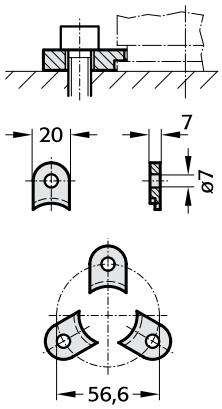
2480.055.00250



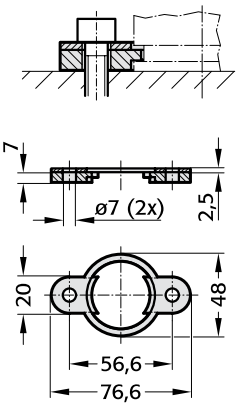
2480.057.00250



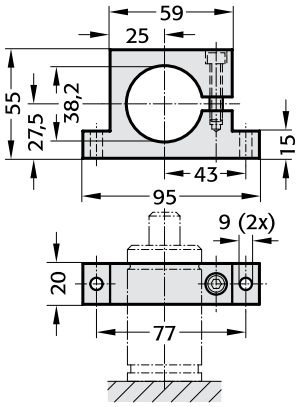
2480.007.00250



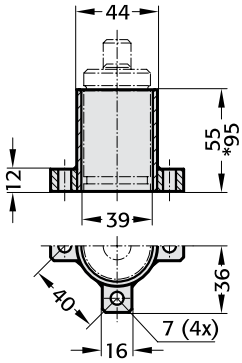
2480.008.00250 [3]



2480.044.00250 [2]



2480.010.00250.055 [3]
2480.010.00250.095* [3]



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

[3] Note:
Not for use with composite connection.

2480.12.00250. Gas Springs

APPROVED PED 97/23/EC

2480.12.00250.

Initial spring force at 150 bar = 250 daN

Order No		stroke max.	l_{min}	l
2480.12.00250.	010	10	60	70
	013	12,7	62,7	75,4
	016	16	66	82
	019	19	69	88
	025	25	75	100
	038	38,1	88,1	126,2
	050	50	100	150
	063	63,5	113,5	177
	080	80	130	210
	100	100	150	250
	125	125	175	300

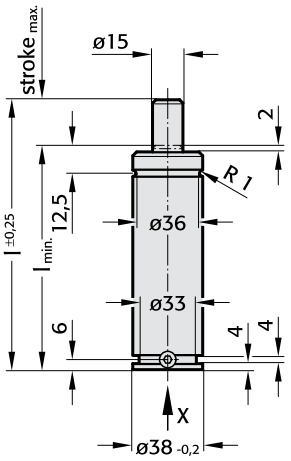
Note:

Order No for spare parts kit:

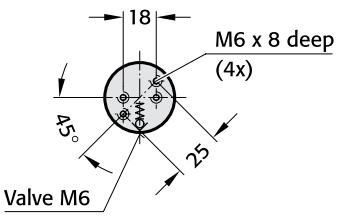
2480.12.00250

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

2480.12.00250.

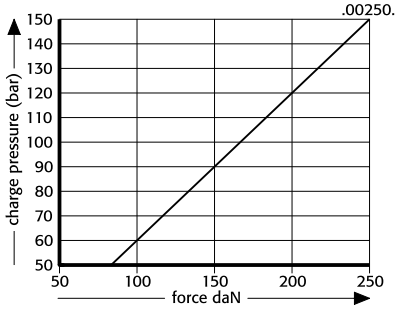


View X



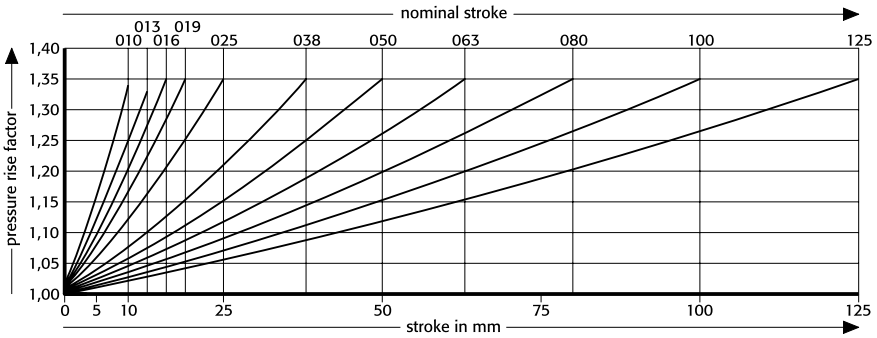
2480.12.00250.

Initial spring force versus charge pressure



2480.12.00250.

Spring force Diagram displacement versus stroke rise

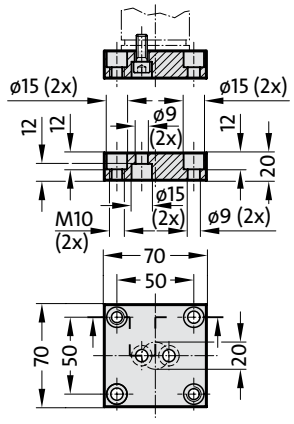


Pressure rise factor accounts for displacement but not external influences!

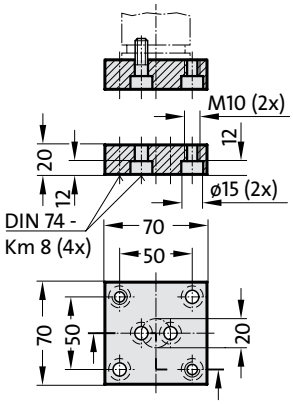
Gas Springs
Mounting Variations

2480.12.00500.

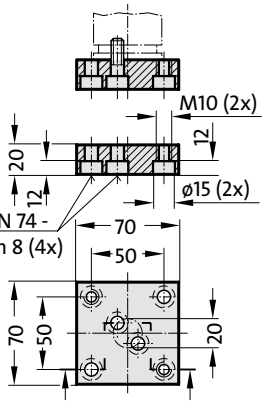
2480.011.00500.2



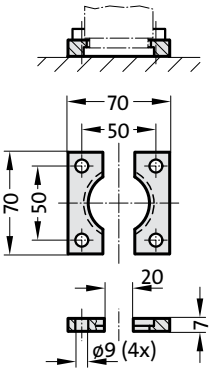
2480.011.00500



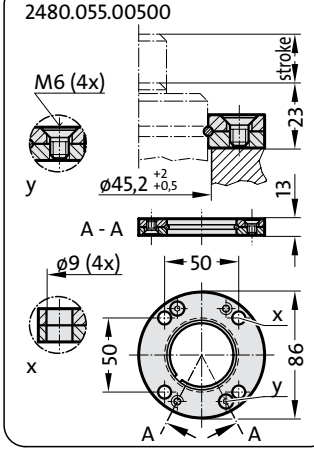
2480.011.00500.1



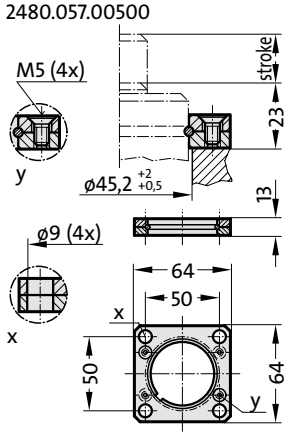
2480.022.00500



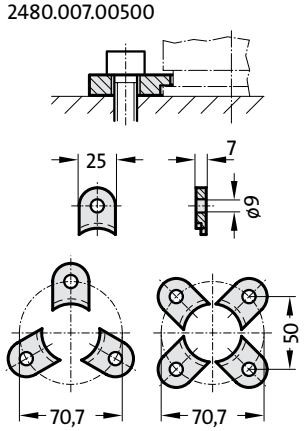
2480.055.00500



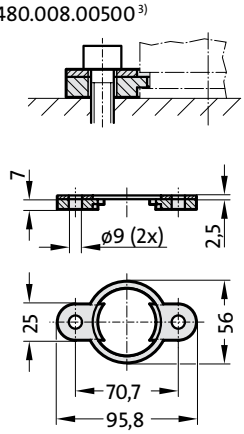
2480.057.00500



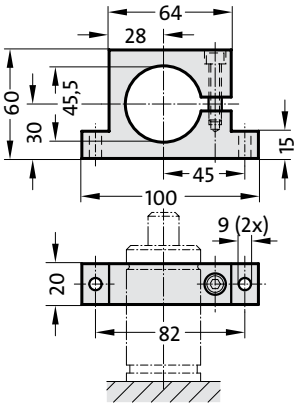
2480.007.00500



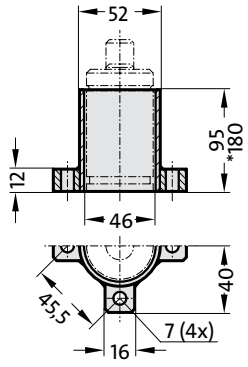
2480.008.00500 [3]



2480.044.00500 [2]



2480.010.00500.095 [3]
2480.010.00500.180* [3]



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

[3] Note:
Not for use with composite connection.

2480.12.00500. Gas Springs

APPROVED PED 97/23/EC

2480.12.00500.

Initial spring force at 150 bar = 500 daN

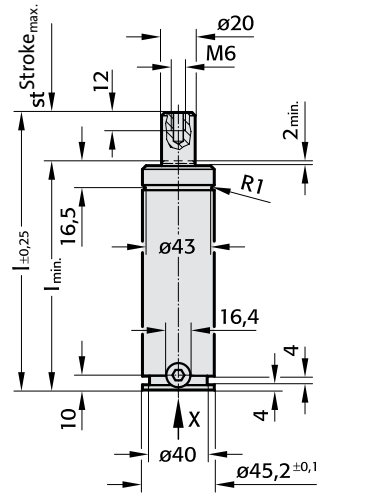
Order No	stroke max.	l_{min}	l
2480.12.00500.010	10	95	105
013	12,7	97,7	110,4
025	25	110	135
038	38,1	123,1	161,2
050	50	135	185
063	63,5	148,5	212
080	80	165	245
100	100	185	285
125	125	210	335
160	160	245	405

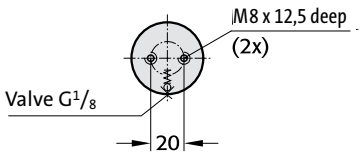
Note:

Order No for spare parts kit
2480.12.00500

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

2480.12.00500.

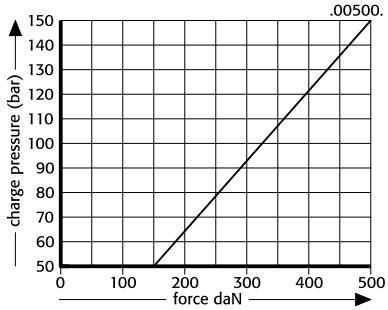




View X

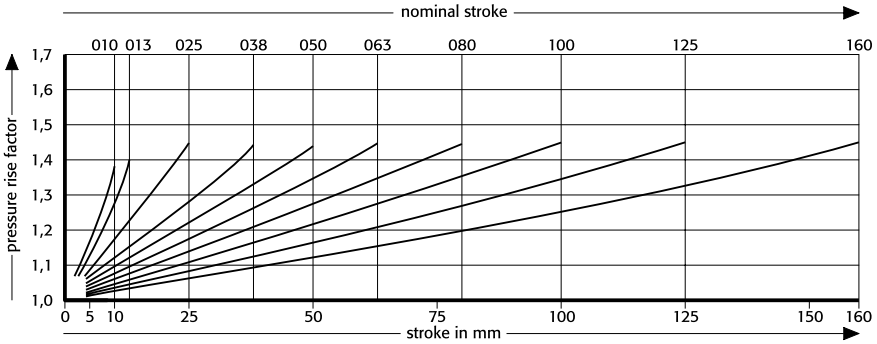
2480.12.00500.

Initial spring force versus charge pressure



2480.12.00500.

Spring force Diagram displacement versus stroke rise

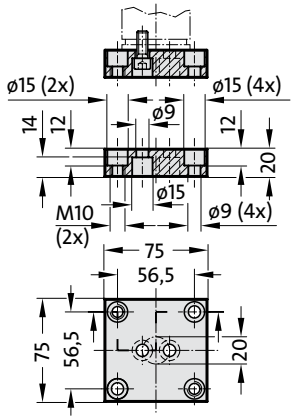


Pressure rise factor accounts for displacement but not external influences!

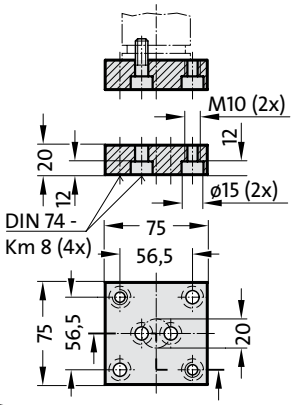
Gas Springs
Mounting Variations

2480.13.00750.

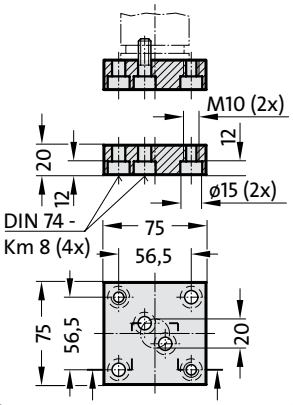
2480.011.00750.3



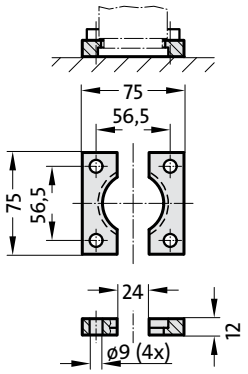
2480.011.00750



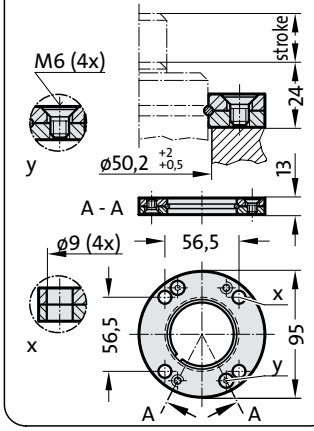
2480.011.00750.1



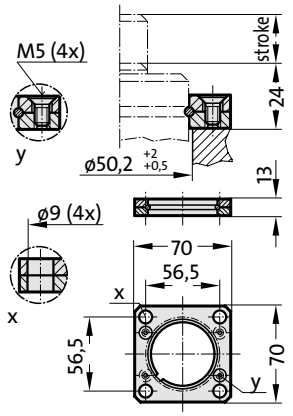
2480.022.00750



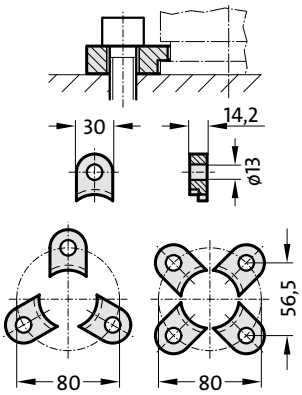
2480.055.00750



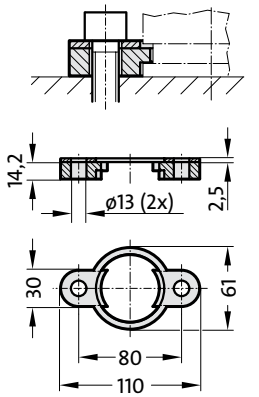
2480.057.00750



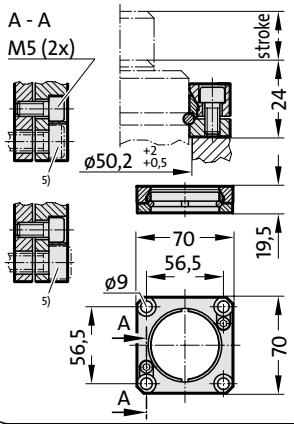
2480.007.00750



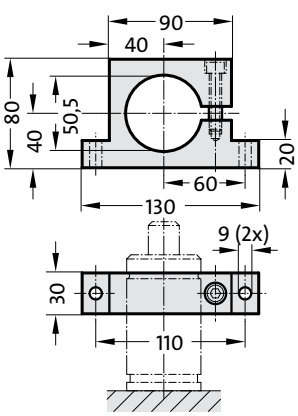
2480.008.00750 3)



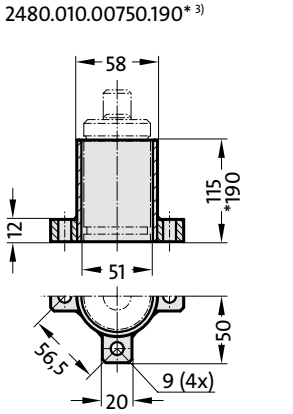
2480.064.00750 4)



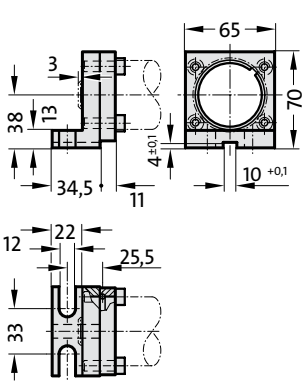
2480.044.00750 2)



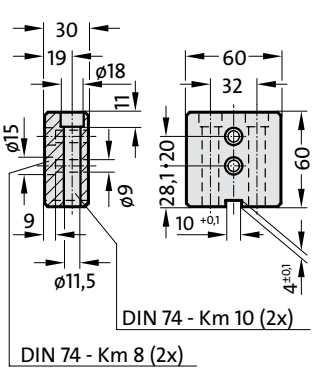
2480.010.00750.115 3)
2480.010.00750.190* 3)



2480.045.00750 2)



2480.047.00750 2)



Notes:

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).

2480.13.00750. Gas Springs

APPROVED PED 97/23/EC

2480.13.00750.

Initial spring force at 150 bar = 750 daN

Order No	stroke max.	l_{min}	l
2480.13.00750. 013	12,7	107,7	120,4
025	25	120	145
038	38,1	133,1	171,2
050	50	145	195
063	63,5	158,5	222
075[1)]	75	170	245
080	80	175	255
088[1)]	87,5	182,5	270
100	100	195	295
113[1)]	112,5	207,5	320
125	125	220	345
138[1)]	137,5	232,5	370
150[1)]	150	245	395
160	160	255	415
175[1)]	175	270	445
200	200	295	495
225[1)]	225	320	545
250	250	345	595
275[1)]	275	370	645
300	300	395	695

Note:

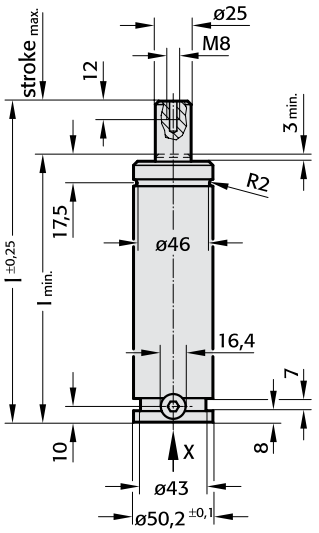
Order No for spare parts kit:
2480.13.00750

Order No for spare parts kit:
to Renault standard EM24.54.700
2480.13.00750.R

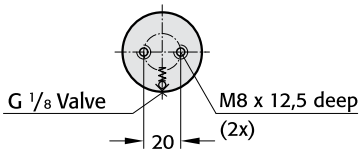
Gas spring
to Renault standard EM24.54.700*
Ordering-code (example)
2480.13.00750. □□□ .R

* Attention: The gas spring cannot be repaired if the overtravel protection is triggered.

2480.13.00750.



View X - Gas spring



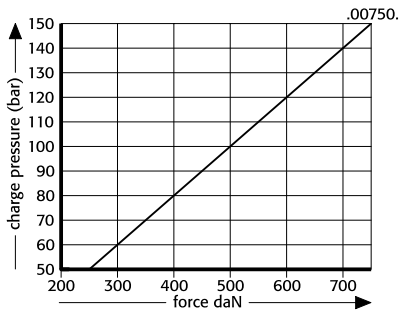
[1)] Special stroke lengths

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

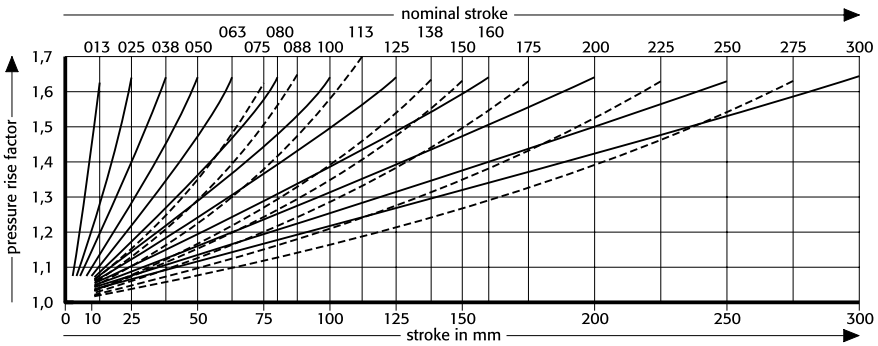
2480.13.00750.

Initial spring force
versus charge pressure



2480.13.00750.

Spring force Diagram displacement versus stroke rise

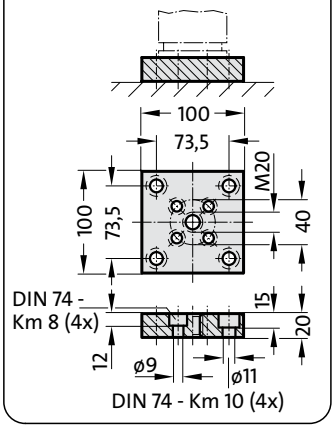


Pressure rise factor accounts for displacement but not external influences!

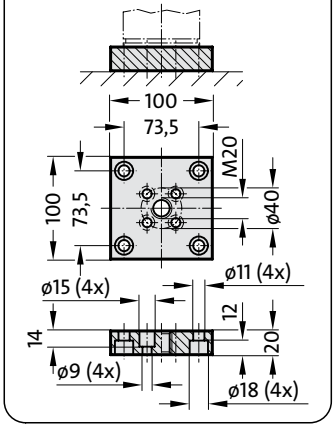
Gas Springs
Mounting Variations

2480.12.01500.

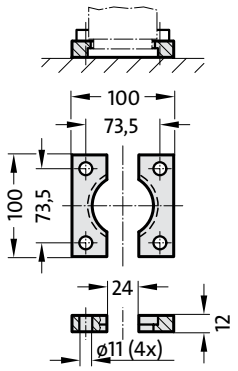
2480.011.01500



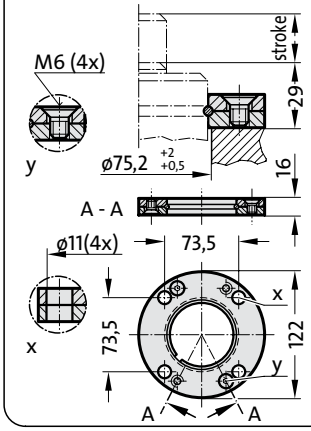
2480.011.01500.2



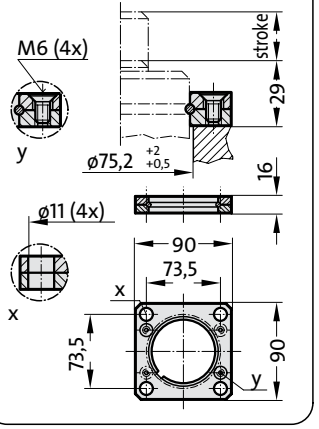
2480.022.01500



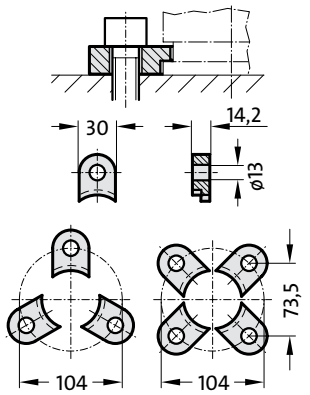
2480.055.01500



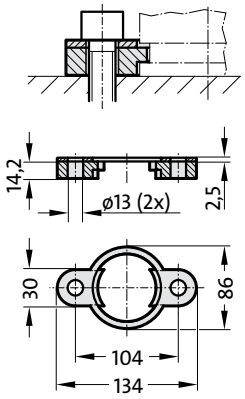
2480.057.01500



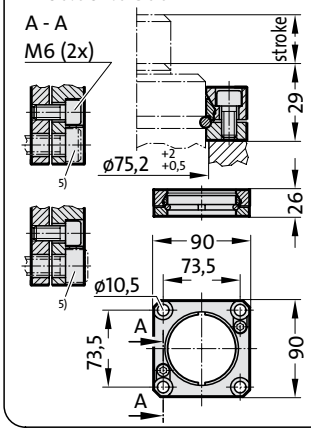
2480.007.01500



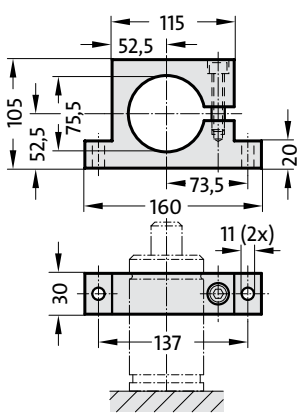
2480.008.01500 3)



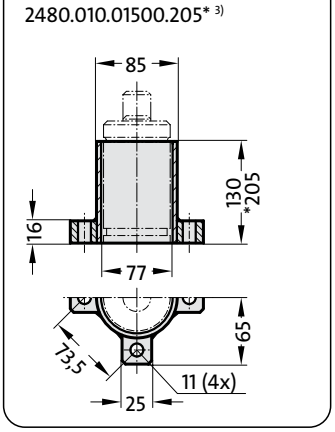
2480.064.01500 4)



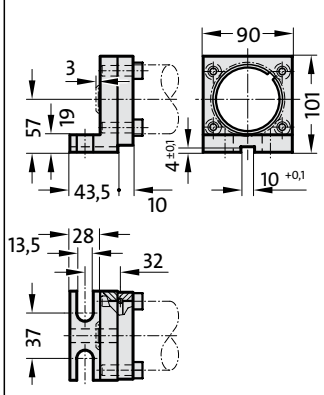
2480.044.01500 2)



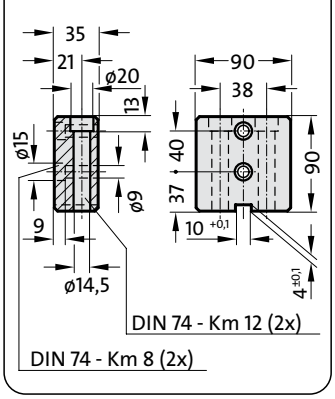
2480.010.01500.130 3)
2480.010.01500.205* 3)



2480.045.01500 2)



2480.047.01500 2)



Notes:

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).

2480.12.01500. Gas Springs

APPROVED PED 97/23/EC

2480.12.01500.

Initial spring force at 150 bar = 1500 daN

Order No.	stroke max.	l_{min}	l
2480.12.01500. 013[1)]	12,7	122,3	135
025	25	135	160
038	38,1	148,1	186,2
050	50	160	210
063	63,5	173,5	237
075[1)]	75	185	260
080	80	190	270
088[1)]	87,5	197,5	285
100	100	210	310
113[1)]	112,5	222,5	335
125	125	235	360
138[1)]	137,5	247,5	385
150[1)]	150	260	410
160	160	270	430
175[1)]	175	285	460
200	200	310	510
225[1)]	225	335	560
250	250	360	610
275[1)]	275	385	660
300	300	410	710

Note:

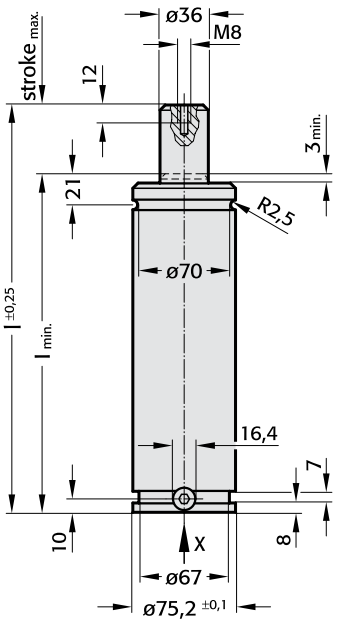
Order No for spare parts kit:
2480.12.01500

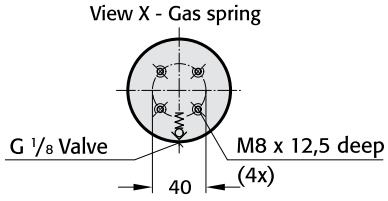
Order No for spare parts kit:
to Renault standard EM24.54.700
2480.12.01500.R

Gas spring
to Renault standard EM24.54.700*
Ordering-code (example)
2480.12.01500. □□□.R

* Attention: The gas spring cannot be repaired if the overtravel protection is triggered.

2480.12.01500.





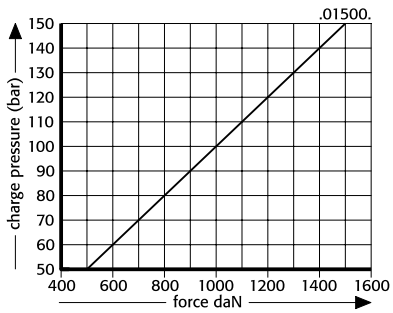
[1)] Special stroke lengths

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

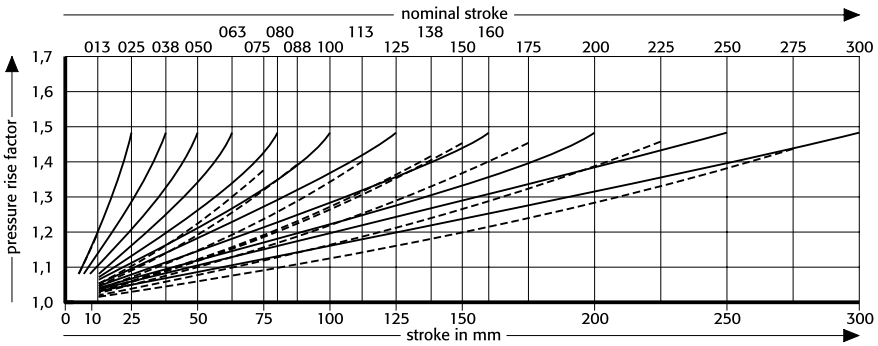
2480.12.01500.

Initial spring force
versus charge pressure



2480.12.01500.

Spring force Diagram displacement versus stroke rise

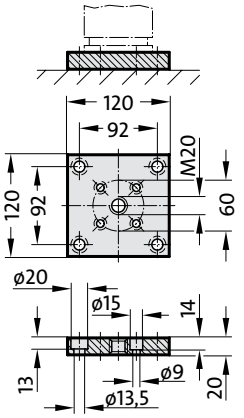


Pressure rise factor accounts for displacement but not external influences!

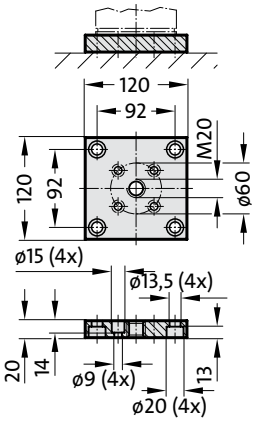
Gas Springs
Mounting Variations

2480.13.03000.

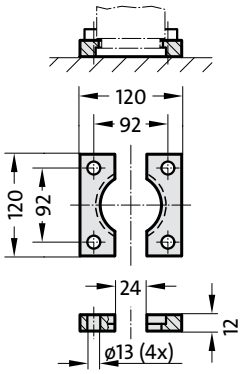
2480.011.03000



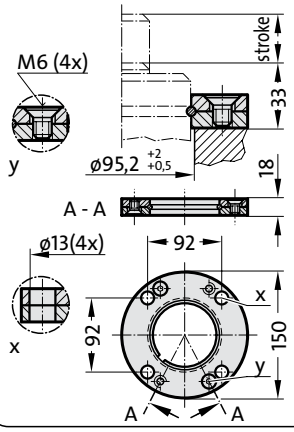
2480.011.03000.2



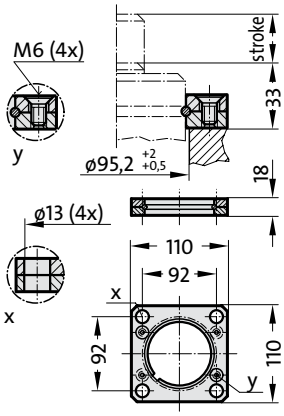
2480.022.03000



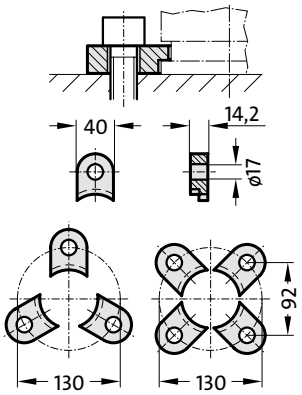
2480.055.03000



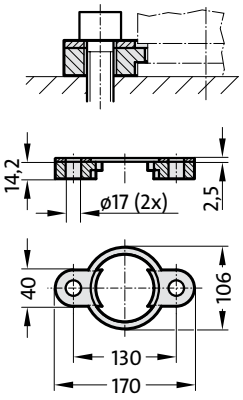
2480.057.03000



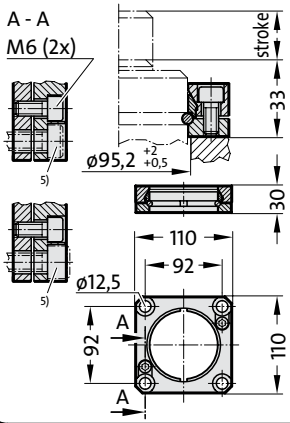
2480.007.03000



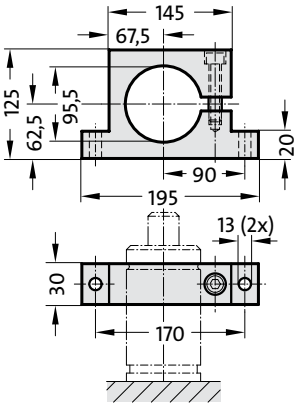
2480.008.03000 3)



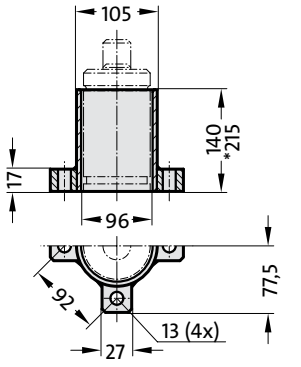
2480.064.03000 4)



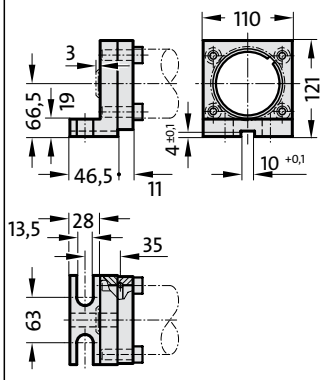
2480.044.03000 2)



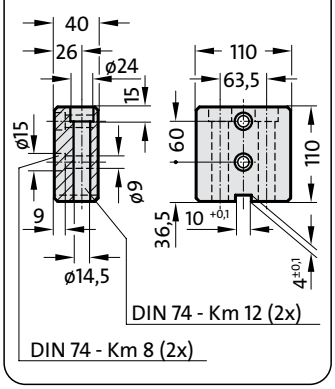
2480.010.03000.140 3)
2480.010.03000.215* 3)



2480.045.03000 2)



2480.047.03000 2)



Notes:

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).

2480.13.03000. Gas Springs

APPROVED PED 97/23/EC

2480.13.03000.

Initial spring force at 150 bar = 3000 daN

Order No	stroke max.	l_{min}	l
2480.13.03000.013[1)]	12,7	132,3	145
025	25	145	170
038	38,1	158,1	196,2
050	50	170	220
063	63,5	183,5	247
075[1)]	75	175	270
080	80	200	280
088.1[1)]	87,5	207,5	295
100	100	220	320
113[1)]	112,5	232,5	345
125	125	245	370
138[1)]	137,5	257,5	395
150[1)]	150	270	420
160	160	280	440
175[1)]	175	295	470
200	200	320	520
225[1)]	225	345	570
250	250	370	620
275[1)]	275	395	670
300	300	420	720

Note:

Order No for spare parts kit:
2480.13.03000

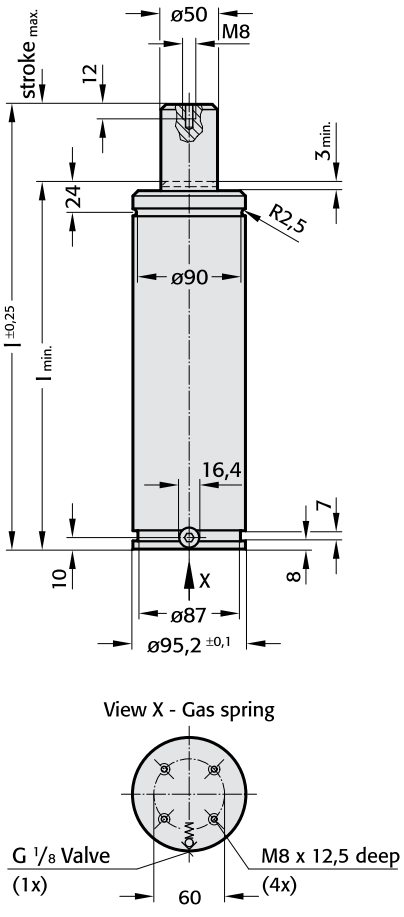
Order No for spare parts kit:
to Renault standard EM24.54.700
2480.13.03000.R

Gas Spring
to Renault standard EM24.54.700*

Order No (example):
2480.13.03000. □□□.R

*Attention: The gas spring cannot be repaired if the overtravel protection is triggered.

2480.13.03000.

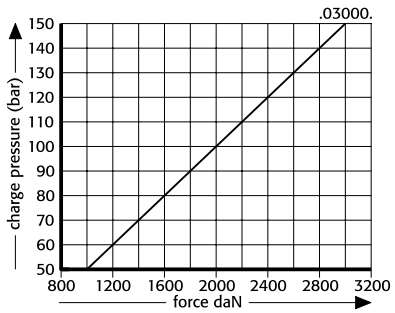


[1)] Special stroke lengths
Not for gas springs
to Renault Standard EM24.54.700.

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

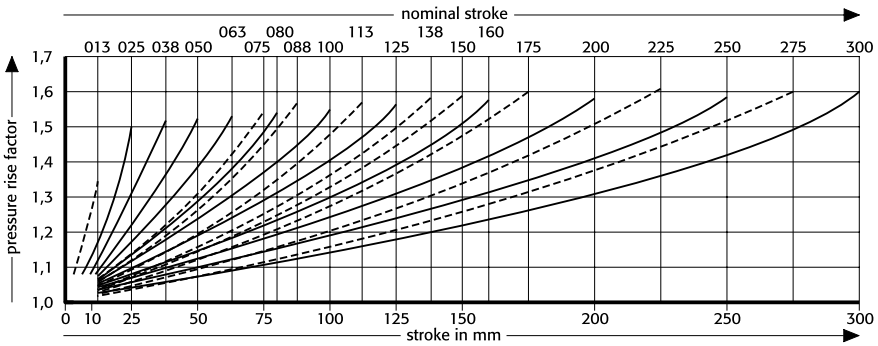
2480.13.03000.

Initial spring force
versus charge pressure



2480.13.03000.

Spring force Diagram displacement versus stroke rise

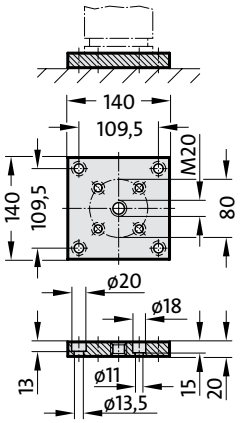


Pressure rise factor accounts for displacement but not external influences!

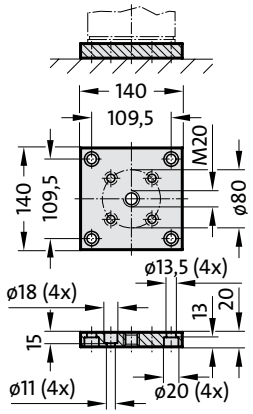
Gas Springs
Mounting Variations

2480.13.05000.

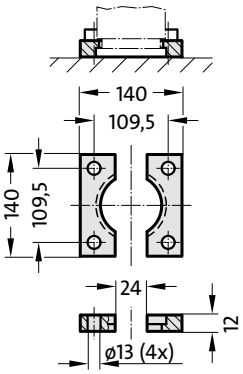
2480.011.05000



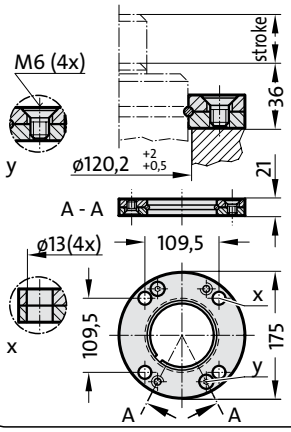
2480.011.05000.2



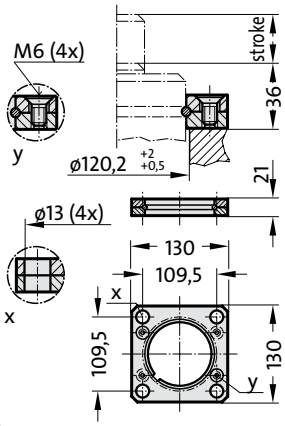
2480.022.05000



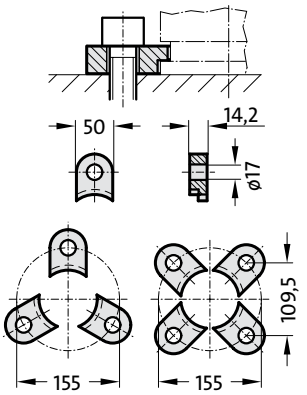
2480.055.05000



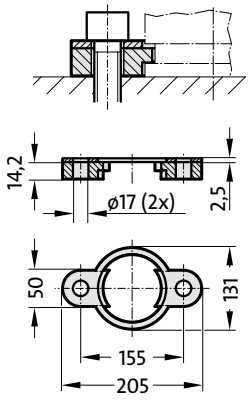
2480.057.05000



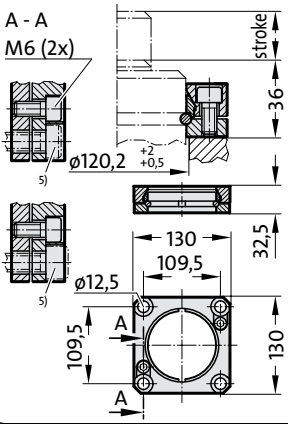
2480.007.05000



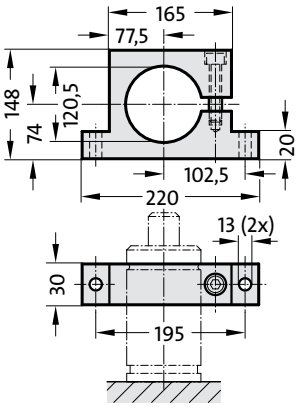
2480.008.05000 [3]



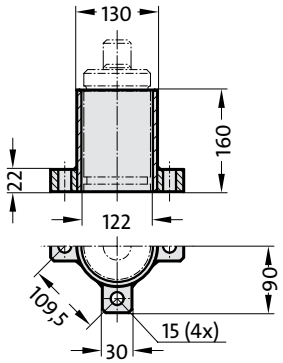
2480.064.05000 [4]



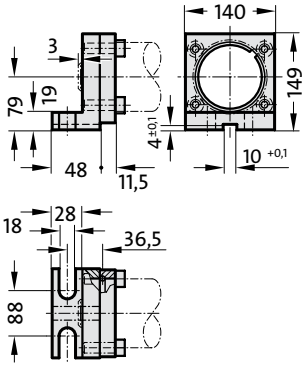
2480.044.05000 [2]



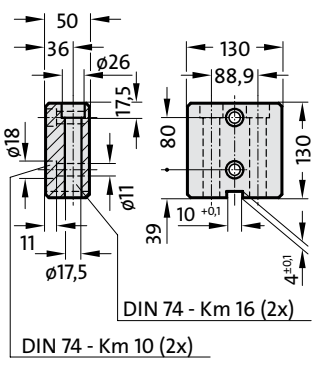
2480.010.05000.160 [3]



2480.045.05000 [2]



2480.047.05000 [2]



Notes:

[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).

2480.13.05000. Gas Springs

2480.13.05000.

Initial spring force at 150 bar = 5000 daN

Order No.	Stroke max.	l_{min}	l
2480.13.05000.025	25	165	190
038	38,1	178,1	216,2
050	50	190	240
063	63,5	203,5	267
075[1)]	75	215	290
080	80	220	300
088[1)]	87,5	227,5	315
100	100	240	340
113[1)]	112,5	252,5	365
125	125	265	390
138[1)]	137,5	277,5	415
150[1)]	150	290	440
160	160	300	460
175[1)]	175	315	490
200	200	340	540
225[1)]	225	365	590
250	250	390	640
275[1)]	275	415	690
300	300	440	740

Note:

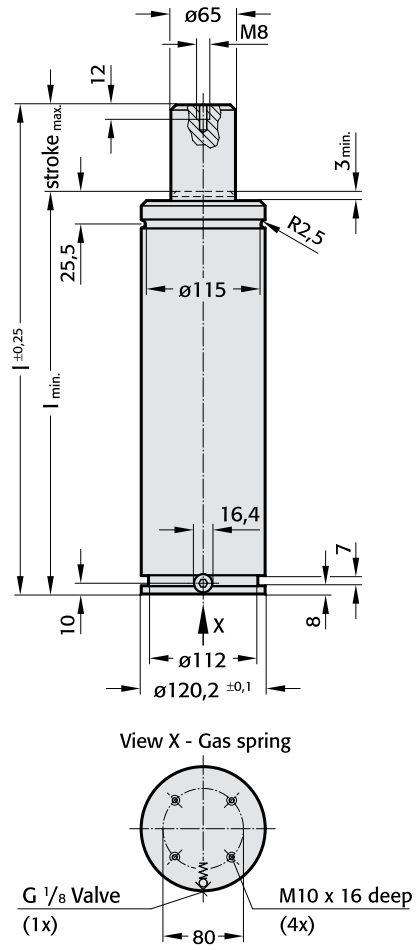
Order No for spare parts kit:
2480.13.05000

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

*Attention: The gas spring cannot be repaired if the overtravel protection is triggered.

2480.13.05000.



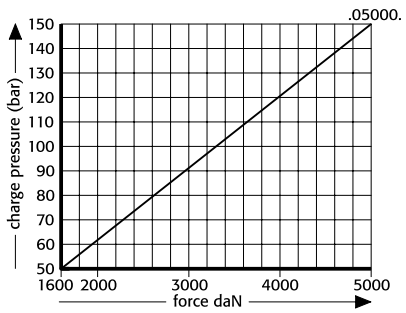
[1)] Special stroke lengths

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

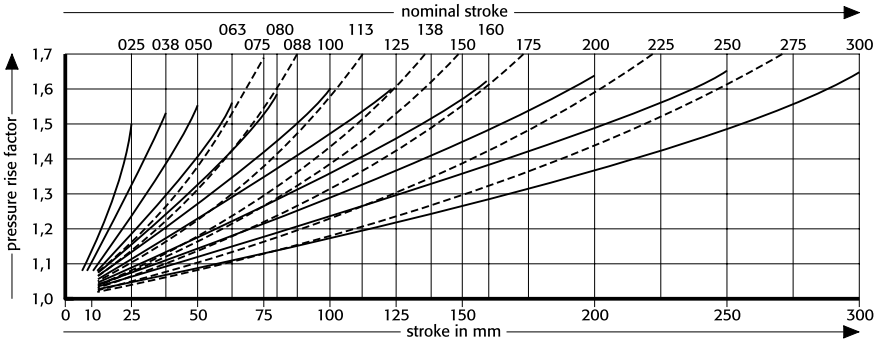
2480.13.05000.

Initial spring force
versus charge pressure



2480.13.05000.

Spring force Diagram displacement versus stroke rise

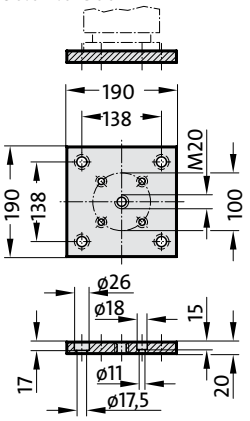


Pressure rise factor accounts for displacement but not external influences!

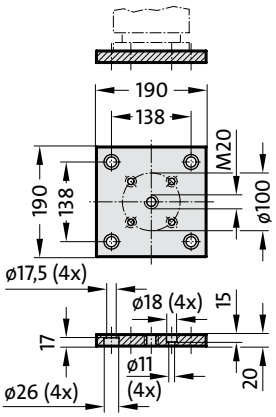
Gas Springs
Mounting Variations

2480.13.07500.

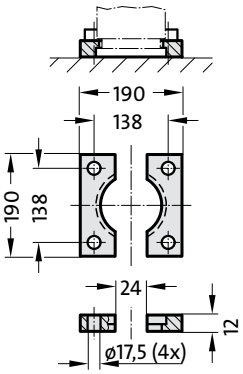
2480.011.07500



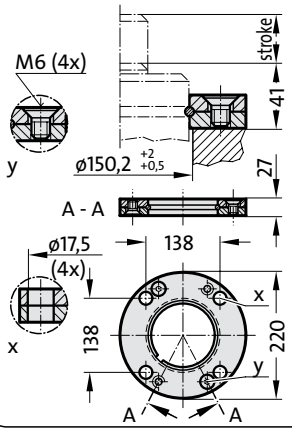
2480.011.07500.2



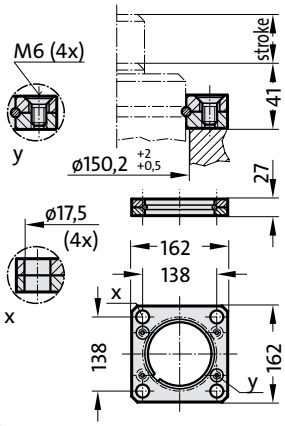
2480.022.07500



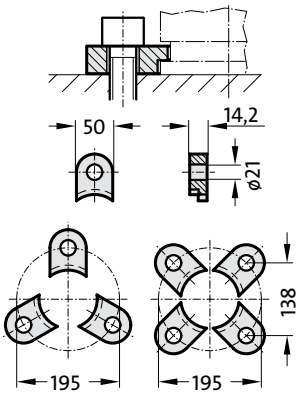
2480.055.07500



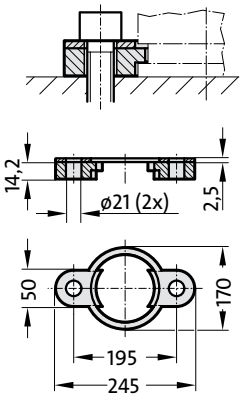
2480.057.07500



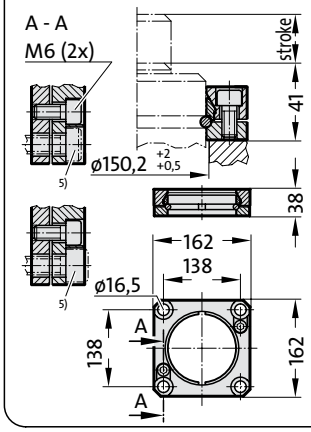
2480.007.07500



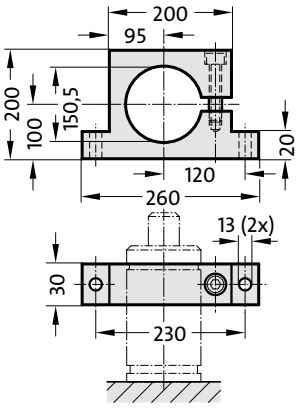
2480.008.07500 [3]



2480.064.07500 [4]



2480.044.07500 [2]



Notes:

[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).

2480.13.07500. Gas Springs

APPROVED PED 97/23/EC

2480.13.07500.

Initial spring force at 150 bar = 7500 daN

Order No	stroke max.	l_{min}	l
2480.13.07500. 025	25	180	205
038	38,1	193,1	231,2
050	50	205	255
063	63,5	218,5	282
075[1)]	75	230	305
080	80	235	315
088.1[1)]	87,5	242,5	330
100	100	255	355
113[1)]	112,5	267,5	380
125	125	280	405
138[1)]	137,5	292,5	430
150[1)]	150	305	455
160	160	315	475
175[1)]	175	330	505
200	200	355	555
225[1)]	225	380	605
250	250	405	655
275[1)]	275	430	705
300	300	455	755

Note:

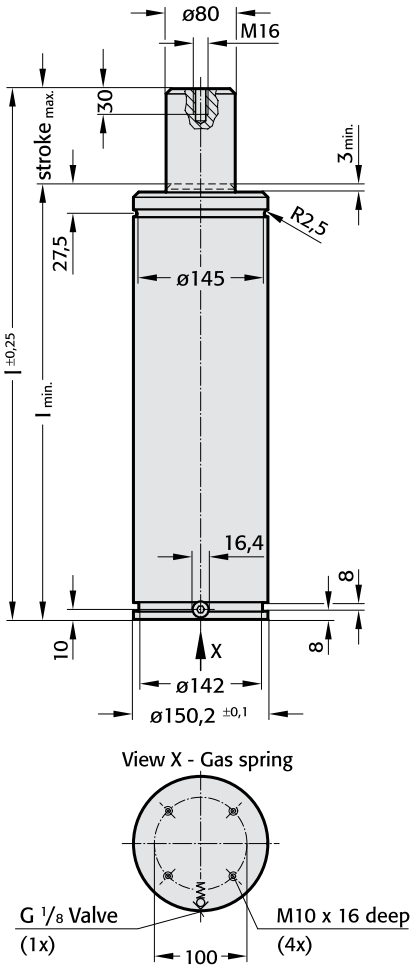
Order No for spare parts kit:
2480.13.07500

Order No for spare parts kit:
to Renault standard EM24.54.700
2480.13.07500.R

Gas spring
to Renault standard EM24.54.700
Ordering-code (example):
2480.13.07500. ☐☐☐.R

* Attention: The gas spring cannot be repaired if the overtravel protection is triggered.

2480.13.07500.



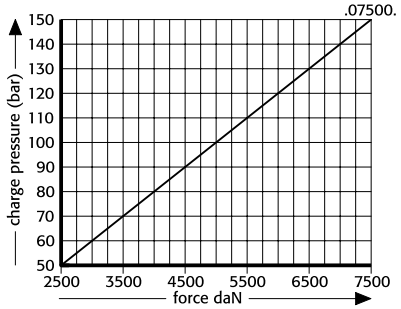
[1)] Special stroke lengths

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

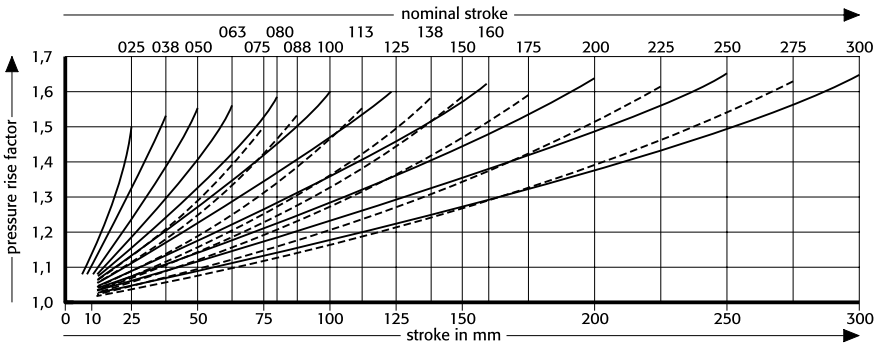
2480.13.07500.

Initial spring force
versus charge pressure



2480.13.07500.

Spring force Diagram displacement versus stroke rise

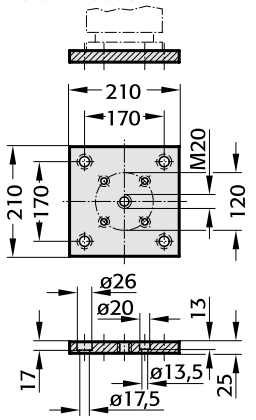


Pressure rise factor accounts for displacement but not external influences!

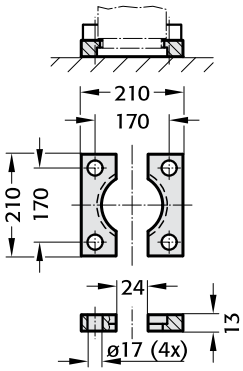
Gas Springs
Mounting Variations

2480.12.10000.

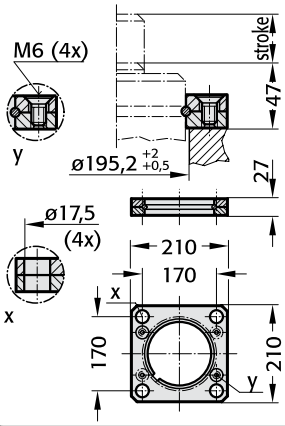
2480.011.10000



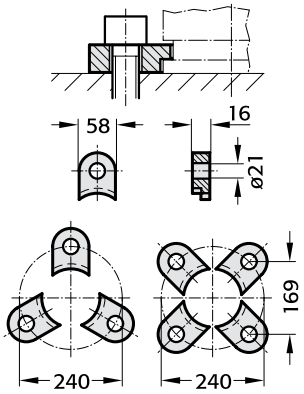
2480.022.10000



2480.057.10000



2480.007.10000



FIBRO ISO 11901 / CNOMO E.24.54.815.N

2480.12.10000. Gas Springs

APPROVED PED 97/23/EC

2480.12.10000.

Initial spring force at 150 bar = 10000 daN

Order No	Stroke max.	l_{min}	l
2480.12.10000.025	25	185	210
038	38,1	198,1	236,2
050	50	210	260
063	63,5	223,5	287
080	80	240	320
100	100	260	360
125	125	285	410
160	160	320	480
200	200	360	560
250	250	410	660
300	300	460	760

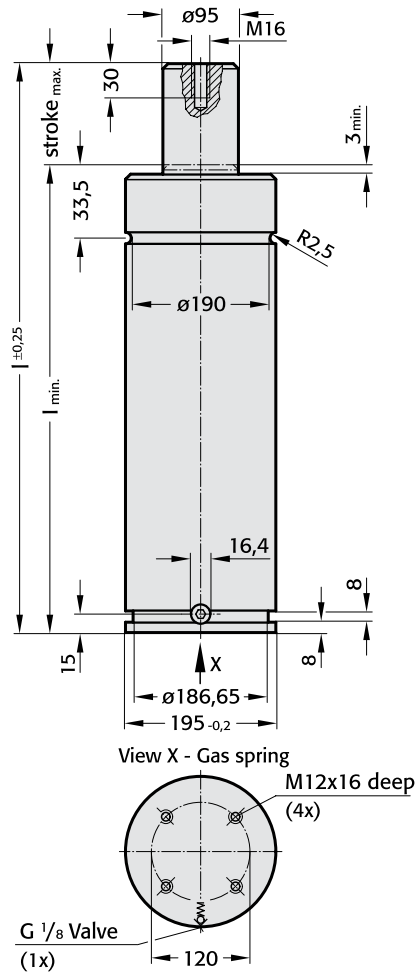
Note:

Order No for spare parts kit:
2480.12.10000

Gas spring
to Renault standard EM24.54.700*
Ordering-code (example)
2480.12.10000. ☐☐☐.R

*Attention: The gas spring cannot be repaired if the overtravel protection is triggered.

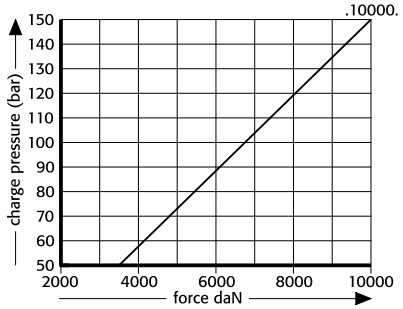
2480.12.10000.



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

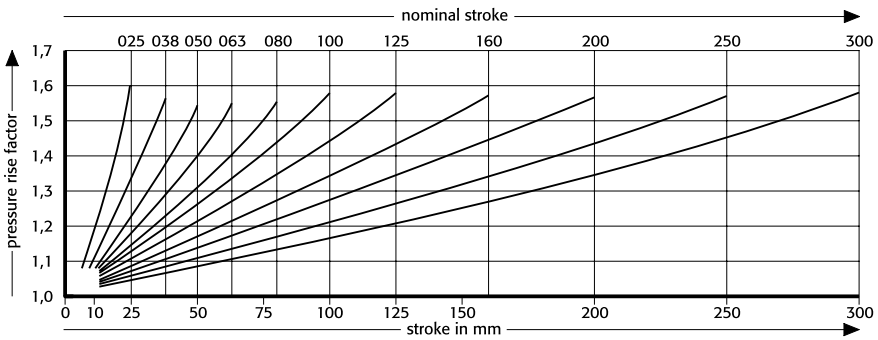
2480.12.10000.

Initial spring force
versus charge pressure



2480.12.10000.

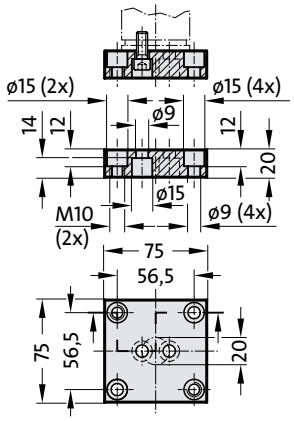
Spring force Diagram displacement versus stroke rise



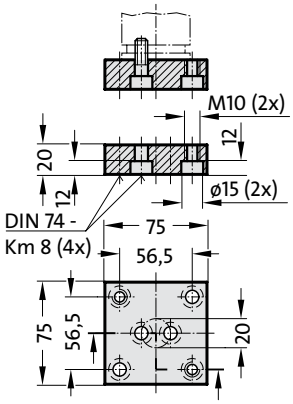
Pressure rise factor accounts for displacement but not external influences!

Gas Springs Standard **HEAVY DUTY**

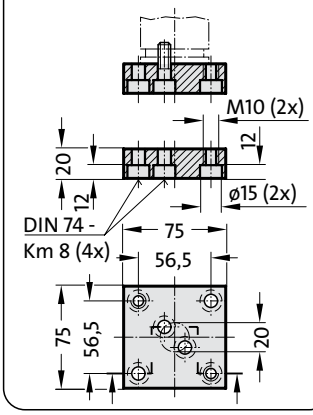
2480.011.00750.3



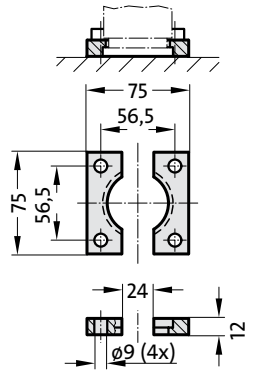
2480.011.00750



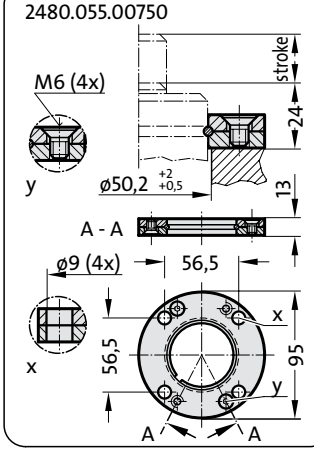
2480.011.00750.1



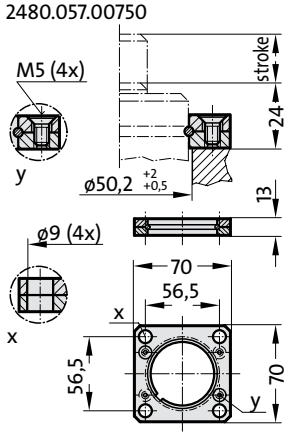
2480.022.00750



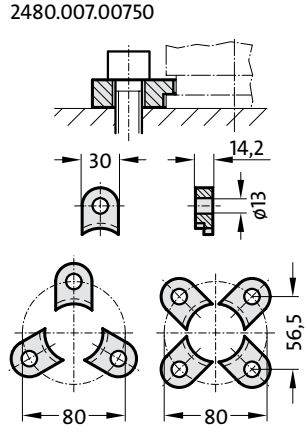
2480.055.00750



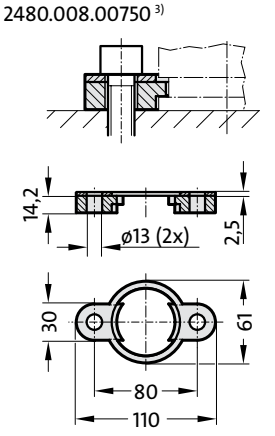
2480.057.00750



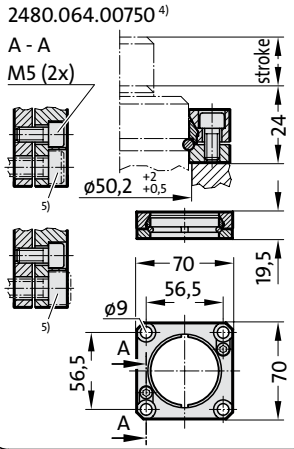
2480.007.00750



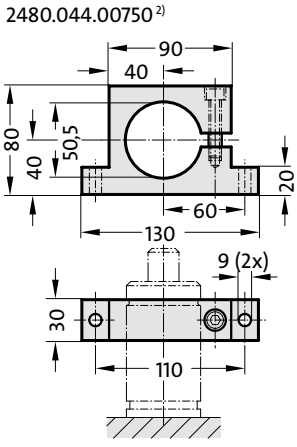
2480.008.00750 [3]



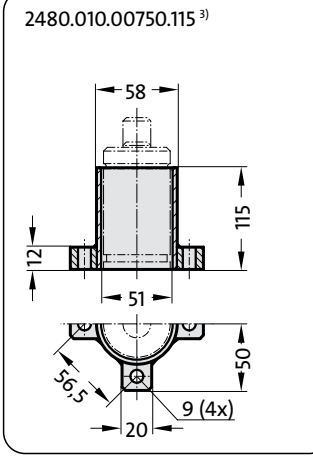
2480.064.00750 [4]



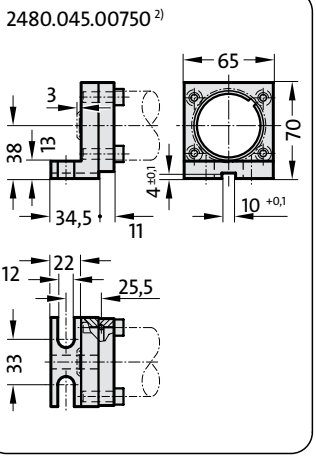
2480.044.00750 [2]



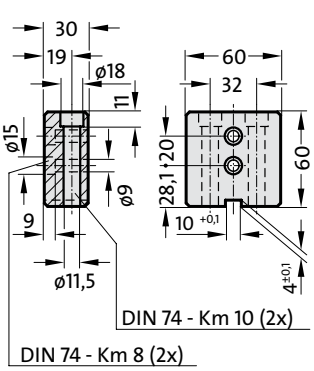
2480.010.00750.115 [3]



2480.045.00750 [2]



2480.047.00750 [2]



Notes:

[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).

FIBRO

2488.13.01000.

Gas Springs
HEAVY DUTY

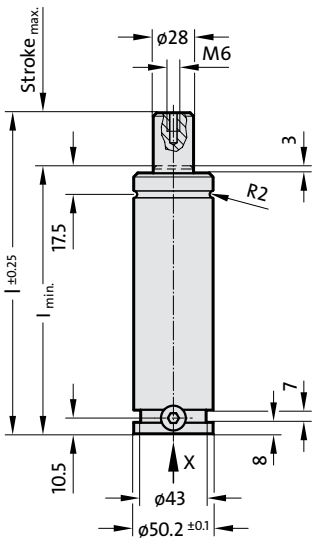
APPROVED PED 97/23/EC

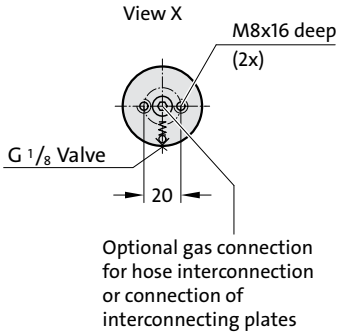
2488.13.01000.

Initial spring force at 150 bar = 1000 daN

Order No	Stroke max.	l_{min}	l
2488.13.01000.013	13	108	121
025	25	120	145
038	38	133	171
050	50	145	195
063	63	158	221
075	75	170	245
080	80	175	255
100	100	195	295
125	125	220	345
150	150	245	395
160	160	255	415
175	175	270	445
200	200	295	495
250	250	345	595
300	300	395	695

2488.13.01000.





Optional gas connection for hose interconnection or connection of interconnecting plates

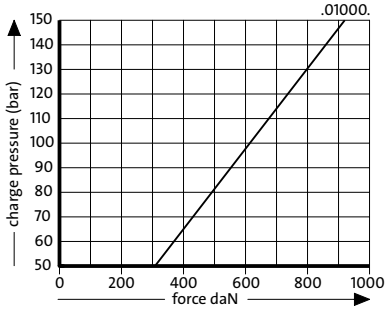
Note:

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

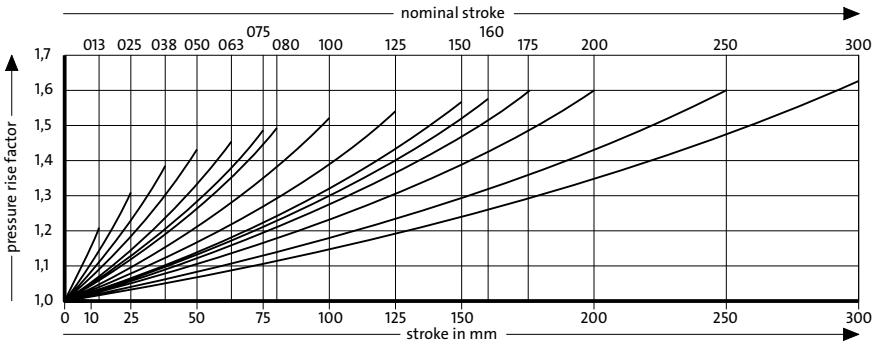
2488.13.01000.

Initial spring force versus charge pressure



2488.13.01000.

Spring force Diagram displacement versus stroke rise



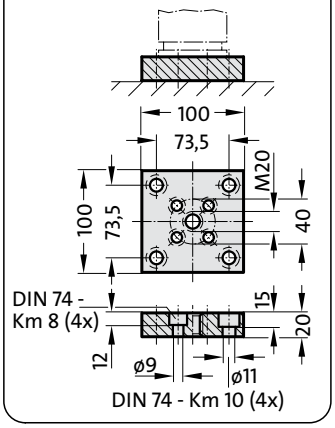
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
HEAVY DUTY
Mounting Variations

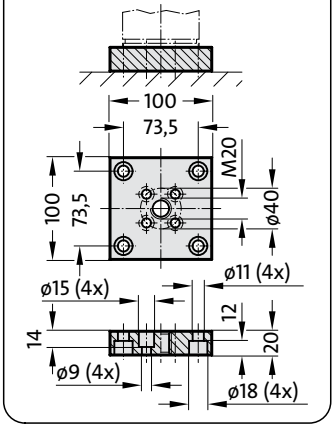
FIBRO

2488.13.02400.

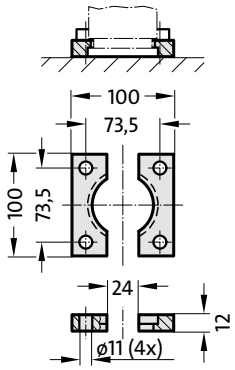
2480.011.01500



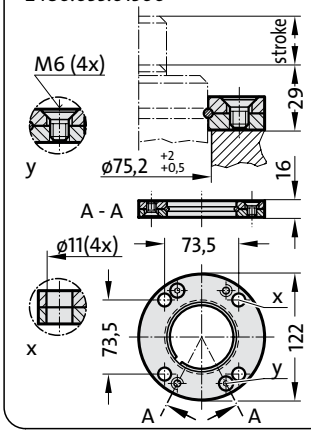
2480.011.01500.2



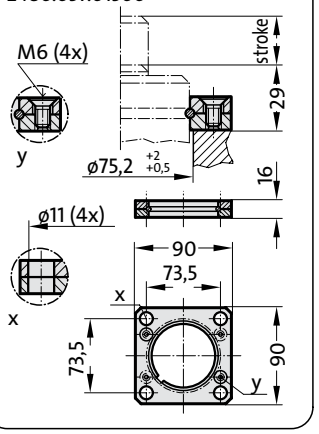
2480.022.01500



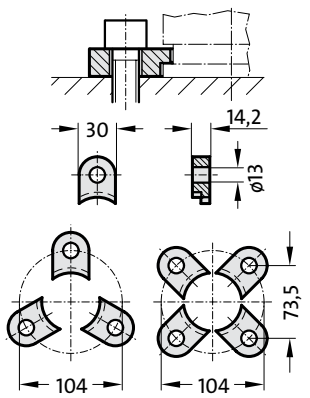
2480.055.01500



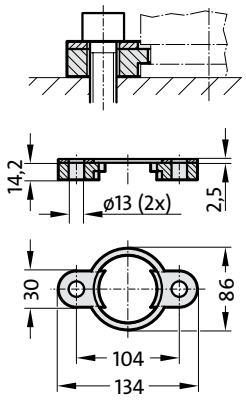
2480.057.01500



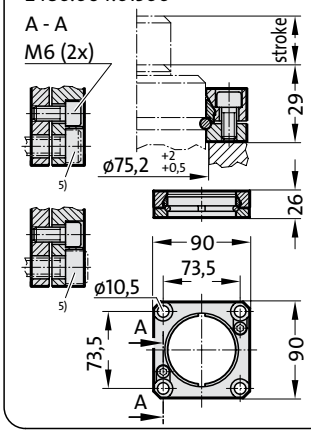
2480.007.01500



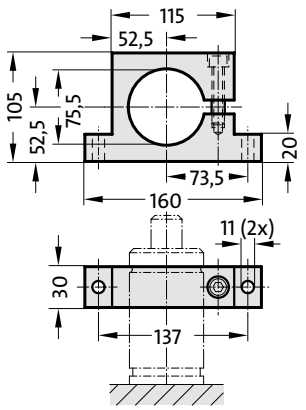
2480.008.01500 [3]



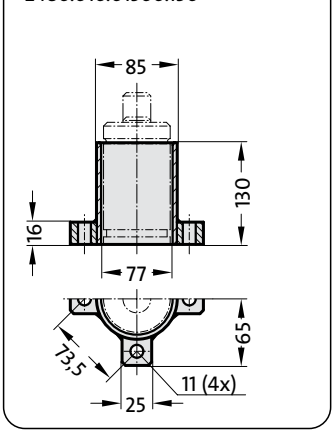
2480.064.01500 [4]



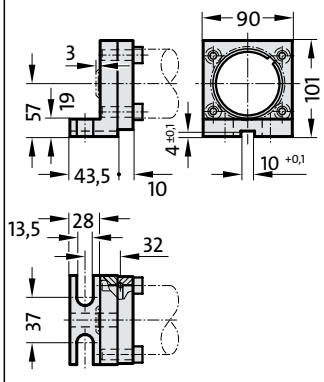
2480.044.01500 [2]



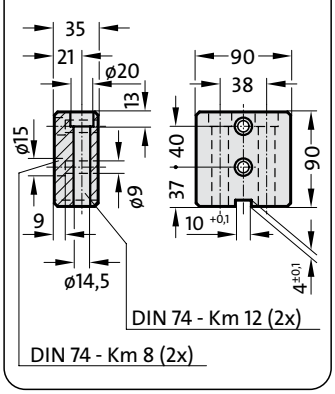
2480.010.01500.130 [3]



2480.045.01500 [2]



2480.047.01500 [2]



Notes:

[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).

FIBRO

2488.13.02400.

Gas Springs
HEAVY DUTY

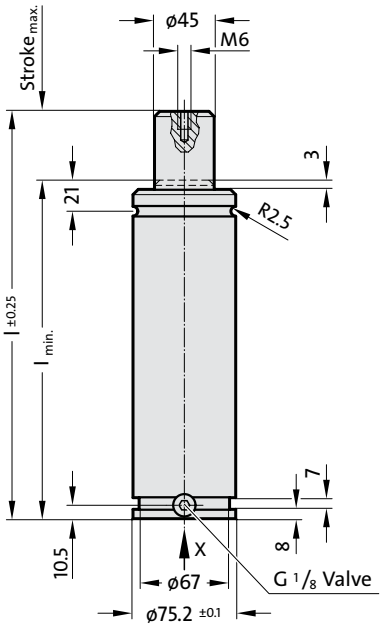
APPROVED PED 97/23/EC

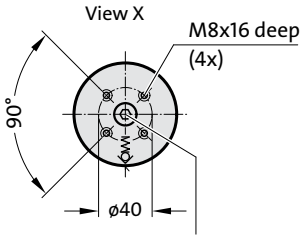
2488.13.02400.

Initial spring force at 150 bar = 2400 daN

Order No	Stroke max.	l_{min}	l
2488.13.02400.025	25	135	160
038	38	148	186
050	50	160	210
063	63	173	236
075	75	185	260
080	80	190	270
100	100	210	310
125	125	235	360
150	150	260	410
160	160	270	430
175	175	285	460
200	200	310	510
250	250	360	610
300	300	410	710

2488.13.02400.





Optional gas connection for hose interconnection or connection of interconnecting plates

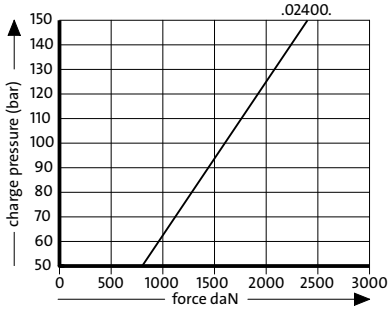
Note:

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

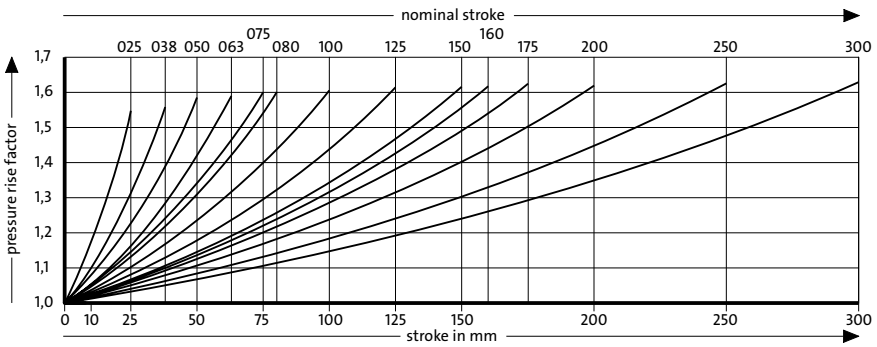
2488.13.02400.

Initial spring force versus charge pressure



2488.13.02400.

Spring force Diagram displacement versus stroke rise



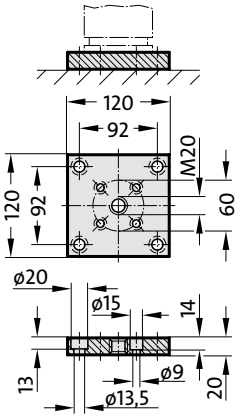
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
HEAVY DUTY
Mounting Variations

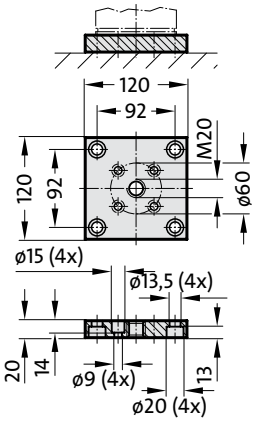
FIBRO

2488.13.04200.

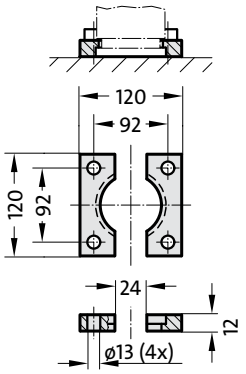
2480.011.03000



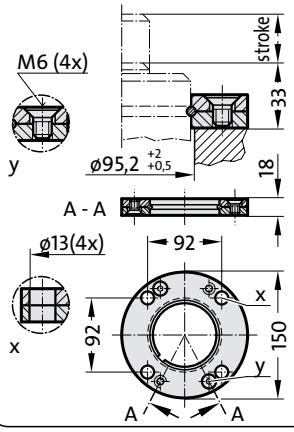
2480.011.03000.2



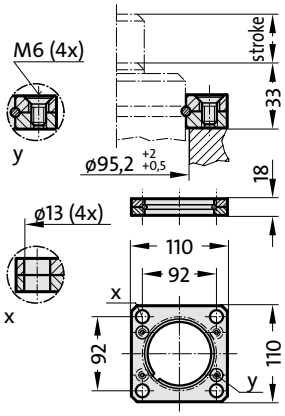
2480.022.03000



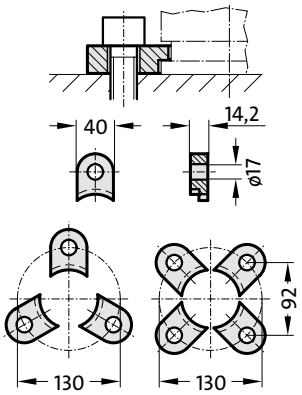
2480.055.03000



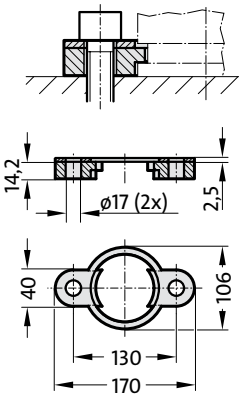
2480.057.03000



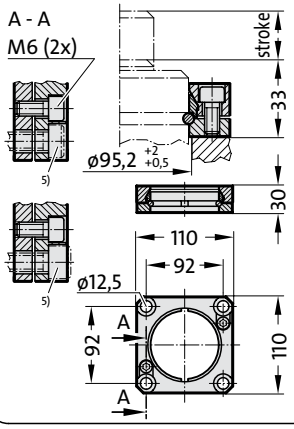
2480.007.03000



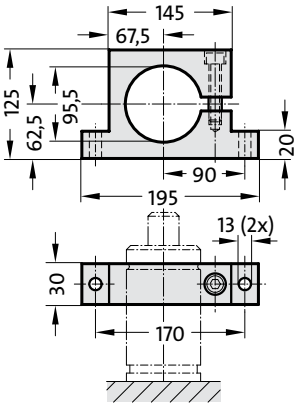
2480.008.03000 [3]



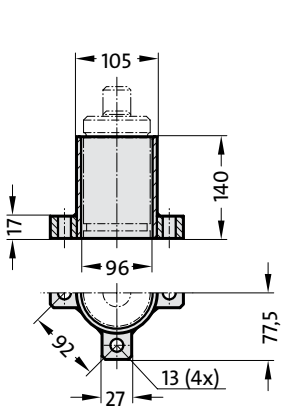
2480.064.03000 [4]



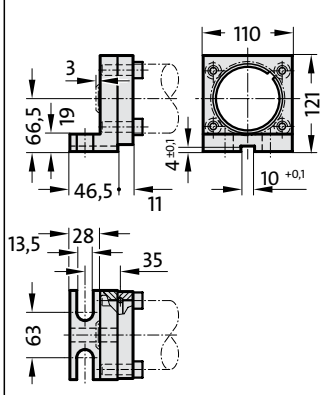
2480.044.03000 [2]



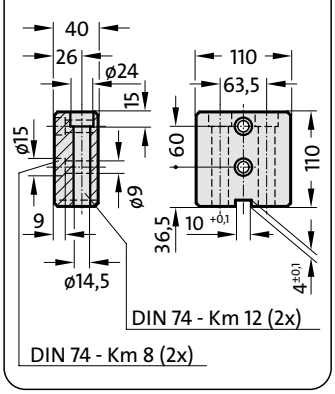
2480.010.03000.140 [3]



2480.045.03000 [2]



2480.047.03000 [2]



Notes:

[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).

FIBRO

2488.13.04200.

Gas Springs
HEAVY DUTY

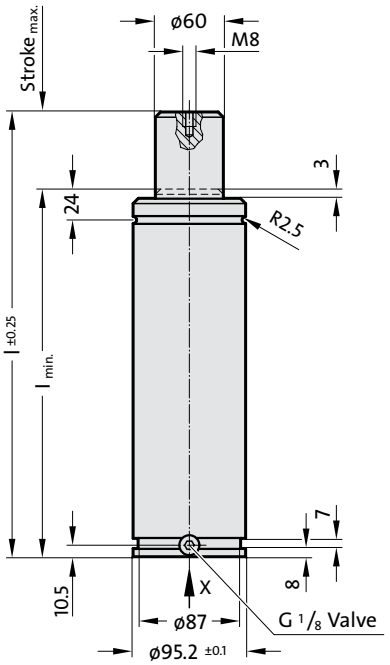
APPROVED PED 97/23/EC

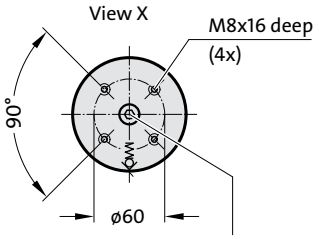
2488.13.04200.

Initial spring force at 150 bar = 4200 daN

Order No	Stroke max.	l_{min}	l
2488.13.04200.025	25	145	170
038	38	158	196
050	50	170	220
063	63	183	246
075	75	195	270
080	80	200	280
100	100	220	320
125	125	245	370
150	150	270	420
160	160	280	440
175	175	295	470
200	200	320	520
250	250	370	620
300	300	420	720

2488.13.04200.





Optional gas connection for hose interconnection or connection of interconnecting plates

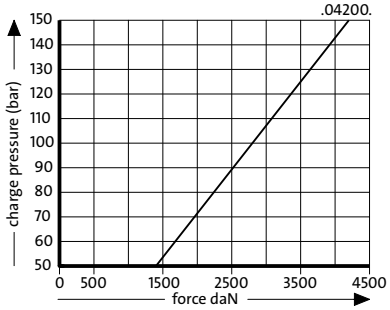
Note:

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

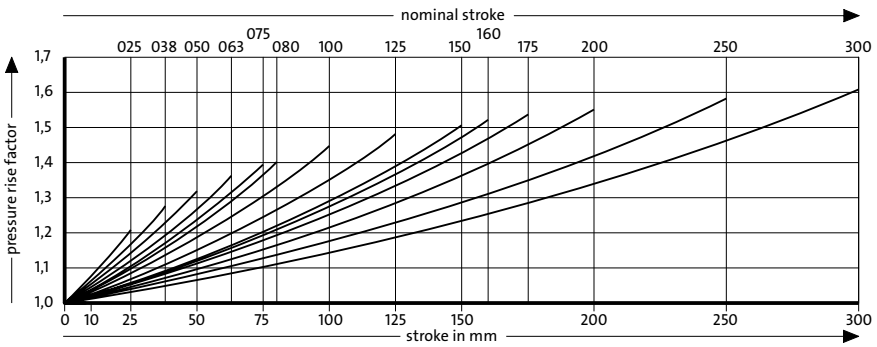
2488.13.04200.

Initial spring force versus charge pressure



2488.13.04200.

Spring force Diagram displacement versus stroke rise



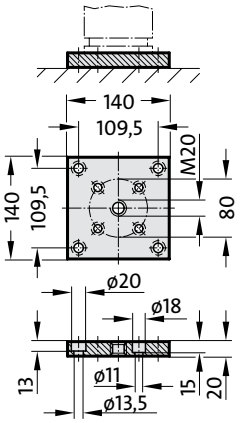
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
HEAVY DUTY
Mounting Variations

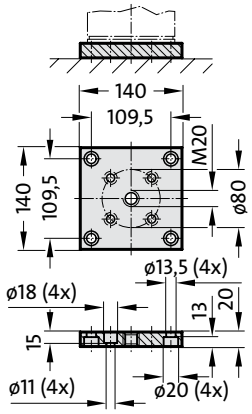
FIBRO

2488.13.06600.

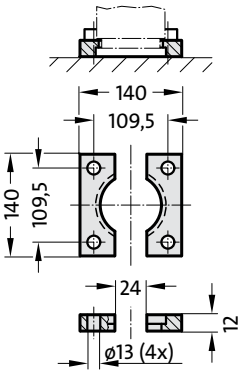
2480.011.05000



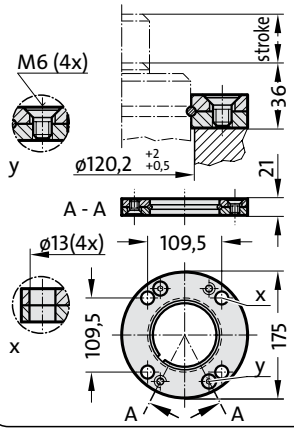
2480.011.05000.2



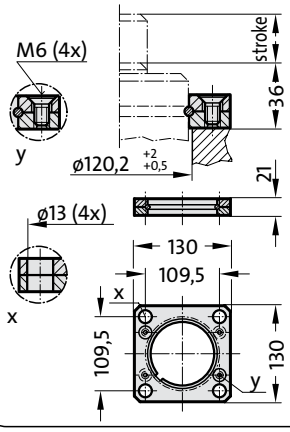
2480.022.05000



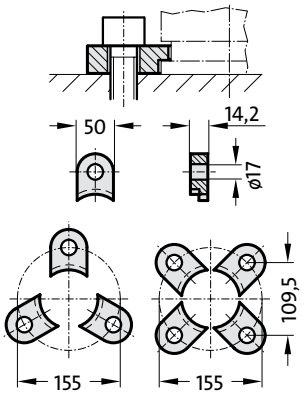
2480.055.05000



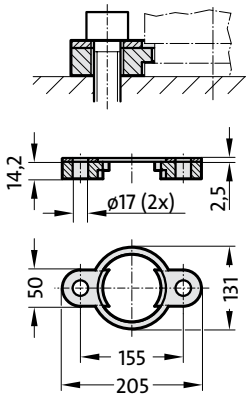
2480.057.05000



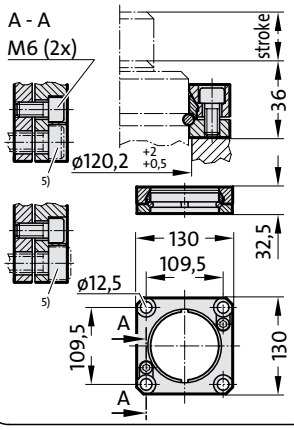
2480.007.05000



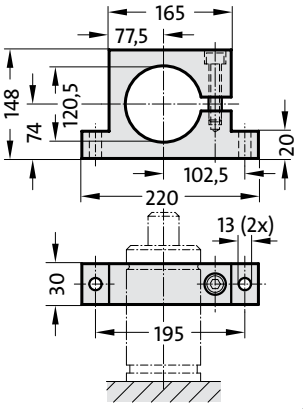
2480.008.05000 [3]



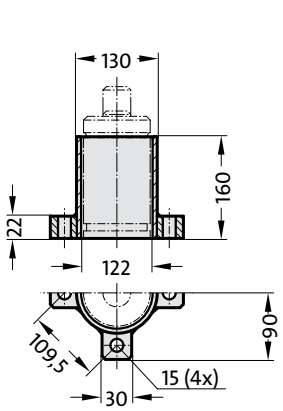
2480.064.05000 [4]



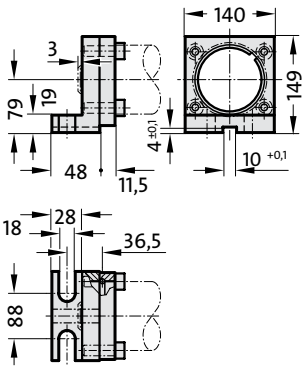
2480.044.05000 [2]



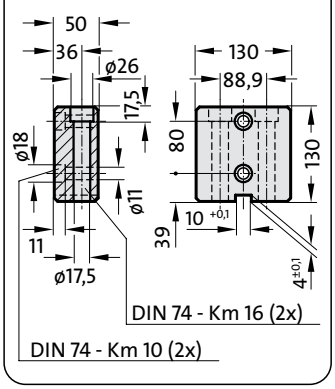
2480.010.05000.160 [3]



2480.045.05000 [2]



2480.047.05000 [2]



Notes:

[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).

FIBRO

2488.13.06600.

Gas Springs
HEAVY DUTY

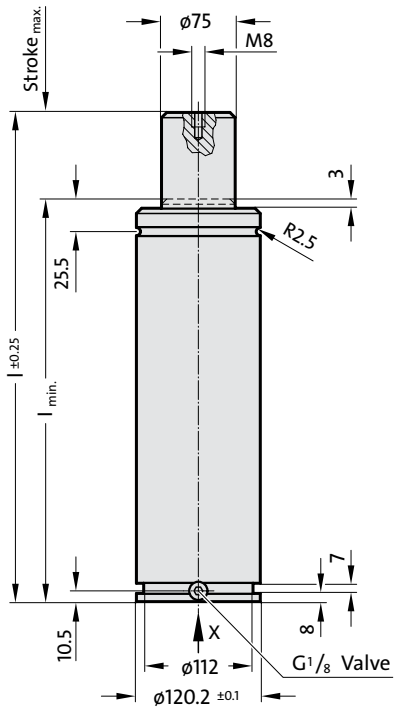
APPROVED PED 97/23/EC

2488.13.06600.

Initial spring force at 150 bar = 6600 daN

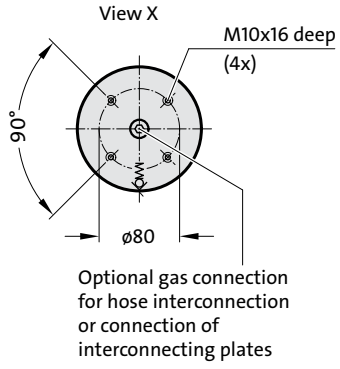
Order No	Stroke max.	l_{min}	l
2488.13.06600.025	25	165	190
038	38	178	216
050	50	190	240
063	63	203	266
075	75	215	290
080	80	220	300
100	100	240	340
125	125	265	390
150	150	290	440
160	160	300	460
175	175	315	490
200	200	340	540
250	250	390	640
300	300	440	740

2488.13.06600.



Note:

Order No for spare parts kit:
2488.13.06600

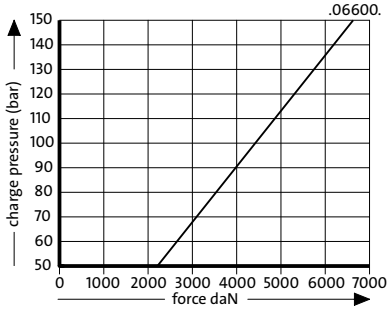


Optional gas connection for hose interconnection or connection of interconnecting plates

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

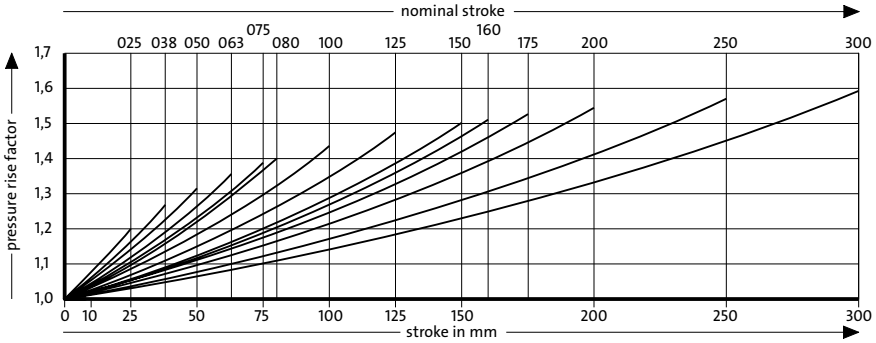
2488.13.06600.

Initial spring force versus charge pressure



2488.13.06600.

Spring force Diagram displacement versus stroke rise



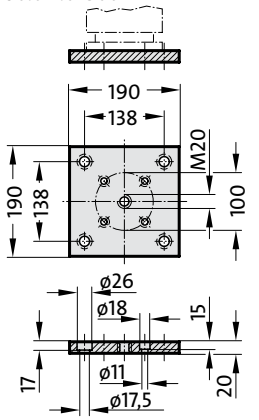
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
HEAVY DUTY
Mounting Variations

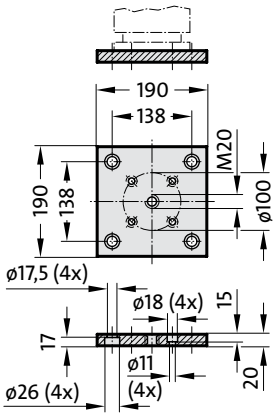
FIBRO

2488.13.09500.

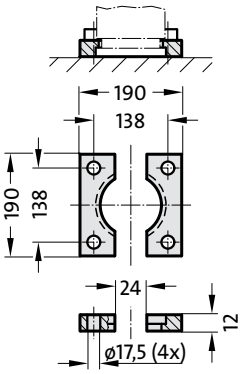
2480.011.07500



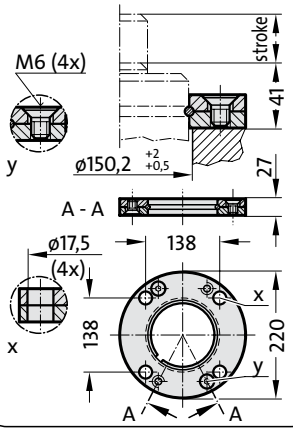
2480.011.07500.2



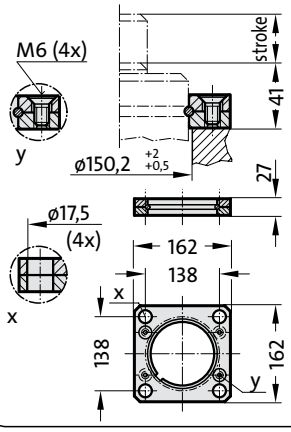
2480.022.07500



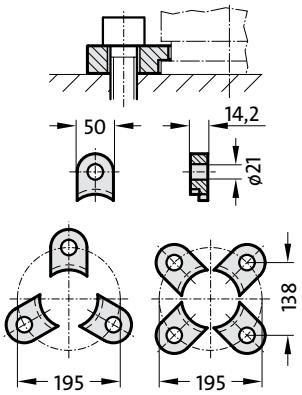
2480.055.07500



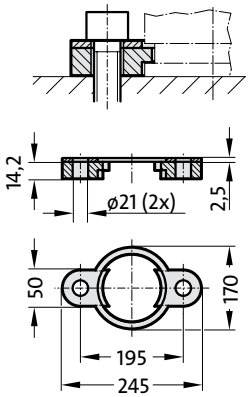
2480.057.07500



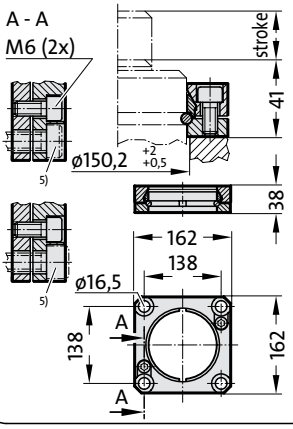
2480.007.07500



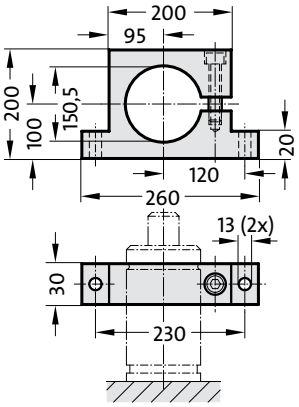
2480.008.07500 [3]



2480.064.07500 [4]



2480.044.07500 [2]



Notes:

[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).

FIBRO

2488.13.09500.

Gas Springs
HEAVY DUTY

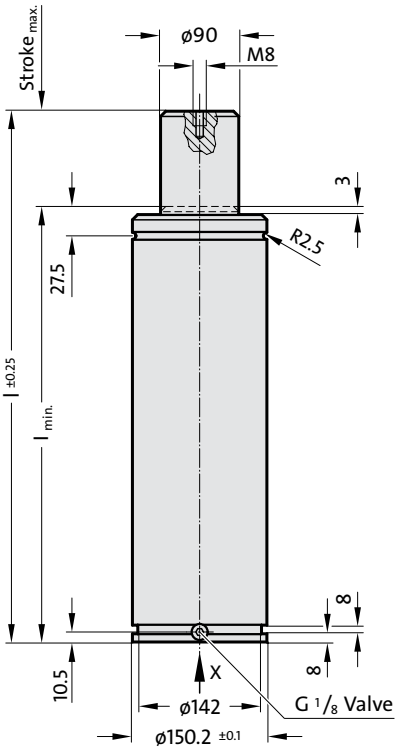
APPROVED PED 97/23/EC

2488.13.09500.

Initial spring force at 150 bar = 9500 daN

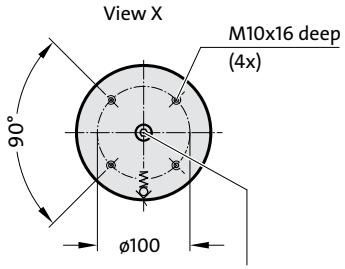
Order No	Stroke max.	l_{min}	l
2488.13.09500.025	25	180	205
038	38	193	231
050	50	205	255
063	63	218	281
075	75	230	305
080	80	235	315
100	100	255	355
125	125	280	405
150	150	305	455
160	160	315	475
175	175	330	505
200	200	355	555
250	250	405	655
300	300	455	755

2488.13.09500.



Note:

Order No for spare parts kit:
2488.13.09500

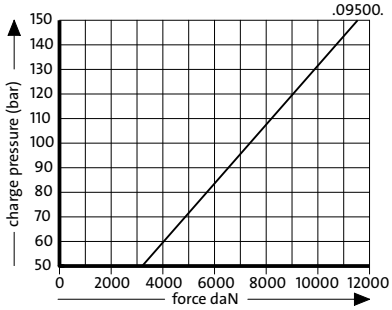


Optional gas connection for hose interconnection or connection of interconnecting plates

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

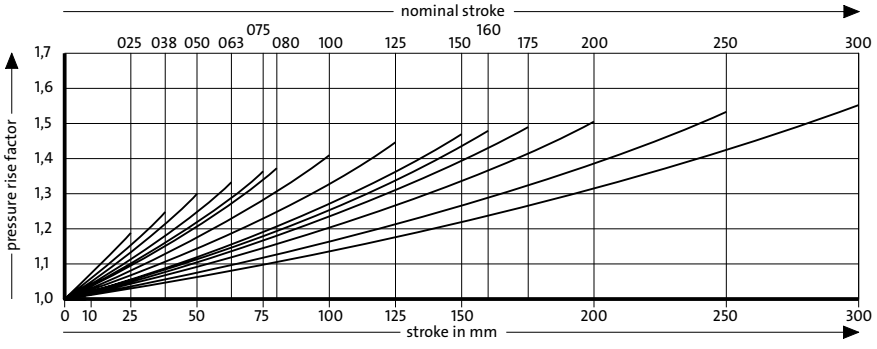
2488.13.09500.

Initial spring force versus charge pressure



2488.13.09500.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

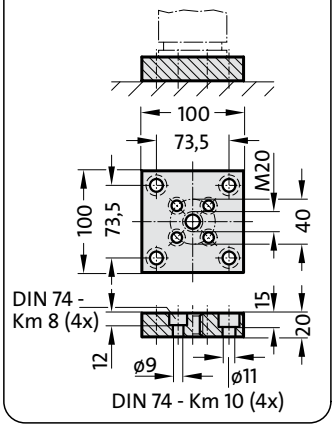
Gas Springs with Reduced Pressure Rise

Gas Springs
with Reduced Pressure Rise
Mounting Variations

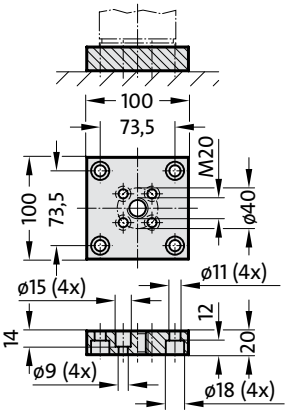
FIBRO

2481.12.00750.

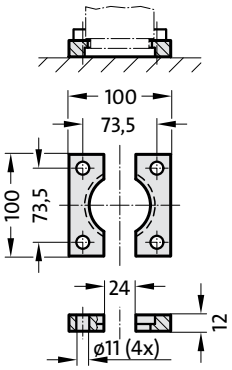
2480.011.01500



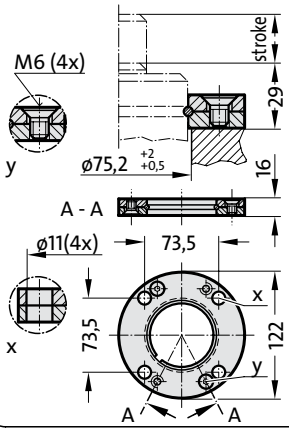
2480.011.01500.2



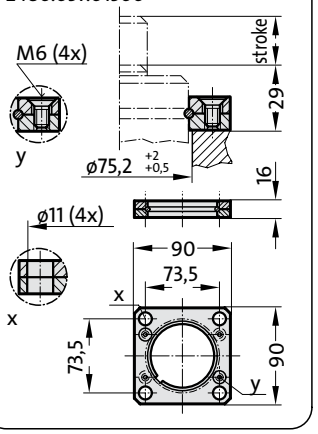
2480.022.01500



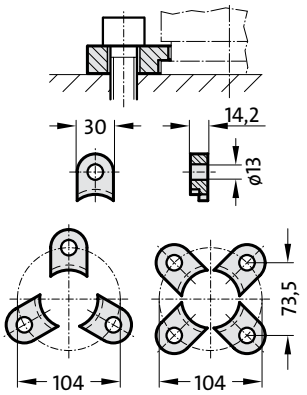
2480.055.01500



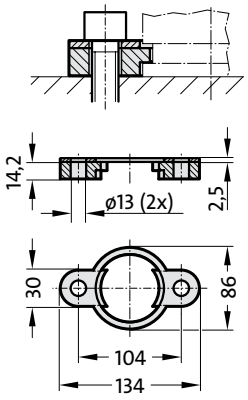
2480.057.01500



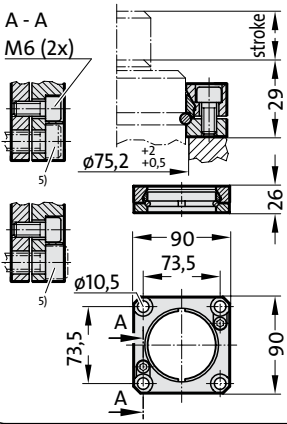
2480.007.01500



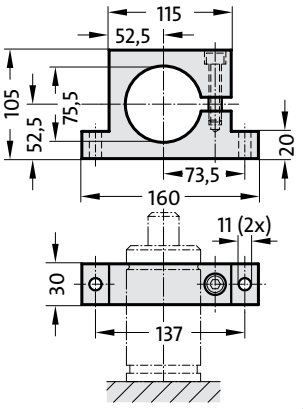
2480.008.01500 [3]



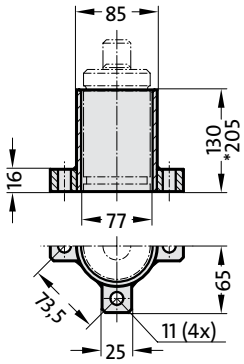
2480.064.01500 [4]



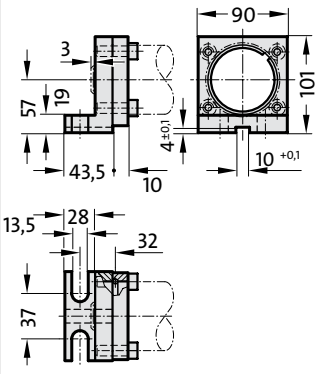
2480.044.01500 [2]



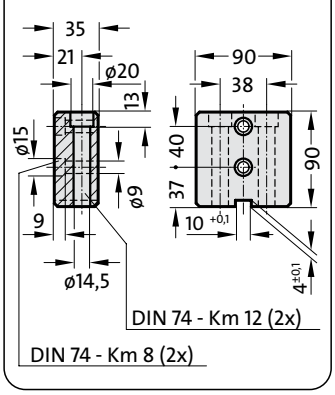
2480.010.01500.130 [3]
2480.010.01500.205* [3]



2480.045.01500 [2]



2480.047.01500 [2]



Notes:

[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).

FIBRO

2481.12.00750.

Gas Springs with Reduced Pressure Rise

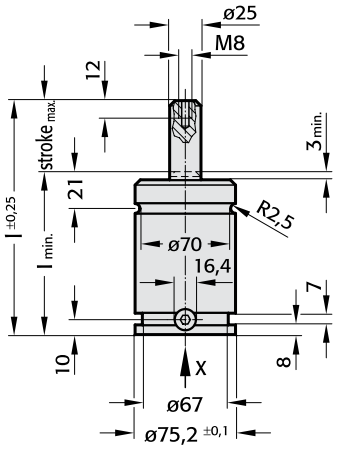
APPROVED PED 97/23/EC

2481.12.00750.

Initial spring force at 150 bar = 750 daN

Order No	stroke max.	l_{min}	l
2481.12.00750.013	12,7	107,7	120,4
025	25	120	145
038	38,1	133,1	171,2
050	50	145	195
063	63,5	158,5	222
080	80	175	255
100	100	195	295
125	125	220	345
160	160	255	415
200	200	295	495
250	250	345	595
300	300	395	695

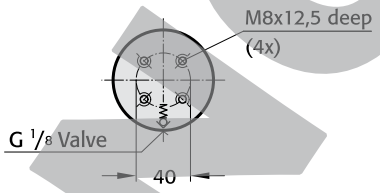
2481.12.00750.



Note:

Order No for spare parts kit:
2481.12.00750

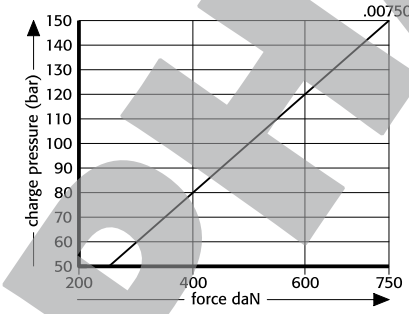
View X



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. 40 to 80 (at 20 °C)
Max. piston speed:	1.6 m/s

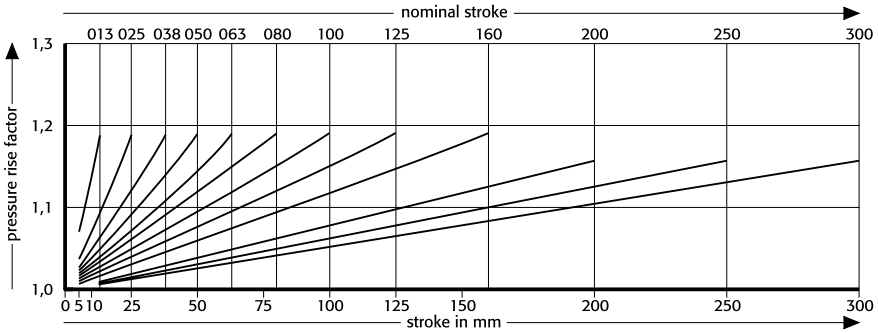
2481.12.00750.

Initial spring force versus charge pressure



2481.12.00750.

Spring force Diagram displacement versus stroke rise



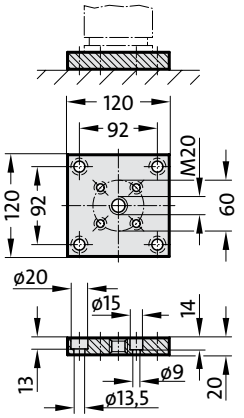
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Reduced Pressure Rise
Mounting Variations

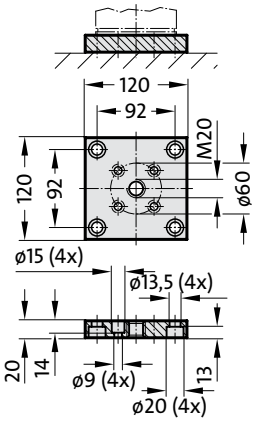
FIBRO

2481.13.01500.

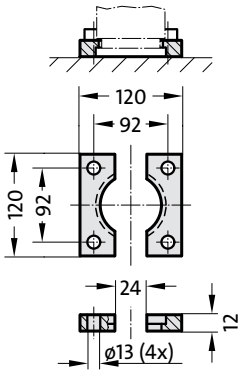
2480.011.03000



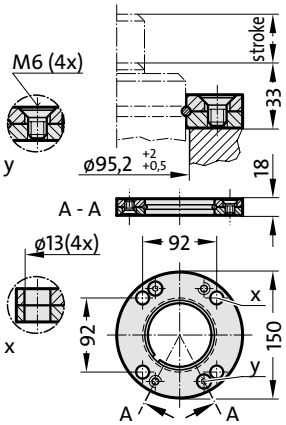
2480.011.03000.2



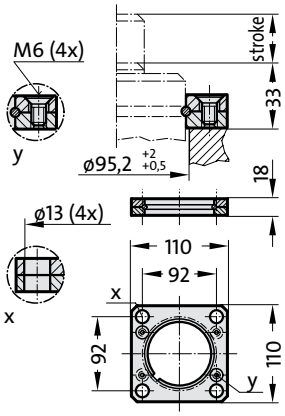
2480.022.03000



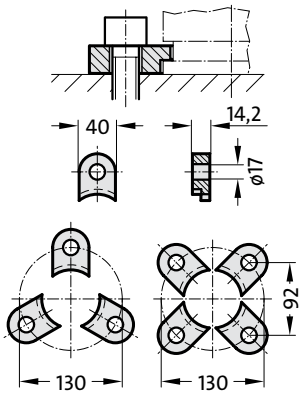
2480.055.03000



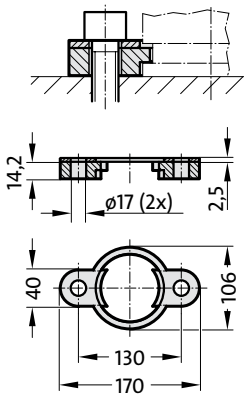
2480.057.03000



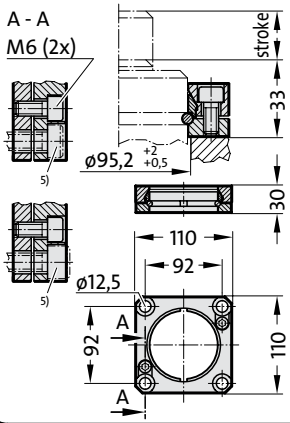
2480.007.03000



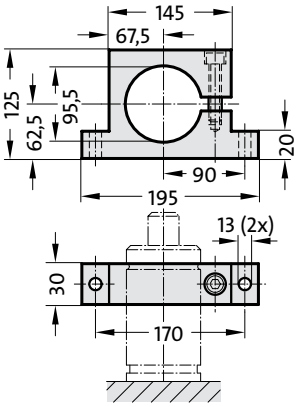
2480.008.03000 [3]



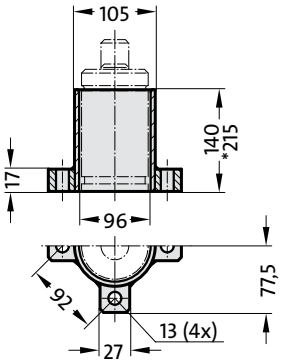
2480.064.03000 [4]



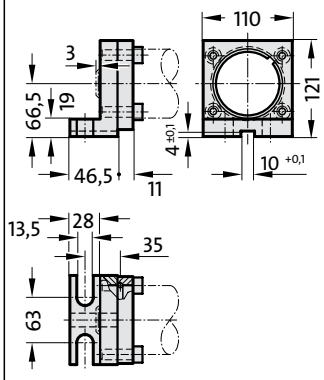
2480.044.03000 [2]



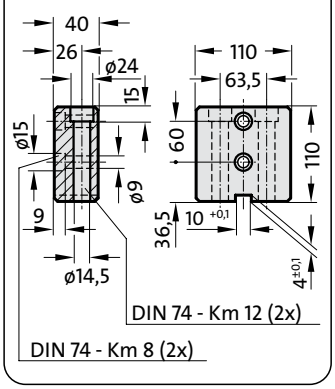
2480.010.03000.140 [3]
2480.010.03000.215* [3]



2480.045.03000 [2]



2480.047.03000 [2]



Notes:

[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).

FIBRO

2481.13.01500.

Gas Springs with Reduced Pressure Rise

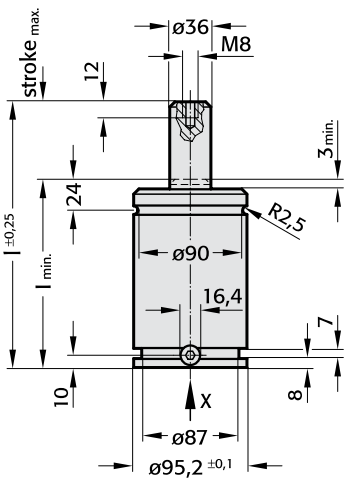
APPROVED PED 97/23/EC

2481.13.01500.

Initial spring force at 150 bar = 1500 daN

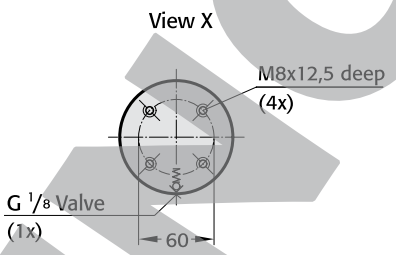
Order No	stroke max.	l_{min}	l
2481.13.01500.025	25	135	160
038	38,1	148,1	186,2
050	50	160	210
063	63,5	173,5	237
080	80	190	270
100	100	210	310
125	125	235	360
160	160	270	430
200	200	310	510
250	250	360	610
300	300	410	710

2481.13.01500.



Note:

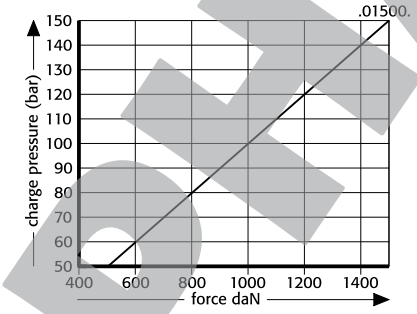
Order No for spare parts kit:
2481.13.01500



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. 40 to 80 (at 20 °C)
Max. piston speed:	1.6 m/s

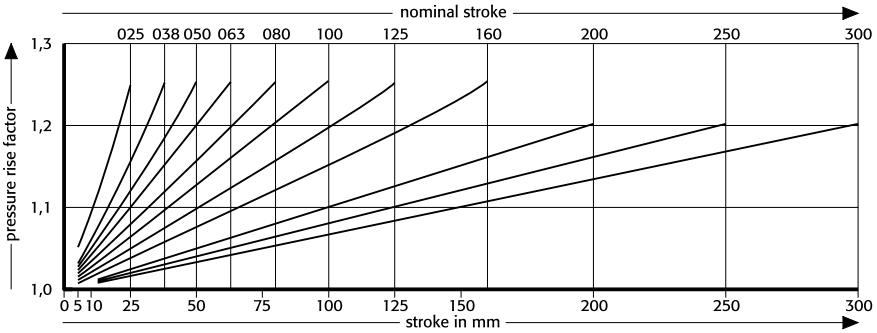
2481.13.01500

Initial spring force versus charge pressure



2481.13.01500.

Spring force Diagram displacement versus stroke rise



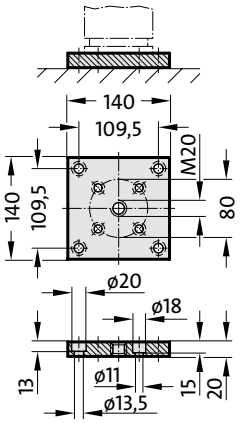
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Reduced Pressure Rise
Mounting Variations

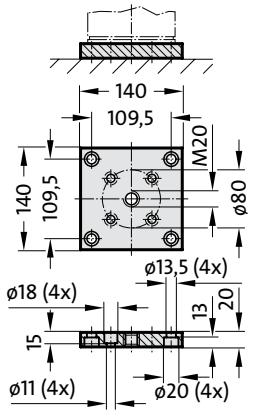
FIBRO

2481.13.03000.

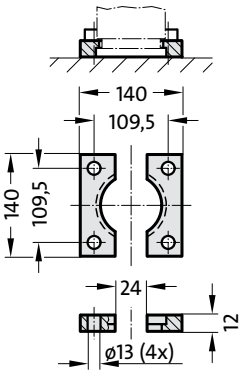
2480.011.05000



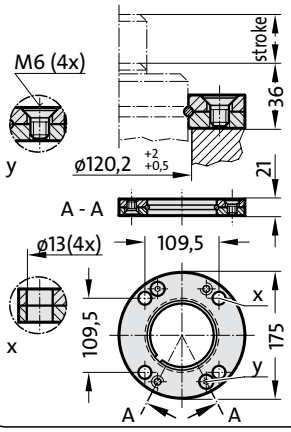
2480.011.05000.2



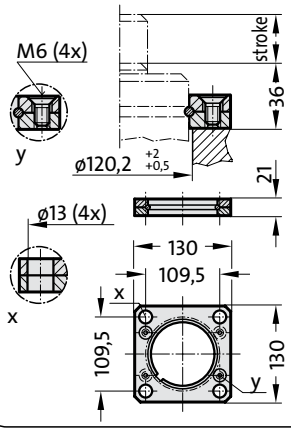
2480.022.05000



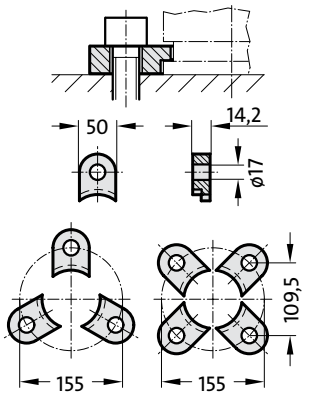
2480.055.05000



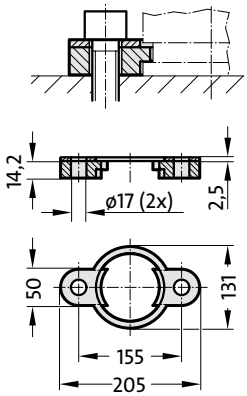
2480.057.05000



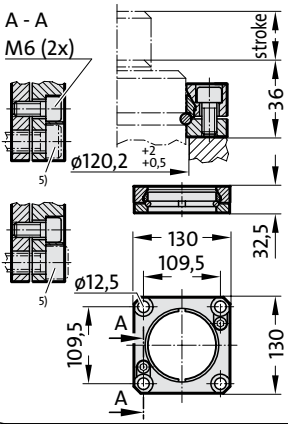
2480.007.05000



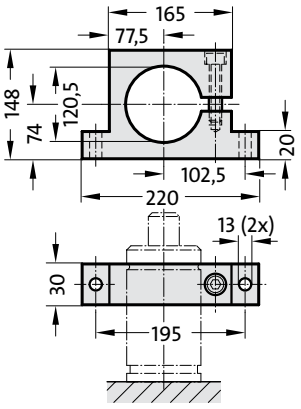
2480.008.05000 [3]



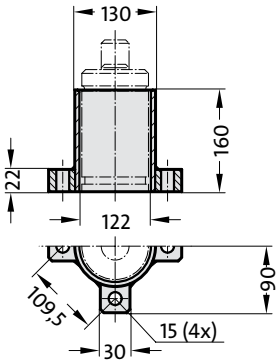
2480.064.05000 [4]



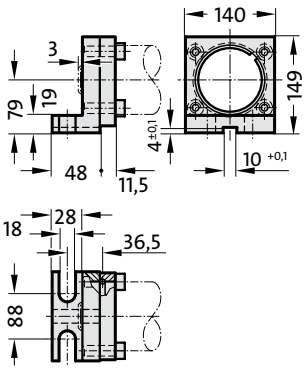
2480.044.05000 [2]



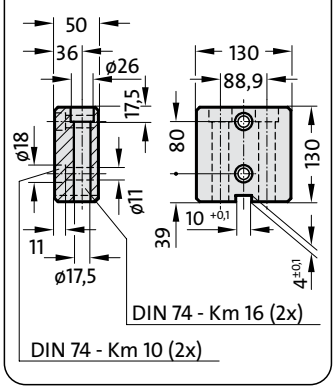
2480.010.05000.160 [3]



2480.045.05000 [2]



2480.047.05000 [2]



Notes:

[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).

FIBRO

2481.13.03000.

Gas Springs with Reduced Pressure Rise

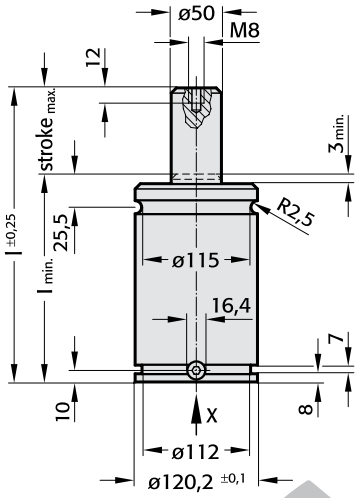
APPROVED PED 97/23/EC

2481.13.03000.

Initial spring force at 150 bar = 3000 daN

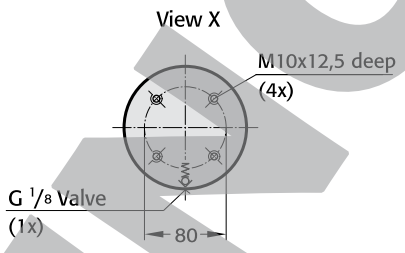
Order No	stroke max.	l_{min}	l
2481.13.03000.025	25	145	170
038	38,1	158,1	196,2
050	50	170	220
063	63,5	183,5	247
080	80	200	280
100	100	220	320
125	125	245	370
160	160	280	440
200	200	320	520
250	250	370	620
300	300	420	720

2481.13.03000.



Note:

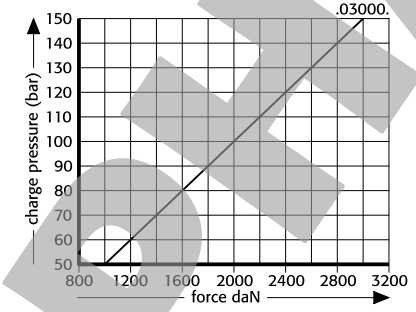
Order No for spare parts kit:
2481.13.03000



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. 40 to 80 (at 20 °C)
Max. piston speed:	1.6 m/s

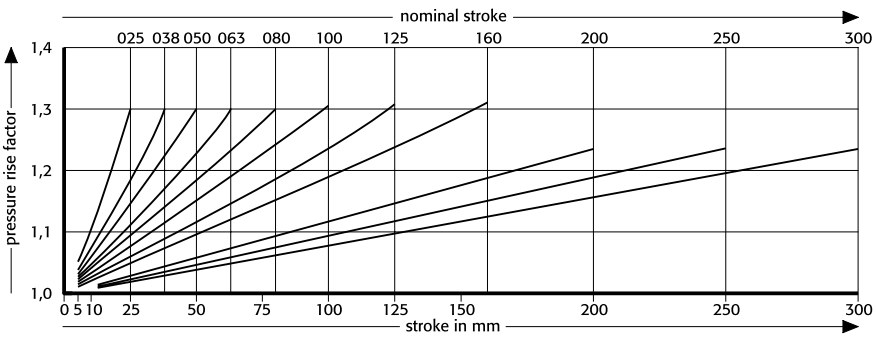
2481.13.03000.

Initial spring force versus charge pressure



2481.13.03000.

Spring force Diagram displacement versus stroke rise



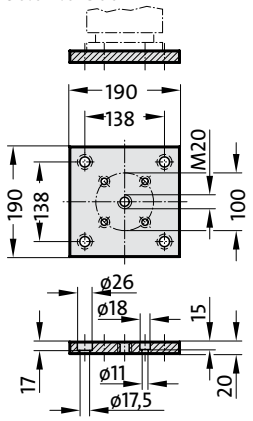
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Reduced Pressure Rise
Mounting Variations

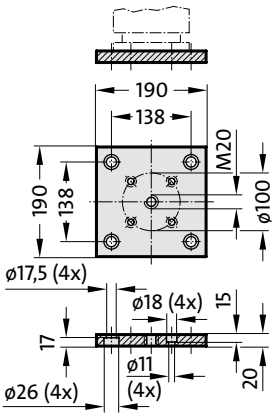
FIBRO

2481.13.05000.

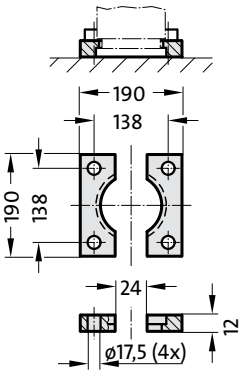
2480.011.07500



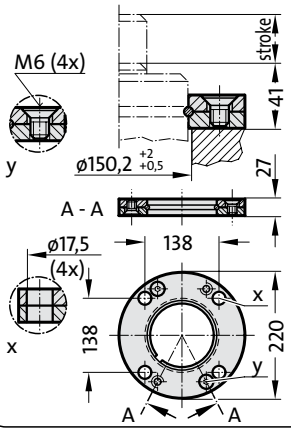
2480.011.07500.2



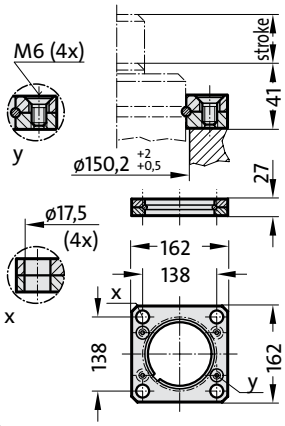
2480.022.07500



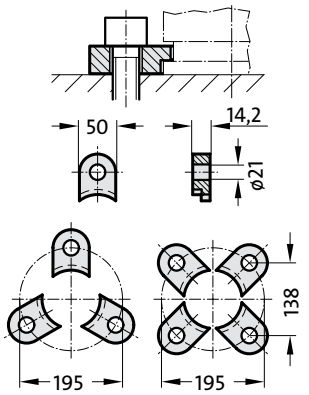
2480.055.07500



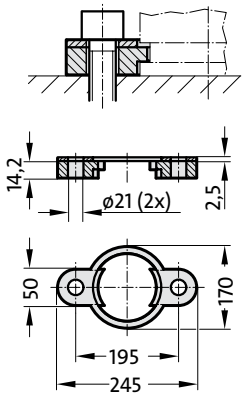
2480.057.07500



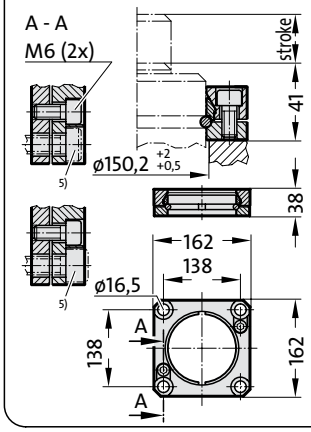
2480.007.07500



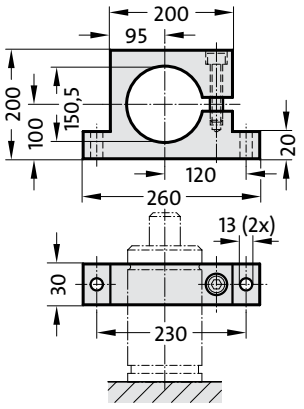
2480.008.07500 [3]



2480.064.07500 [4]



2480.044.07500 [2]



Notes:

[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).

FIBRO

2481.13.05000.

Gas Springs with Reduced Pressure Rise

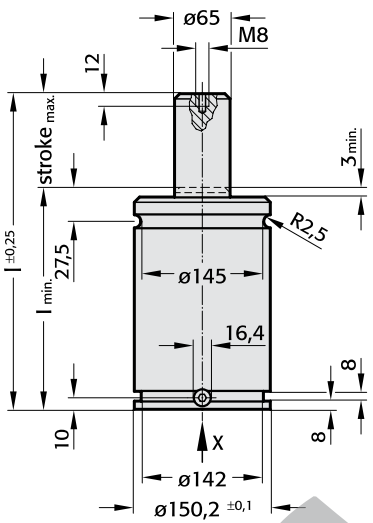
APPROVED PED 97/23/EC

2481.13.05000.

Initial spring force at 150 bar = 5000 daN

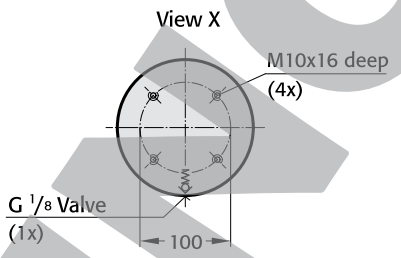
Order No	stroke max.	l_{min}	l
2481.13.05000.025	25	165	190
038	38,1	178,1	216,2
050	50	190	240
063	63,5	203,5	267
080	80	220	300
100	100	240	340
125	125	265	390
160	160	300	460
200	200	340	540
250	250	390	640
300	300	440	740

2481.13.05000.



Note:

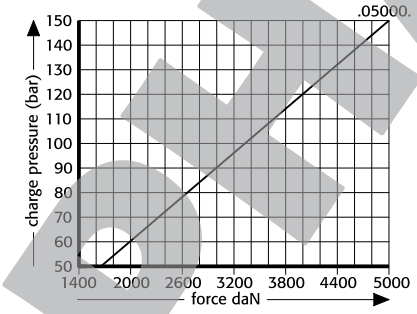
Order No for spare parts kit:
2481.13.05000



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. 40 to 80 (at 20 °C)
Max. piston speed:	1.6 m/s

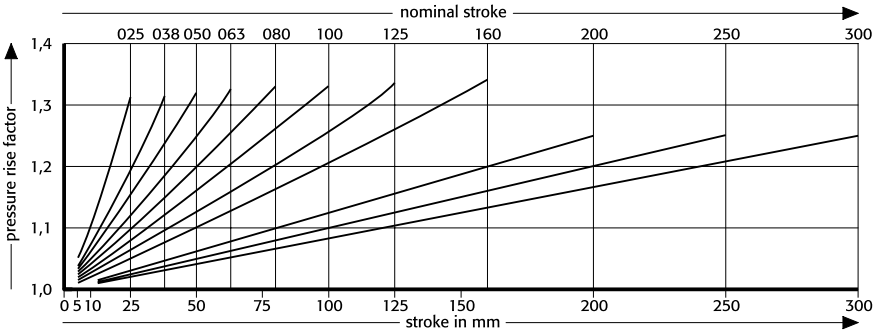
2481.13.05000.

Initial spring force versus charge pressure



2481.13.05000.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

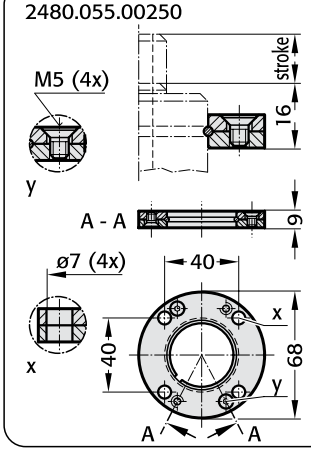
Gas Springs
with through bore passage

Gas Springs
with through bore passage
Mounting Variations

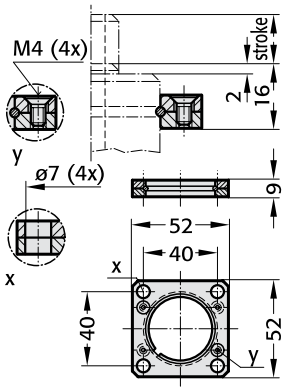
FIBRO

2496.12.00270.

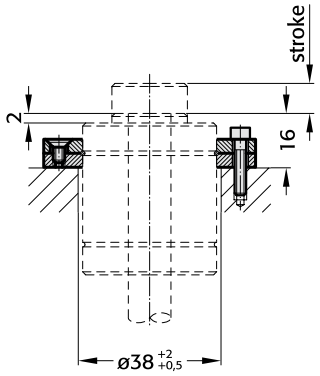
2480.055.00250

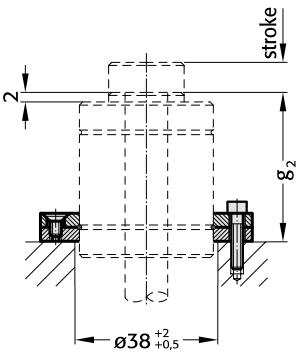


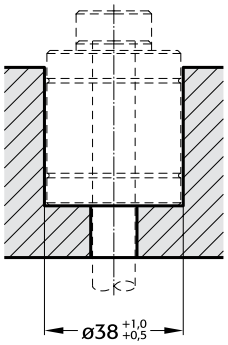
2480.057.00250



Mounting example:







FIBRO

2496.12.00270.

Gas Springs with through bore passage

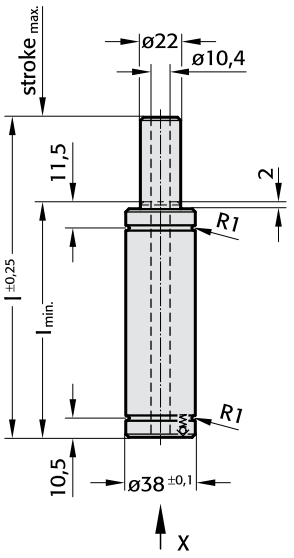
APPROVED PED 97/23/EC

2496.12.00270.

Initial spring force at 150 bar = 270 daN

Order No	stroke max.	l_{min}	l	g_2
2496.12.00270. 016	16	92	108	86
025	25	101	126	95
050	50	126	176	120
080	80	156	236	150

2496.12.00270.



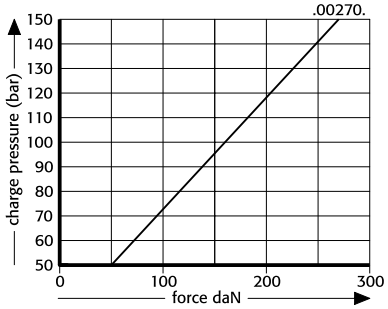
Note:

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:	20 °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

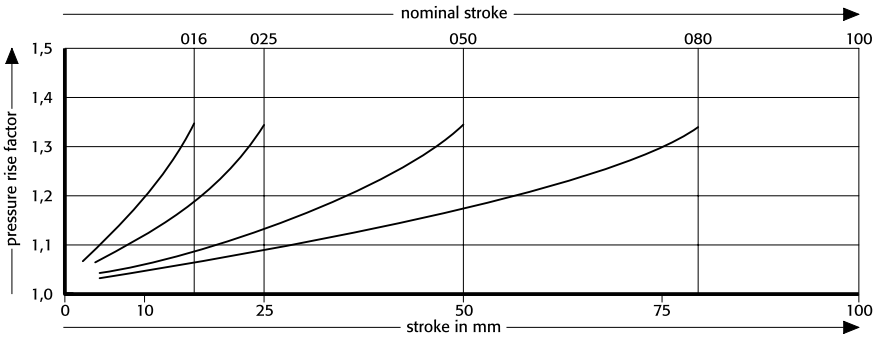
2496.12.00270.

Initial spring force versus charge pressure



2496.12.00270.

Spring force Diagram displacement versus stroke rise



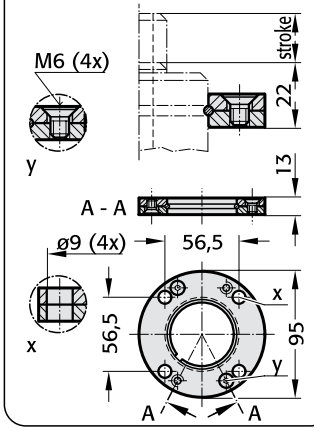
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with through bore passage
Mounting Variations

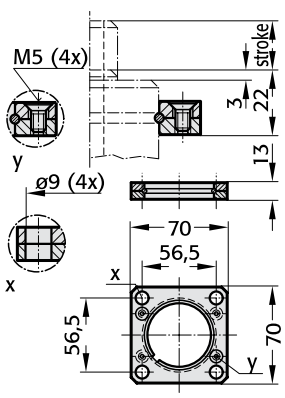
FIBRO

2496.12.00490.

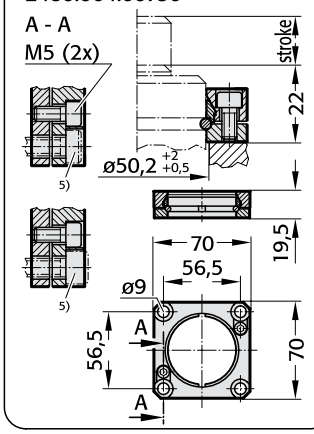
2480.055.00750



2480.057.00750



2480.064.00750[4)]

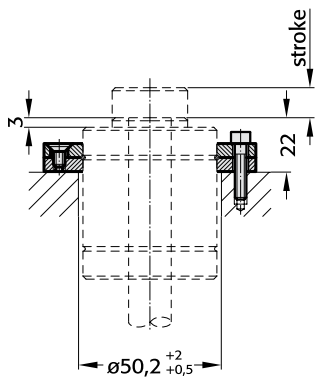


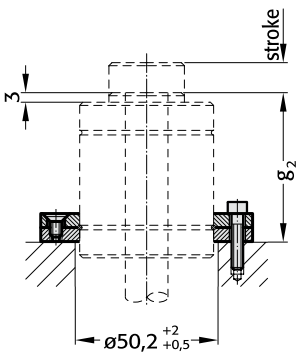
Notes:

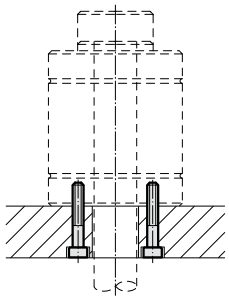
[4)] Square collar flange, non-rotating, fixing for composite connection.

[5)] Machine screws with hexagonal socket (compact head recommended).

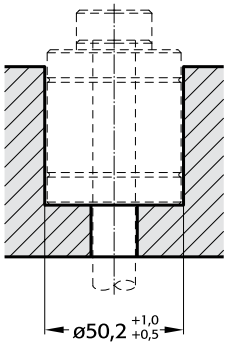
Mounting example:







see Note!



FIBRO

2496.12.00490.

Gas Springs with through bore passage

APPROVED PED 97/23/EC

2496.12.00490.

Initial spring force at 150 bar = 490 daN

Order No	stroke max.	$l_{min.}$	l	g_2
2496.12.00490. 016	16	96	112	88
025	25	105	130	97
050	50	130	180	122
080	80	160	240	152

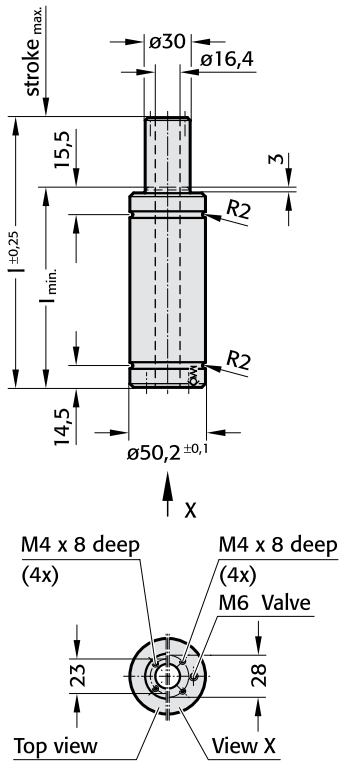
Note:

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

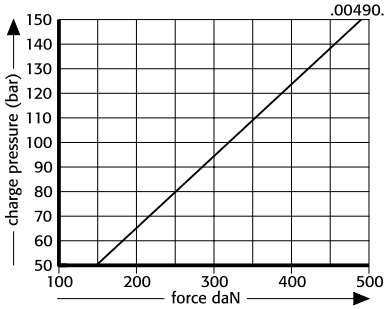
Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	50 bar
Working temperature:	20 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 15 to 40 (at 20 °C)
Max. piston speed:	0.5 m/s

2496.12.00490.



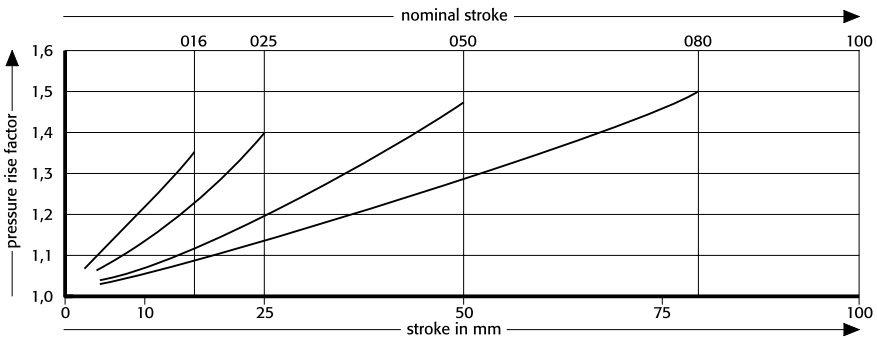
2496.12.00490.

Initial spring force versus charge pressure



2496.12.00490.

Spring force Diagram displacement versus stroke rise



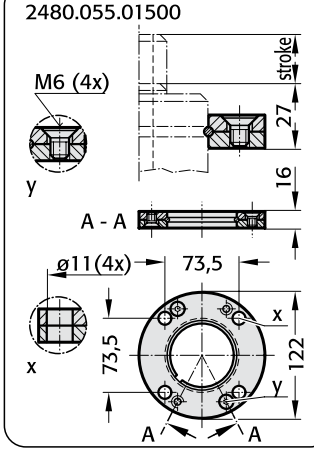
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with through bore passage
Mounting Variations

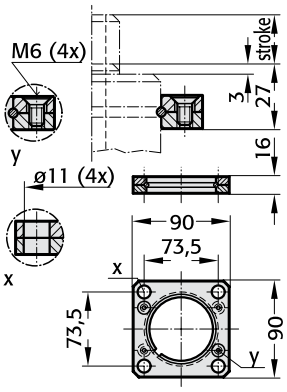
FIBRO

2496.12.01060.

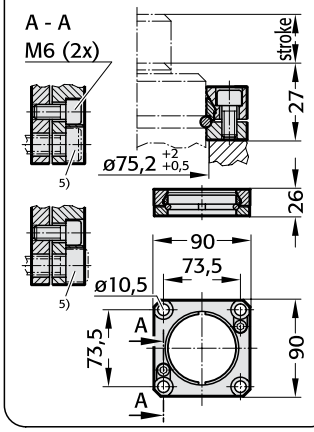
2480.055.01500



2480.057.01500



2480.064.01500[4)]

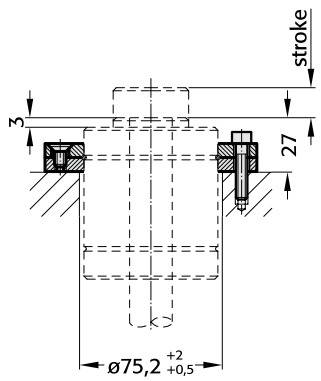


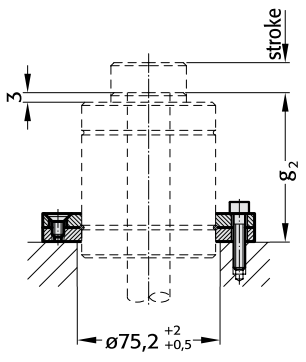
Notes:

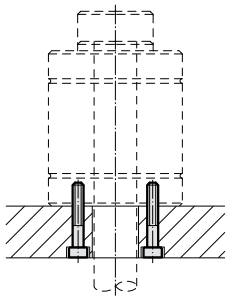
[4)] Square collar flange, non-rotating, fixing for composite connection.

[5)] Machine screws with hexagonal socket (compact head recommended).

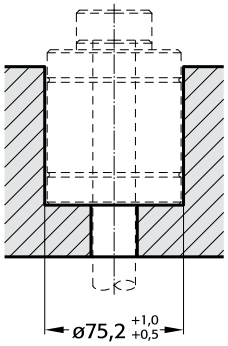
Mounting example:







see Note!



FIBRO

2496.12.01060.

Gas Springs with through bore passage

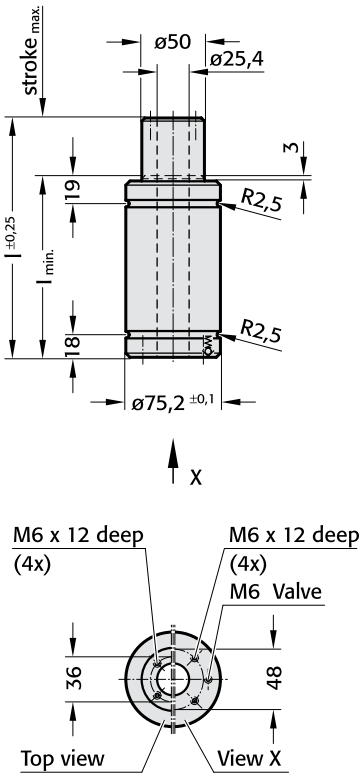
APPROVED PED 97/23/EC

2496.12.01060.

Initial spring force at 150 bar = 1060 daN

Order No	stroke max.	$l_{min.}$	l	g_2
2496.12.01060. 016	16	106	122	96
025	25	115	140	105
050	50	140	190	130
080	80	170	250	160
100	100	190	290	180

2496.12.01060.



Note:

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

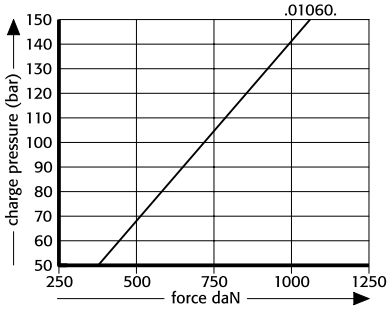
Order No for spare parts kit:

2496.12.01060

Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	50 bar
Working temperature:	20 °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

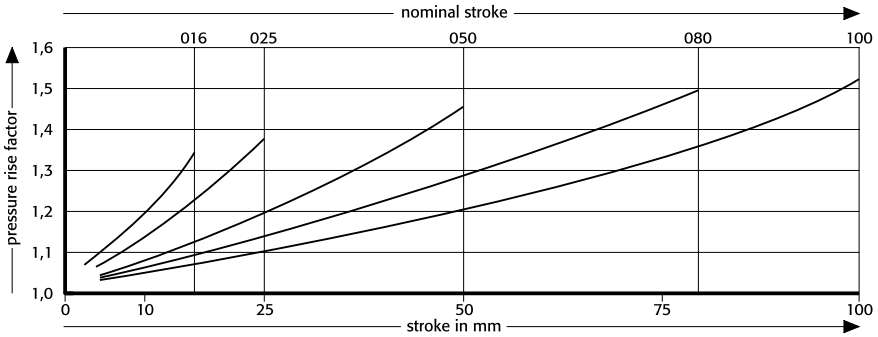
2496.12.01060.

Initial spring force versus charge pressure



2496.12.01060.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force

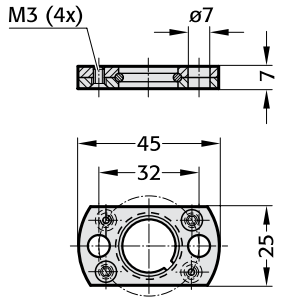
Power Line

Gas Springs
with Increased Spring Force
Mounting Variations

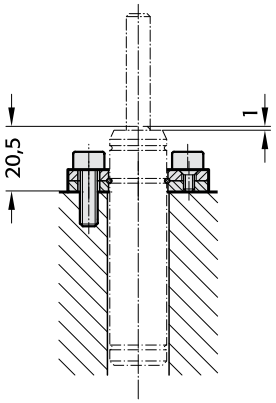
FIBRO

2487.12.00170.

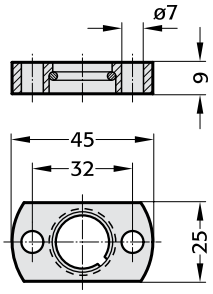
2480.051.00030



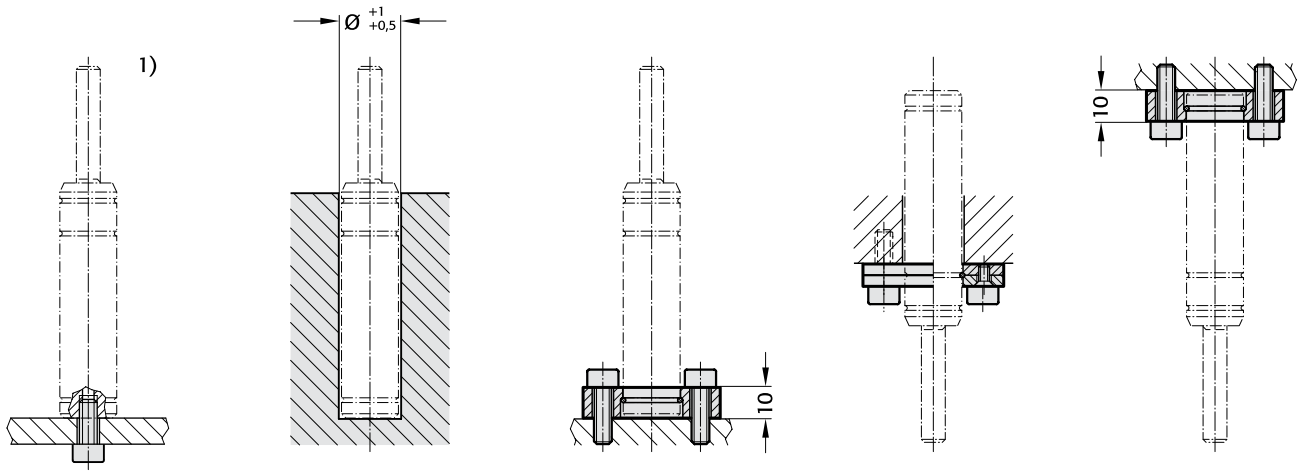
2480.051.00030



2480.052.00030



Mounting example:



FIBRO VDI 3003

2487.12.00170.

POWER LINE
Gas Springs
with Increased Spring Force

APPROVED PED 97/23/EC

2487.12.00170.

Initial spring force at 180 bar = 170 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.00170. 007	7	37	44
010	10	40	50
015	15	45	60
019	19	49	68
025	25	55	80
038	38	68	106
050	50	80	130
063	63	93	156
075	75	110	185
080	80	115	195
100	100	135	235
125	125	160	285

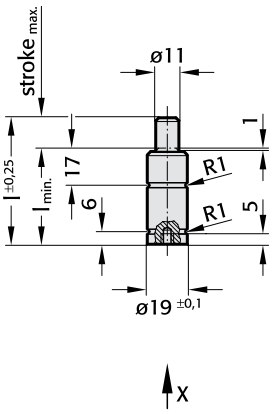
Note:

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

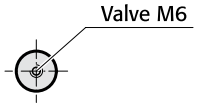
[1] Fixing at bottom thread only recommanded for stroke length up to 50 mm.

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.

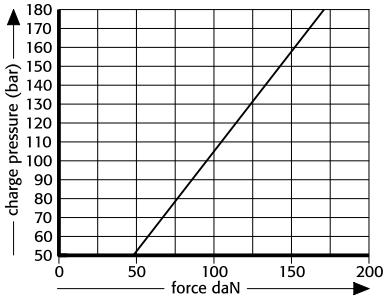


View X



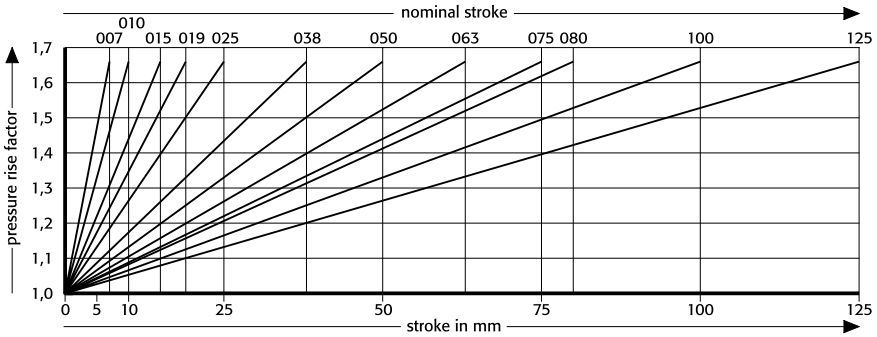
2487.12.00170.

Initial spring force versus charge pressure



2487.12.00170.

Spring force Diagram displacement versus stroke rise



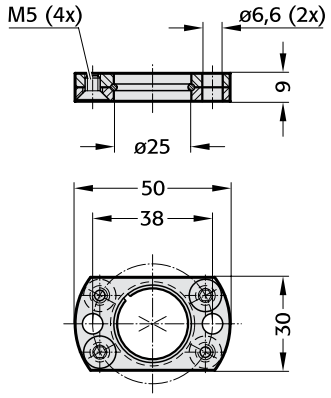
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

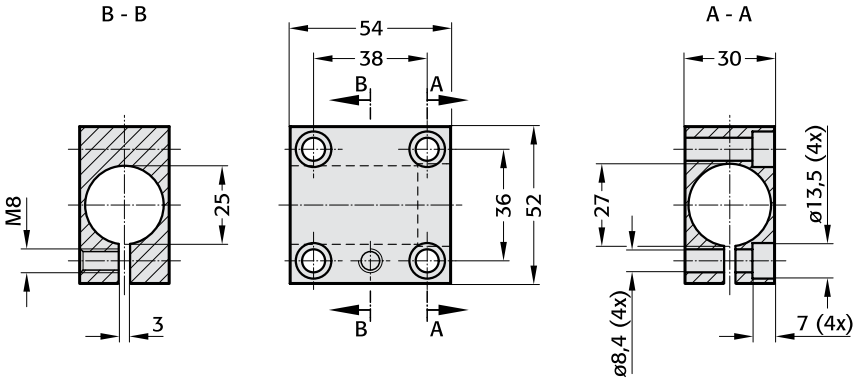
FIBRO

2487.12.00320.

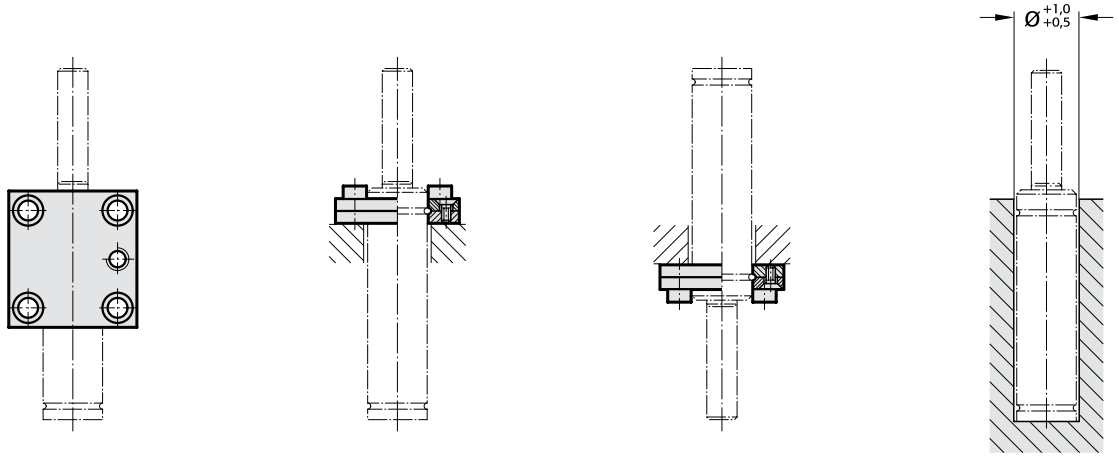
2480.051.00150



2480.053.00150



Mounting example:



FIBRO

2487.12.00320.

POWER LINE
Gas Springs
with Increased Spring Force

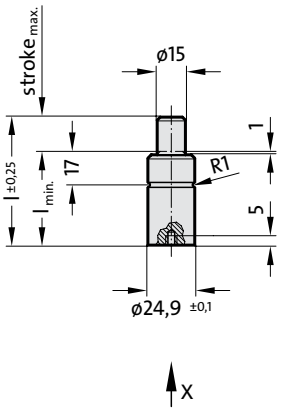
APPROVED PED 97/23/EC

2487.12.00320.

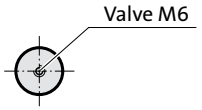
Initial spring force at 180 bar = 320 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.00320. 007	7	37	44
010	10	40	50
015	15	45	60
019	19	49	68
025	25	55	80
038	38	68	106
050	50	80	130
063	63	93	156
075	75	110	185
080	80	115	195
100	100	135	235
125	125	160	285

2487.12.00320.



View X



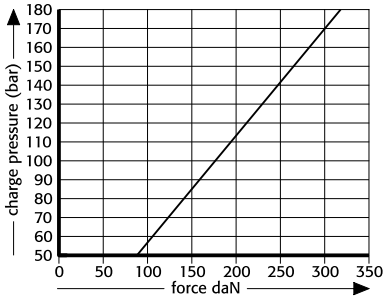
Note:

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. 40 to 100 (at 20 °C)
Max. piston speed:	1.6 m/s

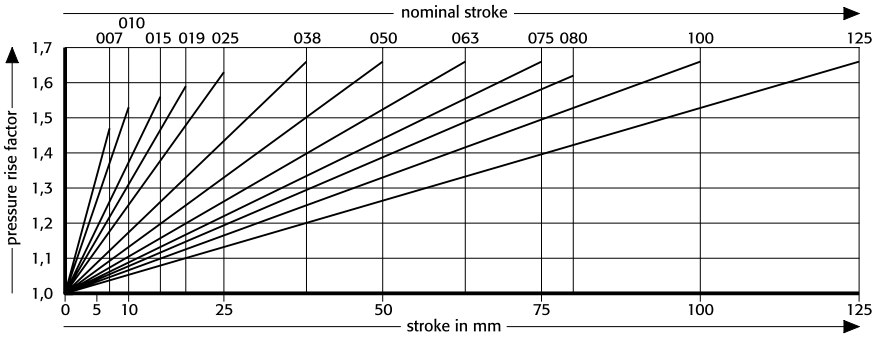
2487.12.00320.

Initial spring force versus charge pressure



2487.12.00320.

Spring force Diagram displacement versus stroke rise



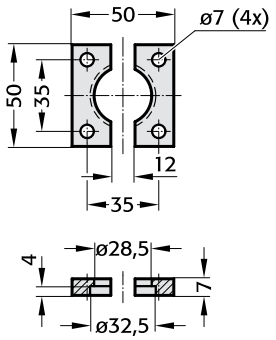
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

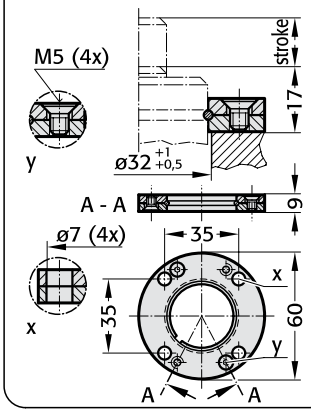
FIBRO

2487.12.00350.

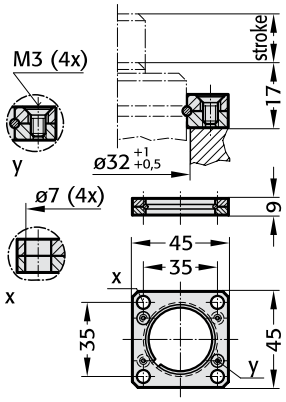
2480.022.00150



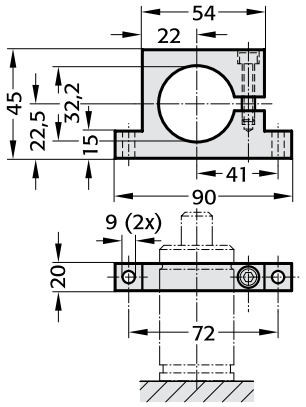
2480.055.00150



2480.057.00150



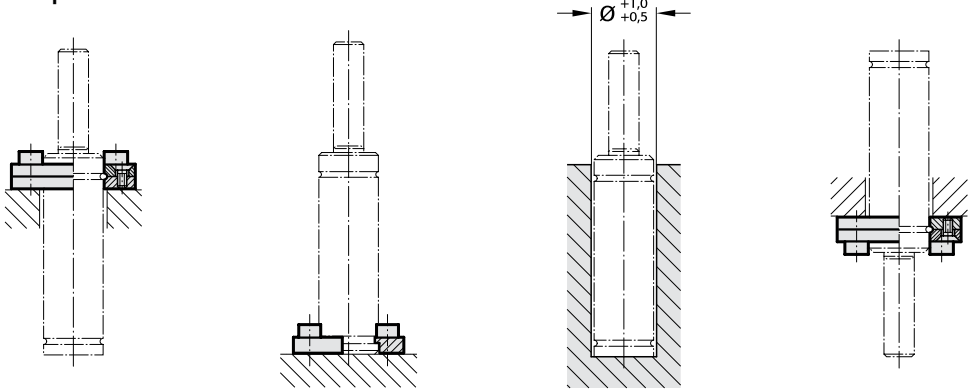
2480.044.00150 [2)]



Note:

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

Mounting example:



FIBRO VDI 3003

2487.12.00350.

POWER LINE
Gas Springs
with Increased Spring Force

APPROVED PED 97/23/EC

2487.12.00350.

Initial spring force at 180 bar = 350 daN

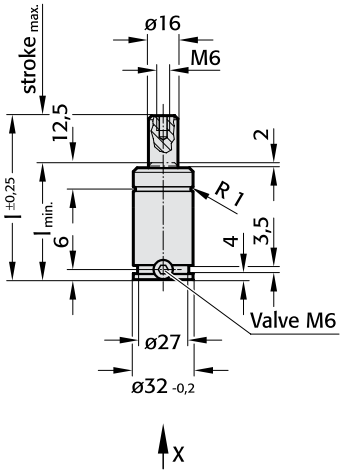
Order No	stroke max.	$l_{min.}$	l
2487.12.00350. 010	10	40	50
013	13	43	56
016	16	46	62
019	19	49	68
025	25	55	80
032	32	62	94
038	38	68	106
050	50	80	130
063	63	93	156
075	75	105	180
080	80	110	190
100	100	130	230
125	125	155	280

Note:

Order No for spare parts kit:
2487.12.00350

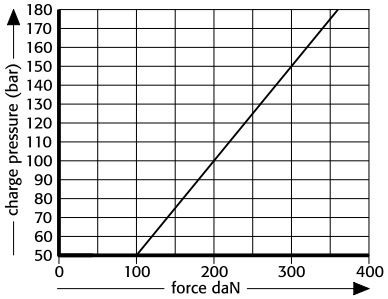
Pressure medium:	Nitrogen N_2
Max. filling pressure:	180 bar
Min. filling pressure:	25 bar
Working temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 20 to 100 (at 20 °C)
Max. piston speed:	1.6 m/s

2487.12.00350.



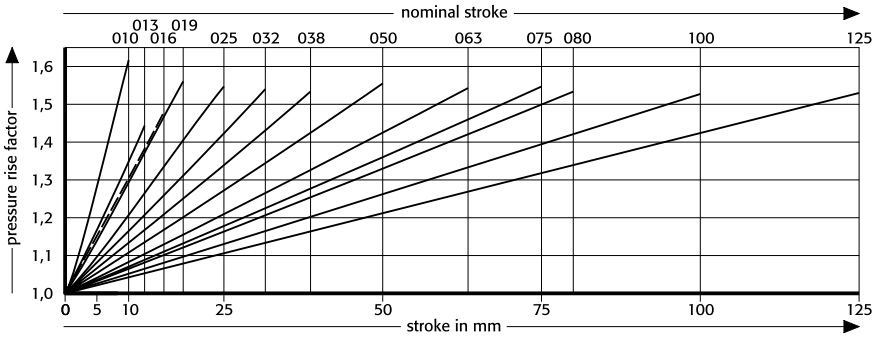
2487.12.00350.

Initial spring force
versus charge pressure



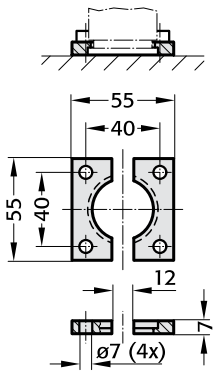
2487.12.00350.

Spring force Diagram displacement versus stroke rise

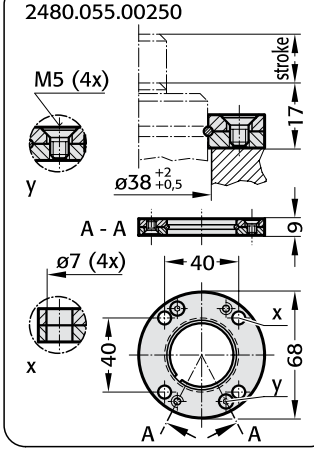


Pressure rise factor accounts for displacement but not external influences!

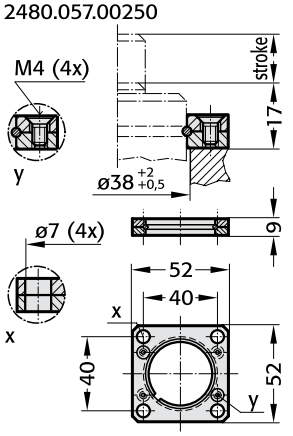
2480.022.00250



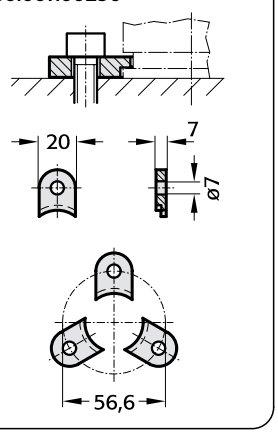
2480.055.00250



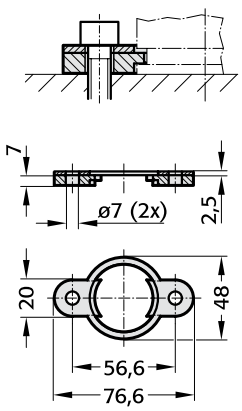
2480.057.00250



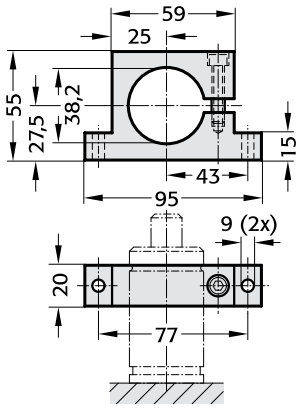
2480.007.00250



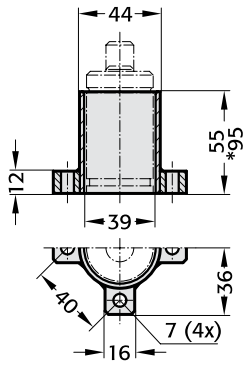
2480.008.00250 [3]



2480.044.00250 [2]



2480.010.00250.055 [3]
2480.010.00250.095* [3]



Notes:

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

[3] Not for use with composite connection.

FIBRO VDI 3003 / CNOMO

2487.12.00500.

POWER LINE
Gas Springs
with Increased Spring Force

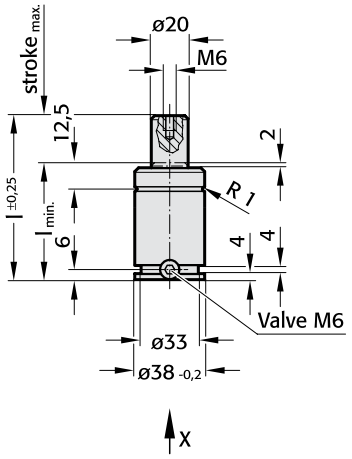
APPROVED PED 97/23/EC

2487.12.00500.

Initial spring force at 150 bar = 500 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.00500. 010	10	40	50
013	13	43	56
016	16	46	62
019	19	49	68
025	25	55	80
032	32	62	94
038	38	68	106
050	50	80	130
063	63	93	156
075	75	105	180
080	80	110	190
100	100	130	230
125	125	155	280

2487.12.00500.

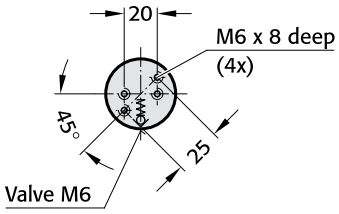


Note:

Order No for spare parts kit:
2487.12.00500

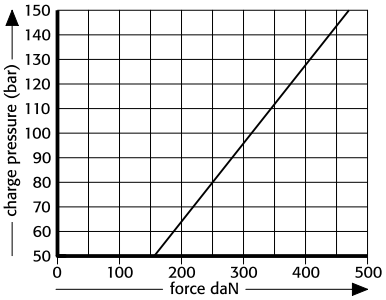
Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	25 bar
Working temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 20 to 100 (at 20 °C)
Max. piston speed:	1.6 m/s

View X



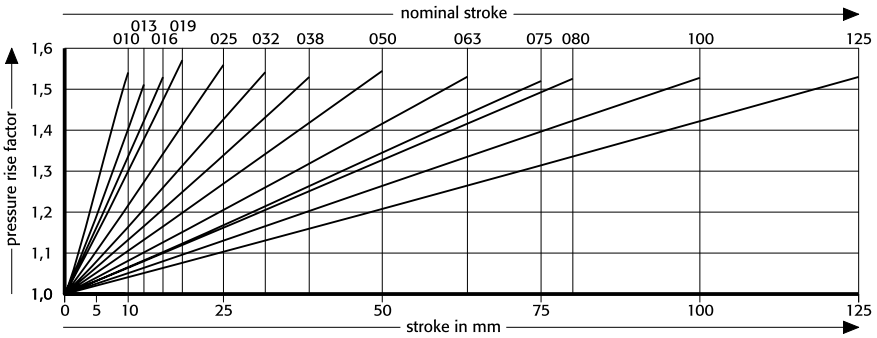
2487.12.00500.

Initial spring force
versus charge pressure



2487.12.00500.

Spring force Diagram displacement versus stroke rise



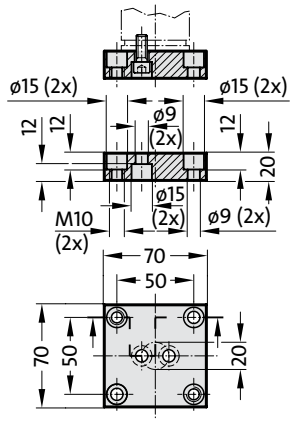
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

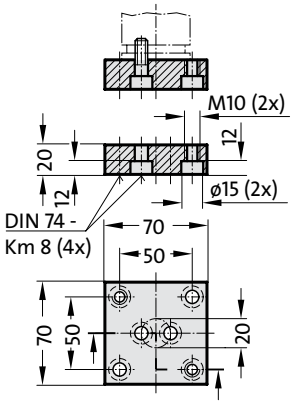
FIBRO

2487.12.00750. .1

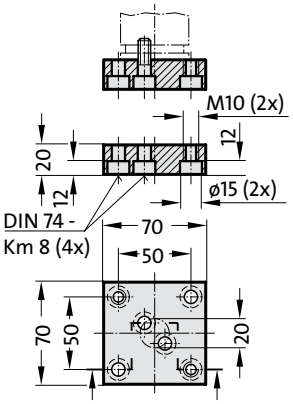
2480.011.00500.2



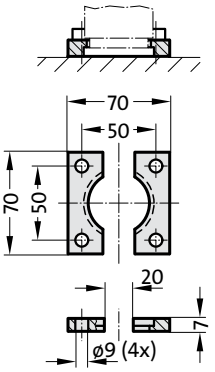
2480.011.00500



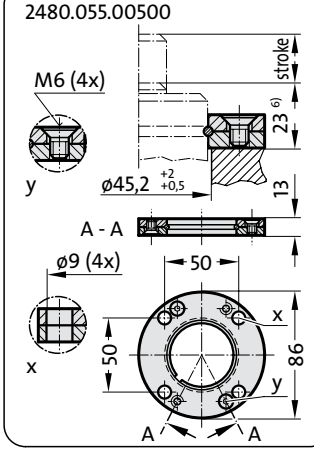
2480.011.00500.1



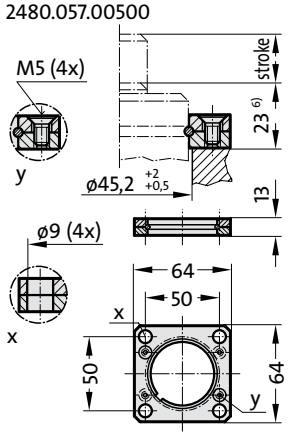
2480.022.00500



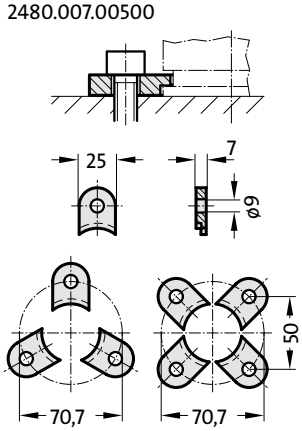
2480.055.00500



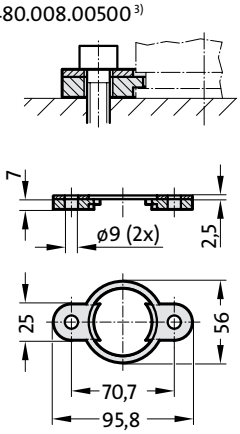
2480.057.00500



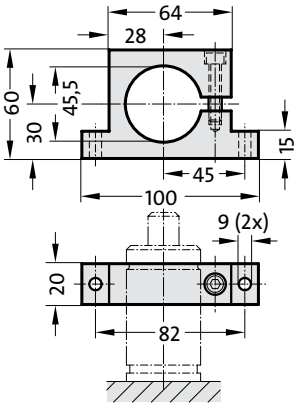
2480.007.00500



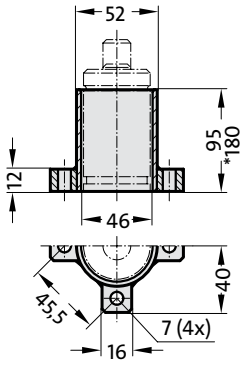
2480.008.00500 3)



2480.044.00500 2)



2480.010.00500.095 3)
2480.010.00500.180* 3)



Notes:

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

3) Not for use with composite connection.

6) Installation height increased from 22 mm to 23 mm according to VDI 3003

FIBRO VDI 3003 / CNOMO

2487.12.00750. .1
replaces 2487.12.00750.

POWER LINE
Gas Springs
with Increased Spring Force

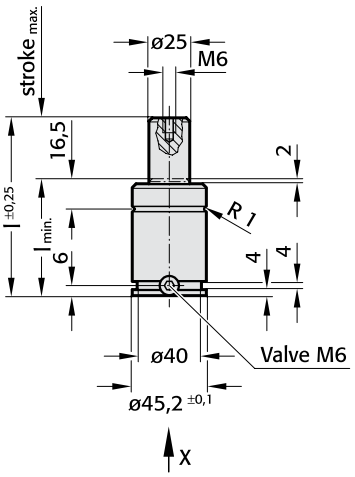
APPROVED PED 97/23/EC

2487.12.00750. .1

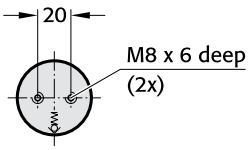
Initial spring force at 150 bar = 750 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.00750. 010.1	10	42	52
013.1	13	45	58
016.1	16	48	64
019.1	19	51	70
025.1	25	57	82
032.1	32	64	96
038.1	38	70	108
050.1	50	82	132
063.1	63	95	158
075.1	75	107	182
080.1	80	112	192
100.1	100	132	232
125.1	125	157	282

2487.12.00750. .1



View X



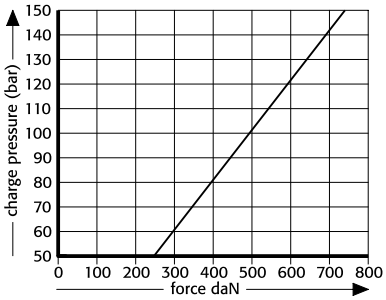
Note:

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

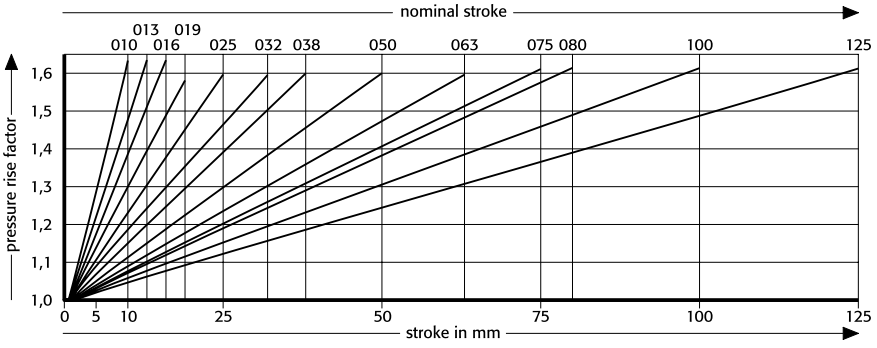
2487.12.00750. .1

Initial spring force versus charge pressure



2487.12.00750. .1

Spring force Diagram displacement versus stroke rise



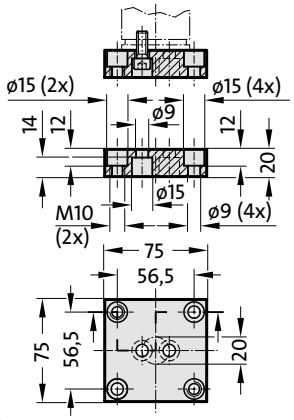
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

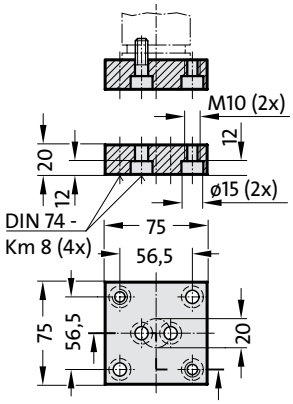
FIBRO

2487.12.01000. .1

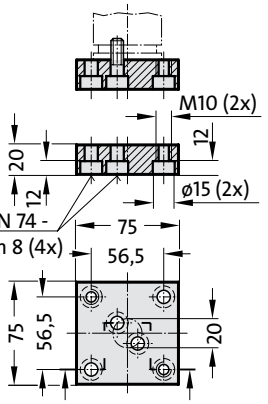
2480.011.00750.3



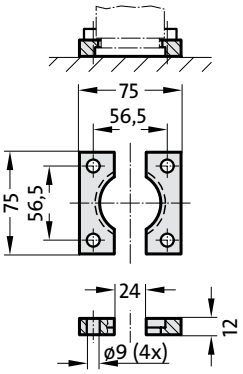
2480.011.00750



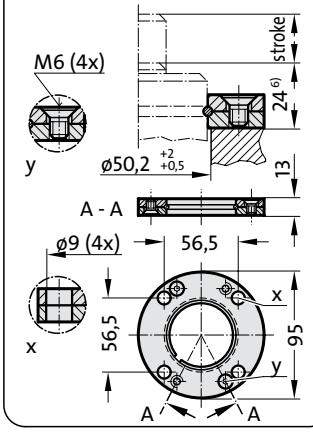
2480.011.00750.1



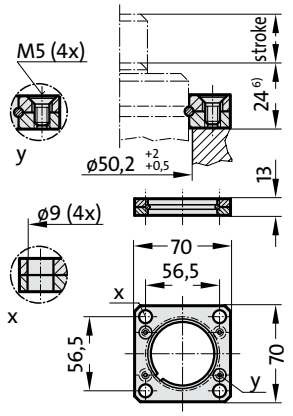
2480.022.00750



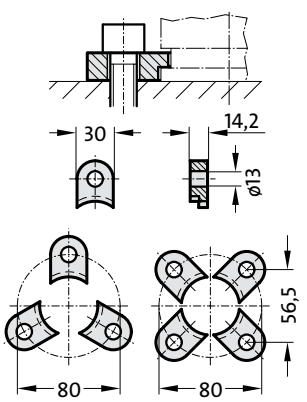
2480.055.00750



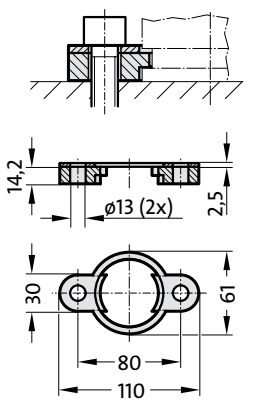
2480.057.00750



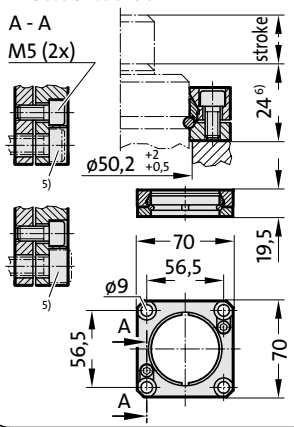
2480.007.00750



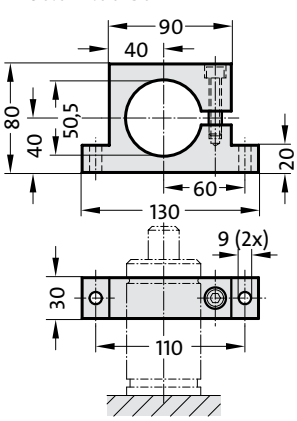
2480.008.00750 3)



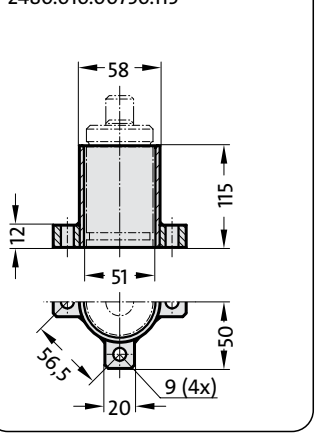
2480.064.00750 4)



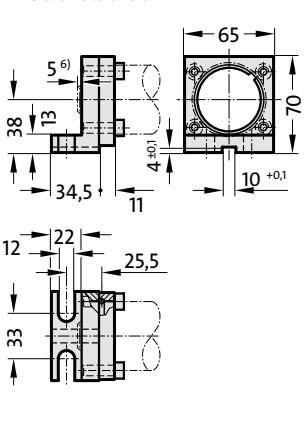
2480.044.00750 2)



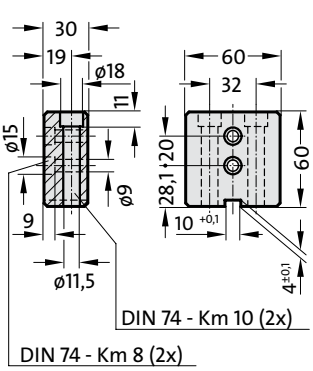
2480.010.00750.115 3)



2480.045.00750 2)



2480.047.00750 2)



Notes:

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

FIBRO VDI 3003 / CNOMO

2487.12.01000. .1
replaces 2487.12.01000.

POWER LINE
Gas Springs
with Increased Spring Force

APPROVED PED 97/23/EC

2487.12.01000. .1

Initial spring force at 150 bar = 1000 daN

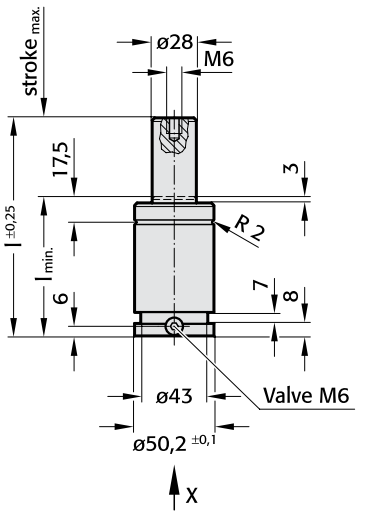
Order No	stroke max.	$l_{min.}$	l
2487.12.01000. 013.1	13	51	64
016.1	16	54	70
019.1	19	57	76
025.1	25	63	88
032.1	32	70	102
038.1	38	76	114
050.1	50	88	138
063.1	63	101	164
075.1	75	113	188
080.1	80	118	198
100.1	100	138	238
125.1	125	163	288

Note:

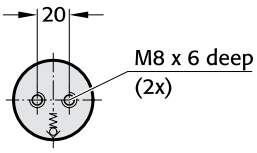
Order No for spare parts kit:
2487.12.01000

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

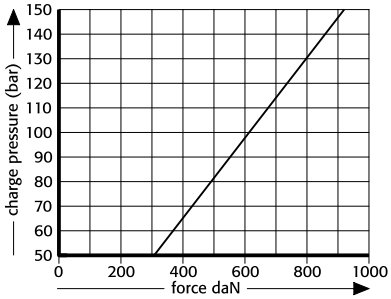


View X



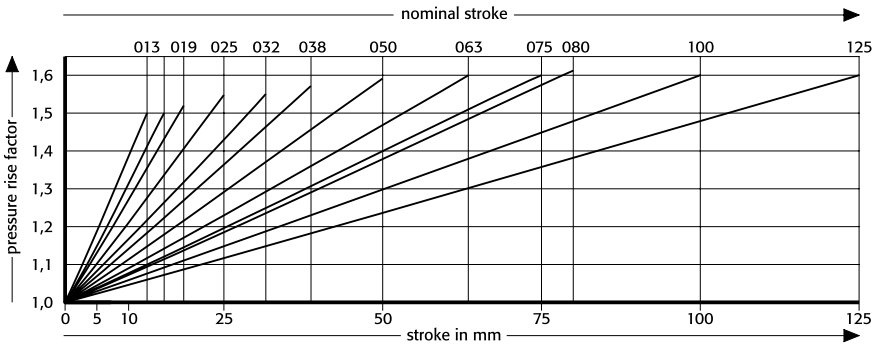
2487.12.01000. .1

Initial spring force
versus charge pressure



2487.12.01000. .1

Spring force Diagram displacement versus stroke rise



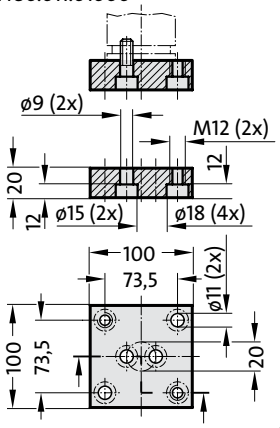
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

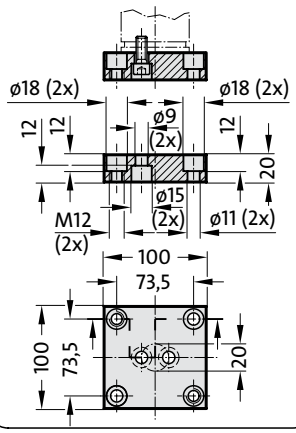
FIBRO

2487.12.01500.

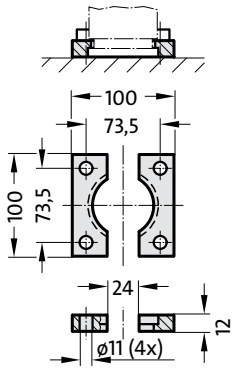
2480.011.01000



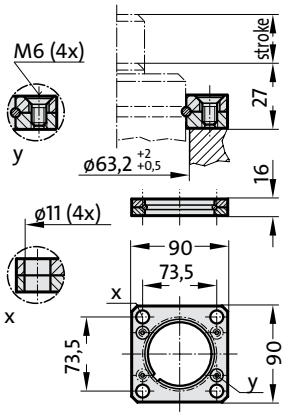
2480.011.01000.2



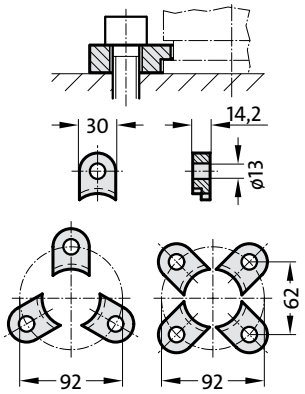
2480.022.01000



2480.057.01000



2480.007.01000



FIBRO VDI 3003

2487.12.01500.

POWER LINE
Gas Springs
with Increased Spring Force

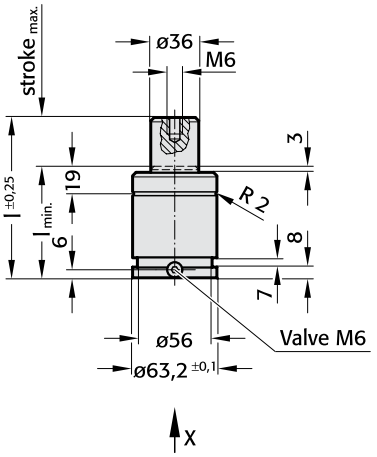
APPROVED PED 97/23/EC

2487.12.01500.

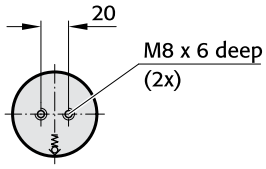
Initial spring force at 150 bar = 1500 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.01500. 013	13	57	70
016	16	60	76
019	19	63	82
025	25	69	94
032	32	76	108
038	38	82	120
050	50	94	144
063	63	107	170
075	75	119	194
080	80	124	204
100	100	144	244
125	125	169	294

2487.12.01500.



View X



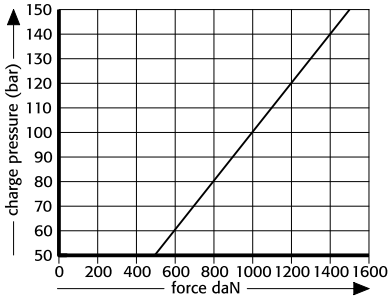
Note:

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

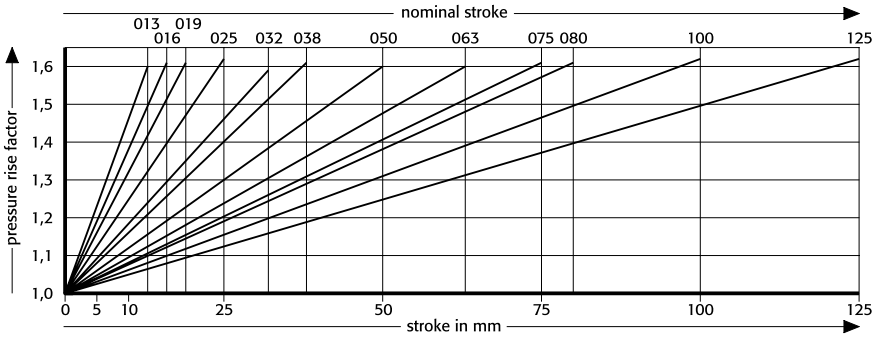
2487.12.01500.

Initial spring force versus charge pressure



2487.12.01500.

Spring force Diagram displacement versus stroke rise



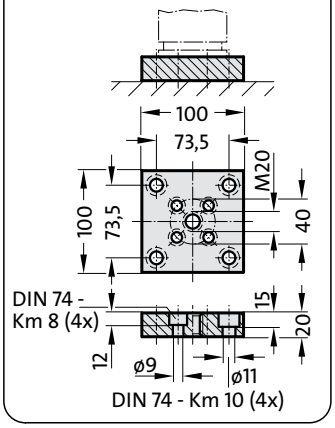
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

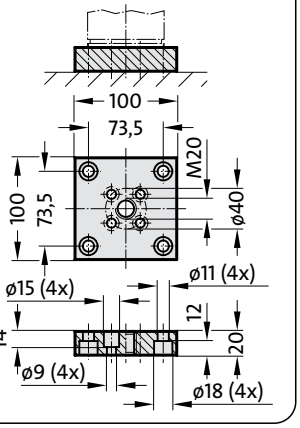
FIBRO

2487.12.02400.

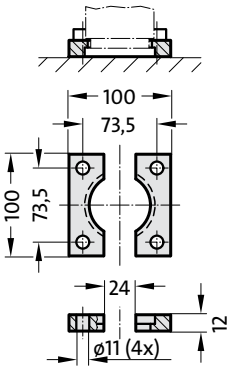
2480.011.01500



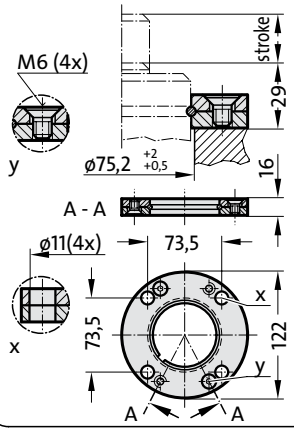
2480.011.01500.2



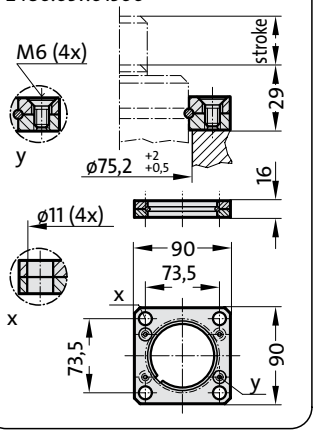
2480.022.01500



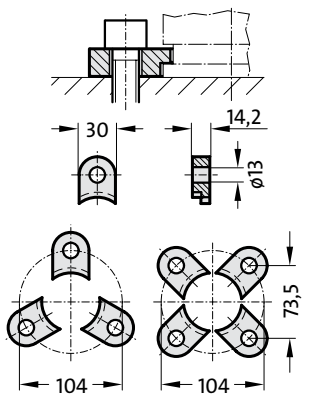
2480.055.01500



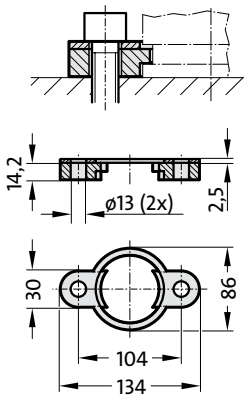
2480.057.01500



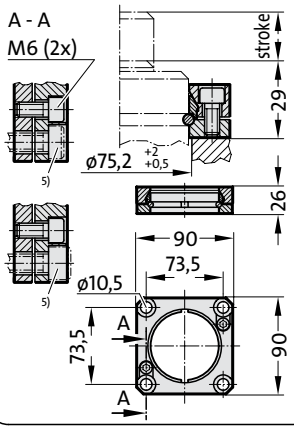
2480.007.01500



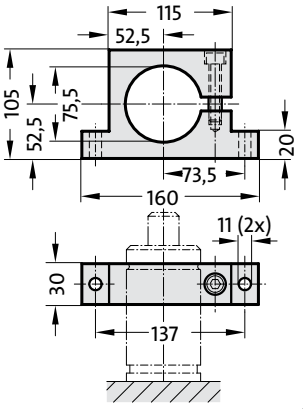
2480.008.01500 [3]



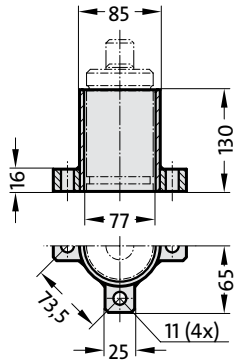
2480.064.01500 [4]



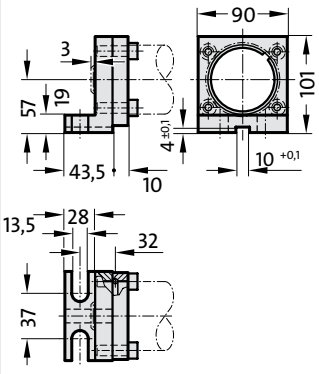
2480.044.01500 [2]



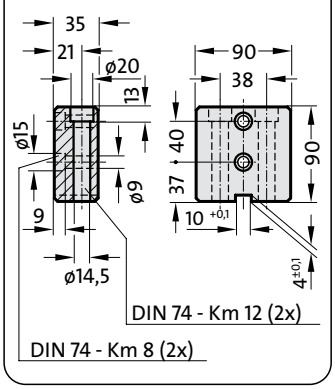
2480.010.01500.130 [3]



2480.045.01500 [2]



2480.047.01500 [2]



Notes:

[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).

FIBRO VDI 3003 / CNOMO

2487.12.02400.

POWER LINE
Gas Springs
with Increased Spring Force

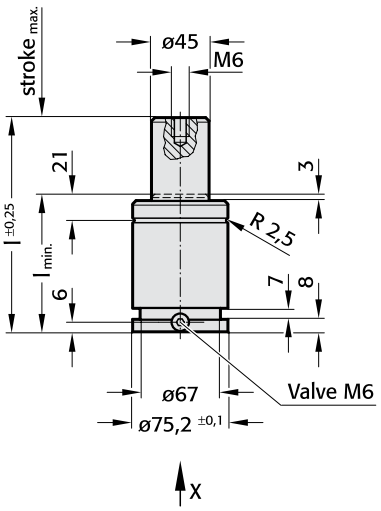
APPROVED PED 97/23/EC

2487.12.02400.

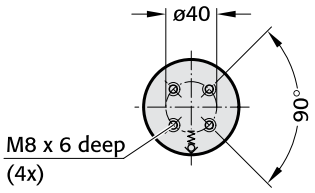
Initial spring force at 150 bar = 2400 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.02400. 016	16	61	77
019	19	64	83
025	25	70	95
032	32	77	109
038	38	83	121
050	50	95	145
063	63	108	171
075	75	120	195
080	80	125	205
100	100	145	245
125	125	170	295

2487.12.02400.



View X



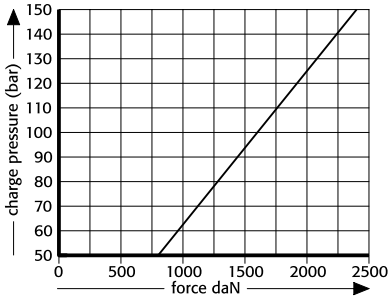
Note:

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

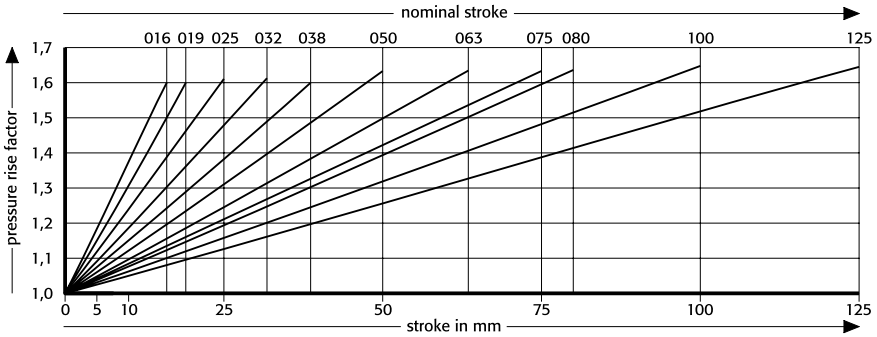
2487.12.02400.

Initial spring force versus charge pressure



2487.12.02400.

Spring force Diagram displacement versus stroke rise



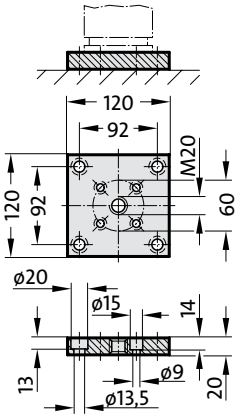
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

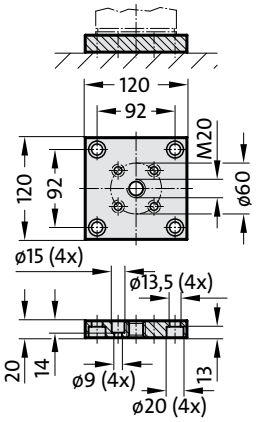
FIBRO

2487.12.04200.

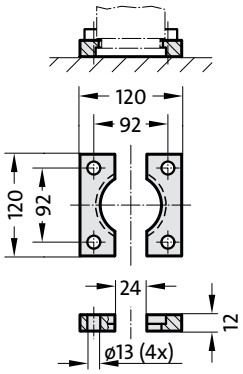
2480.011.03000



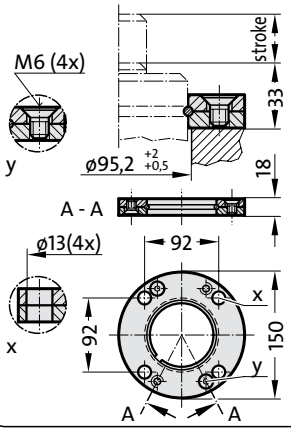
2480.011.03000.2



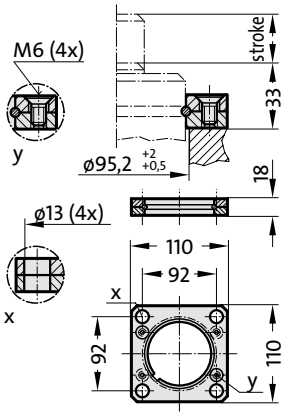
2480.022.03000



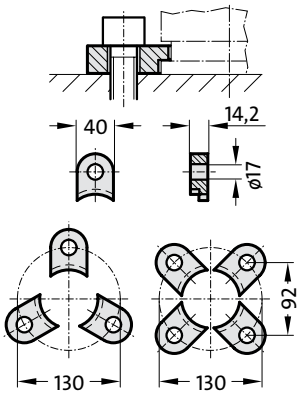
2480.055.03000



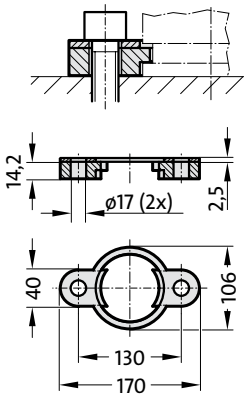
2480.057.03000



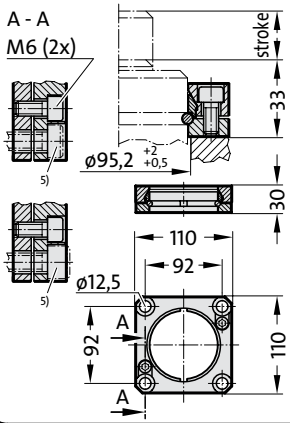
2480.007.03000



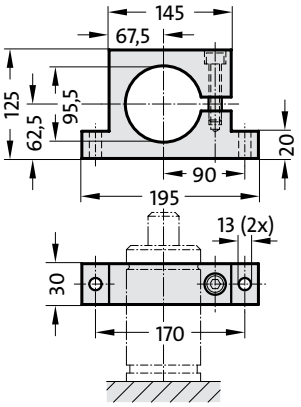
2480.008.03000 [3]



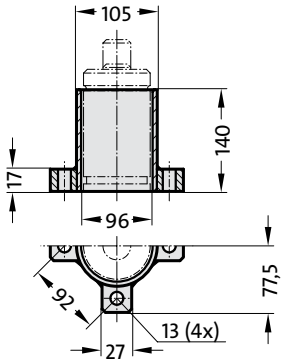
2480.064.03000 [4]



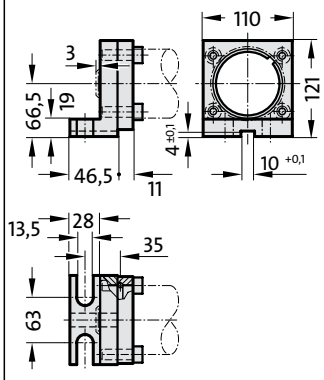
2480.044.03000 [2]



2480.010.03000.140 [3]



2480.045.03000 [2]



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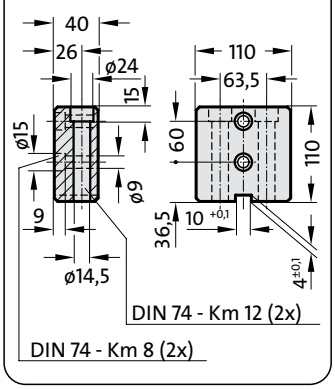


Notes:

[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).

FIBRO VDI 3003 / CNOMO

2487.12.04200.

POWER LINE
Gas Springs
with Increased Spring Force

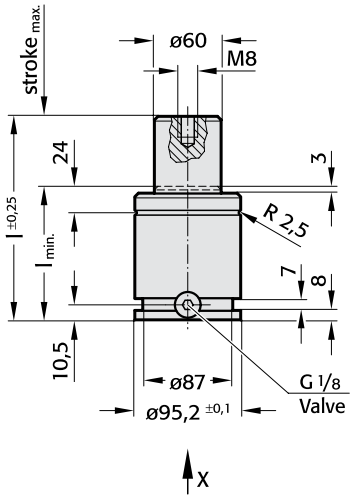
APPROVED PED 97/23/EC

2487.12.04200.

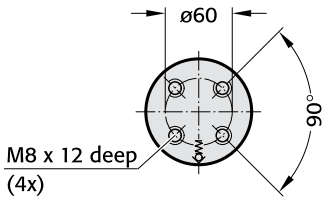
Initial spring force at 150 bar = 4200 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.04200. 016	16	74	90
019	19	77	96
025	25	83	108
032	32	90	122
038	38	96	134
050	50	108	158
063	63	121	184
075	75	133	208
080	80	138	218
100	100	158	258
125	125	183	308

2487.12.04200.



View X



Note:

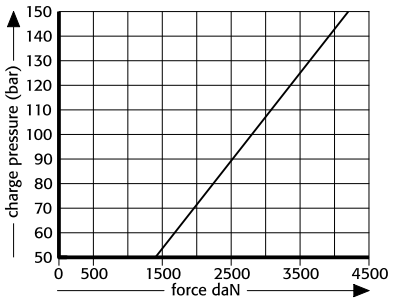
Order No for spare parts kit:

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

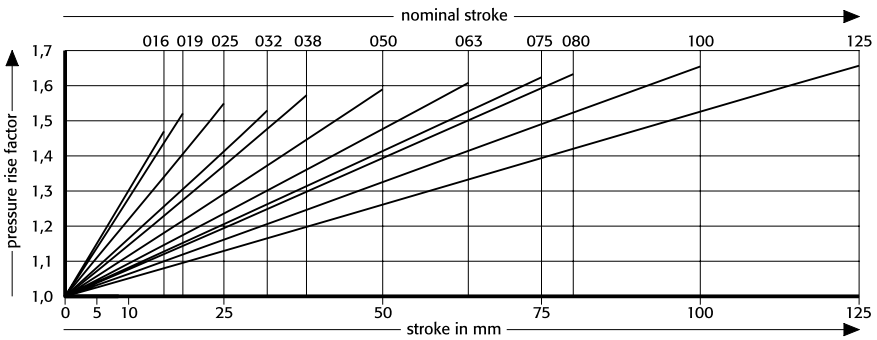
2487.12.04200.

Initial spring force versus charge pressure



2487.12.04200.

Spring force Diagram displacement versus stroke rise



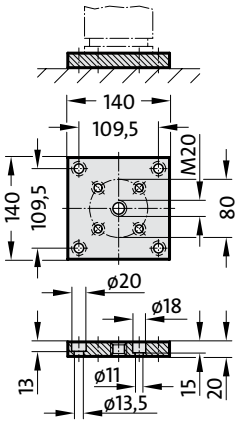
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

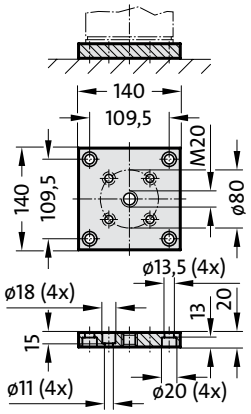
FIBRO

2487.12.06600.

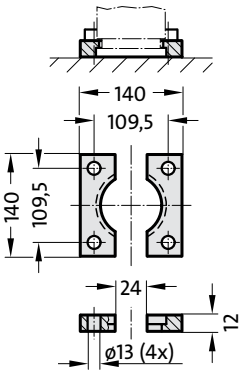
2480.011.05000



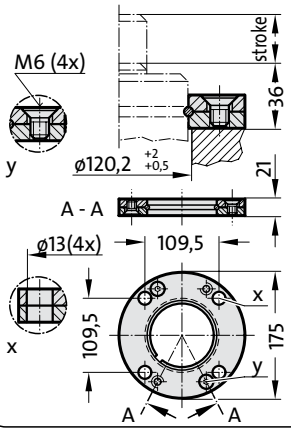
2480.011.05000.2



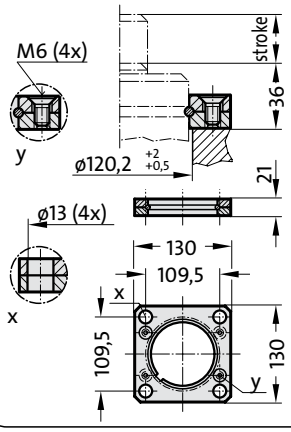
2480.022.05000



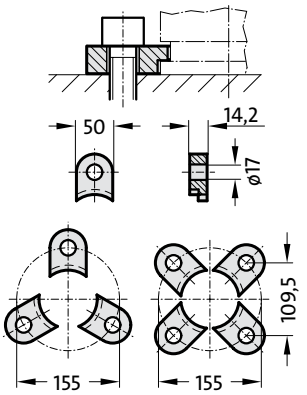
2480.055.05000



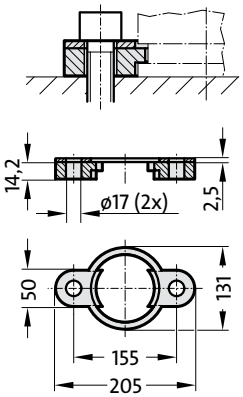
2480.057.05000



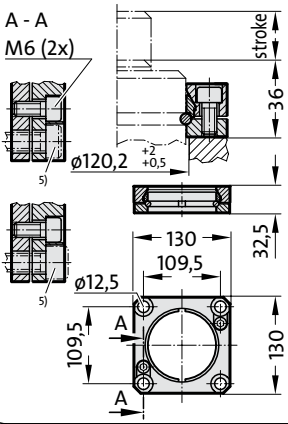
2480.007.05000



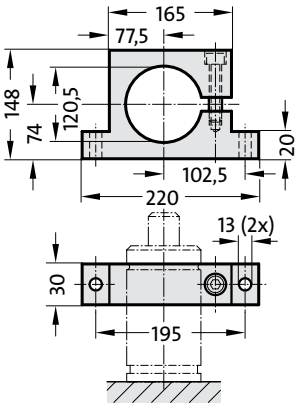
2480.008.05000 [3]



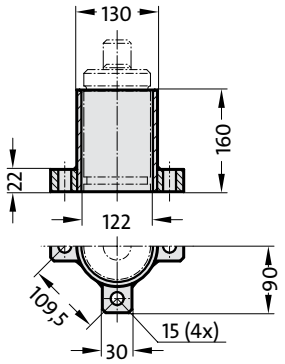
2480.064.05000 [4]



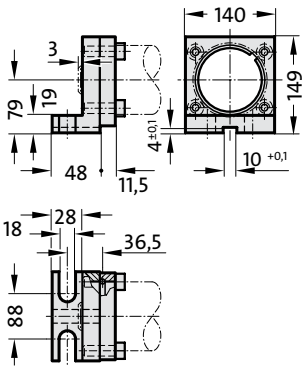
2480.044.05000 [2]



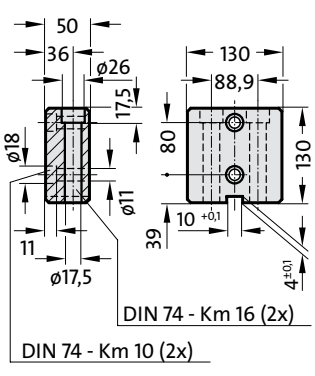
2480.010.05000.160 [3]



2480.045.05000 [2]



2480.047.05000 [2]



Notes:

[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).

FIBRO VDI 3003

2487.12.06600.

POWER LINE
Gas Springs
with Increased Spring Force

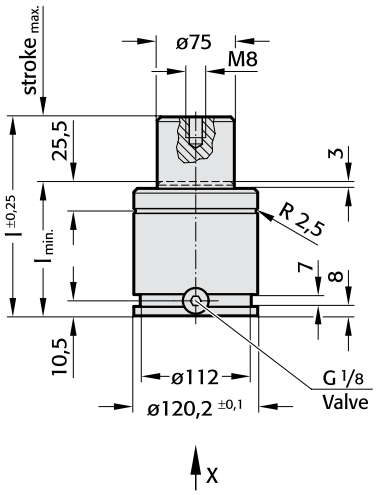
APPROVED PED 97/23/EC

2487.12.06600.

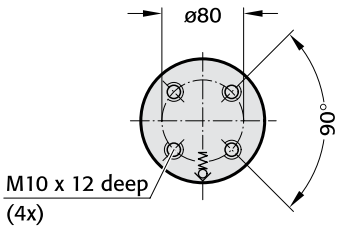
Initial spring force at 150 bar = 6630 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.06600. 016	16	84	100
019	19	87	106
025	25	93	118
032	32	100	132
038	38	106	144
050	50	118	168
063	63	131	194
075	75	143	218
080	80	148	228
100	100	168	268
125	125	193	318

2487.12.06600.



View X



Note:

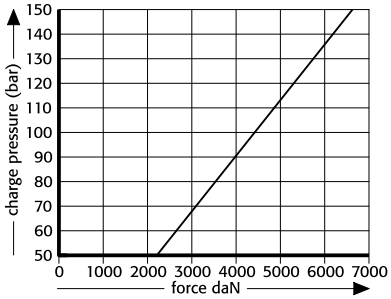
Order No for spare parts kit:

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

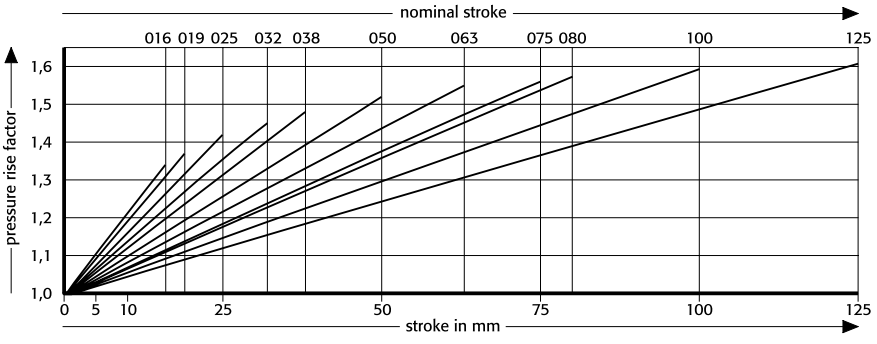
2487.12.06600.

Initial spring force versus charge pressure



2487.12.06600.

Spring force Diagram displacement versus stroke rise



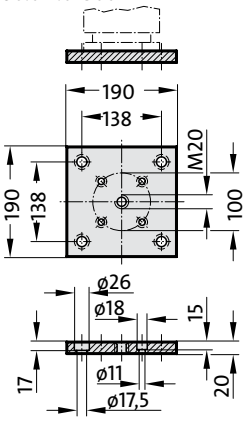
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Increased Spring Force
Mounting Variations

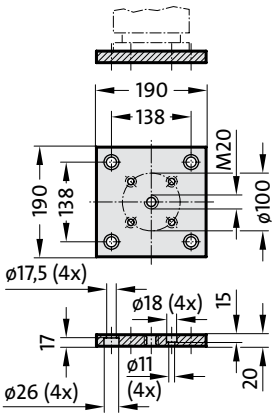
FIBRO

2487.12.09500.

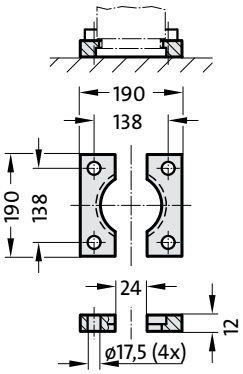
2480.011.07500



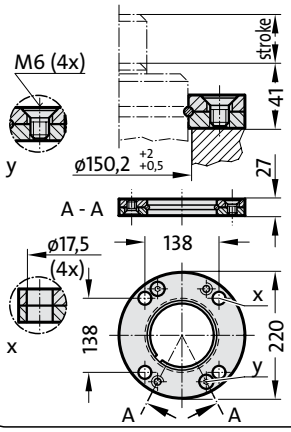
2480.011.07500.2



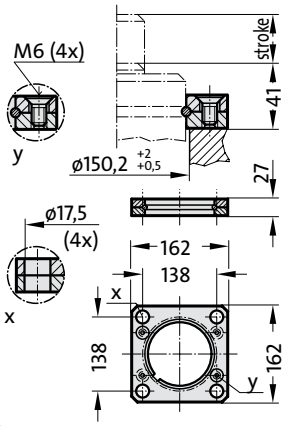
2480.022.07500



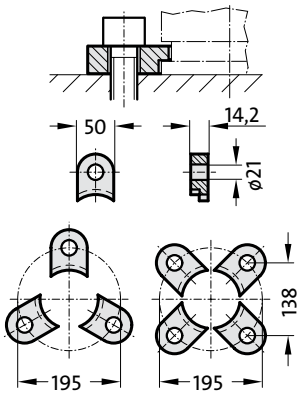
2480.055.07500



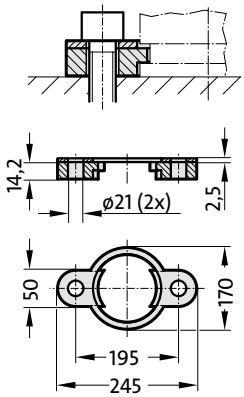
2480.057.07500



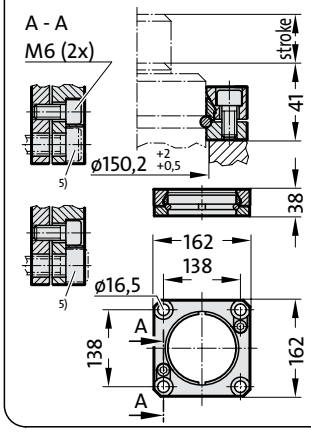
2480.007.07500



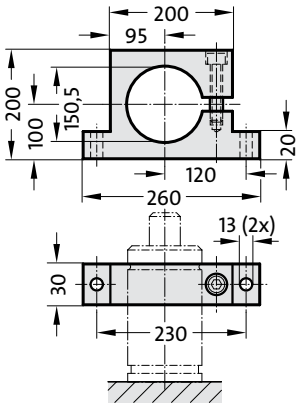
2480.008.07500 [3]



2480.064.07500 [4]



2480.044.07500 [2]



Notes:

[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).

FIBRO VDI 3003

2487.12.09500.

POWER LINE
Gas Springs
with Increased Spring Force

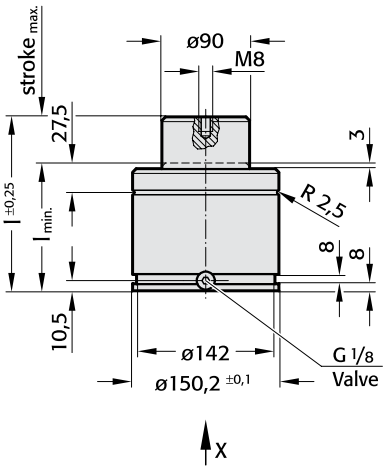
APPROVED PED 97/23/EC

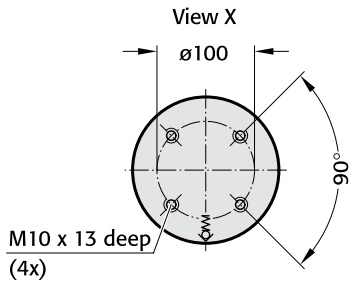
2487.12.09500.

Initial spring force at 150 bar = 9500 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.09500. 019	19	97	116
025	25	103	128
032	32	110	142
038	38	116	154
050	50	128	178
063	63	141	204
075	75	153	228
080	80	158	238
100	100	178	278
125	125	203	328

2487.12.09500.





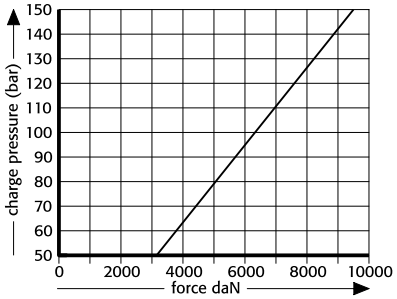
Note:

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

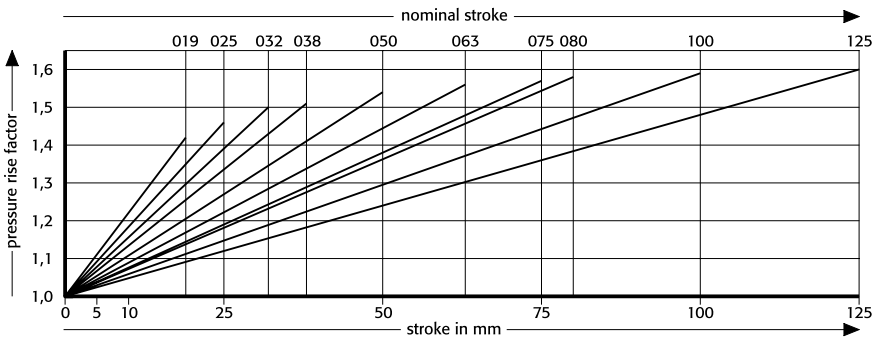
2487.12.09500.

Initial spring force versus charge pressure



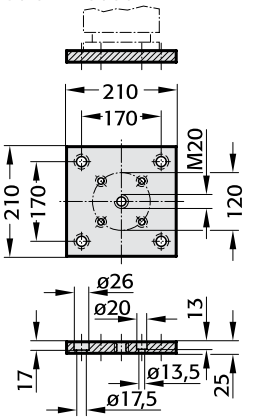
2487.12.09500.

Spring force Diagram displacement versus stroke rise

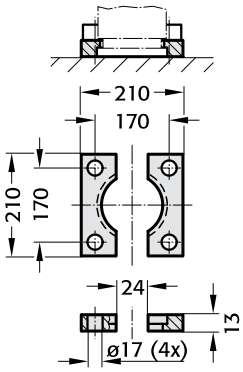


Pressure rise factor accounts for displacement but not external influences!

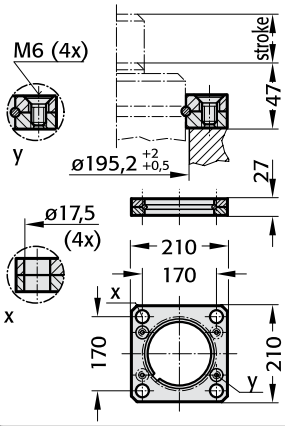
2480.011.10000



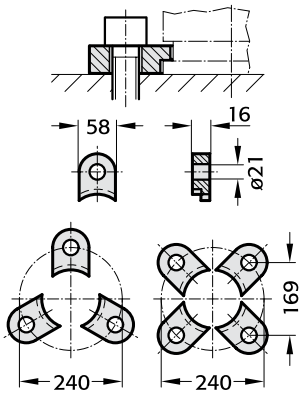
2480.022.10000



2480.057.10000



2480.007.10000



FIBRO

2487.12.20000.

POWER LINE
Gas Springs
with Increased Spring Force

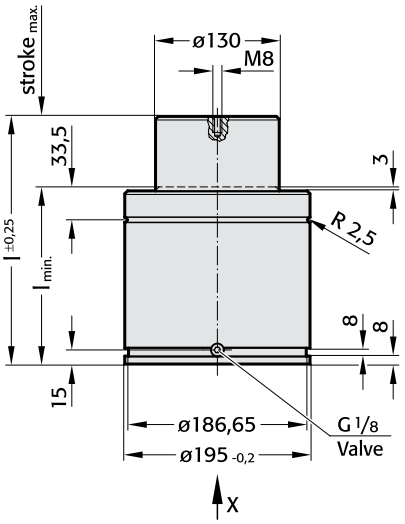
APPROVED PED 97/23/EC

2487.12.20000.

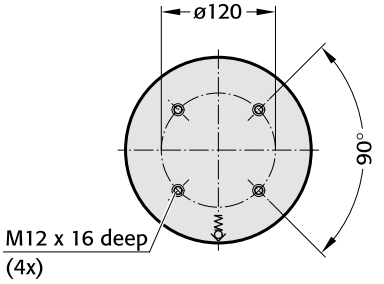
Initial spring force at 150 bar = 20000 daN

Order No	stroke max.	$l_{min.}$	l
2487.12.20000. 019	19	129	148
025	25	135	160
032	32	142	174
038	38	148	186
050	50	160	210
063	63	173	236
075	75	185	260
080	80	190	270
100	100	210	310
125	125	235	360

2487.12.20000.



View X



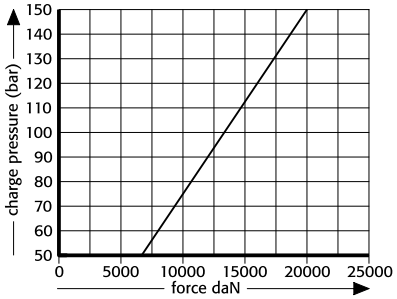
Note:

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

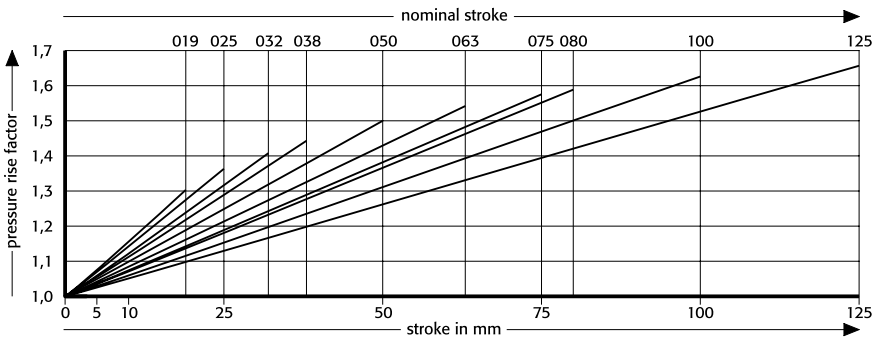
2487.12.20000.

Initial spring force
versus charge pressure



2487.12.20000.

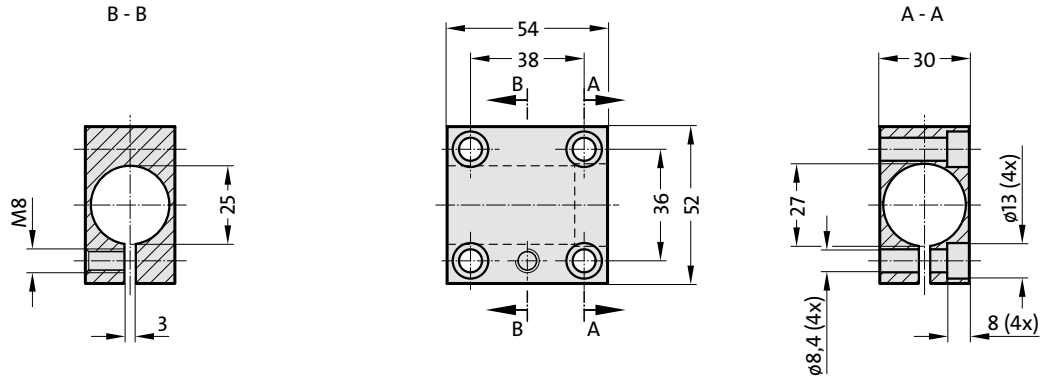
Spring force Diagram displacement versus stroke rise



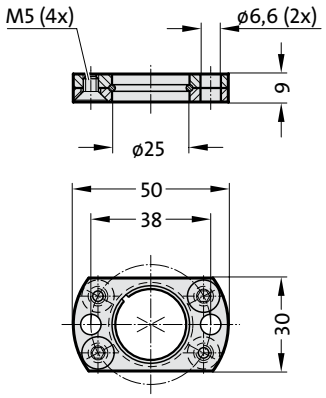
Pressure rise factor accounts for displacement but not external influences!

Compact
Gas Springs

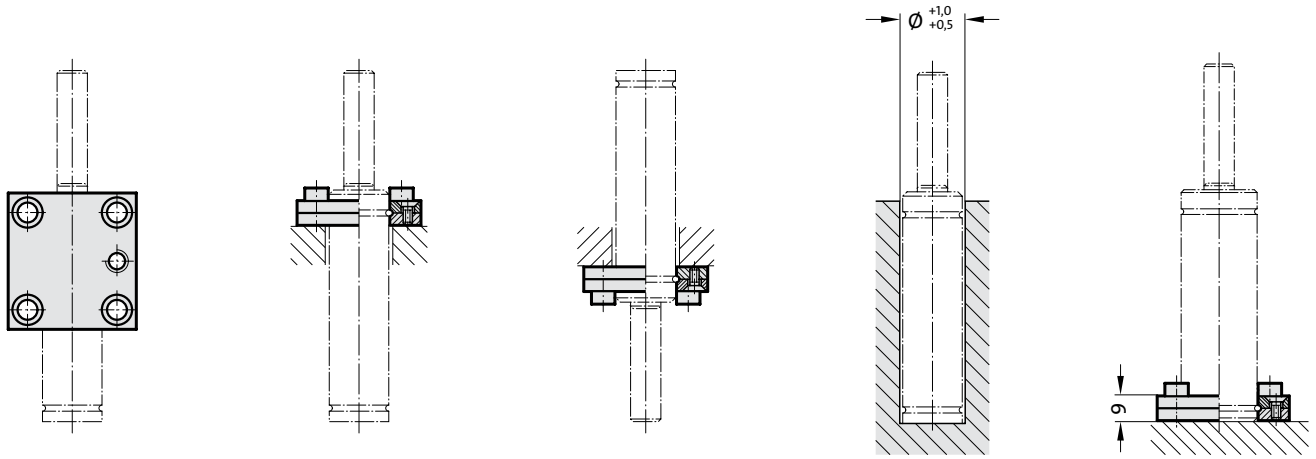
2480.053.00150



2480.051.00150



Mounting example:



FIBRO

2490.12.00420.

Compact Gas Springs for small displacement and high forces

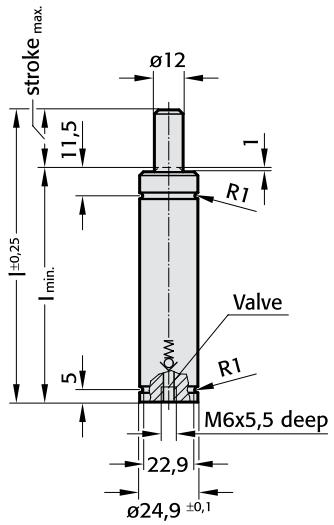
APPROVED PED 97/23/EC

2490.12.00420.

Initial spring force at 150 bar = 420 daN

Order No	stroke max.	l_{min}	l
2490.12.00420.006	6	50	56
010	10	60	70
016	16	75	91
025	25	95	120
032	32	108	140
040	40	125	165
050	50	145	195

2490.12.00420.



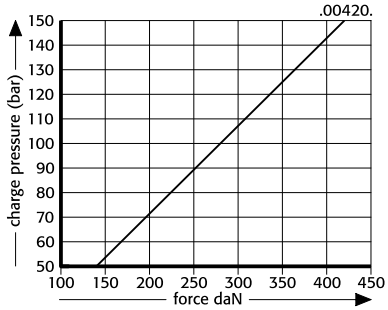
Note:

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:	25 bar
Working temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 50–100 (at 20 °C)
Max. piston speed:	0.5 m/s

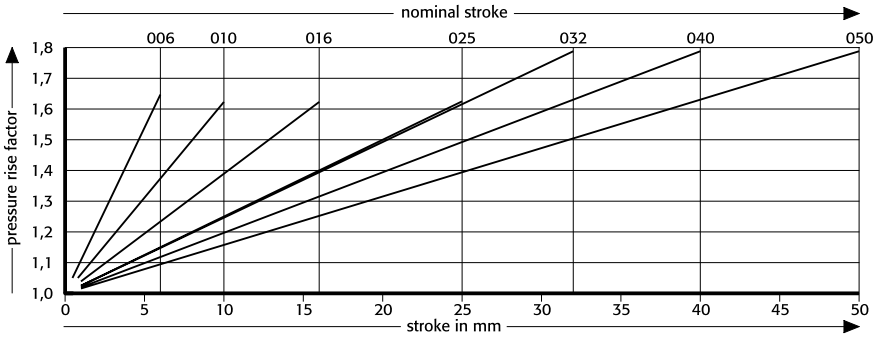
2490.12.00420.

Initial spring force versus charge pressure



2490.12.00420.

Spring force Diagram displacement versus stroke rise



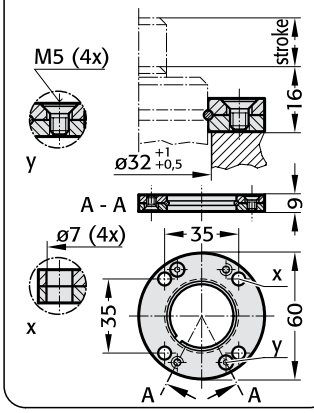
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

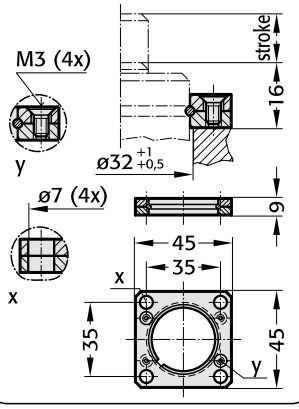
FIBRO

2490.12.00750.

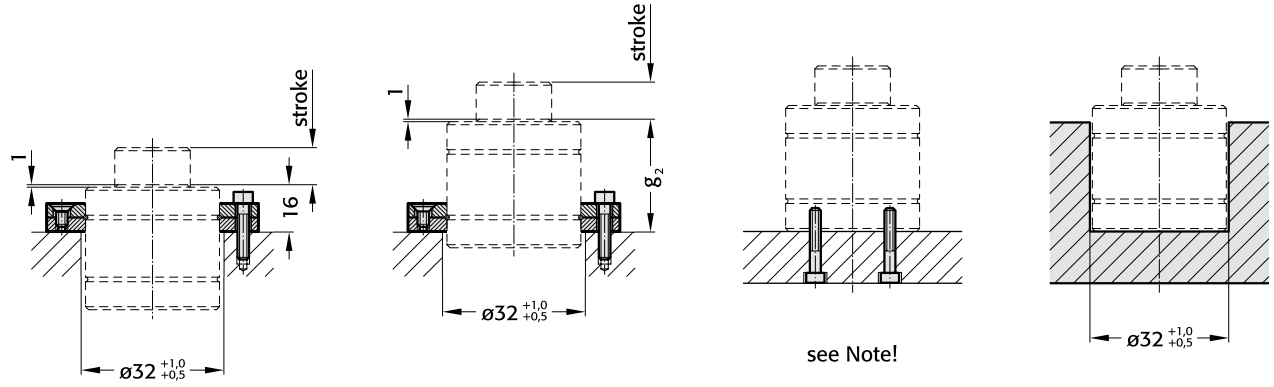
2480.055.00150



2480.057.00150



Mounting example:



FIBRO

2490.12.00750.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

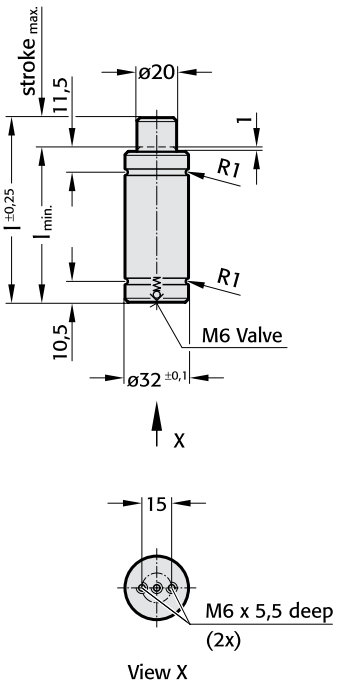
2490.12.00750.

Initial spring force at 150 bar = 750 daN

Order No	stroke max.	$l_{min.}$	l	g_2*
2490.12.00750. 006	6	56,75	63	51
010	10	64,75	75	59
016	16	76,75	93	71
025	25	94,75	120	89
032	32	107,75	140	102
040	40	124,75	165	119
050	50	144,75	195	139

g_2* see mounting example

2490.12.00750.



View X

Note:

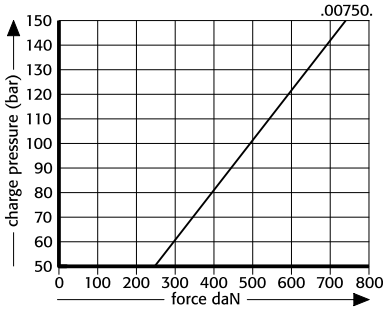
Worn gas springs cannot be repaired, they have to be replaced completely.

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. 50–100 (at 20 °C)
Max. piston speed:	0.5 m/s

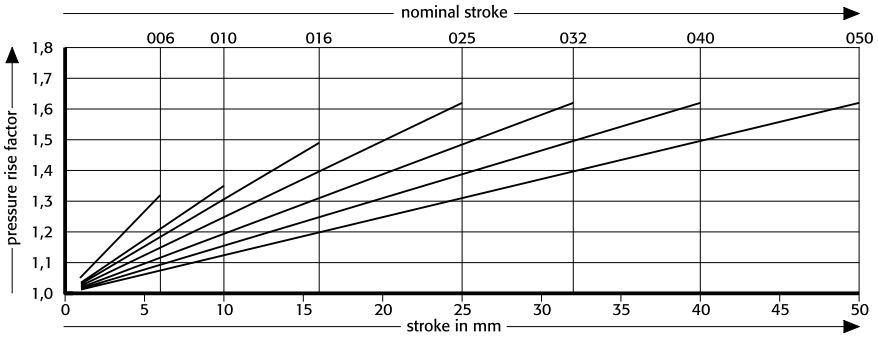
2490.12.00750.

Initial spring force versus charge pressure



2490.12.00750.

Spring force Diagram displacement versus stroke rise



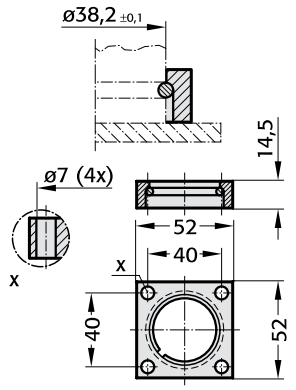
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

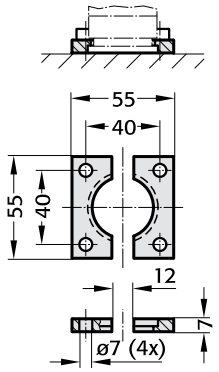
FIBRO

2490.12.01000.

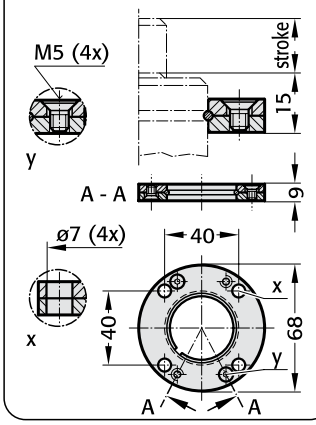
2480.052.01000



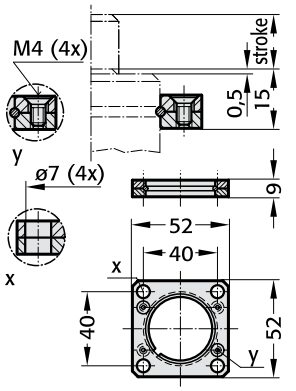
2480.022.00250



2480.055.00250



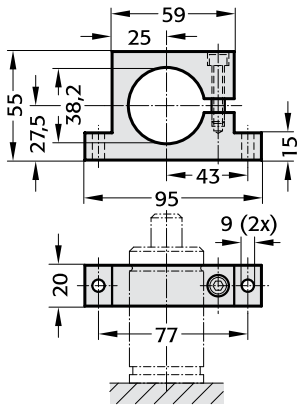
2480.057.00250



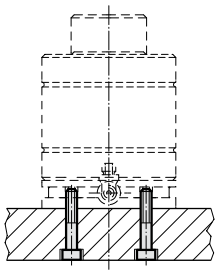
Note:

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

2480.044.00250[2]

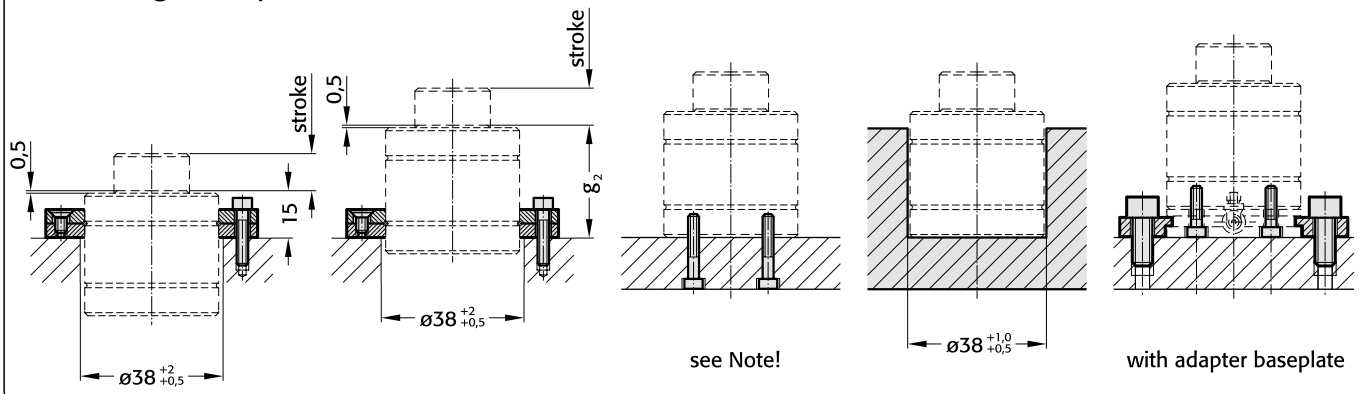


Mounting example:



with adapter baseplate

Mounting example:



FIBRO

2490.12.01000.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

2490.12.01000.

Initial spring force at 150 bar = 1000 daN

Order No	stroke max.	$l_{min.}$	l	g_2*
2490.12.01000. 006	6	54,75	61	49
010	10	67,75	78	62
016	16	83,75	100	78
025	25	109,75	135	104
032	32	134,75	167	129
040	40	154,75	195	149
050	50	179,75	230	174

g_2* see mounting example

Note:

Order No for spare parts kit:
2490.12.01000

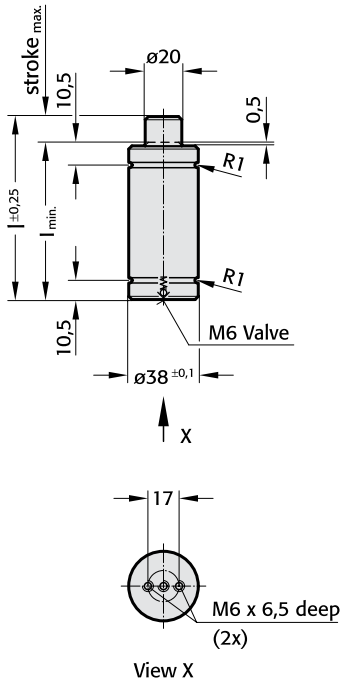
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

Before fitting the adapter base plate remove the valve from the gas spring.

If vibration occurs, tighten the fixing screws accordingly.

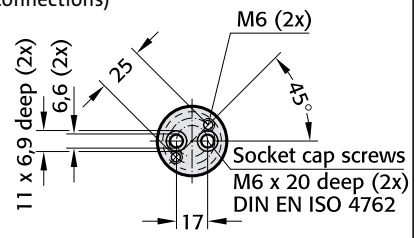
Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	25 bar
Working temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 100 (at 20 °C)
Max. piston speed:	0.5 m/s

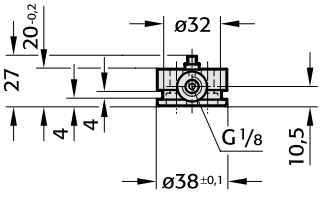
2490.12.01000.



2480.00.20.01000

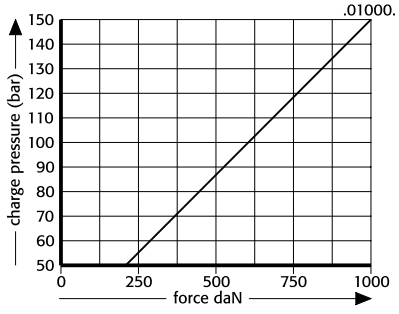
Adapter baseplate with connecting fitting, without valve (only for use with composite connections)





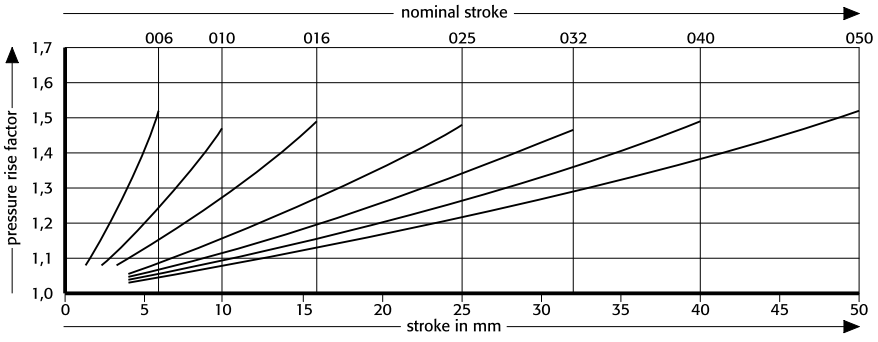
2490.12.01000.

Initial spring force versus charge pressure



2490.12.01000.

Spring force Diagram displacement versus stroke rise



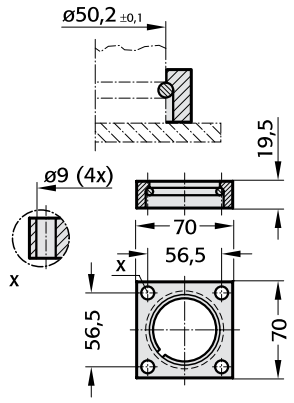
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

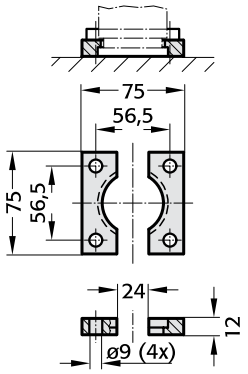
FIBRO

2490.12.01800.

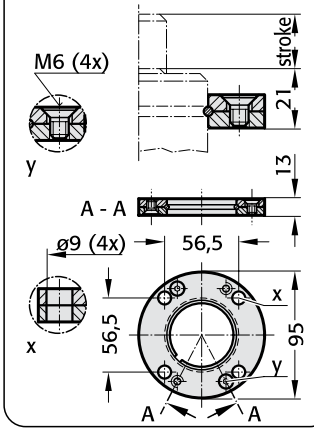
2480.052.01800



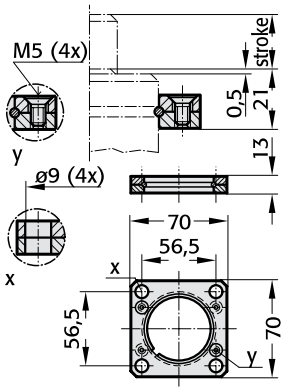
2480.022.00750



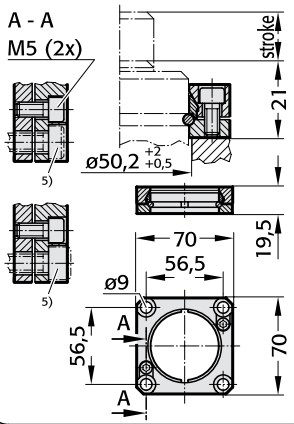
2480.055.00750



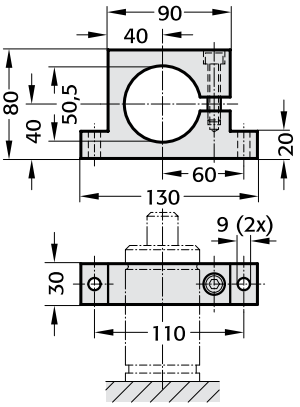
2480.057.00750



2480.064.00750 [4]



2480.044.00750 [2]



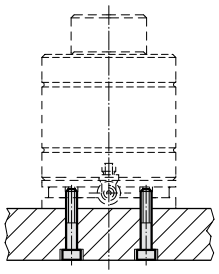
Notes:

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

[4] Square collar flange, non-rotating, fixing for composite connection.

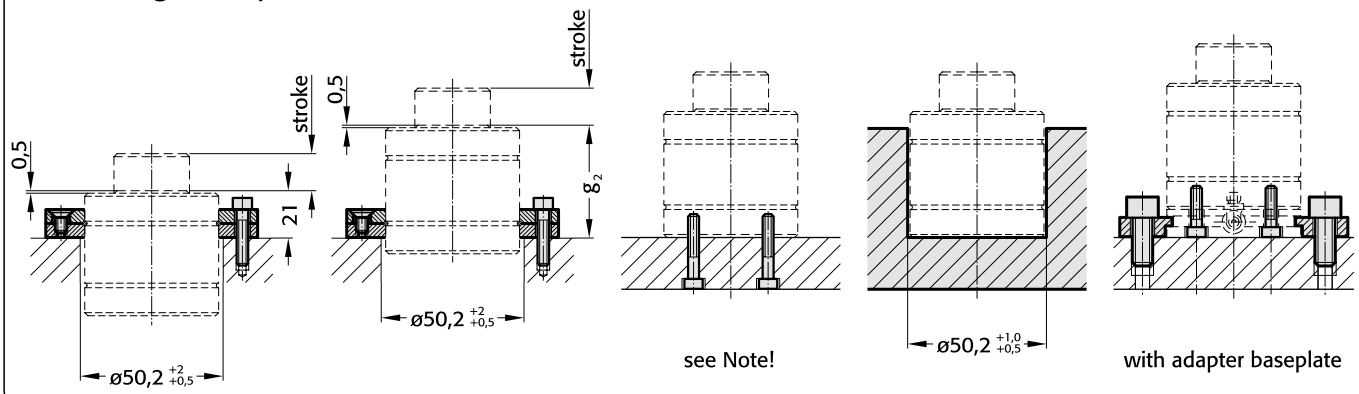
[5] Machine screws with hexagonal socket (compact head recommended).

Mounting example:



with adapter baseplate

Mounting example:



FIBRO

2490.12.01800.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

2490.12.01800.

Initial spring force at 150 bar = 1800 daN

Order No	stroke max.	$l_{min.}$	l	g_2*
2490.12.01800. 006	6	59,75	66	52
010	10	69,75	80	62
016	16	89,75	106	82
025	25	109,75	135	102
032	32	129,75	162	122
040	40	149,75	190	142
050	50	169,75	220	162

g_2* see mounting example

Note:

Order No for spare parts kit:
2490.12.01800

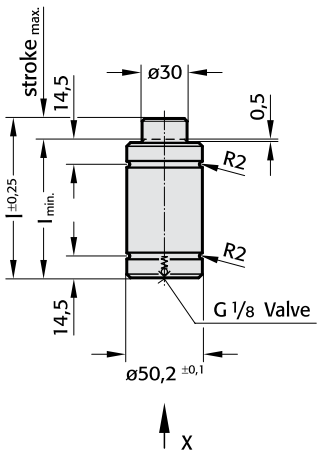
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

Before fitting the adapter base plate remove the valve from the gas spring.

If vibration occurs, tighten the fixing screws accordingly.

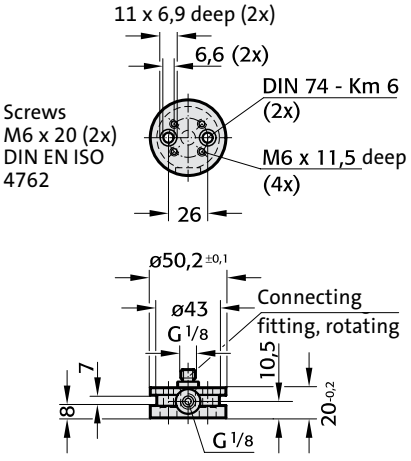
Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	25 bar
Working temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 100 (at 20 °C)
Max. piston speed:	0.5 m/s

2490.12.01800.



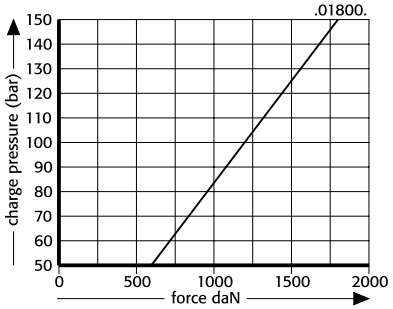
2480.00.20.01800

Adapter baseplate with connecting fitting, without valve (only for use with composite connections)



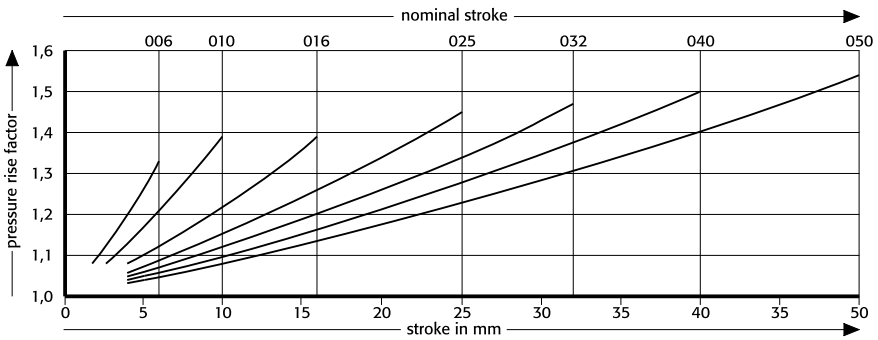
2490.12.01800.

Initial spring force versus charge pressure



2490.12.01800.

Spring force Diagram displacement versus stroke rise



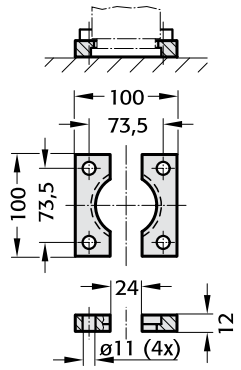
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

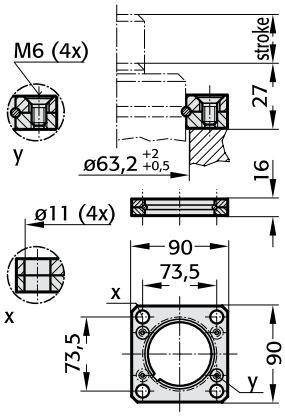
FIBRO

2490.12.03000.

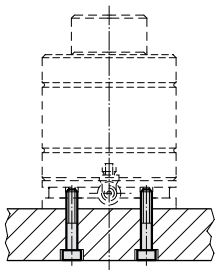
2480.022.01000



2480.057.01000

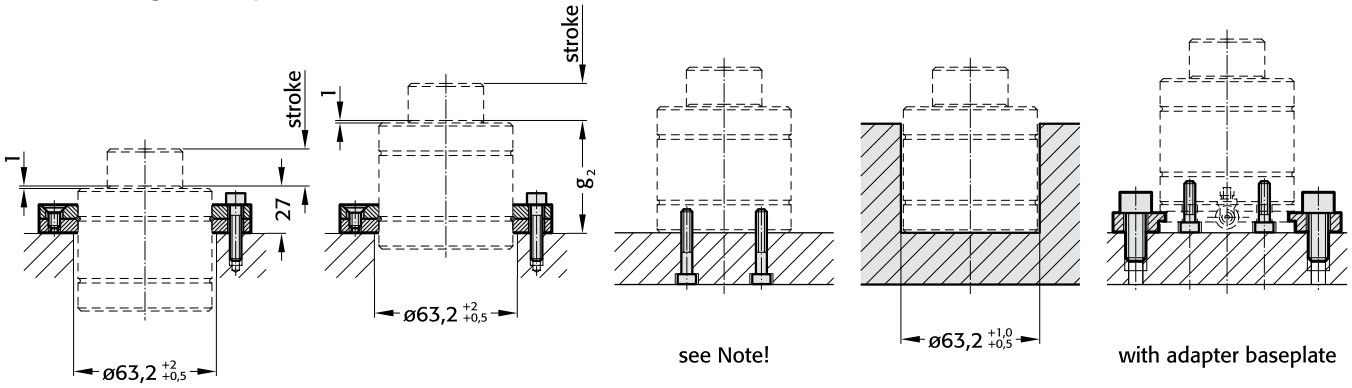


Mounting example:



with adapter baseplate

Mounting example:



FIBRO

2490.12.03000.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

2490.12.03000.

Initial spring force at 150 bar = 3000 daN

Order No		stroke max.	$l_{min.}$	l	g_2*
2490.12.03000.	010	10	74,75	85	65
	016	16	86,75	103	77
	025	25	104,75	130	95
	032	32	117,75	150	108
	040	40	134,75	175	125
	050	50	154,75	205	145

g_2* see mounting example

Note:

Order No for spare parts kit:
2490.12.03000

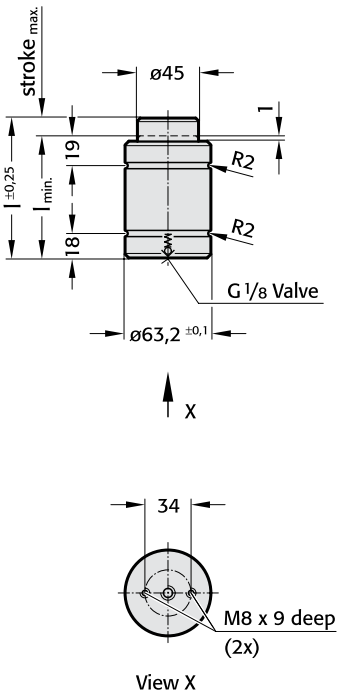
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

Before fitting the adapter base plate remove the valve from the gas spring.

If vibration occurs, tighten the fixing screws accordingly.

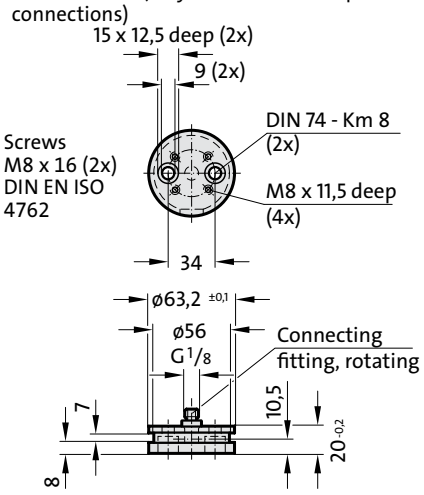
Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	25 bar
Working temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Max. recommended extensions per minute:	approx. 100 (at 20 °C)
Max. piston speed:	0.5 m/s

2490.12.03000.



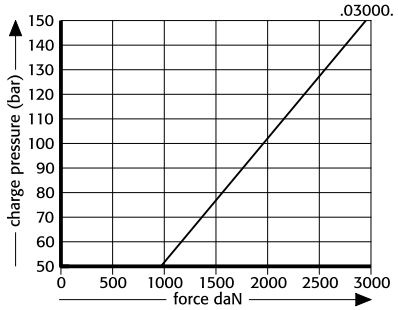
2480.00.20.03000

Adapter baseplate with connecting fitting, without valve (only for use with composite connections)



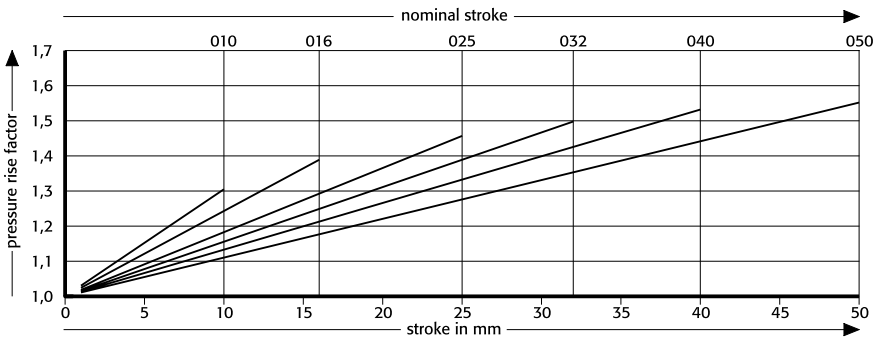
2490.12.03000.

Initial spring force versus charge pressure



2490.12.03000.

Spring force Diagram displacement versus stroke rise



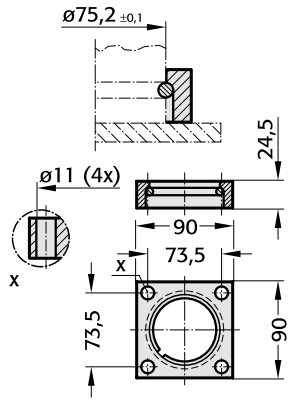
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

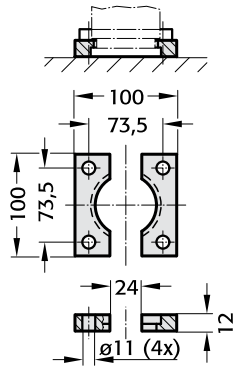
FIBRO

2490.13.04700.

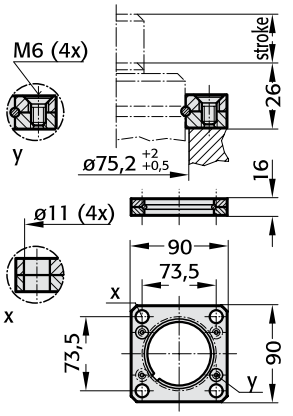
2480.052.04700



2480.022.01500

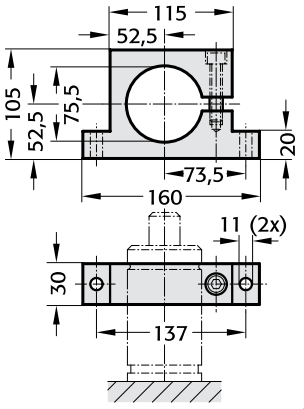


2480.058.01500

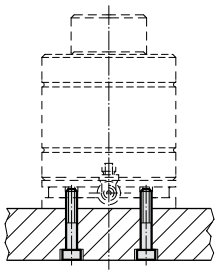


[2] Attention:
The spring force must be absorbed by the stop surface.

2480.044.01500[2]

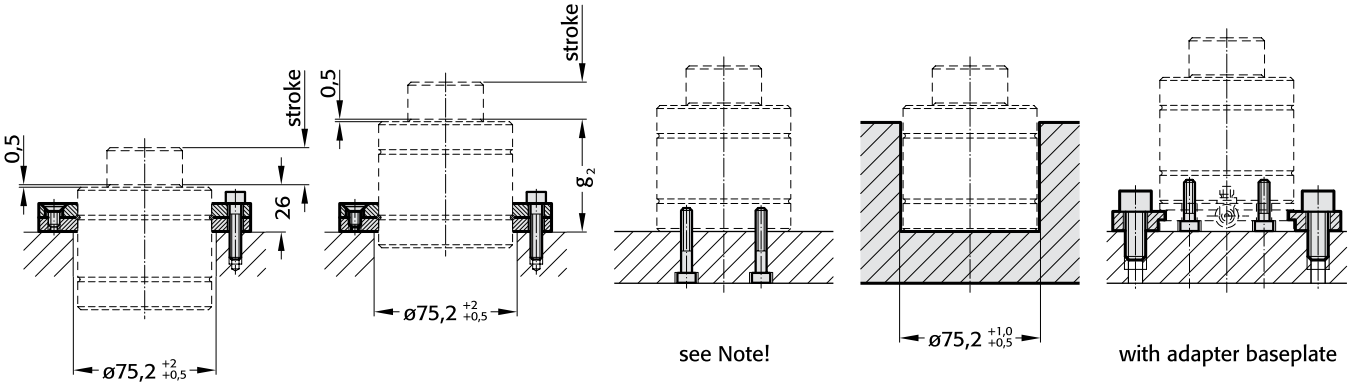


Mounting example:



with adapter baseplate

Mounting example:



FIBRO

2490.13.04700.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

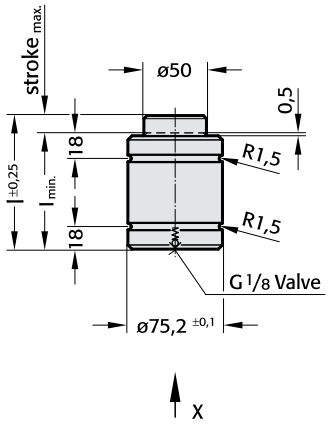
2490.13.04700.

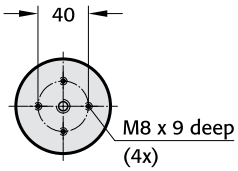
Initial spring force at 150 bar = 4700 daN

Order No	stroke max.	$l_{min.}$	l	g_2*
2490.13.04700. 010	10	69,75	80	60
016	16	89,75	106	80
025	25	109,75	135	100
032	32	134,75	167	125
040	40	159,75	200	150
050	50	189,75	240	180

g_2* see mounting example

2490.13.04700.





View X

Note:

Order No for spare parts kit:
2490.12.04700

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

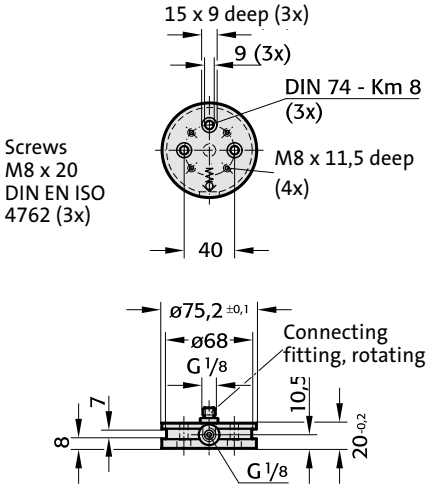
Before fitting the adapter base plate remove the valve from the gas spring.

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. 100 (at 20 °C)
Max. piston speed:	0.5 m/s

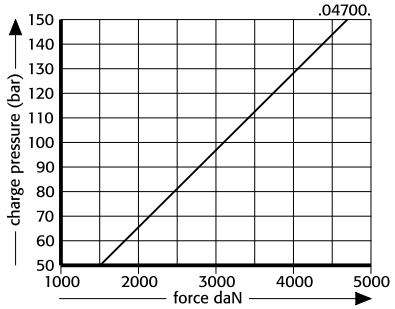
2480.00.20.04700

Adapter baseplate with connecting Fitting



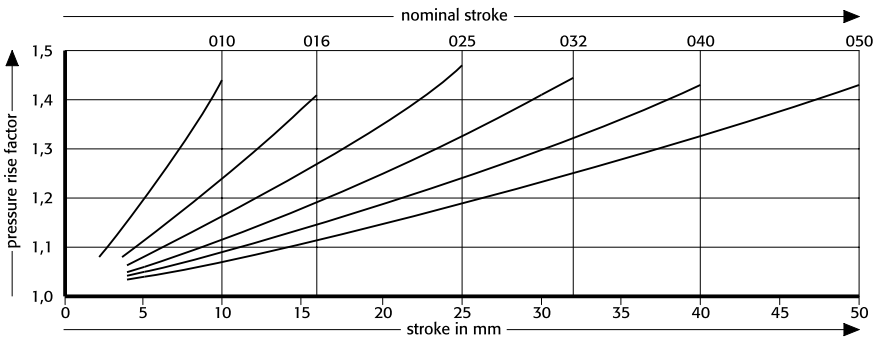
2490.13.04700.

Initial spring force versus charge pressure



2490.13.04700.

Spring force Diagram displacement versus stroke rise



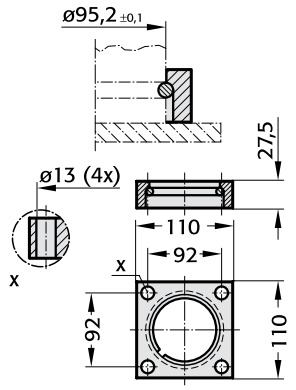
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

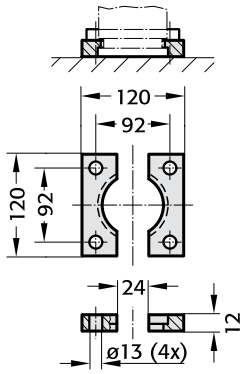
FIBRO

2490.13.07500.

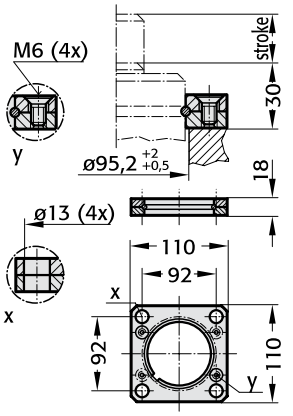
2480.052.07500



2480.022.03000

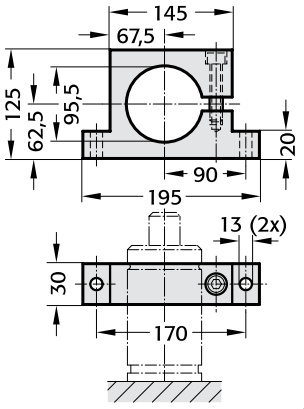


2480.058.03000

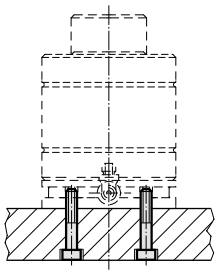


[2] Attention:
The spring force must be absorbed by the stop surface.

2480.044.03000[2]

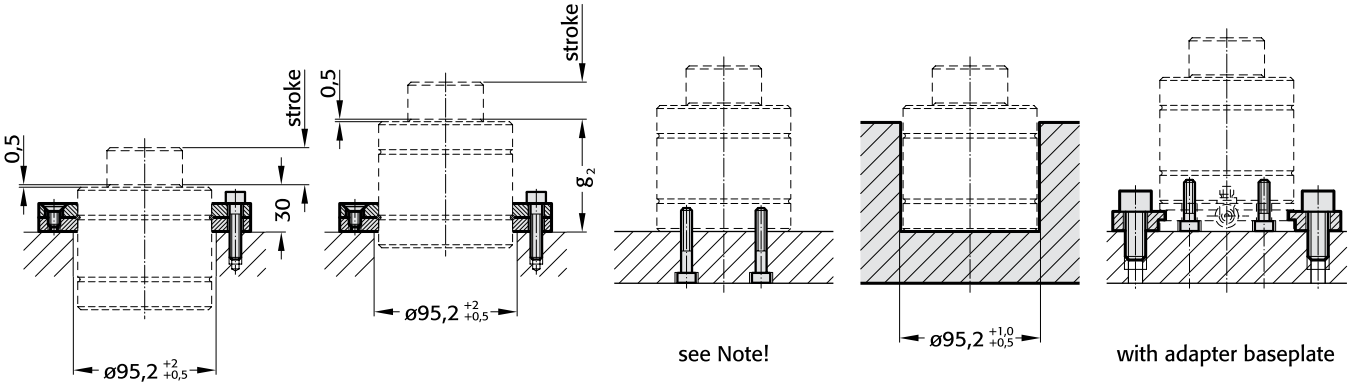


Mounting example:



with adapter baseplate

Mounting example:



FIBRO

2490.13.07500.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

2490.13.07500.

Initial spring force at 150 bar = 7500 daN

Order No	stroke max.	$l_{min.}$	l	g_2*
2490.13.07500. 010	10	79,75	90	68
016	16	99,75	116	88
025	25	119,75	145	108
032	32	149,75	182	138
040	40	169,75	210	158
050	50	204,75	255	193

g_2* see mounting example

Note:

Order No for spare parts kit:
2490.12.07500

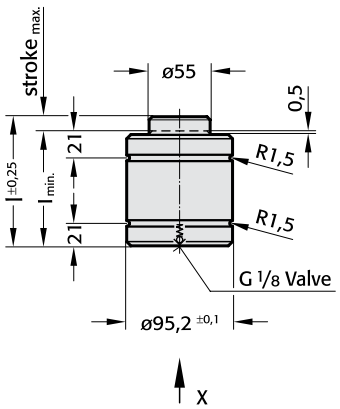
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

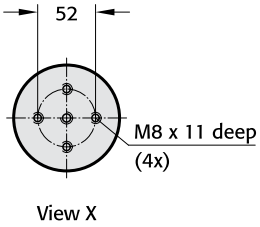
Before fitting the adapter base plate remove the valve from the gas spring.

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. 100 (at 20 °C)
Max. piston speed:	0.5 m/s

2490.13.07500.

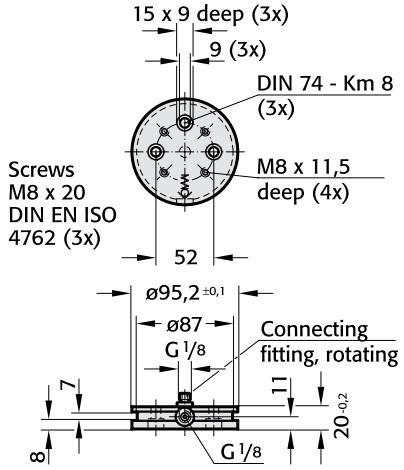




View X

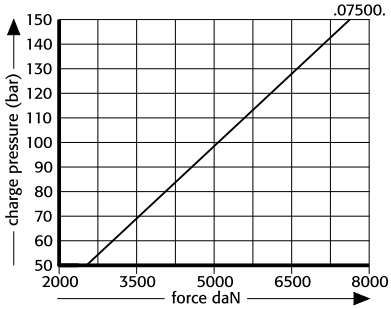
2480.00.20.07500

Adapter baseplate with connecting Fitting



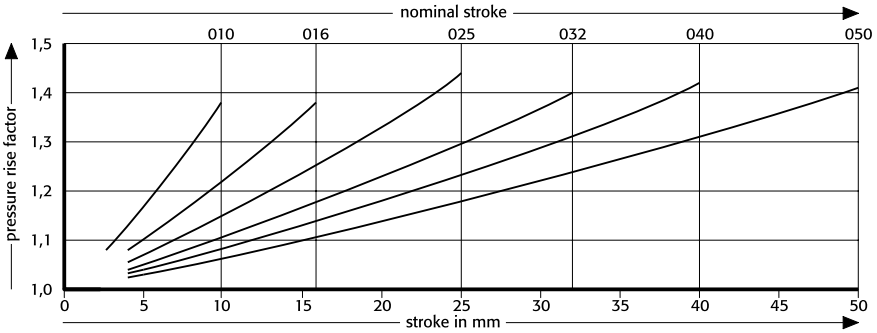
2490.13.07500.

Initial spring force versus charge pressure



2490.13.07500.

Spring force Diagram displacement versus stroke rise



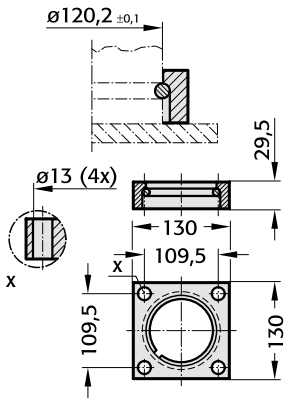
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

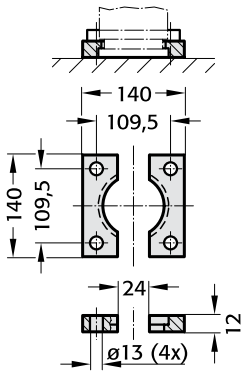
FIBRO

2490.12.11800.

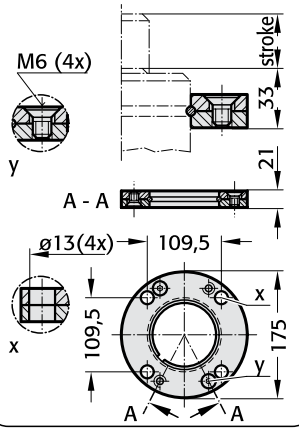
2480.052.11800



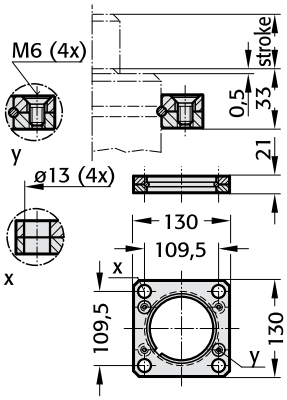
2480.022.05000



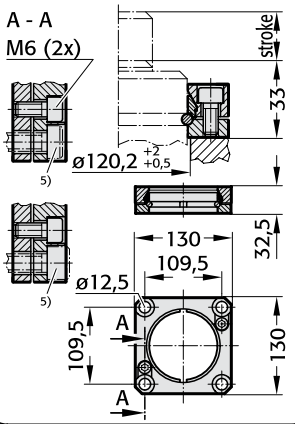
2480.055.05000



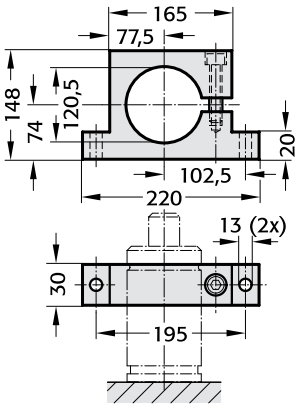
2480.057.05000



2480.064.05000[4]



2480.044.05000[2]



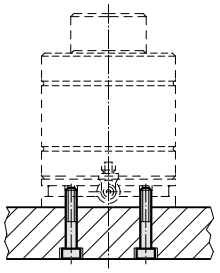
Notes:

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

[4] Square collar flange, non-rotating, fixing for composite connection.

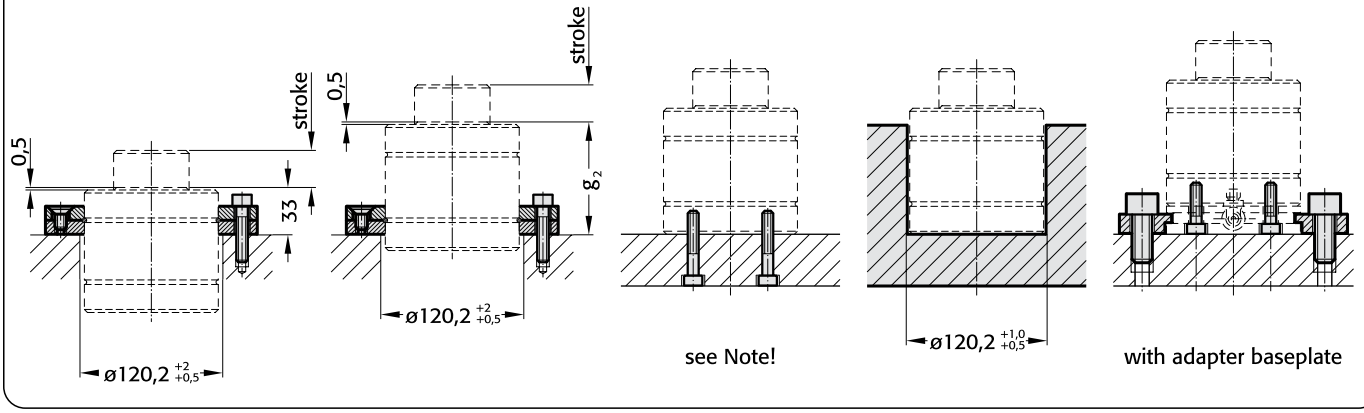
[5] Machine screws with hexagonal socket (compact head recommended).

Mounting example:



with adapter baseplate

Mounting example:



FIBRO

2490.12.11800.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

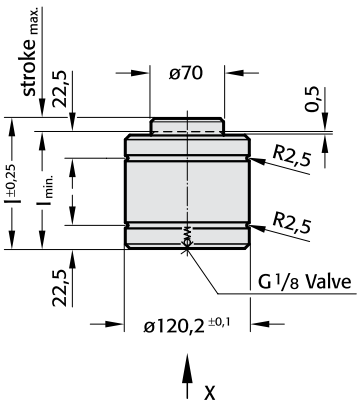
2490.12.11800.

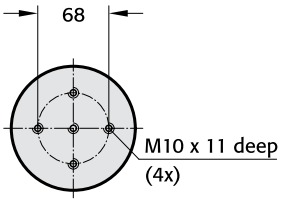
Initial spring force at 150 bar = 11800 daN

Order No	stroke max.	$l_{min.}$	l	g_2*
2490.12.11800. 010	10	89,75	100	78
016	16	109,75	126	98
025	25	129,75	155	118
032	32	154,75	187	143
040	40	179,75	220	168
050	50	209,75	260	198

g_2* see mounting example

2490.12.11800.





View X

Note:

Order No for spare parts kit:
2490.12.11800

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

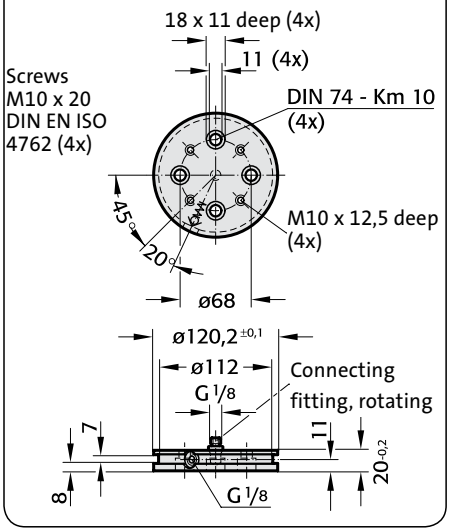
Before fitting the adapter base plate remove the valve from the gas spring.

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. 100 (at 20 °C)
Max. piston speed:	0.5 m/s

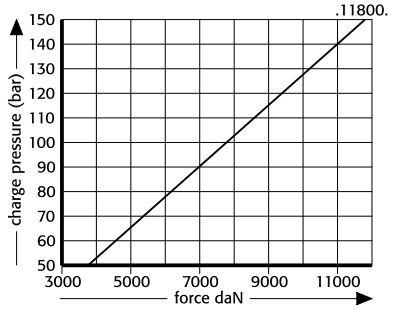
2480.00.20.11800

Adapter baseplate with connecting Fitting



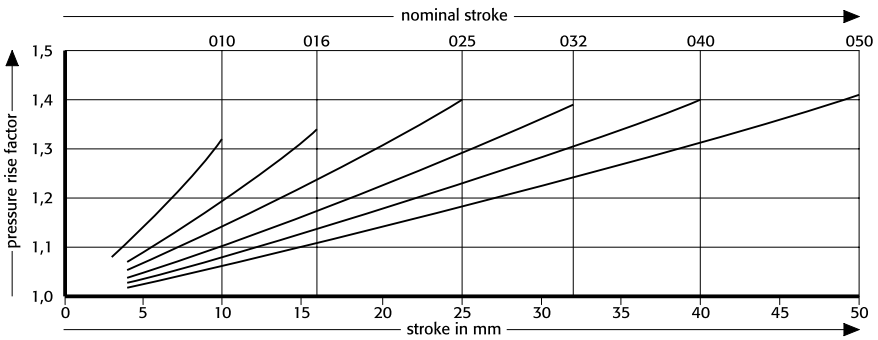
2490.12.11800.

Initial spring force versus charge pressure



2490.12.11800.

Spring force Diagram displacement versus stroke rise



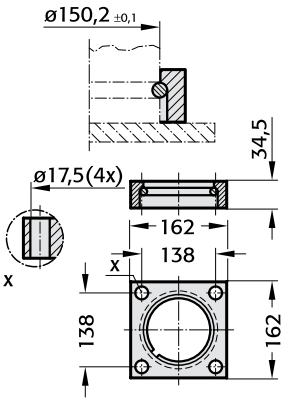
Pressure rise factor accounts for displacement but not external influences!

Compact Gas Springs
for small displacement and high forces
Mounting Variations

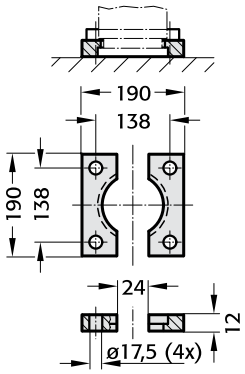
FIBRO

2490.12.18300.

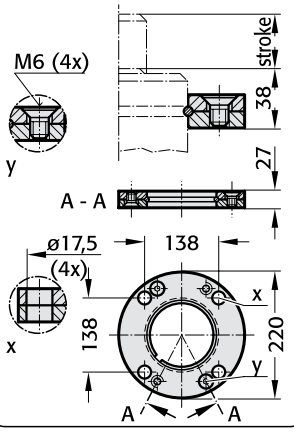
2480.052.18300



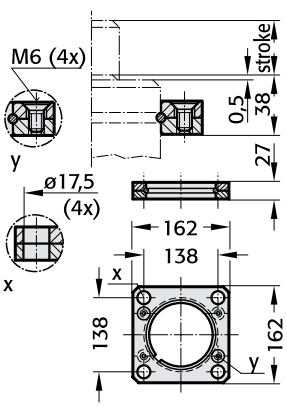
2480.022.07500



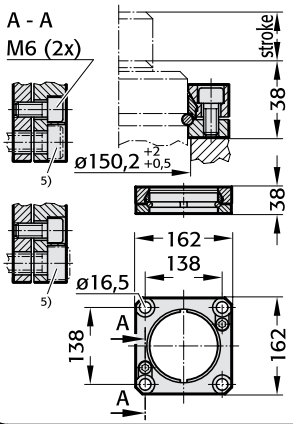
2480.055.07500



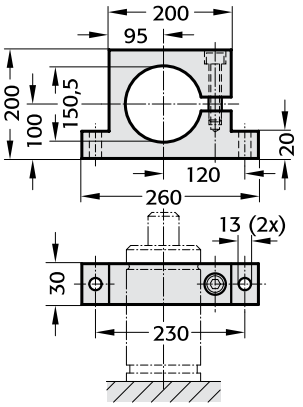
2480.057.07500



2480.064.07500 [4]



2480.044.07500 [2]



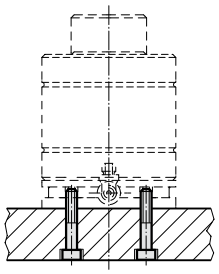
Notes:

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

[4] Square collar flange, non-rotating, fixing for composite connection.

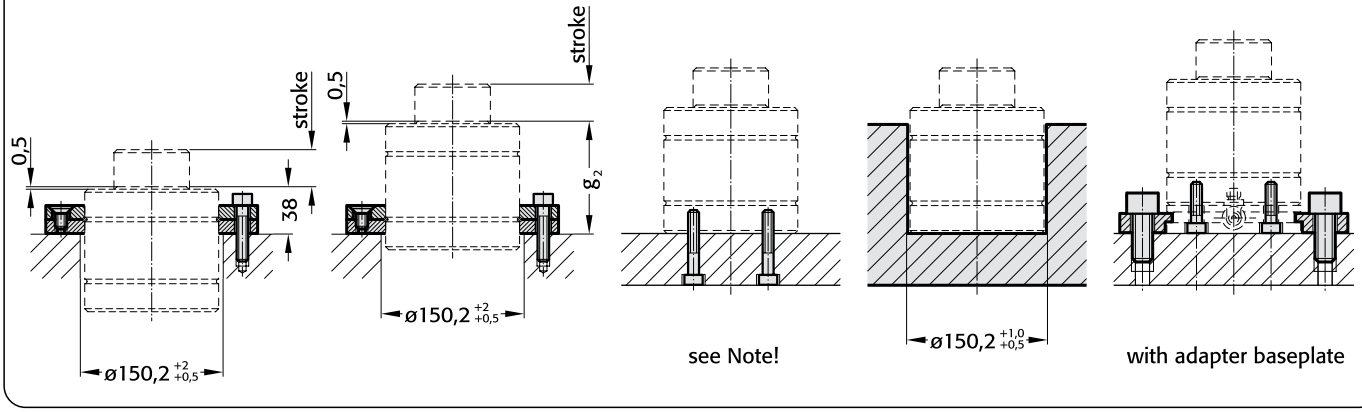
[5] Machine screws with hexagonal socket (compact head recommended).

Mounting example:



with adapter baseplate

Mounting example:



FIBRO

2490.12.18300.

Compact Gas Springs for small displacement and high forces

APPROVED PED 97/23/EC

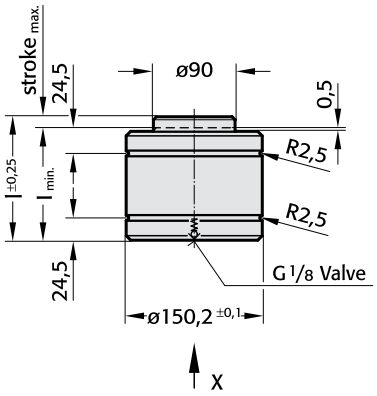
2490.12.18300.

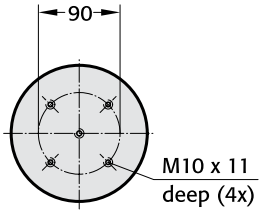
Initial spring force at 150 bar = 18300 daN

Order No		stroke max.	$l_{min.}$	l	g_2*
2490.12.18300.	010	10	99,75	110	89
	016	16	119,75	136	109
	025	25	139,75	165	129
	032	32	164,75	197	154
	040	40	194,75	235	184
	050	50	219,75	270	209

g_2* see mounting example

2490.12.18300.





View X

Note:

Order No for spare parts kit:
2490.12.18300

When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

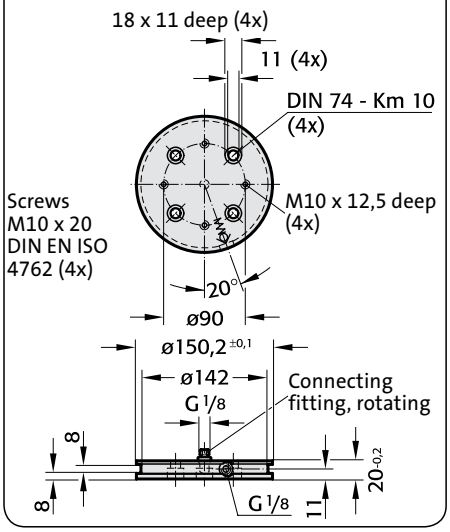
Before fitting the adapter base plate remove the valve from the gas spring.

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. 100 (at 20 °C)
Max. piston speed:	0.5 m/s

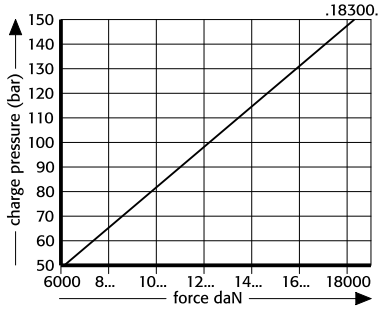
2480.00.20.18300

Adapter baseplate with connecting Fitting



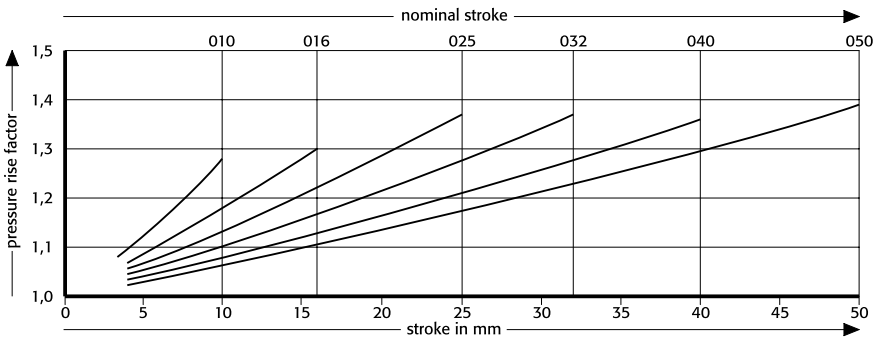
2490.12.18300.

Initial spring force versus charge pressure



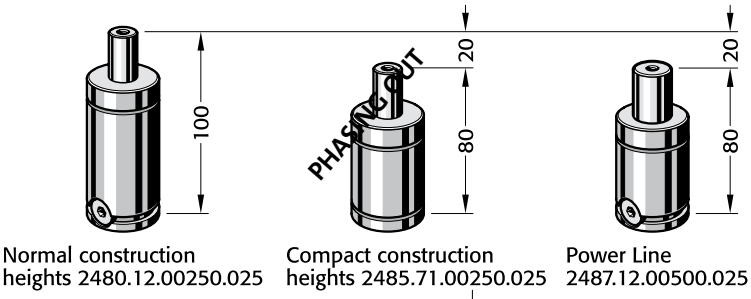
2490.12.18300.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

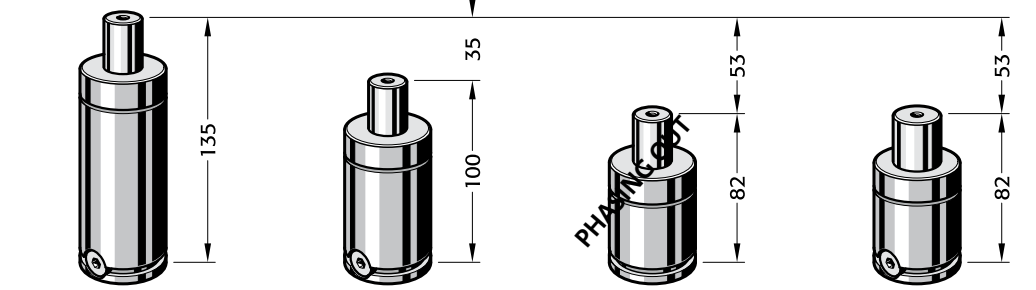
Gas Springs with Low Build Height



Normal construction heights 2480.12.00250.025

Compact construction heights 2485.71.00250.025

Power Line 2487.12.00500.025



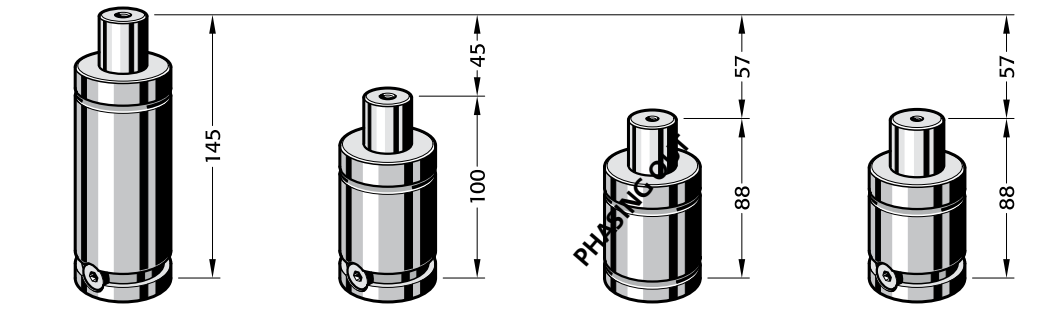
Normal construction heights 2480.12.00500.025

Low construction heights 2485.12.00500.025

Low construction heights 2485.71.00500.025

Power Line 2487.12.00750.025

Construction heights with the same stroke and the same/increased spring force

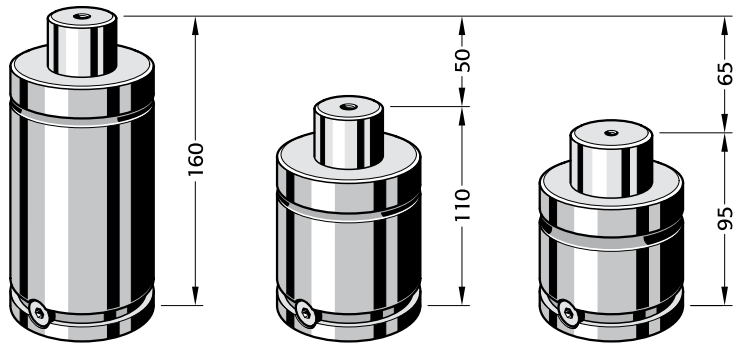


Normal construction heights 2480.13.00750.025

Low construction heights 2485.12.00750.025

Low construction heights 2485.71.00750.025

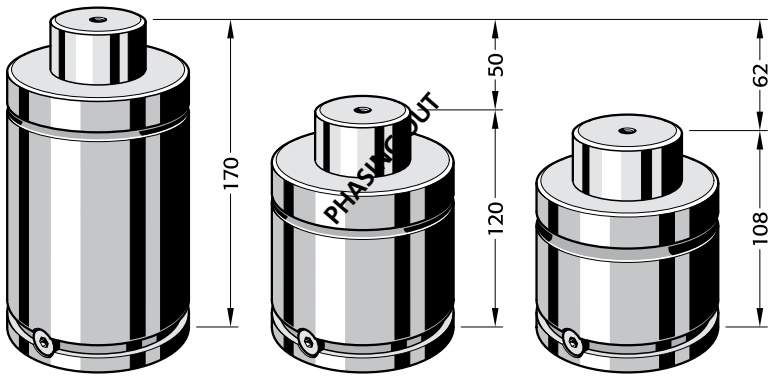
Power Line 2487.12.01000.025



Normal construction heights 2480.12.01500.025

Low construction heights 2485.12.01500.025

Power Line 2487.12.02400.025



Normal construction heights 2480.13.03000.025

Low construction heights 2485.12.03000.025

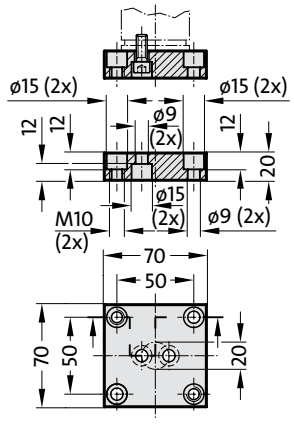
Power Line 2487.12.04200.025

Gas Springs
with Low Build Height
Mounting Variations

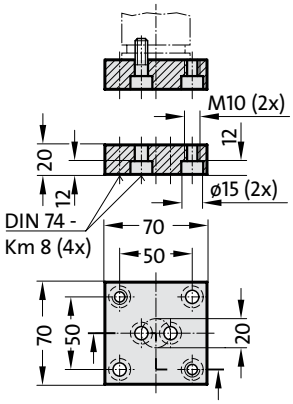
FIBRO

2485.12.00500.

2480.011.00500.2



2480.011.00500



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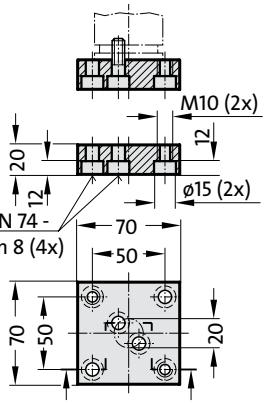
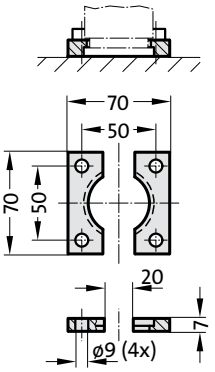
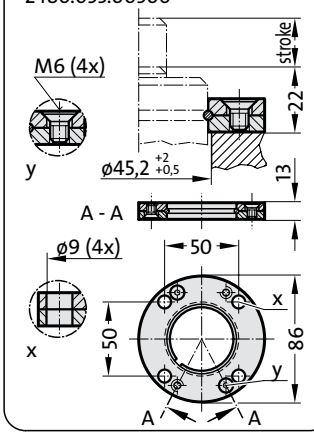


2480.022.00500



2480.055.00500



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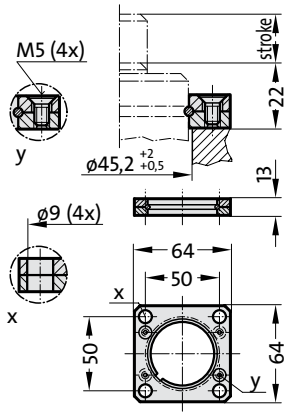
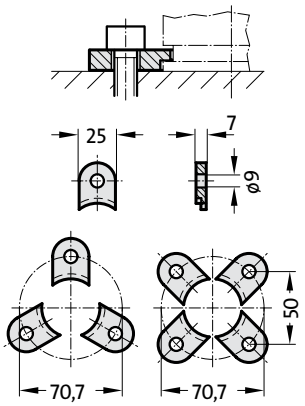
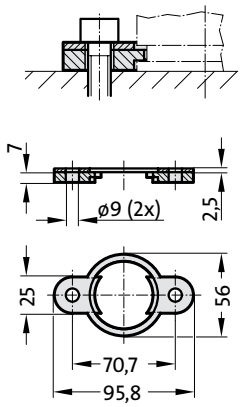


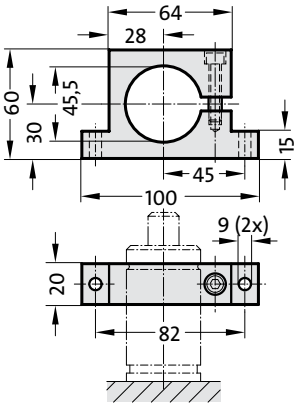
2480.007.00500



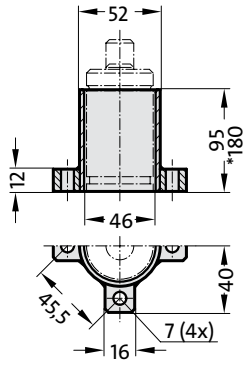
2480.008.00500 [3]



2480.044.00500 [2]



2480.010.00500.095 [3]
2480.010.00500.180* [3]



Notes:

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

[3] Not for use with composite connection.

FIBRO

2485.12.00500.

Gas Springs with Low Build Height

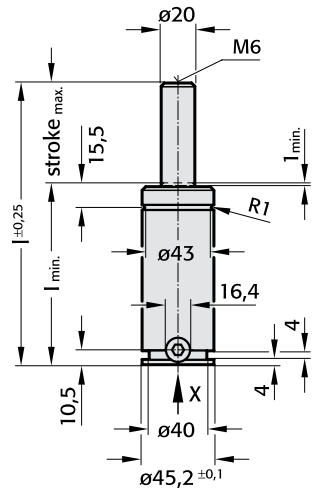
APPROVED PED 97/23/EC

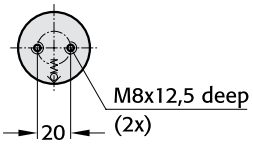
2485.12.00500.

Initial spring force at 150 bar = 500 daN

Order No	stroke max.	l_{min}	l
2485.12.00500. 006	6	56	62
013	12,7	62,7	75,4
019	19	69,1	88,1
025	25	75	100
038	38,1	88,1	126,2
050	50	100	150
063	63,5	113,5	177
080	80	130	210
100	100	150	250
125	125	175	300

2485.12.00500.





View X

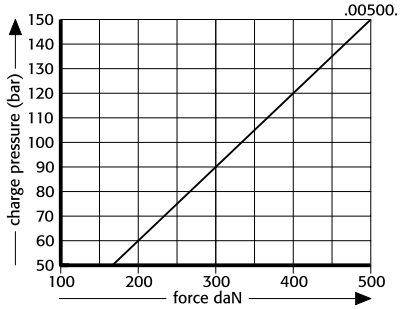
Note:

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

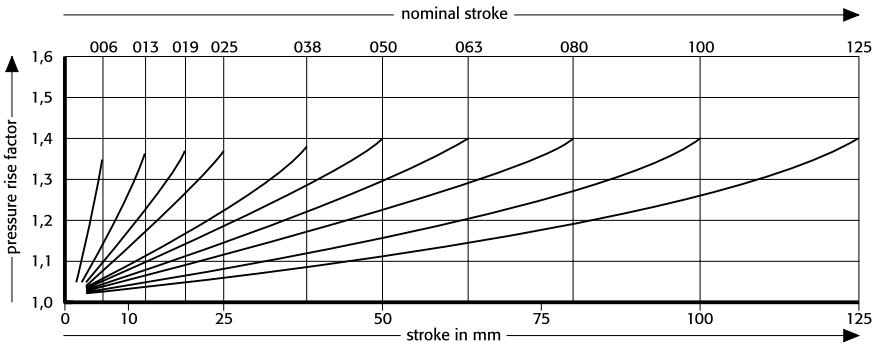
2485.12.00500.

Initial spring force versus charge pressure



2485.12.00500.

Spring force Diagram displacement versus stroke rise



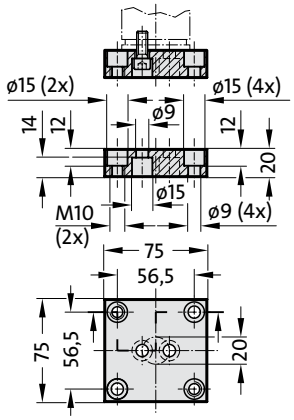
Pressure rise factor accounts for displacement but not external influences!

Gas Springs with Low Build Height Mounting Variations

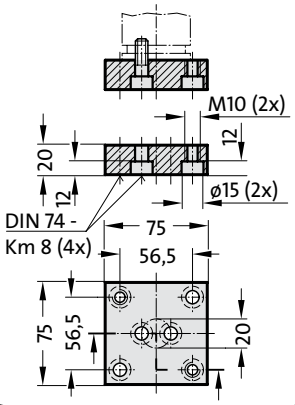
FIBRO

2485.12.00750.

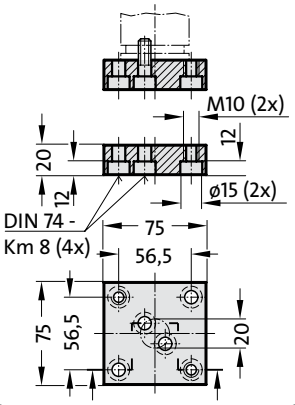
2480.011.00750.3



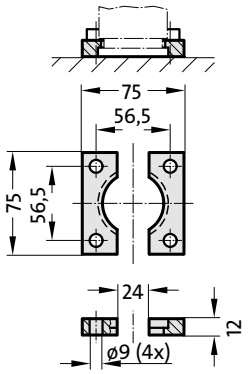
2480.011.00750



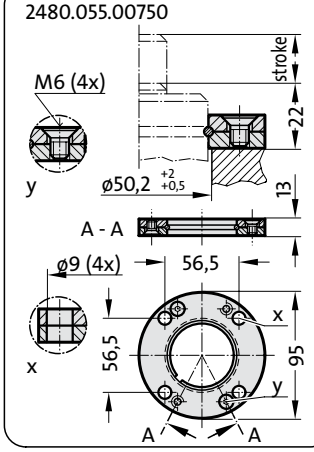
2480.011.00750.1



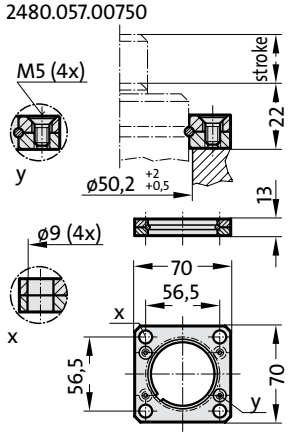
2480.022.00750



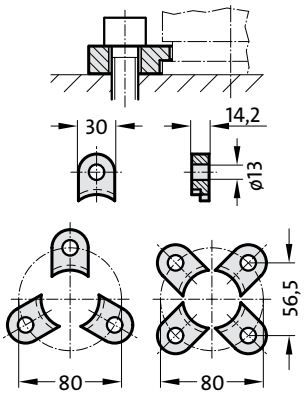
2480.055.00750



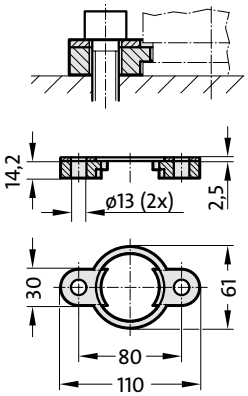
2480.057.00750



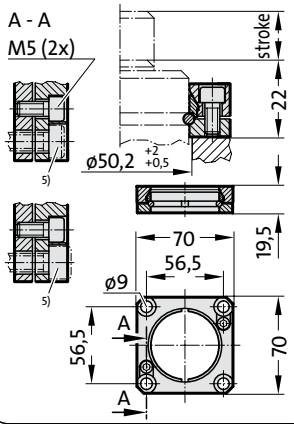
2480.007.00750



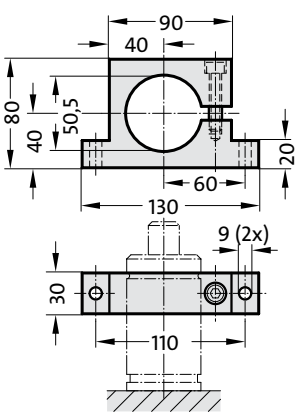
2480.008.00750 3)



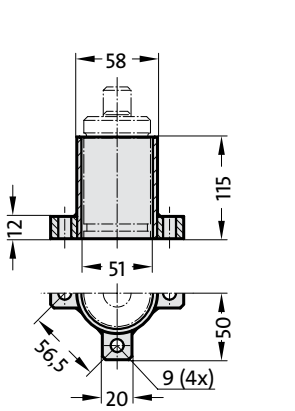
2480.064.00750 4)



2480.044.00750 2)



2480.010.00750.115 3)



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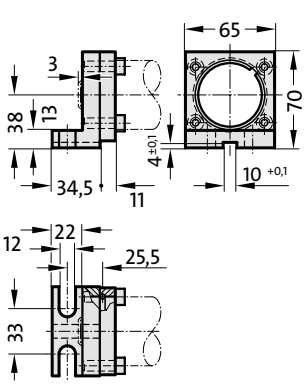

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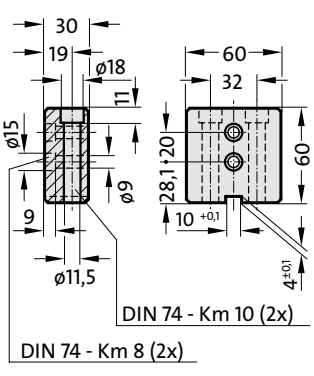


Notes:

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).

FIBRO

2485.12.00750.

Gas Springs with Low Build Height

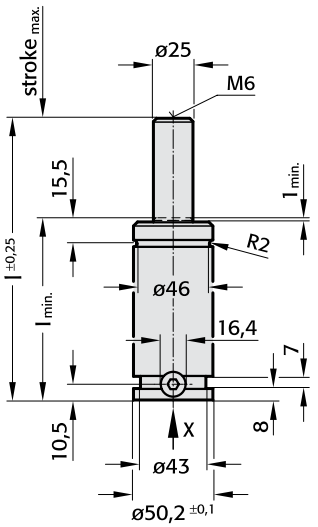
APPROVED PED 97/23/EC

2485.12.00750.

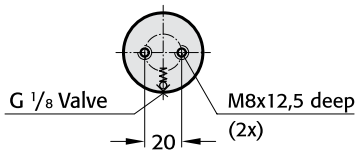
Initial spring force at 150 bar = 750 daN

Order No	stroke max.	l_{min}	l
2485.12.00750. 006	6	56	62
013	12,7	62,7	75,4
019	19	69,1	88,1
025	25	75	100
038	38,1	88,1	126,2
050	50	100	150
063	63,5	113,5	177
080	80	130	210
100	100	150	250
125	125	175	300

2485.12.00750.



View X



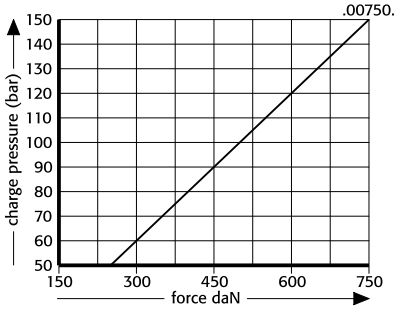
Note:

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

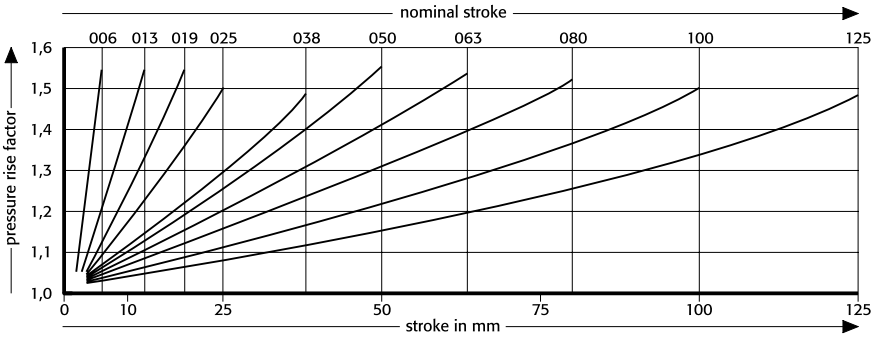
2485.12.00750.

Initial spring force versus charge pressure



2485.12.00750.

Spring force Diagram displacement versus stroke rise



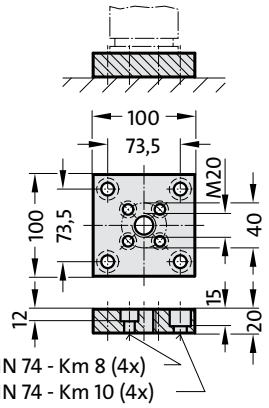
Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with Low Build Height
Mounting Variations

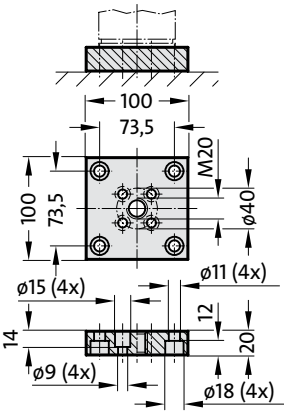
FIBRO

2485.12.01500.

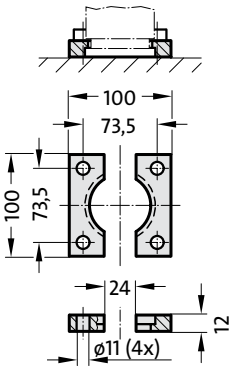
2480.011.01500



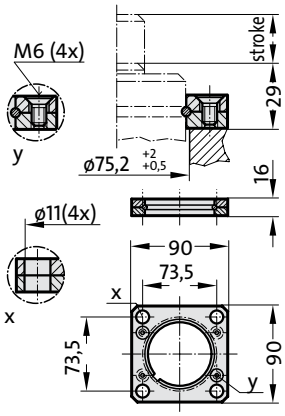
2480.011.01500.2



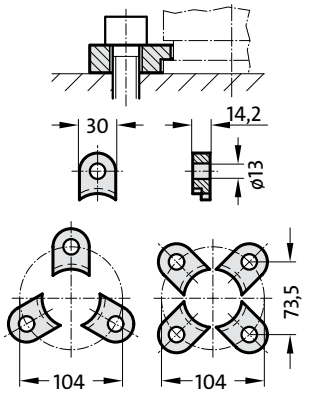
2480.022.01500



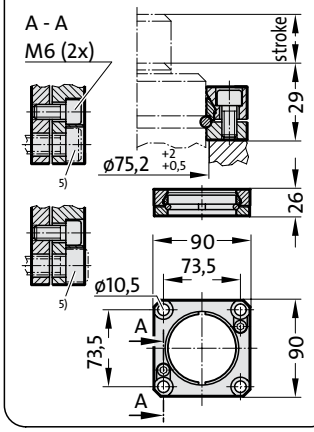
2480.058.01500



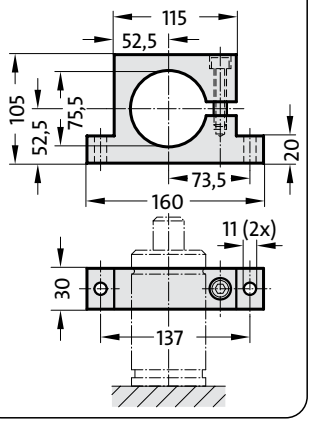
2480.007.01500



2480.064.01500 [4]



2480.044.01500 [2]



Notes:

[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).

FIBRO

2485.12.01500.

Gas Spring with Low Build Height

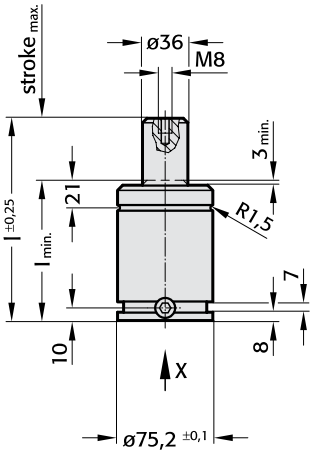
APPROVED PED 97/23/EC

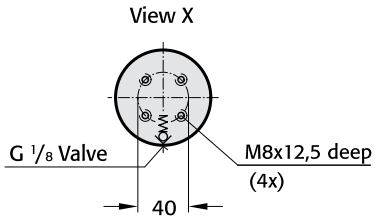
2485.12.01500.

Initial spring force at 150 bar = 1500 daN

Order No	stroke max.	l_{min}	l
2485.12.01500. 025	25	85	110
038	38,1	98,1	136,2
050	50	110	160
063	63,5	123,5	187
080	80	140	220
100	100	160	260

2485.12.01500.





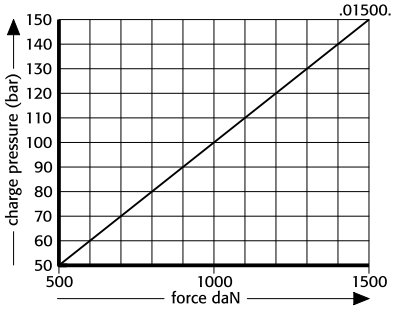
Note:

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

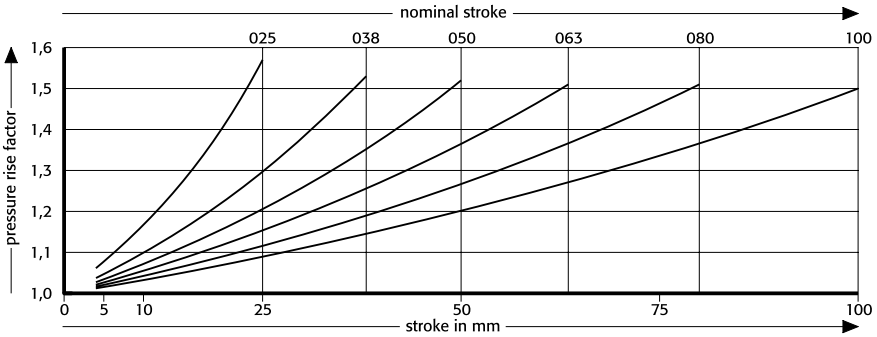
2485.12.01500.

Initial spring force versus charge pressure



2485.12.01500.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

››Speed Control™‹‹ SPC GAS SPRINGS, cushioned

››Speed Control™‹‹, SPC Gas Springs, cushioned

Description

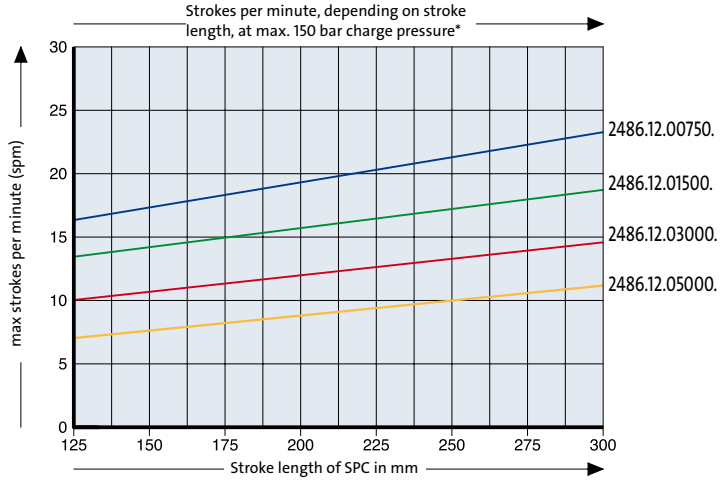
FIBRO SPC Gas Springs »Speed Control™« have been engineered to reduce or eliminate blank holder bounce; commonly associated with increased return stroke speeds form link drive presses.

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 to 300 mm.
- Linkable using hose system.

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.

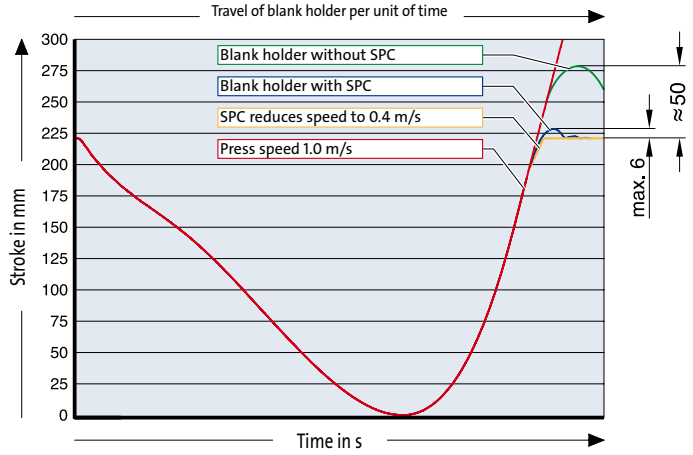
Caution !

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.

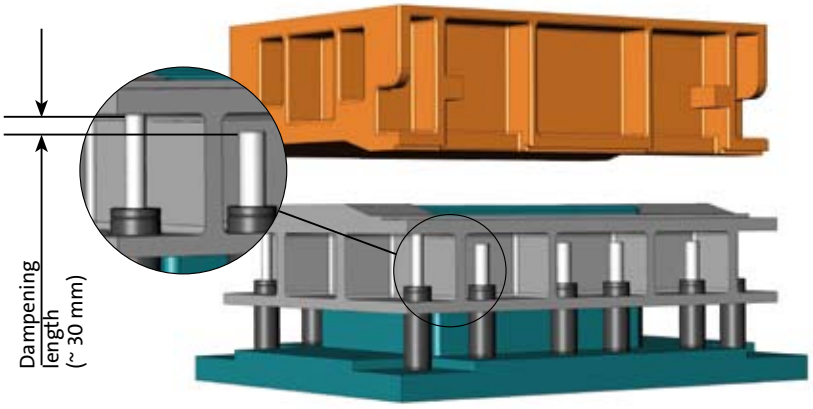
*At ambient room temperature with free air flow

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)

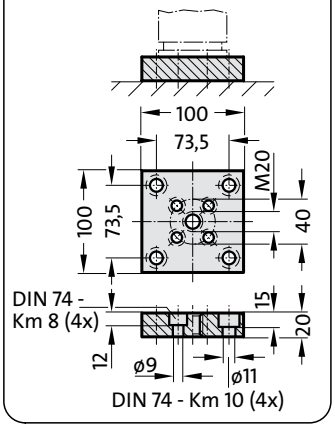
Please note: Springs must be installed with a recess of 25 mm to balance the total length difference (2 x stroke length = 50 mm). Alternatively, the contact surface of the sheet metal retainer can be recessed in order to achieve the same effect.

››Speed Control™‹‹, SPC Gas Springs, cushioned Mounting Variations

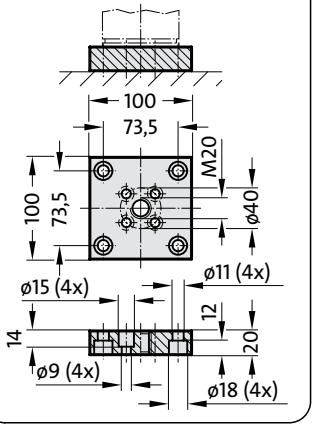
FIBRO

2486.12.00750.

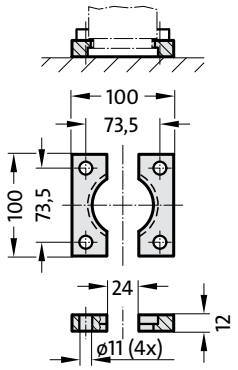
2480.011.01500



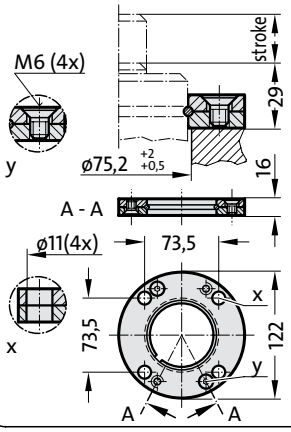
2480.011.01500.2



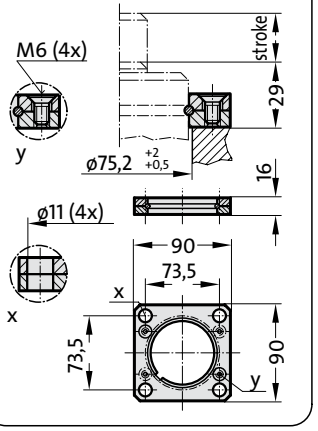
2480.022.01500



2480.055.01500



2480.057.01500



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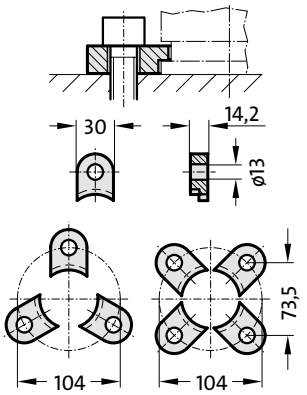
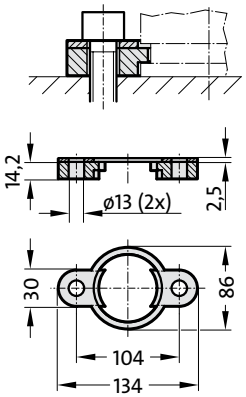
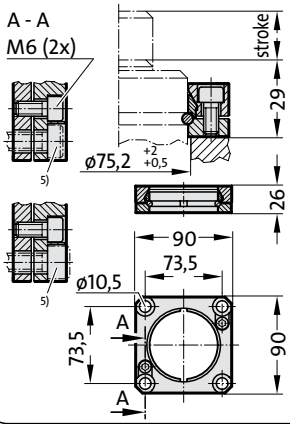


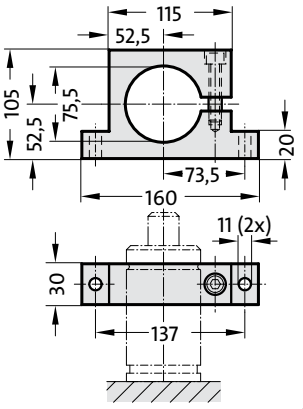
2480.008.01500 [3]



2480.064.01500 [4]



2480.044.01500 [2]



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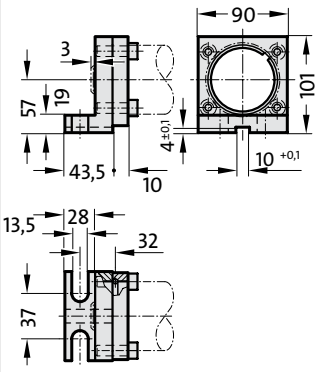

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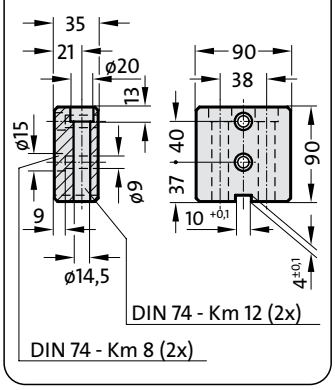


Notes:

[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).

FIBRO

2486.12.00750.

››Speed Control™‹‹, SPC Gas Springs, cushioned

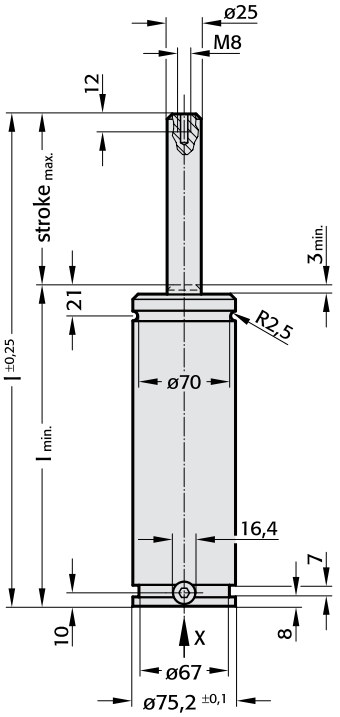
APPROVED PED 97/23/EC

2486.12.00750.

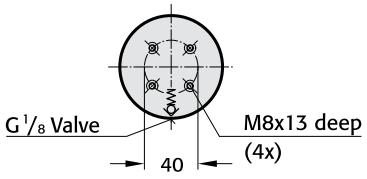
Initial spring force at 150 bar = 750 daN

Order No	stroke max.	l_{min}	l
2486.12.00750. 125	125	235	360
160	160	270	430
200	200	310	510
250	250	360	610
300	300	410	710

2486.12.00750.



View X



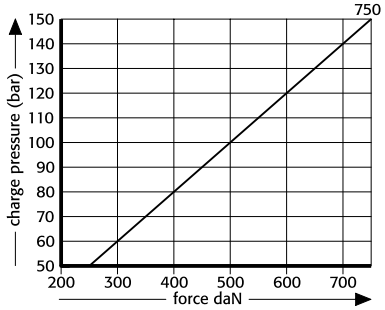
Note:

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
Recommended max. strokes/min:	approx. 16 to 24 (at 20°C)
Dampening length:	~ 30 mm
Piston rod speed, decelerated:	0.4 m/s

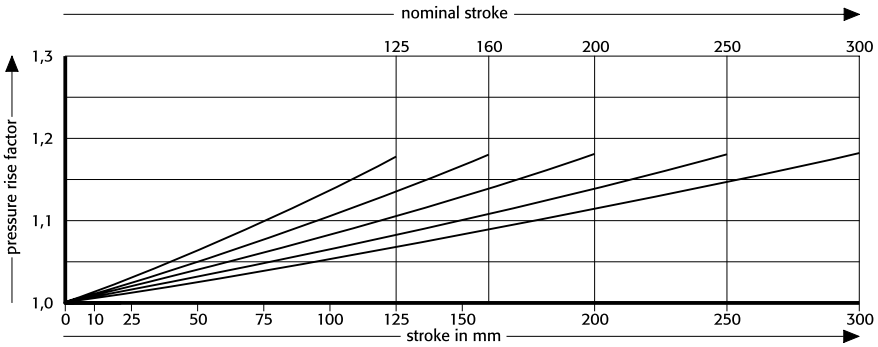
2486.12.00750.

Initial spring force versus charge pressure



2486.12.00750.

Spring force Diagram displacement versus stroke rise



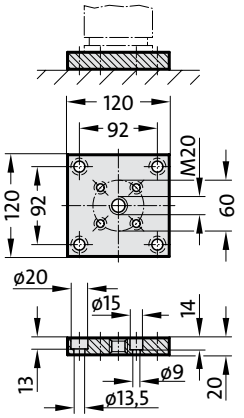
Pressure rise factor accounts for displacement but not external influences!

››Speed Control™‹‹, SPC Gas Springs, cushioned Mounting Variations

FIBRO

2486.12.01500.

2480.011.03000



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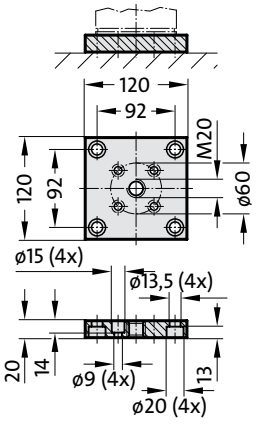

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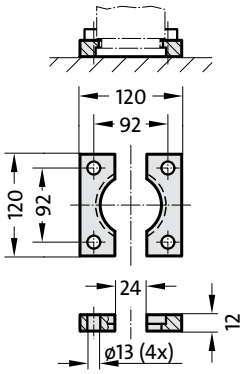

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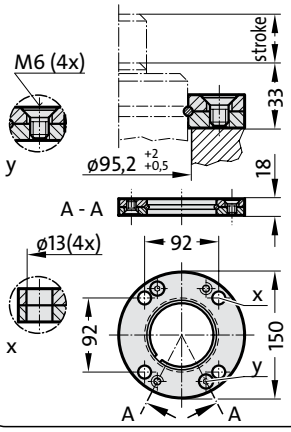
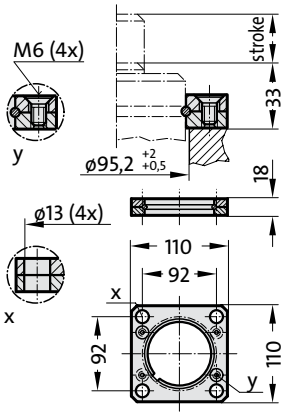
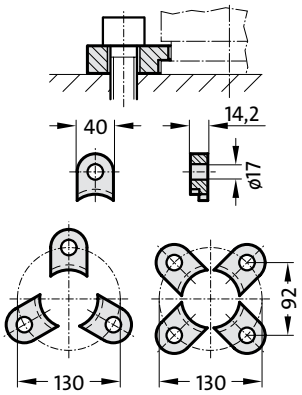


2480.057.03000



2480.007.03000



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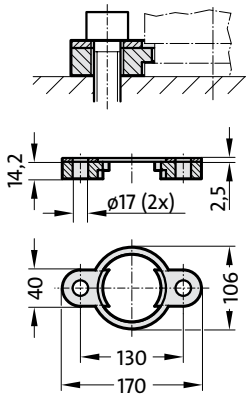
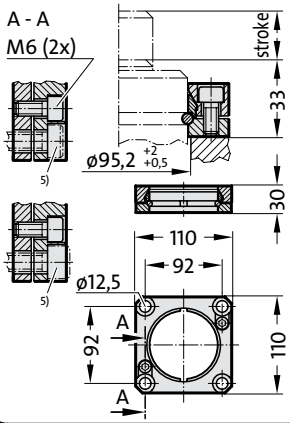


2480.064.03000 [4]



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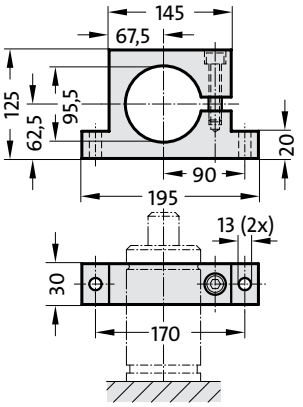

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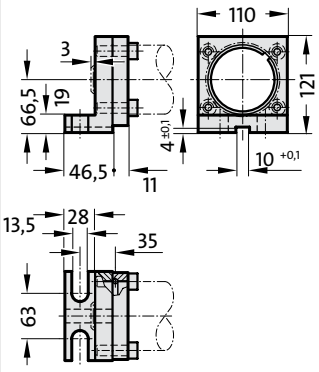

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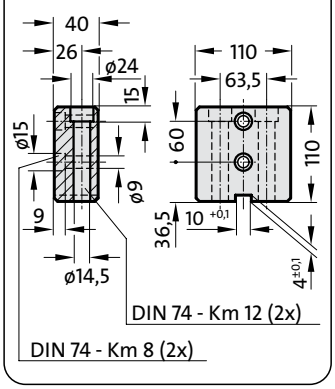


Notes:

[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).

FIBRO

2486.12.01500.

››Speed Control™‹‹, SPC Gas Springs, cushioned

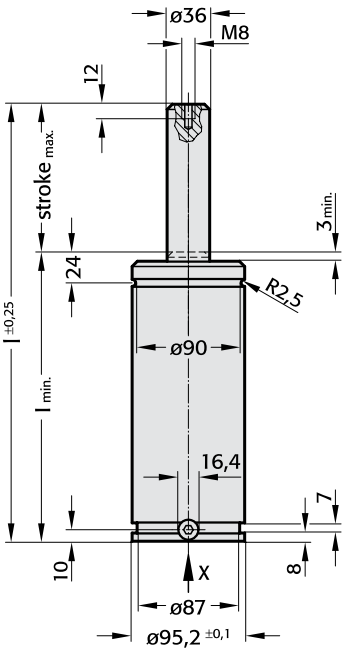
APPROVED PED 97/23/EC

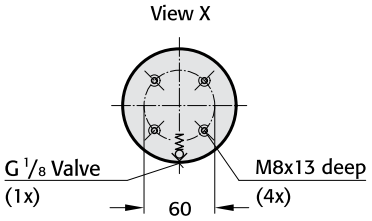
2486.12.01500.

Initial spring force at 150 bar = 1500 daN

Order No	stroke max.	l_{min}	l
2486.12.01500. 125	125	245	370
160	160	280	440
200	200	320	520
250	250	370	620
300	300	420	720

2486.12.01500.





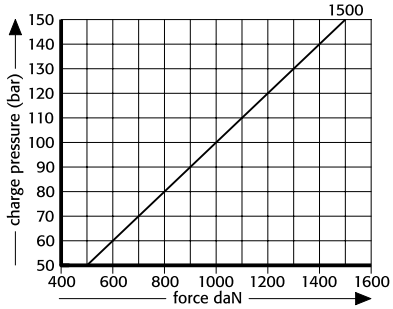
Note:

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
Recommended max. strokes/min:	approx. 14 to 19 (at 20°C)
Dampening length:	~ 30 mm
Piston rod speed, decelerated:	0.4 m/s

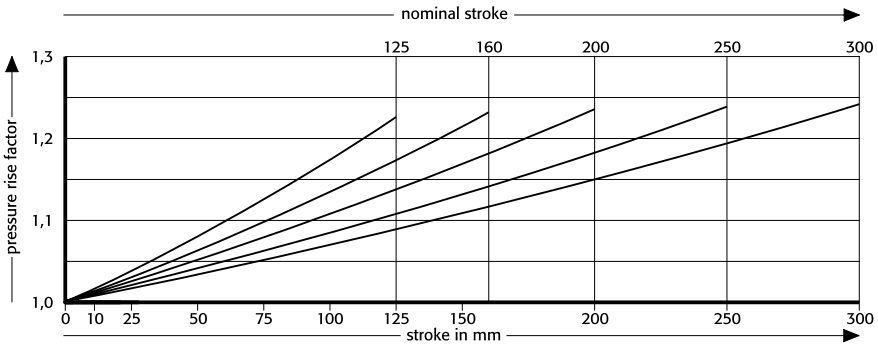
2486.12.01500.

Initial spring force versus charge pressure



2486.12.01500.

Spring force Diagram displacement versus stroke rise



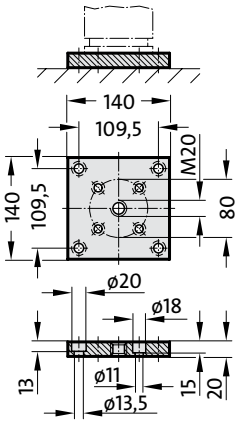
Pressure rise factor accounts for displacement but not external influences!

››Speed Control™‹‹, SPC Gas Springs, cushioned Mounting Variations

FIBRO

2486.12.03000.

2480.011.05000



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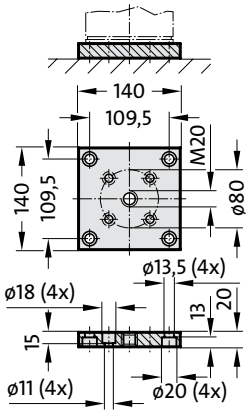
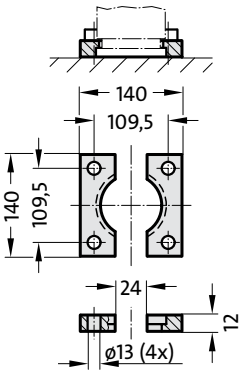


2480.022.05000



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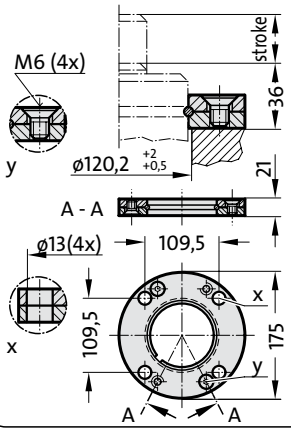

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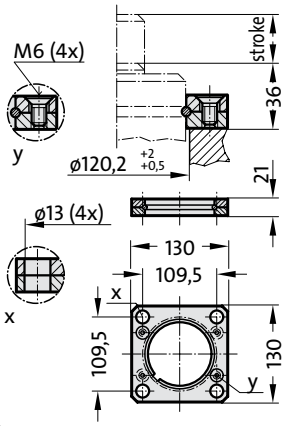

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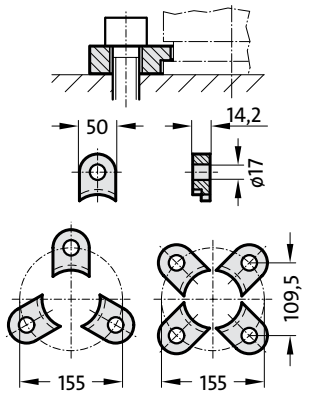

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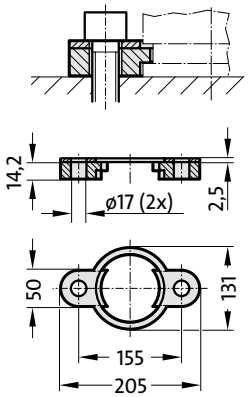

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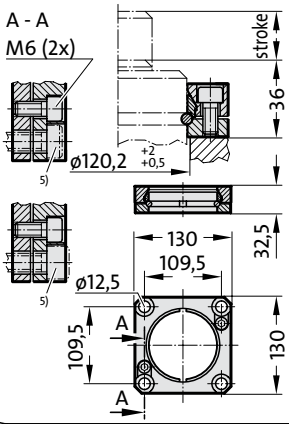

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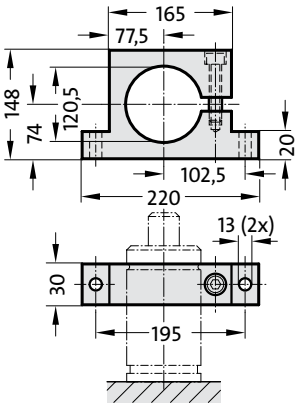
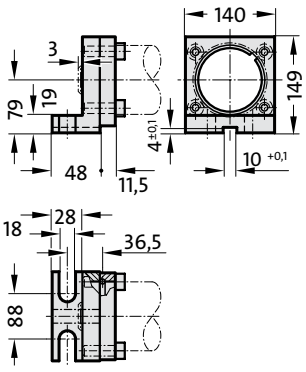
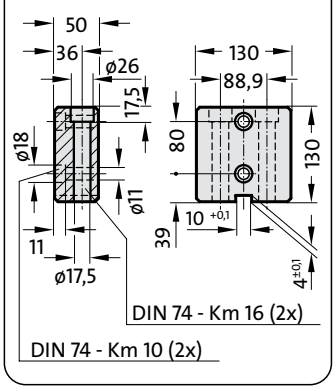


2480.045.05000 [2]



2480.047.05000 [2]



Notes:

[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).

FIBRO

2486.12.03000.

››Speed Control™‹‹, SPC Gas Springs, cushioned

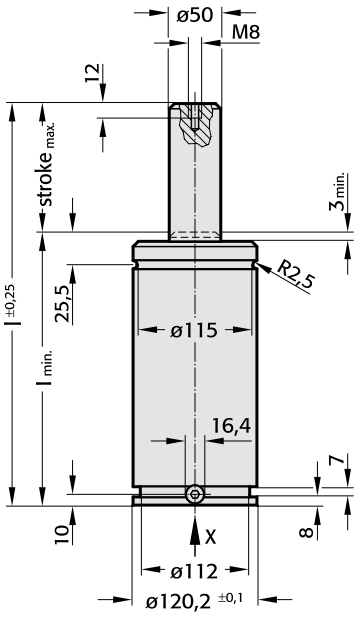
APPROVED PED 97/23/EC

2486.12.03000.

Initial spring force at 150 bar = 3000 daN

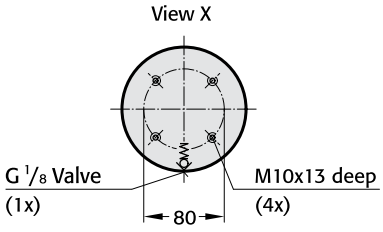
Order No	stroke max.	l_{min}	l
2486.12.03000. 125	125	265	390
160	160	300	460
200	200	340	540
250	250	390	640
300	300	440	740

2486.12.03000.



Note:

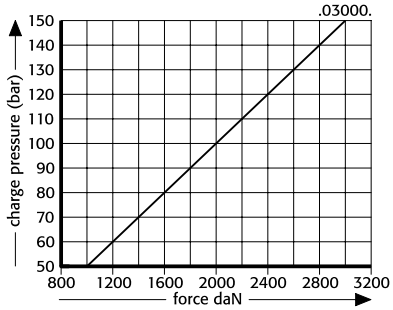
Order No for spare parts kit:
2486.12.03000



Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	25 bar
Operating temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Recommended max. strokes/min:	approx. 10 to 13 (at 20°C)
Dampening length:	~ 30 mm
Piston rod speed, decelerated:	0.4 m/s

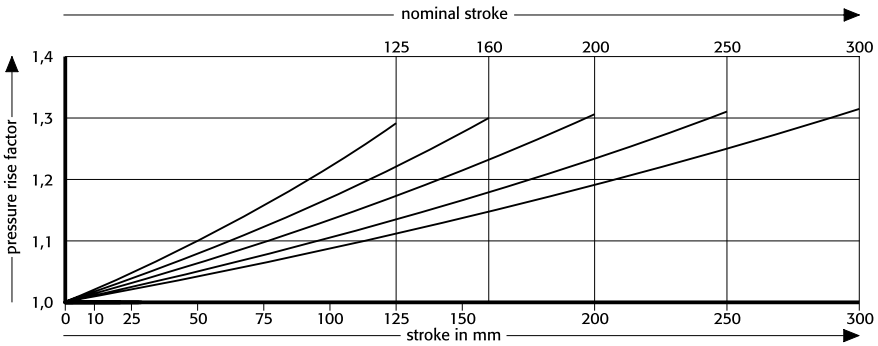
2486.12.03000.

Initial spring force versus charge pressure



2486.12.03000.

Spring force Diagram displacement versus stroke rise

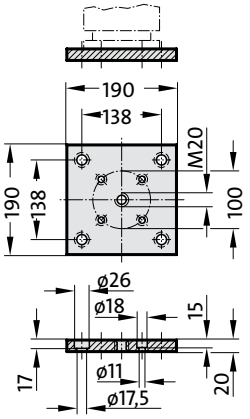


Pressure rise factor accounts for displacement but not external influences!

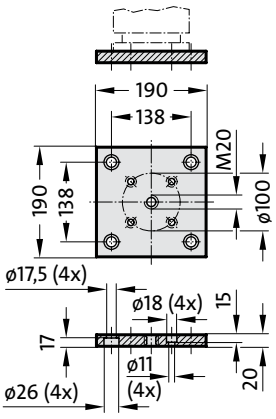
››Speed Control™‹‹
SPC Gas Springs, cushioned
Mounting Variations

2486.12.05000.

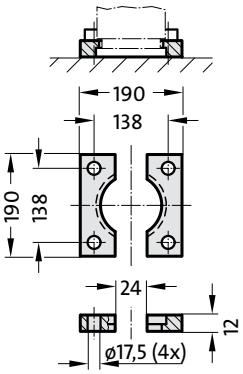
2480.011.07500



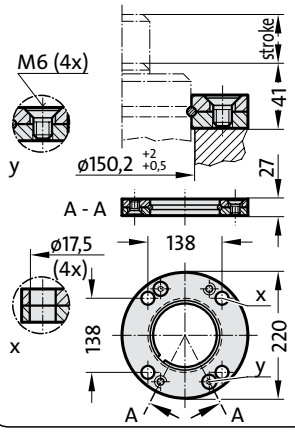
2480.011.07500.2



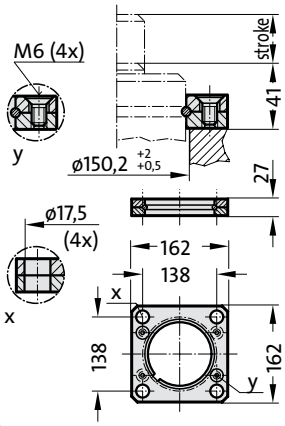
2480.022.07500



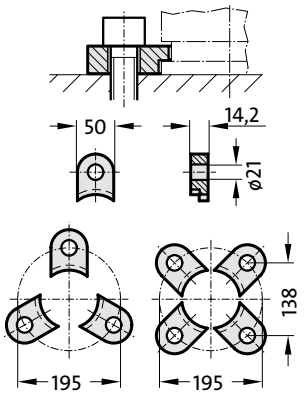
2480.055.07500



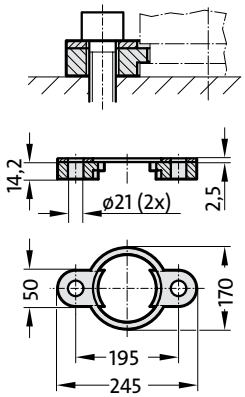
2480.057.07500



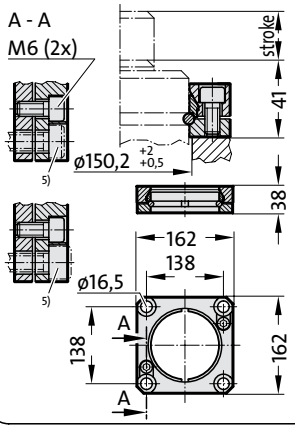
2480.007.07500



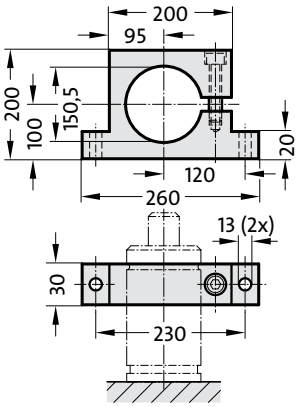
2480.008.07500 [3]



2480.064.07500 [4]



2480.044.07500 [2]



Notes:

[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).

FIBRO

2486.12.05000.

››Speed Control™‹‹, SPC Gas Springs, cushioned

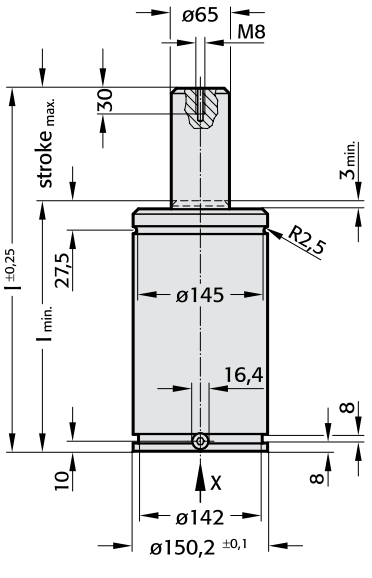
APPROVED PED 97/23/EC

2486.12.05000.

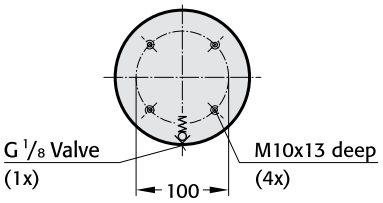
Initial spring force at 150 bar = 5000 daN

Order No	stroke max.	l_{min}	l
2486.12.05000. 125	125	280	405
160	160	315	475
200	200	355	555
250	250	405	655
300	300	455	755

2486.12.05000.



View X



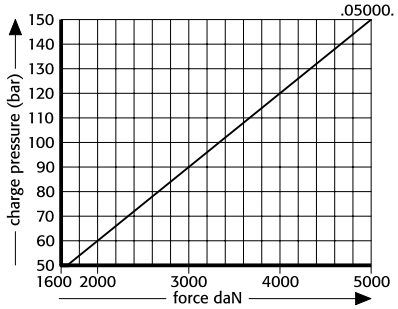
Note:

Order No for spare parts kit:
2486.12.05000

Pressure medium:	Nitrogen N_2
Max. filling pressure:	150 bar
Min. filling pressure:	25 bar
Operating temperature:	0 °C to +80 °C
Temperature related force increase:	±0.3%/°C
Recommended max. strokes/min:	approx. 6 to 11 (at 20°C)
Dampening length:	~ 30 mm
Piston rod speed, decelerated:	0.4 m/s

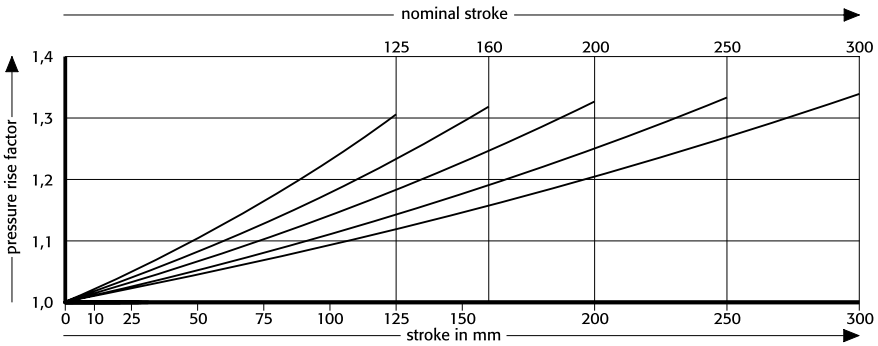
2486.12.05000.

Initial spring force versus charge pressure



2486.12.05000.

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, threaded

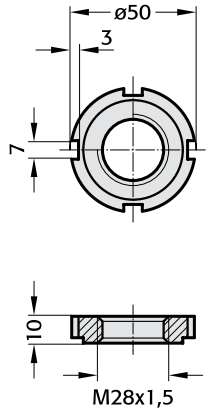
Gas Springs with external thread small dimensions and low forces
Mounting Variation

FIBRO

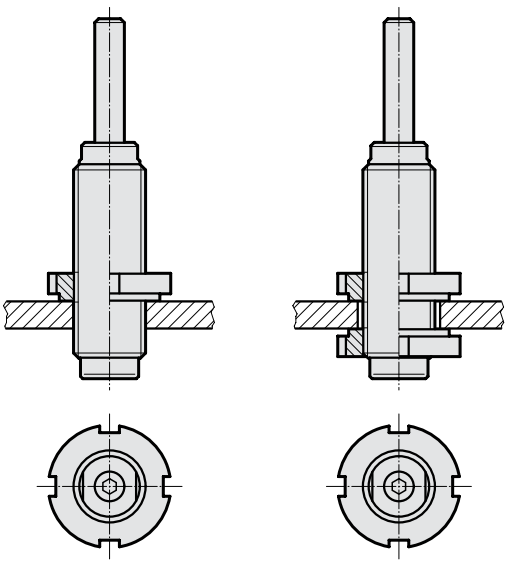
2480.32.

2480.005.00200

Slotted nut



Mounting example:



FIBRO

2480.32.

Gas Springs with external thread small dimensions and low forces

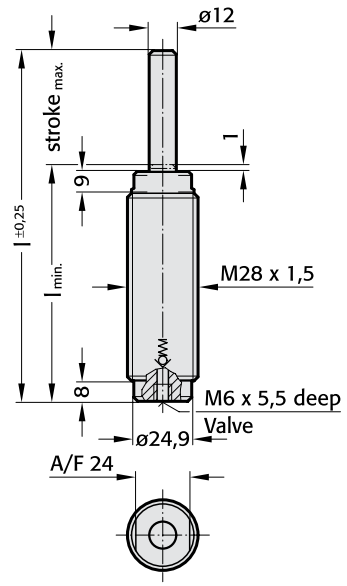
APPROVED PED 97/23/EC

2480.32.00050.
00100.
00150.
00200.

Order No		stroke max.	$l_{min.}$	l
2480.32.	.010	10	52	62
	013	12,7	54,7	67,4
	016	16	58	74
	025	25	67	92
	038	38,1	80,1	118,2
	050	50	92	142
	063	63,5	105,5	169
	080	80	122	202
	100	100	142	242
	125	125	167	292

Order No for spare parts kit: 2480.21.00150

2480.32.



Springs Force Colour Markings

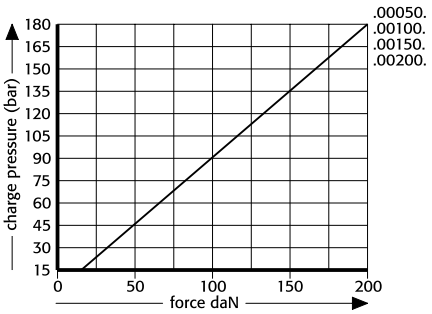
Order No		Initial spring force daN	pressure bar	Colour
2480.32.	00050	50	45	green
	00100.	100	90	blue
	00150.	150	135	red
	00200.	200	180	yellow
	00000.*			black

*As required by customer.
Can also be supplied unfilled.

Pressure medium:	Nitrogen N2
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 min.:	approx. 80 to 100 (at 20°C)
Max. piston speed:	1.6 m/s

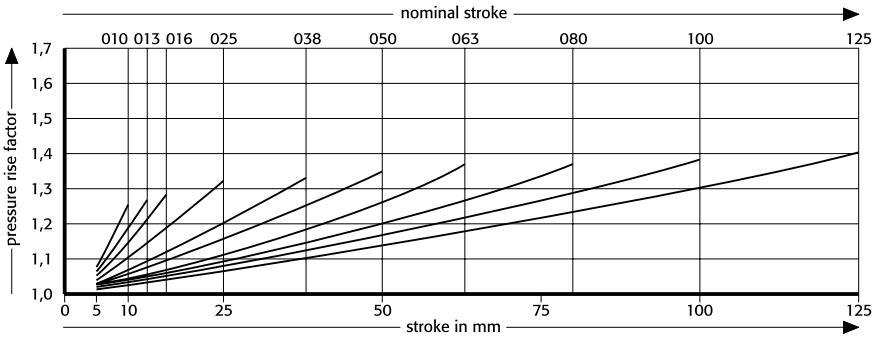
2480.32.

Initial spring force versus charge pressure



2480.32.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

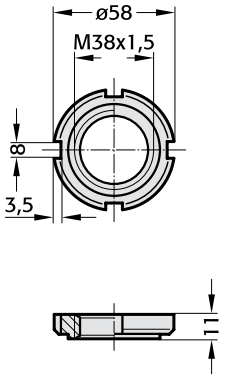
Gas Springs
with external thread
Mounting Variations

FIBRO

2480.32.00250.

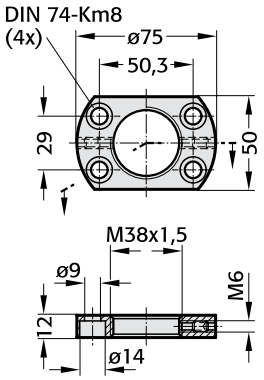
2480.005.00250

Slotted nut



2480.006.00250

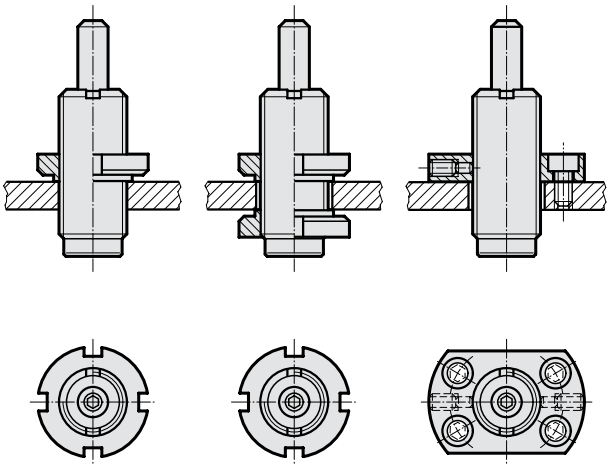
Clamped flange



2480.00.51.01

Box spanner for assembling/disassembling of gas springs

Mounting example:



FIBRO

2480.32.00250.

Gas Springs with external thread

APPROVED PED 97/23/EC

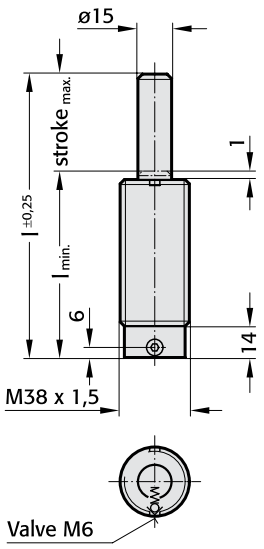
2480.32.

Initial spring force at 150 bar = 250 daN

Order No		stroke max.	$l_{min.}$	l
2480.32.00250.	013	12,7	62,7	75,4
	025	25	75	100
	038	38,1	88,1	126,2
	050	50	100	150
	063	63,5	113,5	177
	080	80	130	210
	100	100	150	250

Order No for spare parts kit: 2480.12.00250

2480.32.00250.



Pressure medium:	Nitrogen N2
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 min.:	approx. 80 to 100 (at 20°C)
Max. piston speed:	1.6 m/s

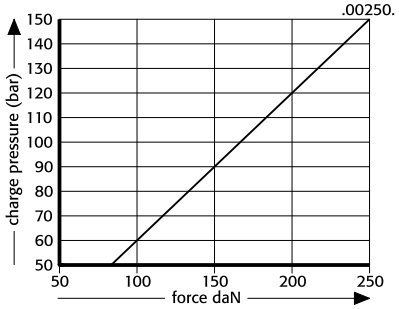
Installation with ring nut(s) 2480.005.00250 can be done with one or two ring nuts. If the hole in the bolster plate is not threaded, two ring nuts are needed. Holes threaded M 38 × 1,5 require one only ring nut for mounting of the Gas Springs.

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.

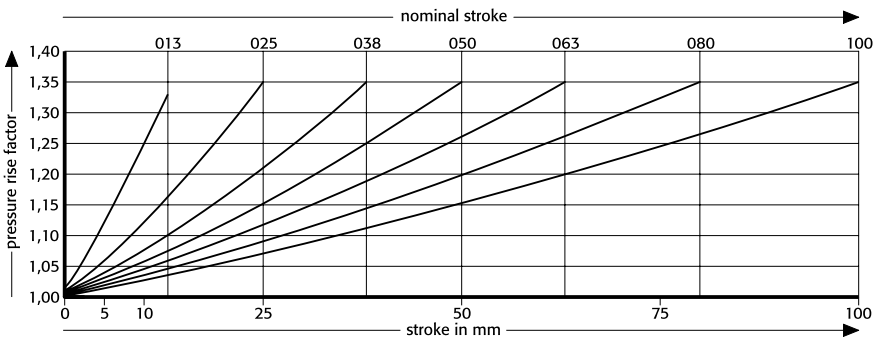
2480.32.00250.

Initial spring force versus charge pressure



2480.32.00250.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with male fixing thread, small dimensions
Mounting Variations

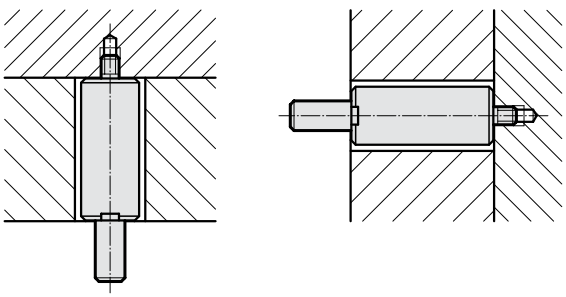
FIBRO

2480.82.00250.

2480.00.51.01

Box spanner for assembling/disassembling of gas springs

Mounting example:



FIBRO

2480.82.00250.

Gas Springs with male fixing thread small dimensions

APPROVED PED 97/23/EC

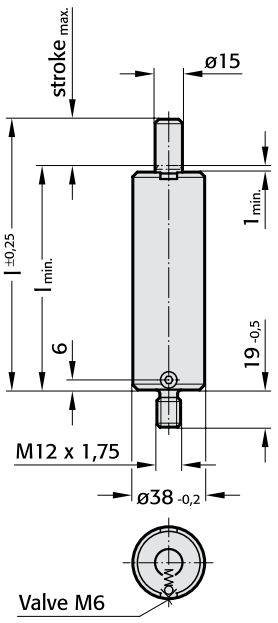
2480.82.00250.

Initial spring force at 150 bar = 250 daN

Order No	stroke max.	$l_{min.}$	l
2480.82.00250.013	12,7	62,7	75,4
025	25	75	100
038	38,1	88,1	126,2
050	50	100	150
063	63,5	113,5	177
080	80	130	210
100	100	150	250

Order No for spare parts kit: 2480.12.00250

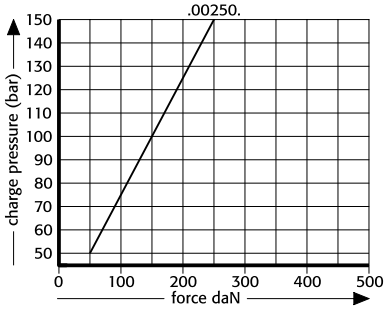
2480.82.00250.



Pressure medium:	Nitrogen N2
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 min.:	approx. 80 to 100 (at 20°C)
Max. piston speed:	1.6 m/s

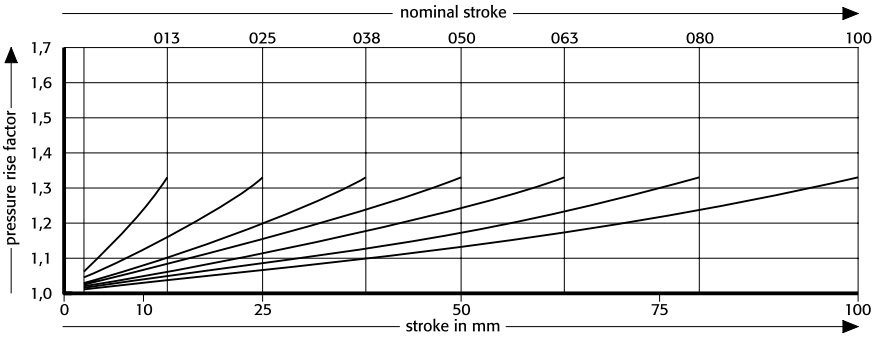
2480.82.00250.

Initial spring force versus charge pressure



2480.82.00250.

Spring force Diagram displacement versus stroke rise

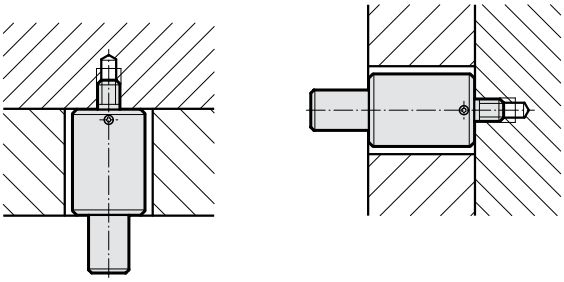


Pressure rise factor accounts for displacement but not external influences!

2480.00.51.05

Box spanner for assembling/disassembling of gas springs

Mounting example:



FIBRO

2487.82.01000.

POWER LINE Gas Springs with male fixing thread and increased spring force

APPROVED PED 97/23/EC

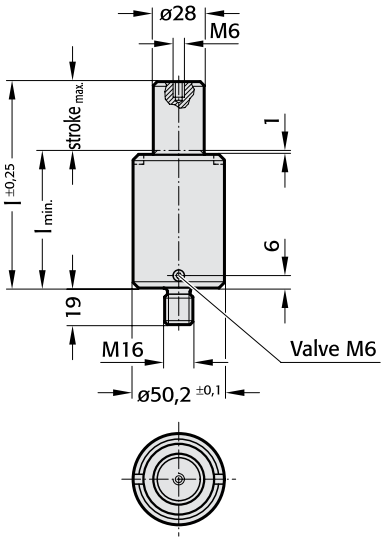
2487.82.01000.

Initial spring force at 150 bar = 920 daN

Order No	stroke max.	$l_{min.}$	l
2487.82.01000. 013	13	51	64
016	16	54	70
019	19	57	76
025	25	63	88
032	32	70	102
038	38	76	114
050	50	88	138
063	63	101	164
075	75	113	188
080	80	118	198
100	100	138	238
125	125	163	288

Order No for spare parts kit: 2487.12.01000

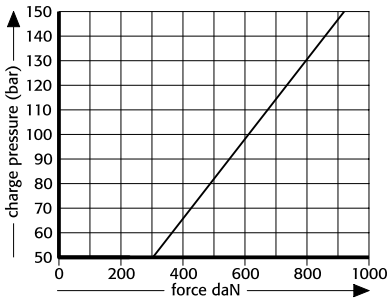
2487.82.01000.



Pressure medium:	Nitrogen N2
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 min.:	approx. 50 to 100 (at 20°C)
Max. piston speed:	1.6 m/s

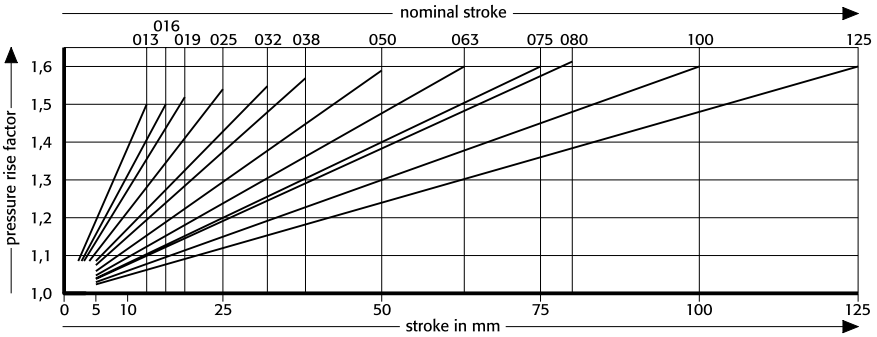
2487.82.01000.

Initial spring force versus charge pressure



2487.82.01000.

Spring force Diagram displacement versus stroke rise

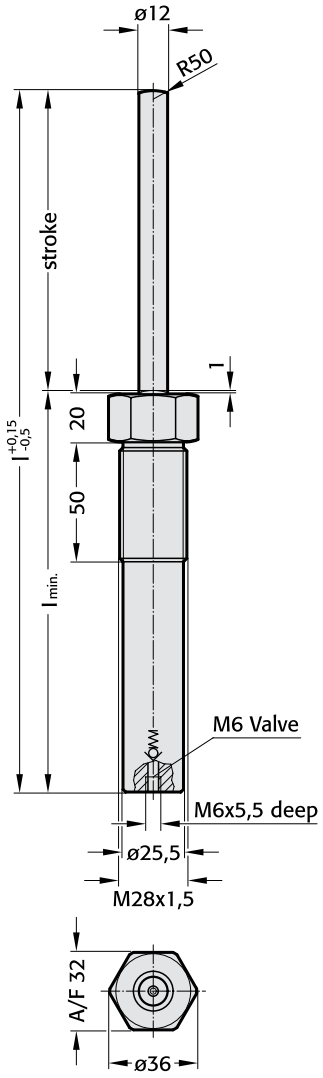


Pressure rise factor accounts for displacement but not external influences!

Gas Springs
with hexagonal flange (Stabiliser)

2480.33.

2480.33.



2480.33.00015.125
00050.125
00100.125
00150.125
00200.125

Order No		stroke	l_{min}	l
2480.33.	.125	125	167	292

Pressure medium:	Nitrogen N2
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 min.:	approx. 80 to 100 (at 20°C)
Max. piston speed:	1.6 m/s

Springs Force Colour Markings

Order No	pressure bar	Initial spring force daN	Colour
2480.33. 00015.	13	15	Black
00050.	45	50	Green
00100.	90	100	Blue
00150.	135	150	Red
00200.	180	200	Yellow

Ordering code (example):

Gas spring	=	2480.33.
Force 50 daN	=	00050.
Stroke 125 mm	=	125
Order No	=	2480.33.00050.125

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.

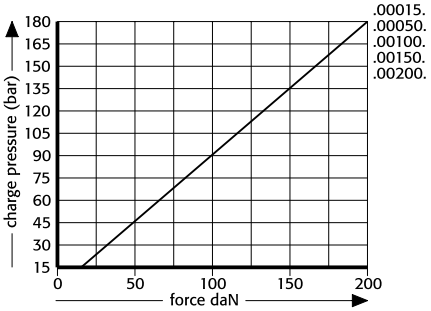
Note:

Other stroke lengths available on request! See Gas Springs 2480.32.

Order No for spare parts kit:
2480.21.00150

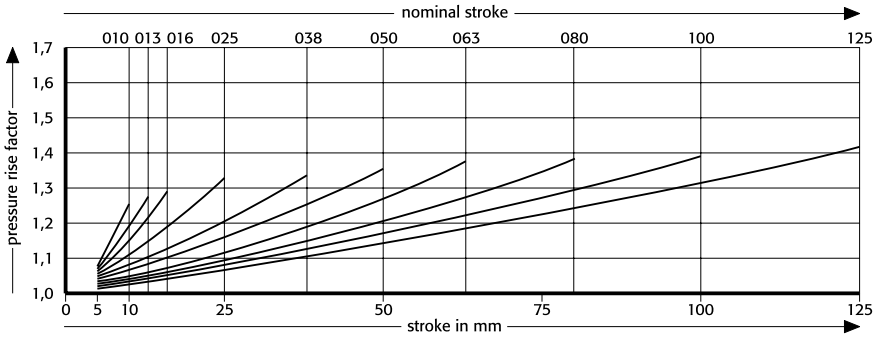
2480.33.

Initial spring force
versus charge pressure



2480.33.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

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 2484.13 gas 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.

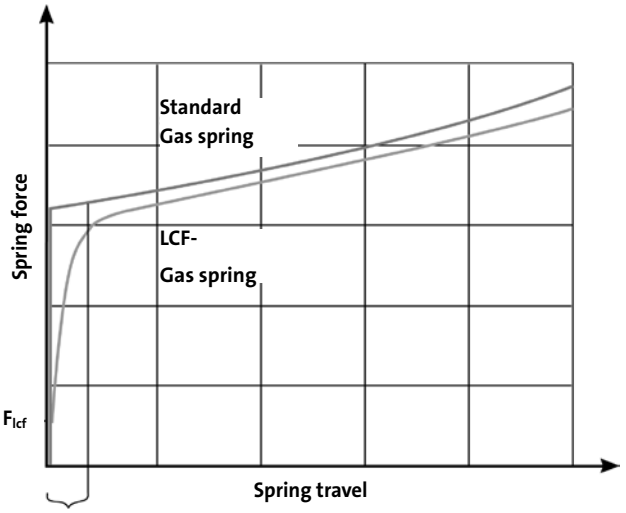
The reduced noise level is due to the lower impact force, making these springs a cost-effective alternative to soundproofing panels. They are thus more economical and environmentally-friendly.

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 is a trade mark of Associated Spring

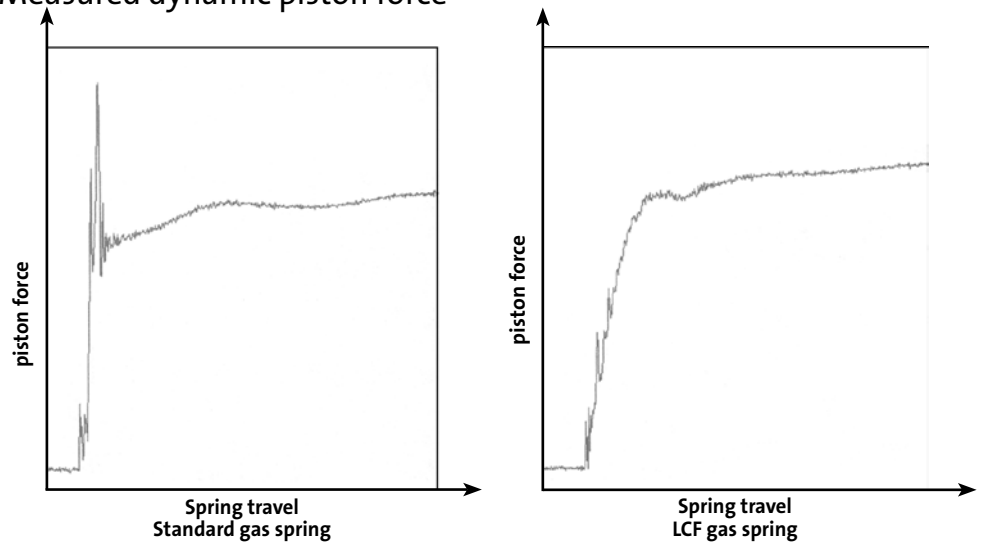
Force diagram for gas springs



Damped spring travel S_1

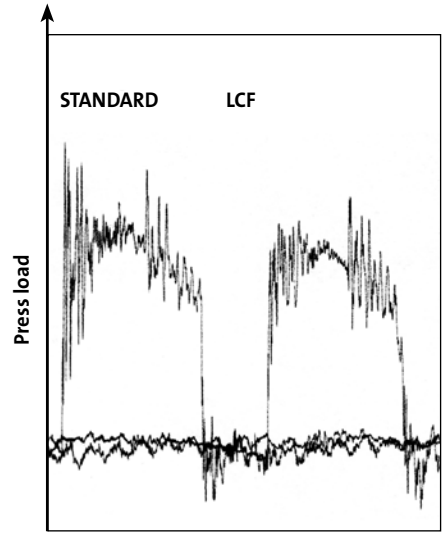
With the springs from the LCF series, the force builds up gradually and acceleration is uniform.

Measured dynamic piston force

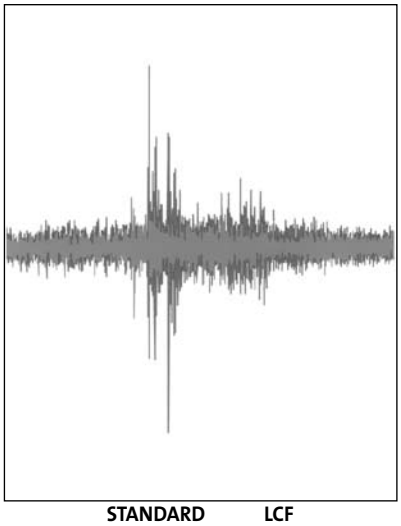


Measured values for the 5000th series

Comparative press load diagram

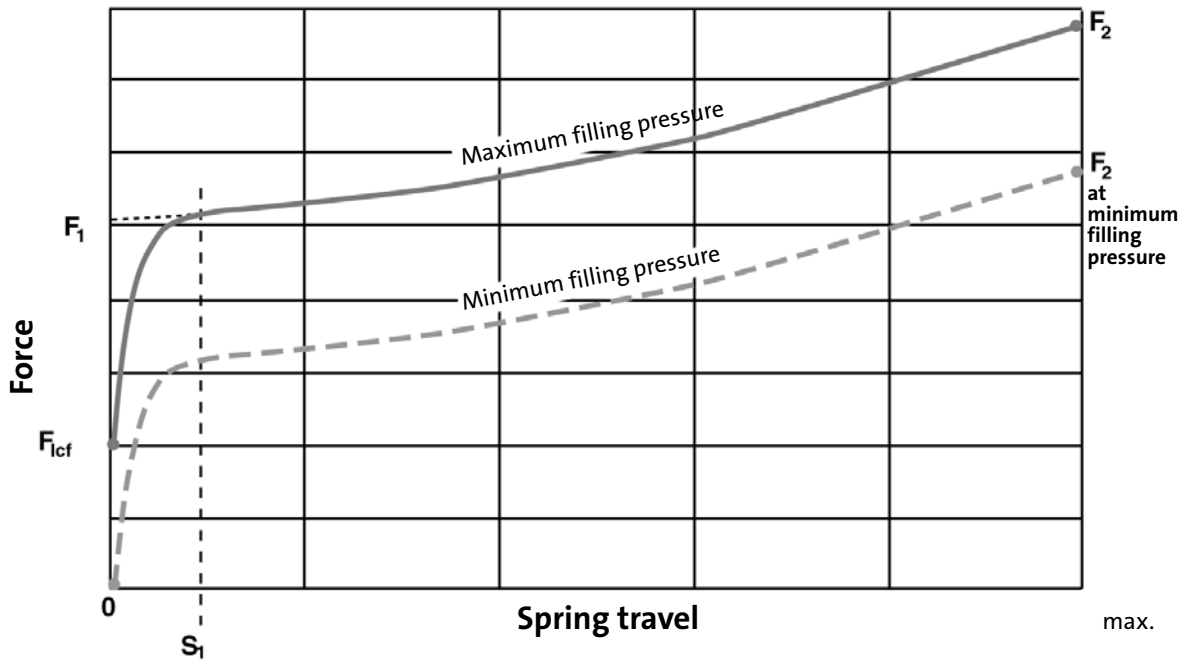


Noise reduction



The springs from the LCF series are quieter due to the reduced impact force.

Force 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

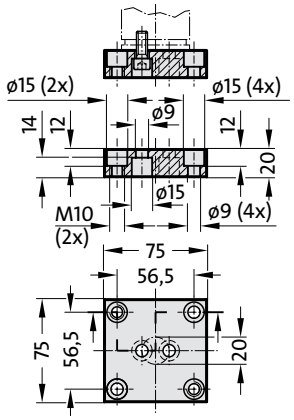
1. After the damped spring travel (S1) the LCF gas spring achieves the same initial spring force (F1) and pressure build up as the standard gas spring (to ISO).
2. The spring force (Flcf) should exceed the weight (e.g. the pad) by at least 15% so that it is held in the correct position (this does not apply in the case of minimum filling pressure).

Spring Size	F_{lcf} at 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

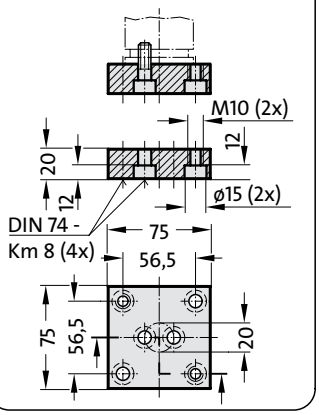
Gas Springs
Mounting Variations

2484.13.00750.

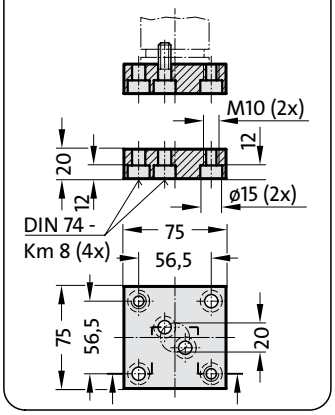
2480.011.00750.3



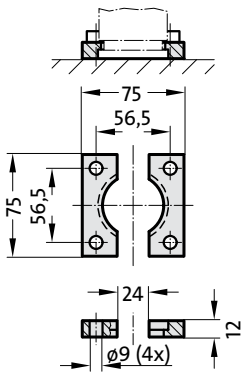
2480.011.00750



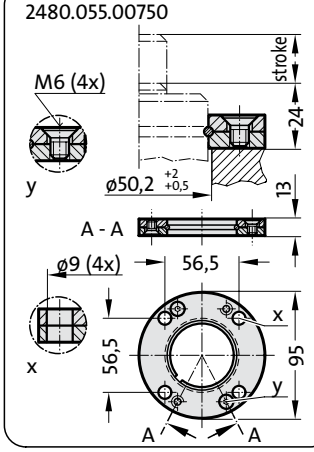
2480.011.00750.1



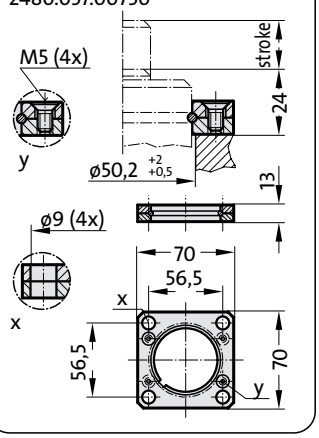
2480.022.00750



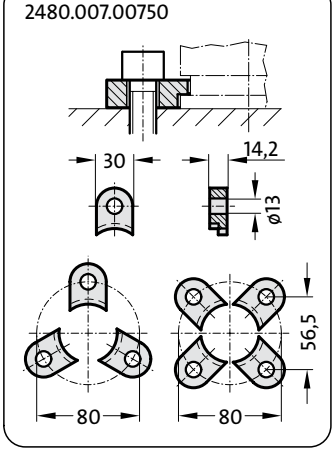
2480.055.00750



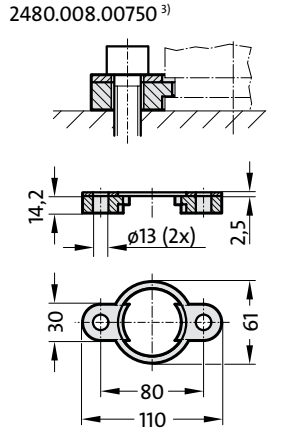
2480.057.00750



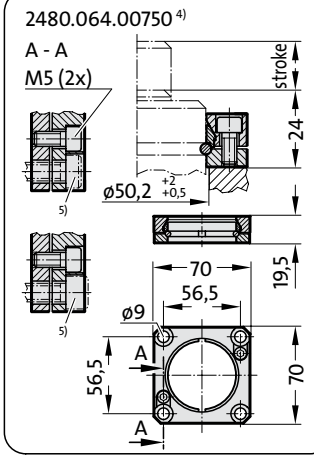
2480.007.00750



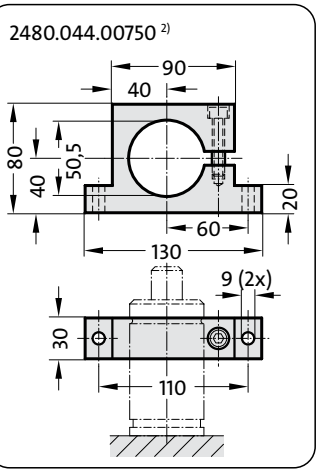
2480.008.00750 [3]



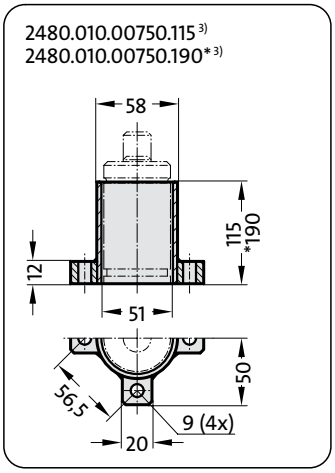
2480.064.00750 [4]



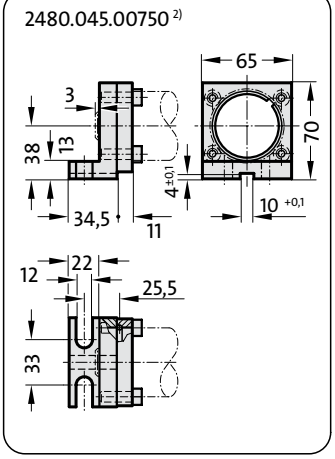
2480.044.00750 [2]



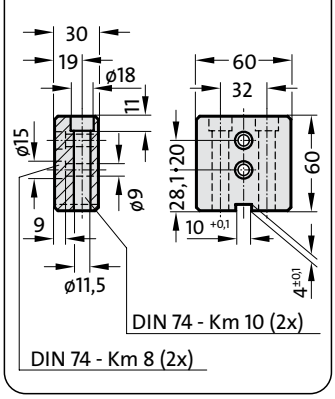
2480.010.00750.115 [3]
2480.010.00750.190* [3]



2480.045.00750 [2]



2480.047.00750 [2]



Notes:

[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).

FIBRO

2484.13.00750.

LCF gas springs, damped

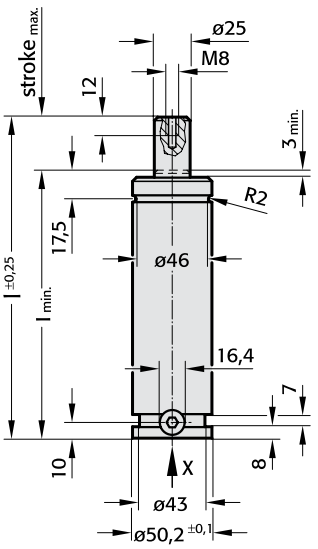
APPROVED PED 97/23/EC

2484.13.00750.

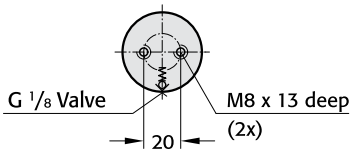
Initial spring force F_{lcf} at 150 bar = 470 daN
Full spring force after 3.1 mm damped spring travel

Order No	stroke max.	l_{min}	l
2484.13.00750. 013	12,7	107,7	120,4
025	25	120	145
038	38,1	133,1	171,2
050	50	145	195
063	63,5	158,5	222
080	80	175	255
100	100	195	295
125	125	220	345
160	160	255	415
200	200	295	495
250	250	345	595
300	300	395	695

2484.13.00750.



View X - Gas spring



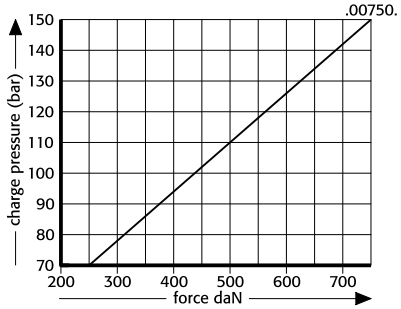
Note:

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

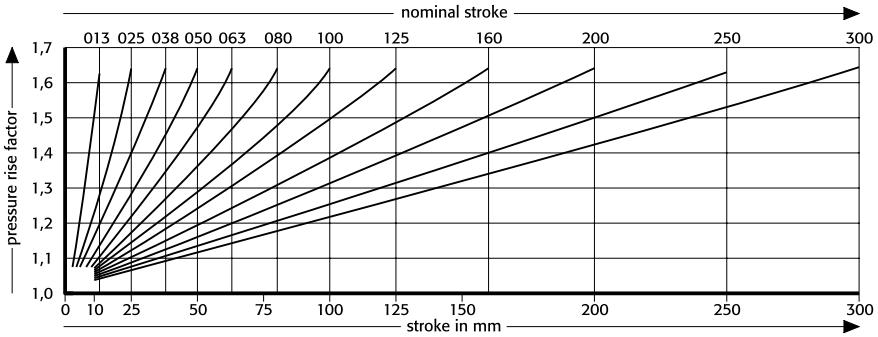
2484.13.00750.

Initial spring force versus charge pressure



2484.13.00750.

Spring force Diagram displacement versus stroke rise

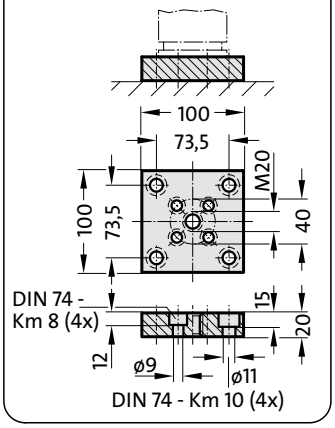


Pressure rise factor accounts for displacement but not external influences!

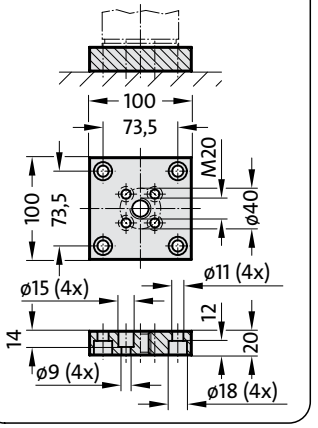
Gas Springs
Mounting Variations

2484.12.01500.

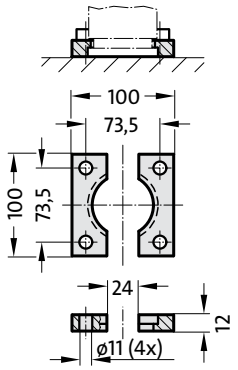
2480.011.01500



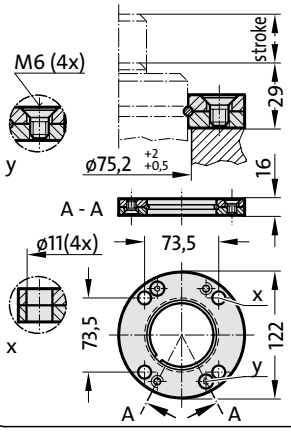
2480.011.01500.2



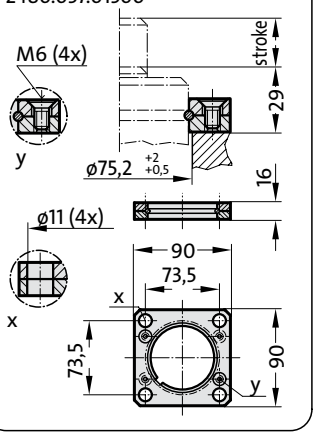
2480.022.01500



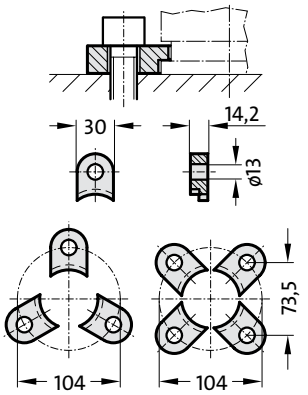
2480.055.01500



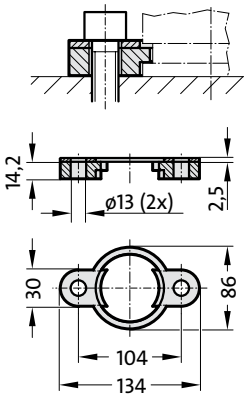
2480.057.01500



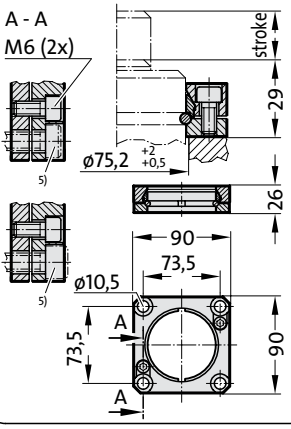
2480.007.01500



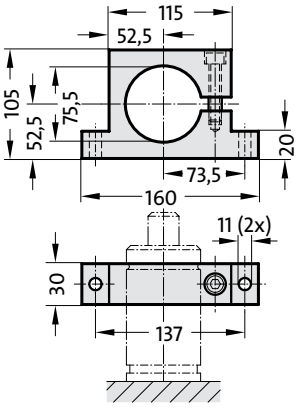
2480.008.01500 3)



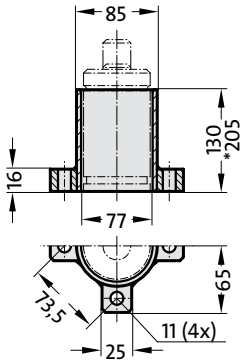
2480.064.01500 4)



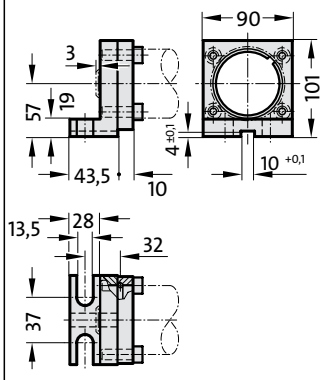
2480.044.01500 2)



2480.010.01500.130 3)
2480.010.01500.205* 3)



2480.045.01500 2)



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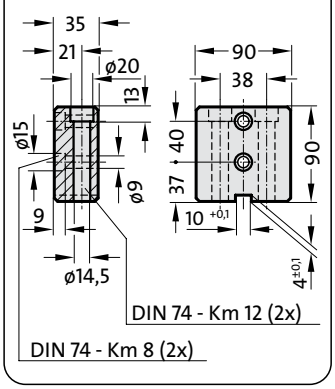


Notes:

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).

FIBRO

2484.12.01500.

LCF gas springs, damped

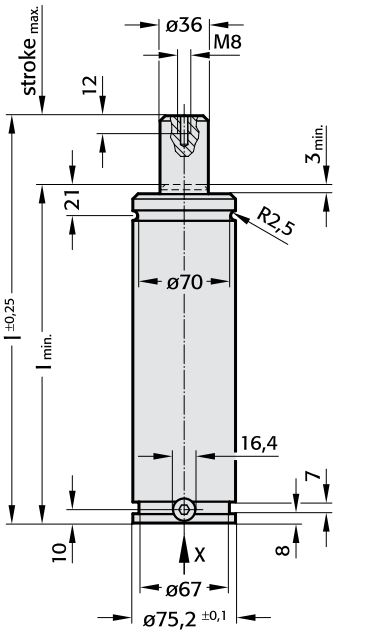
APPROVED PED 97/23/EC

2484.12.01500.

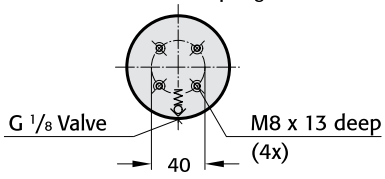
Initial spring force F_{lcf} at 150 bar = 700 daN
Full spring force after 4.6 mm damped spring travel

Order No	stroke max.	l_{min}	l
2484.12.01500.025	25	135	160
038	38,1	148,1	186,2
050	50	160	210
063	63,5	173,5	237
080	80	190	270
100	100	210	310
125	125	235	360
160	160	270	430
200	200	310	510
250	250	360	610
300	300	410	710

2484.12.01500.



View X - Gas spring



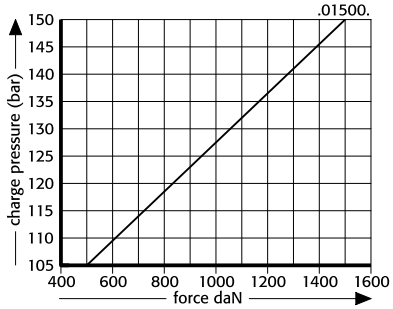
Note:

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

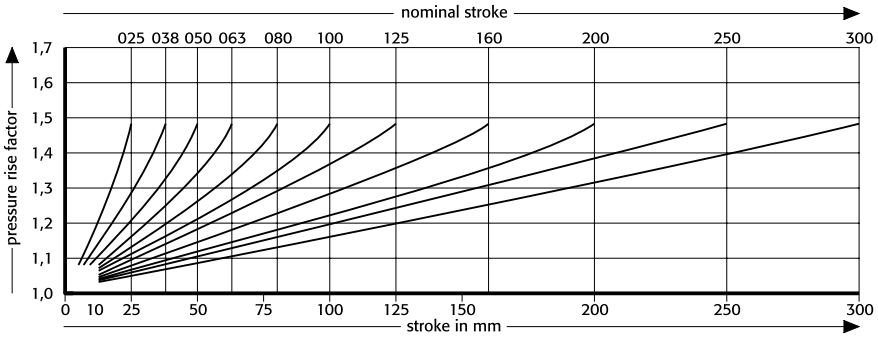
2484.12.01500.

Initial spring force versus charge pressure



2484.12.01500.

Spring force Diagram displacement versus stroke rise

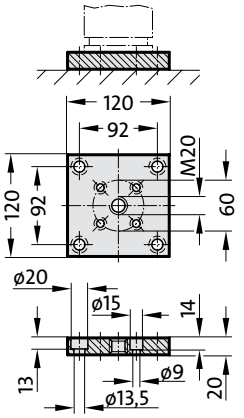


Pressure rise factor accounts for displacement but not external influences!

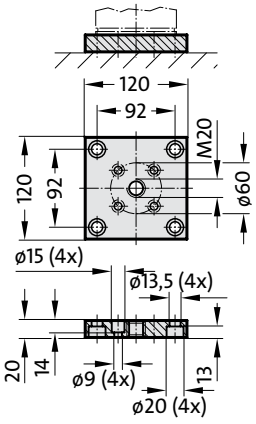
Gas Springs
Mounting Variations

2484.13.03000.

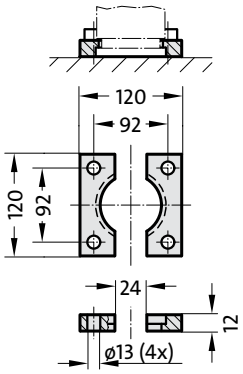
2480.011.03000



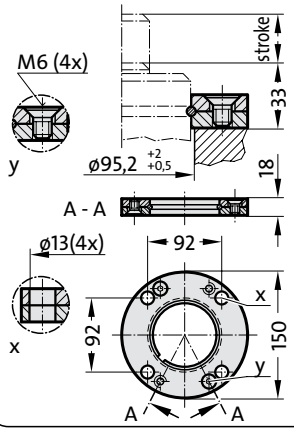
2480.011.03000.2



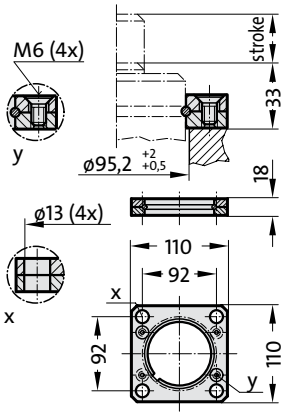
2480.022.03000



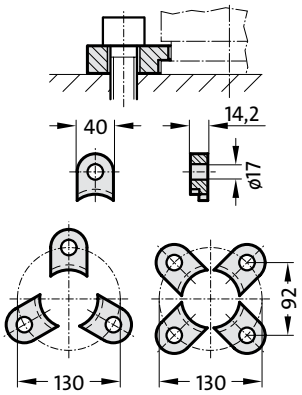
2480.055.03000



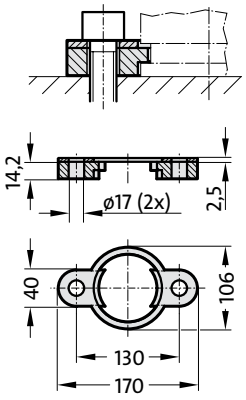
2480.057.03000



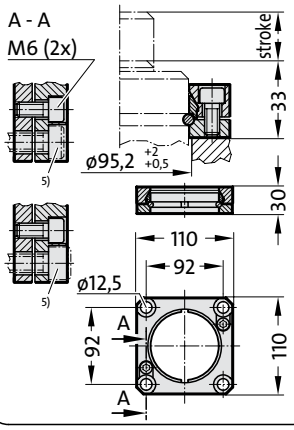
2480.007.03000



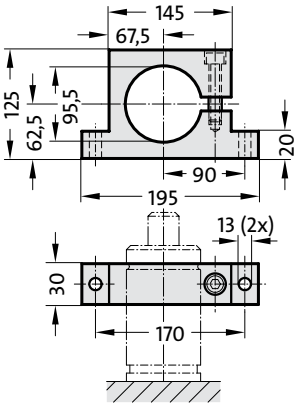
2480.008.03000 3)



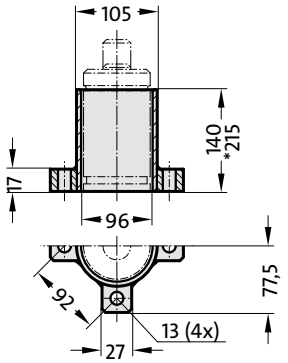
2480.064.03000 4)



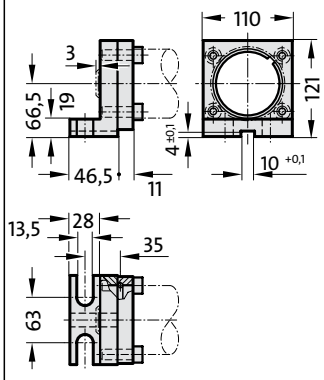
2480.044.03000 2)



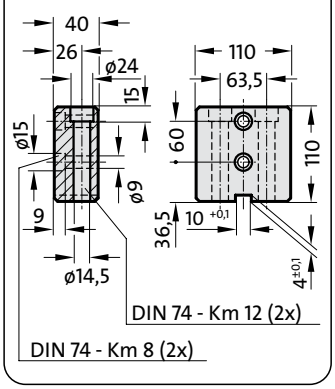
2480.010.03000.140 3)
2480.010.03000.215* 3)



2480.045.03000 2)



2480.047.03000 2)



Notes:

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).

FIBRO

2484.13.03000.

LCF gas springs, damped

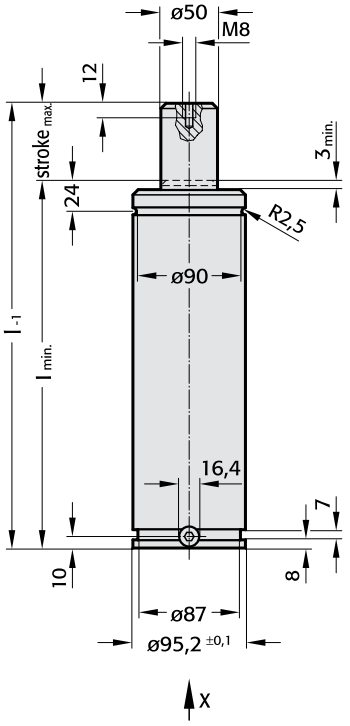
APPROVED PED 97/23/EC

2484.13.03000.

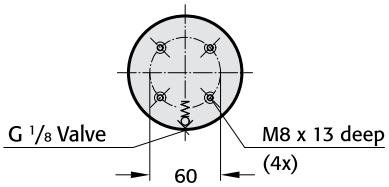
Initial spring force F_{lcf} at 150 bar = 1600 daN
Full spring force after 3.8 mm damped spring travel

Order No	stroke max.	l_{min}	l
2484.13.03000.025	25	145	170
038	38,1	158,1	196,2
050	50	170	220
063	63,5	183,5	247
080	80	200	280
100	100	220	320
125	125	245	370
160	160	280	440
200	200	320	520
250	250	370	620
300	300	420	720

2484.13.03000.



View X - Gas spring



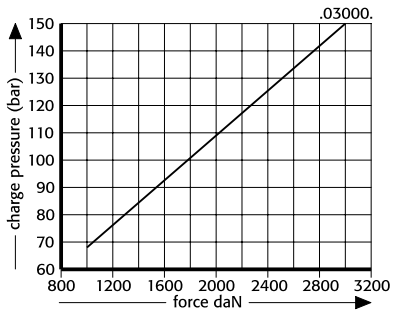
Note:

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

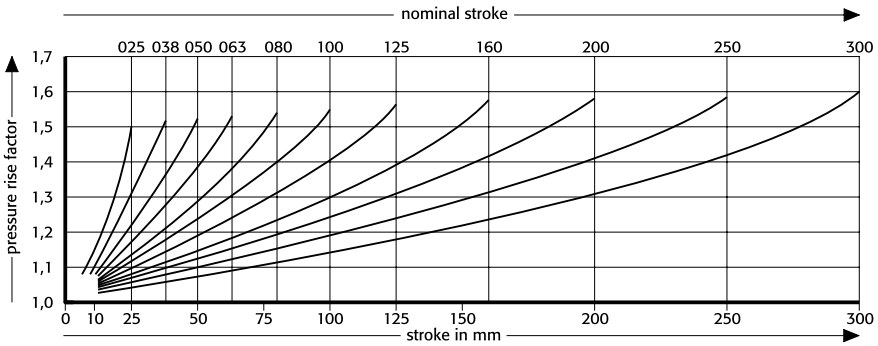
2484.13.03000.

Initial spring force versus charge pressure



2484.13.03000.

Spring force Diagram displacement versus stroke rise

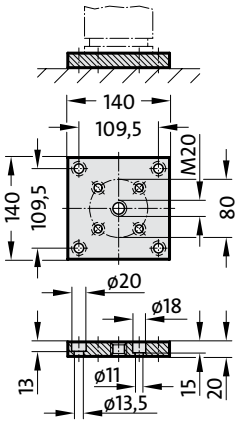


Pressure rise factor accounts for displacement but not external influences!

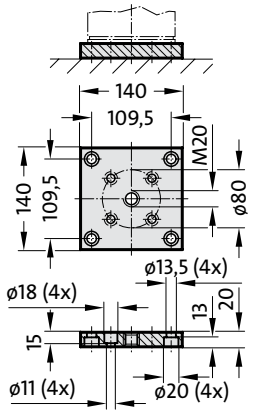
Gas Springs
Mounting Variations

2484.13.05000.

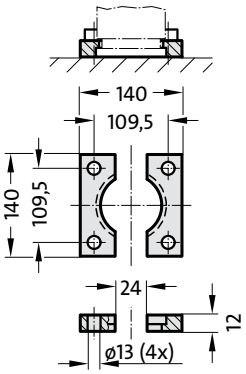
2480.011.05000



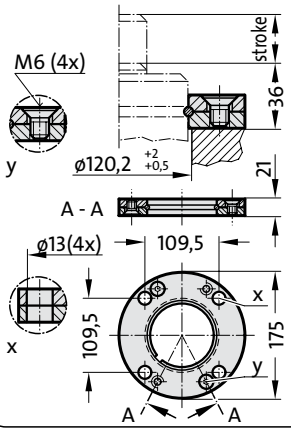
2480.011.05000.2



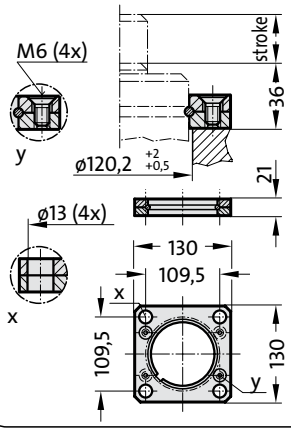
2480.022.05000



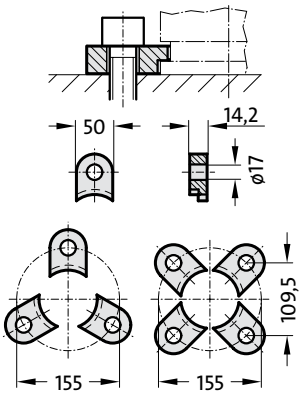
2480.055.05000



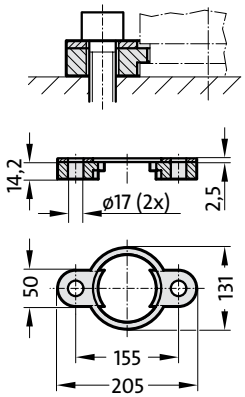
2480.057.05000



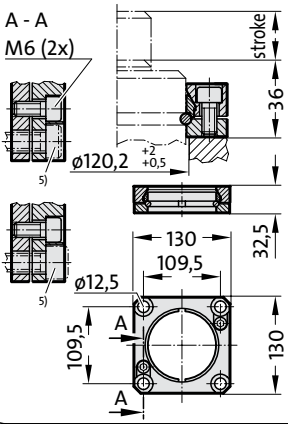
2480.007.05000



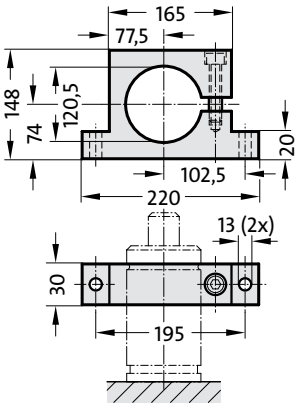
2480.008.05000 [3]



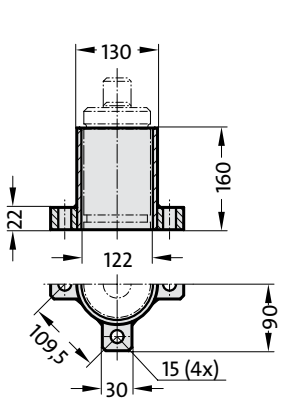
2480.064.05000 [4]



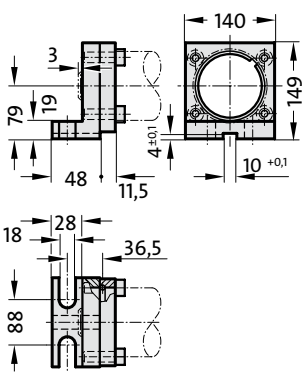
2480.044.05000 [2]



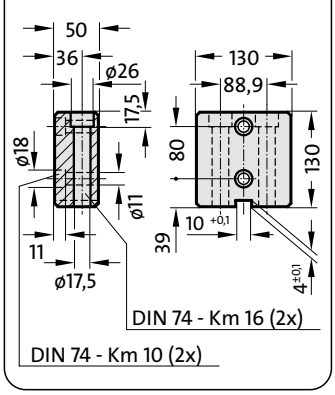
2480.010.05000.160 [3]



2480.045.05000 [2]



2480.047.05000 [2]



Notes:

[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).

FIBRO

2484.13.05000.

LCF gas springs, damped

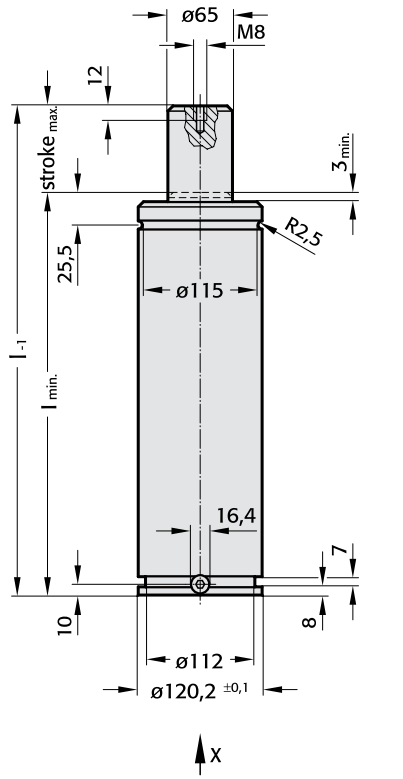
APPROVED PED 97/23/EC

2484.13.05000.

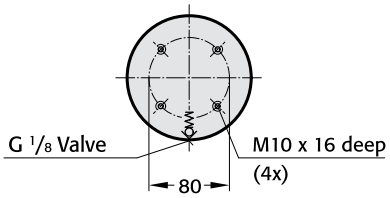
Initial spring force F_{lcf} at 150 bar = 2500 daN
Full spring force after 7.7 mm damped spring travel

Order No	stroke max.	l_{min}	l
2484.13.05000.025	25	165	190
038	38,1	178,1	216,2
050	50	190	240
063	63,5	203,5	267
080	80	220	300
100	100	240	340
125	125	265	390
160	160	300	460
200	200	340	540
250	250	390	640
300	300	440	740

2484.13.05000.



View X - Gas spring



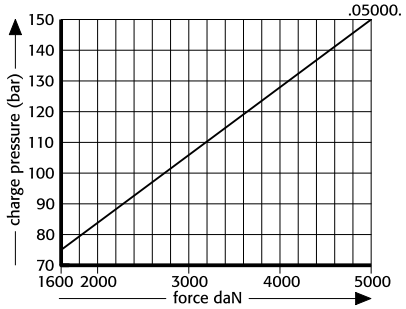
Note:

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

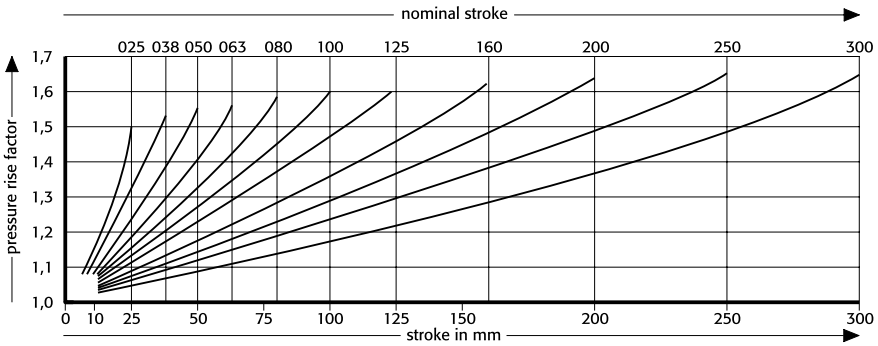
2484.13.05000.

Initial spring force versus charge pressure



2484.13.05000.

Spring force Diagram displacement versus stroke rise

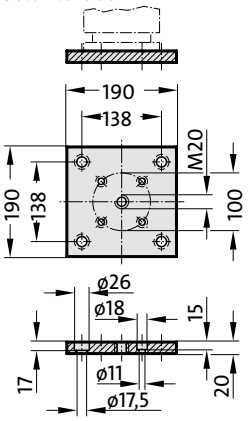


Pressure rise factor accounts for displacement but not external influences!

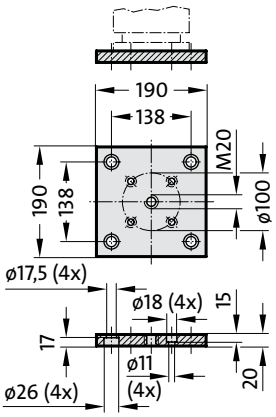
Gas Springs
Mounting Variations

2484.13.07500.

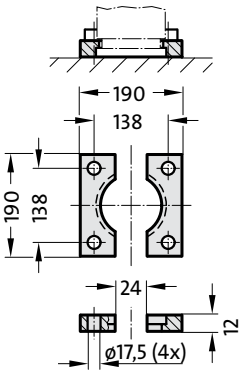
2480.011.07500



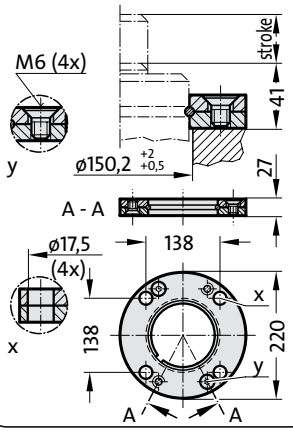
2480.011.07500.2



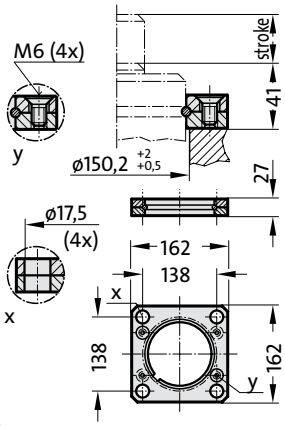
2480.022.07500



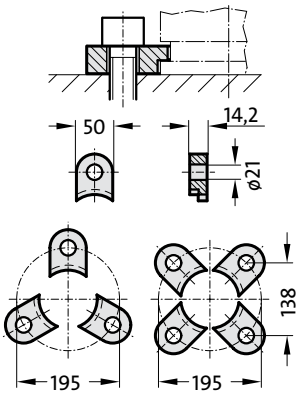
2480.055.07500



2480.057.07500



2480.007.07500



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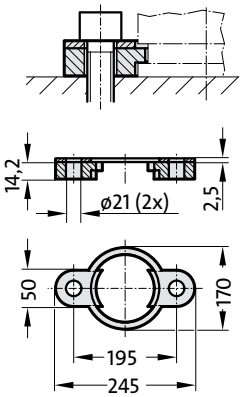
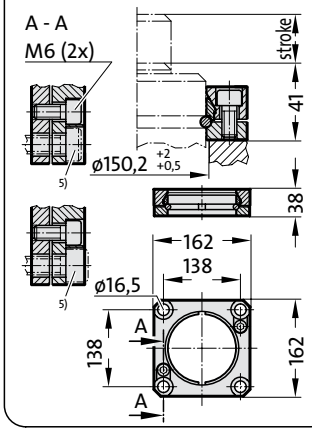
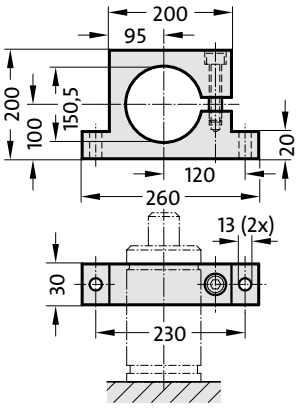


2480.064.07500 [4]



2480.044.07500 [2]



Notes:

[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).

FIBRO

2484.13.07500.

LCF gas springs, damped

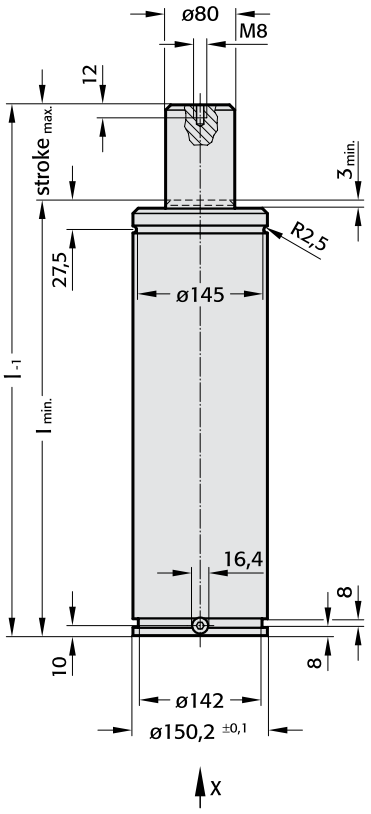
APPROVED PED 97/23/EC

2484.13.07500.

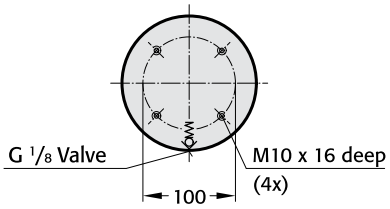
Initial spring force F_{lcf} at 150 bar = 3000 daN
Full spring force after 10.4 mm damped spring travel

Order No	stroke max.	l_{min}	l
2484.13.07500.025	25	180	205
038	38,1	193,1	231,2
050	50	205	255
063	63,5	218,5	282
080	80	235	315
100	100	255	355
125	125	280	405
160	160	315	475
200	200	355	555
250	250	405	655
300	300	455	755

2484.13.07500.



View X - Gas spring



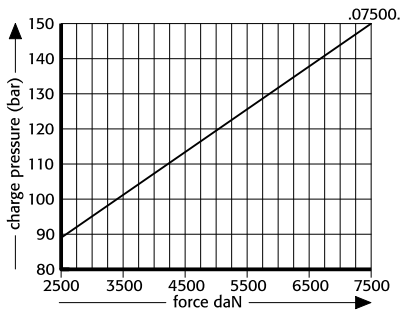
Note:

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

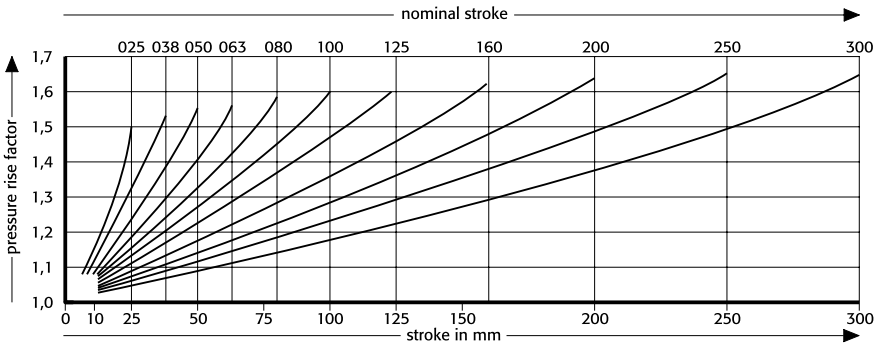
2484.13.07500.

Initial spring force versus charge pressure



2484.13.07500.

Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Controllable Gas Springs

Patented

Please request your catalogue

Air Springs to VW Standard

Please request your catalogue

Manifold-systems

Please request your catalogue

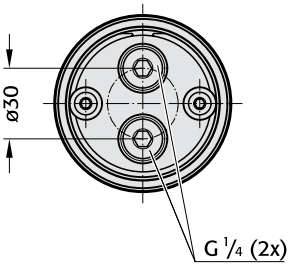
Gas Spring Accessories

Pressure reservoir for reduced pressure rise

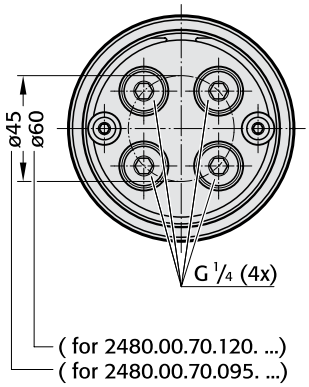
2480.00.70.

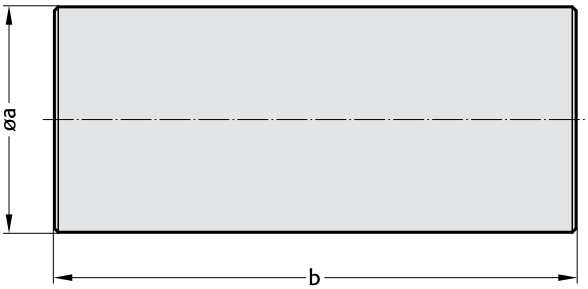
2480.00.70.

Base plate for
for 2480.00.70.075. ...



Base plate for
for 2480.00.70.095. ...
for 2480.00.70.120. ...





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 24º-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 page F282.

2480.00.70.

Order No	Volumen in l (litres)	diameter a	b
2480.00.70.075.0170	0,25	75	170
0250	0,50	75	250
0410	1,0	75	410
2480.00.70.095.0300	1,0	95	300
0500	2,0	95	500
0700	3,0	95	700
0900	4,0	95	900
2480.00.70.120.0360	2,0	120	360
0615	4,0	120	615
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	[dm_2]	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 litre pressure reservoir.

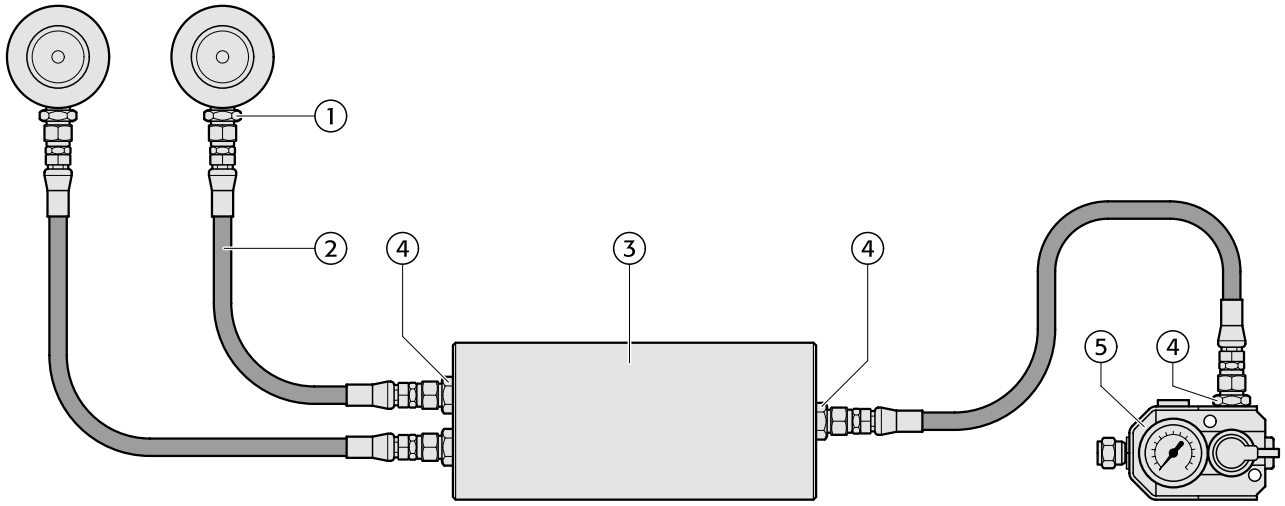
$$\text{Pressure increase} = \frac{8\ \text{l} + (10 \times 0{,}51\ \text{l})}{8\ \text{l} + (10 \times (0{,}51\ \text{l} - 0{,}5\ \text{dm} \times 0{,}332\ \text{dm}^2))} = 1{,}145$$

FIBRO

2480.00.70.

Pressure reservoir for reduced pressure rise

Installaton example: 24°-cone-system

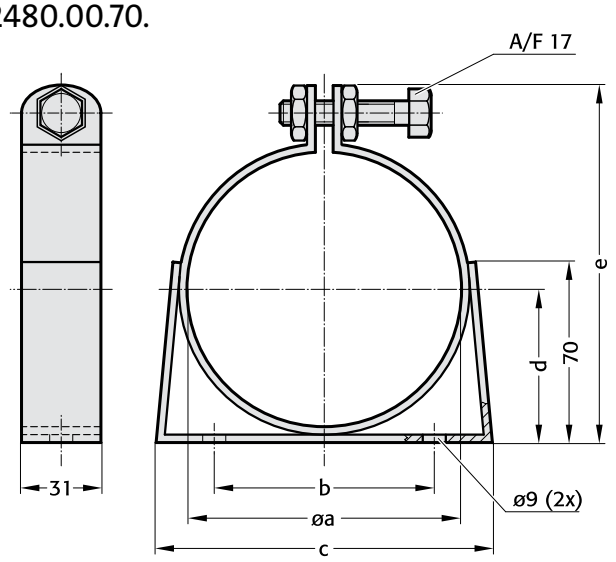


Item	Quantity	Description	Order No
1	2	Connection thread G1/8	2480.00.26.03
2	3	24°-cone-hose	2480.00.25.01.
3	1	Pressure reservoir	2480.00.70. .
4	4	Connection thread G1/4	2480.00.26.04
5	1	Monitoring unit	2480.00.31.01

Mounting clamps for pressure reservoir

2480.00.70.

2480.00.70.



2480.00.70.

Order No	∅a	b	c	d	e
2480.00.70.075	75	80	105	41,5	102
095	95	100	145	51,5	122
120	120	100	145	64	147

Ordering Code (example):

Mounting clamp (1) for pressure reservoir	= 2480.00.70.
Øa = 75 mm	= 075
Order No	= 2480.00.70.075

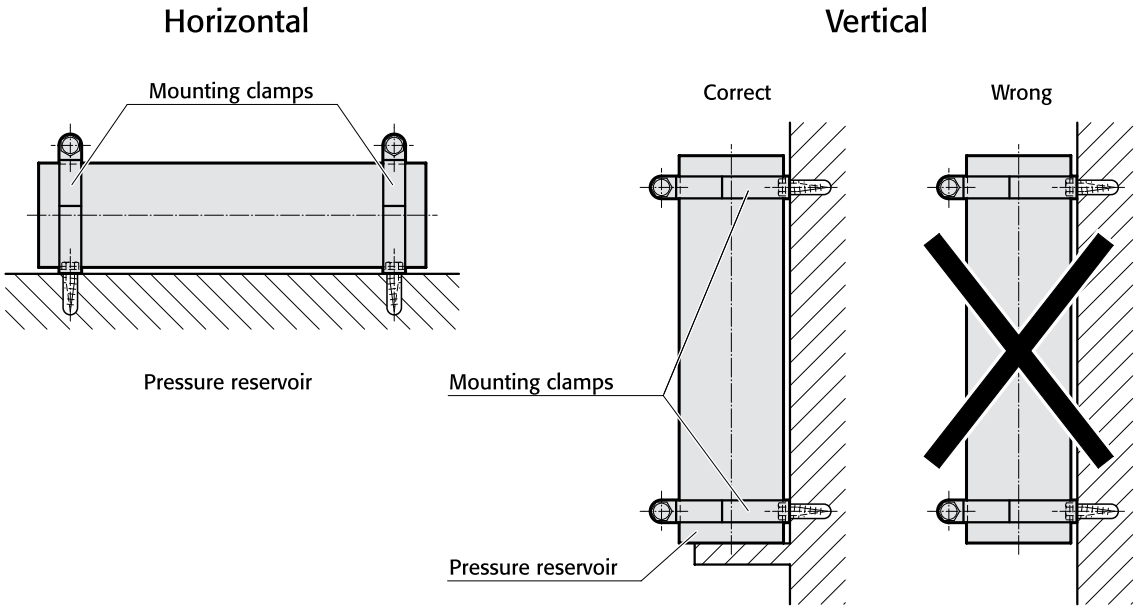
Mounting clamp for pressure reservoir

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.

Installation Example:



FIBRO

2480.015. Pressure Plates, shock absorbing

Description:

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.

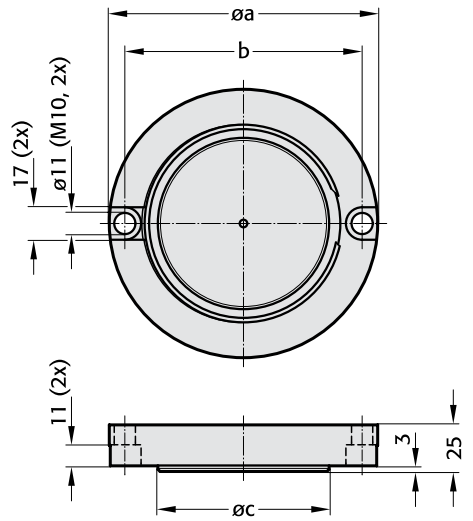
Material:

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

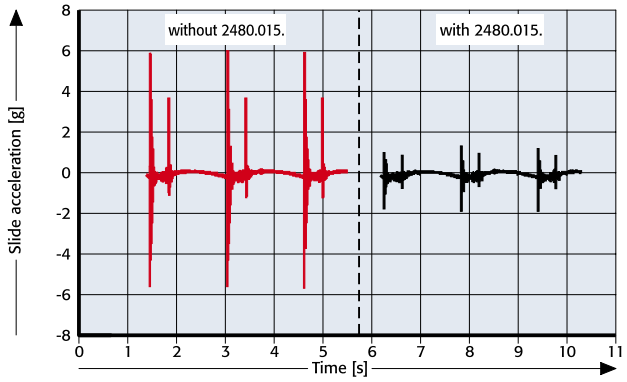
2480.015.

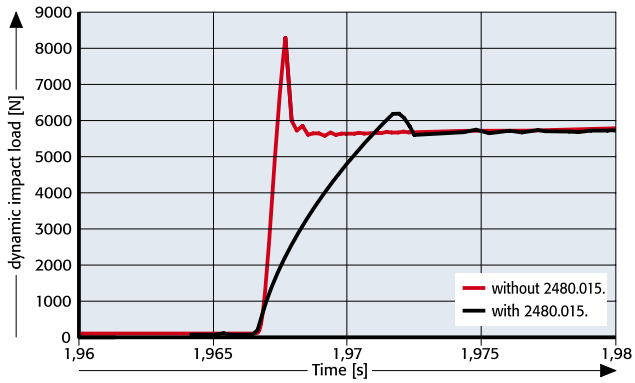


2480.015.

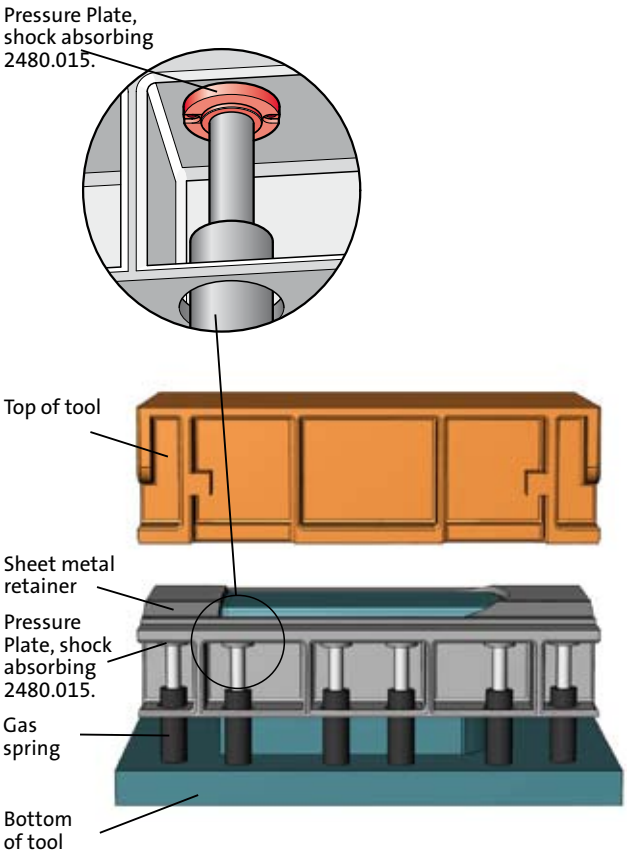
Order No	Gas spring strength	a	b	c
2480.015.01500	750 – 1500	108	91	58
2480.015 05000	> 1500 – 6600	143	126	92
2480.015 10000	> 6600 – 10000	167	150	112

Function





Installation example

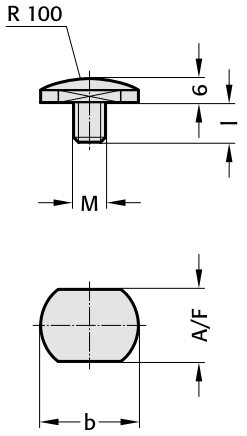


Thrust Pads and Thrust Plates for Gas Springs

2480.004.
2480.009.

2480.004. Thrust Pad

for gas springs with M6 and M8 thread in the piston rod



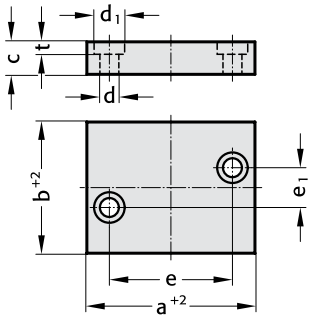
2480.004.

Order No	M	A/F	b	l
2480.004.06	M6	17	20	6
08	M8	19	22,5	11

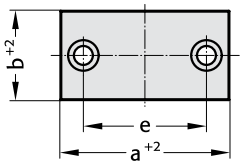
Material:

steel 1.1731, case-hardened

2480.009. Thrust Plate



2480.009. .1 Thrust Plate



2480.009.

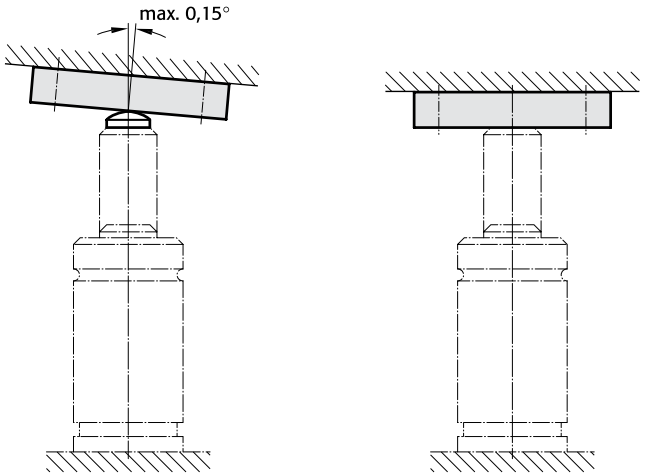
Order No	max. piston rod diameter	a	b	c	d	d_1	e	e_1	t
2480.009.00250	15	50	25	12	7	11	32	8	7
00500	20	55	30	12	7	11	40	14	7
00500.1*	20	55	32	16	9	15	37	–	10
00750	25	70	35	15	9	15	48	14	9
00750.1*	36	65	50	16	9	15	47	–	10
01500	36	75	50	15	9	15	56	30	9
03000	50	85	60	15	9	15	66	40	9
03000.1*	50	80	60	16	9	15	62	–	10
05000	65	100	80	20	11	18	72	56	11
05000.1*	65	80	80	16	9	15	62	–	10
07500	80	110	100	20	11	18	85	75	11
07500.1*	80	100	100	16	9	15	82	–	10

* to Volvo standard

Material:

steel 1.2842, hardened

Installation Examples:



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.

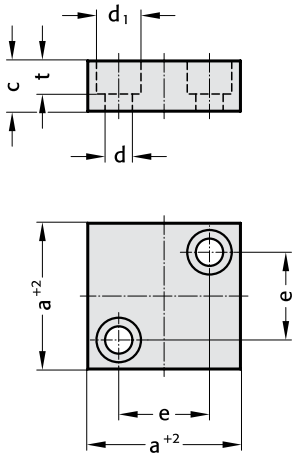
Note:

Especially with gas springs of large stroking capacity we recommend the use of the pad plate combination!

FIBRO

2480.018.
2480.019. Thrust Plates for Gas Springs

2480.018. Thrust Plate
2480.019. Thrust Plate



2480.018./2480.019.

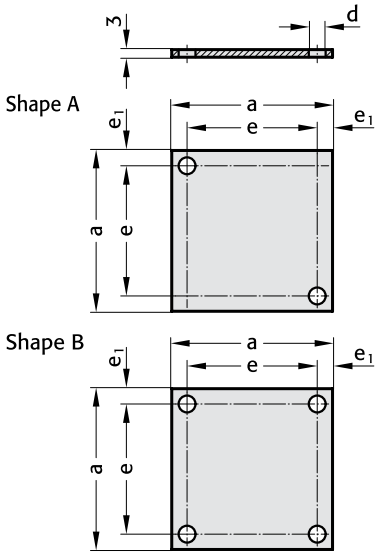
Order No	max.piston rod diameter	a	c	d	d_1	e	t
2480.018.01500	65	90	12	9	15	64	9
2480.019.00100	15	40	15	9	15	21	10
00100.2*	15	40	15	7	11	24	7
00750	25	56	20	11	18	32	13
03000	50	71	20	11	18	48	13
03000.2*	50	70	15	9	15	50	9
03000.1	80	90	20	11	18	67	13
07500.2*	80	90	15	9	15	70	9
07500	95	140	20	11	18	110	13

* to VDI 3003

Material:

steel 1.2842, hardened

2480.019.45. Thrust Plate



2480.019.45.

Order No	shape	max. piston rod-diameter	a	e_1	e	d
2480.019.45.00750	A	50	70	10	50	11
2480.019.45.01500	A	80	90	10	70	11
2480.019.45.03000	B	95	105	10	85	11
2480.019.45.05000	B	95	125	10	105	11
2480.019.45.07500	B	95	150	12,5	125	13
2480.019.45.10000	B	95	190	12,5	165	13

Material:

steel 1.2842, hardened

Concertina Shrouds 2480.080.

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

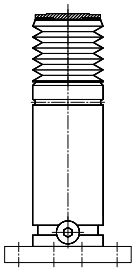
Material	Concertina Shroud:	CSM-Rubber 65 ±3 Shore A
	Disc:	Steel burnished
	Ring:	stainless Steel
Temperature range:		0-90 °C
Chemical resistance	Acids:	very good
	Alkaline solutions:	very good
	Solvents:	sufficient
Weather resistance	Sun light (UV):	good
	Ozone:	very good
	Water:	sufficient
Oil resistance	Mineral:	good
	Synthetic:	sufficient

Delivery:

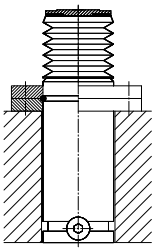
Concertina shroud incl. rotatable disk and countersunk screw.

Custom dimensions/materials available on request.

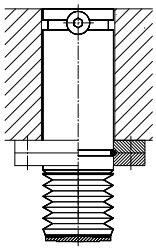
Mounting Examples: Concertina Shroud

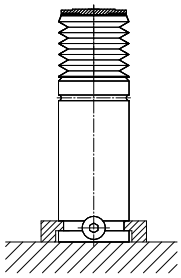


screw mounted at the bottom with 2480.011.

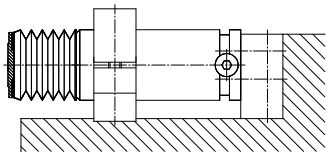


fixed with 2480.055./057./064.

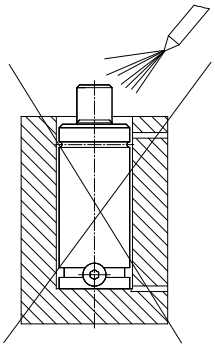


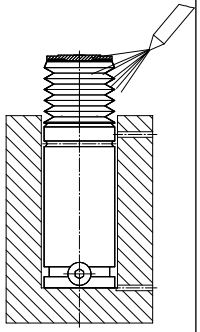


fixed with 2480.007./008.



fixed with 2480.044./045./047.



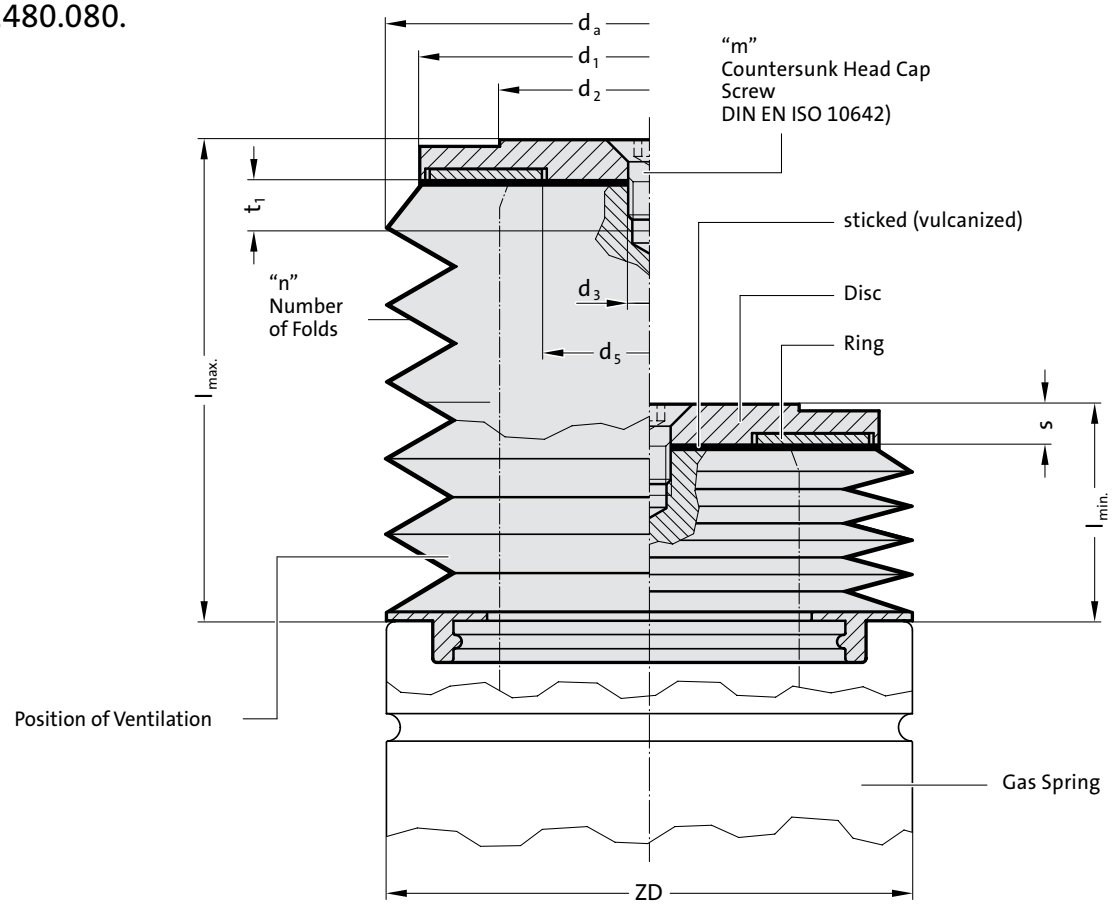


installed loose in the bore

More mounting examples for Gas Springs see page „Mounting Directions for Gas Springs“

2480.080. Concertina Shrouds

2480.080.



Type of Gas Spring	2487.12.00350.	2487.12.00500.	2480.12.00500.	2487.12.00750..1	2480.13.00750.	2487.12.01000..1 2488.12.01000.	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
da	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 x 8	M6 x8	M6 x 12	M6 x8	M8x12	M6x10	M6x10	M8x12	M6x10	M8x12	M8x12	M8x12	M8x12	M16x25	M8x12
Stroke	125 (Stroke ≤ 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 for 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	= 2480.080.	Concertina Shroud	= 2480.080.
ZD = 120 mm	= 120.	ZD = 120 mm	= 120.
d_2/KD = 65 mm	= 065.	d_2/KD = 65 mm	= 065.
Stroke = 125 (Stroke ≤ 125 mm)	= 125	Stroke = 300 (Stroke > 125 mm)	= 300
Order No.	= 2480.080.120.065.125	Order No.	= 2480.080.120.065.300

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 sping 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.

Page F289–F299

+ Small external diameter of hose 0,5 mm
+ Small external diameter of hose 0,5 mm 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.

Page F300–F302

+ 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.

Page F303–F305

+ 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.

Page F306–F309

+ small external hose diameter ø5 mm
+ hose: small bending radius Rmin = 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.

Recommendation 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).

FIBRO

Instruction for Hose Assembly Mounting arrangement for gas springs in the Minimess system

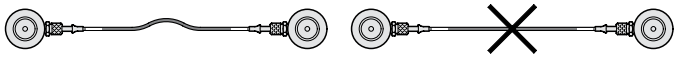
Never exceed the maximum pressures and temperatures for the hoses.

Ensure that all hoses and adaptors are perfectly clean prior to assembly.

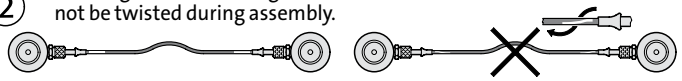
To be suitable for use with compressed gas the hose sheath must be perforated. We recommend the use of the 24°-cone-hose system for pressure reservoir to ensure an unrestricted gas flow.

Follow the instructions below to ensure functionality and maximum service life for the hose connection:

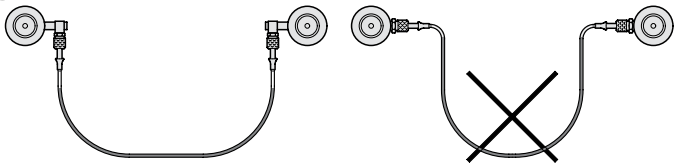
1. Select a hose length to provide a certain amount of play.



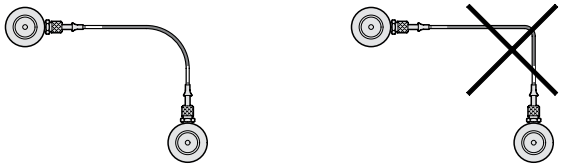
2. The longitudinal marking on the hose must not be twisted during assembly.



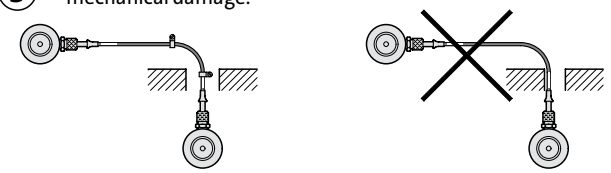
3. Use only hose fittings which prevent kinks forming in the hose.



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.

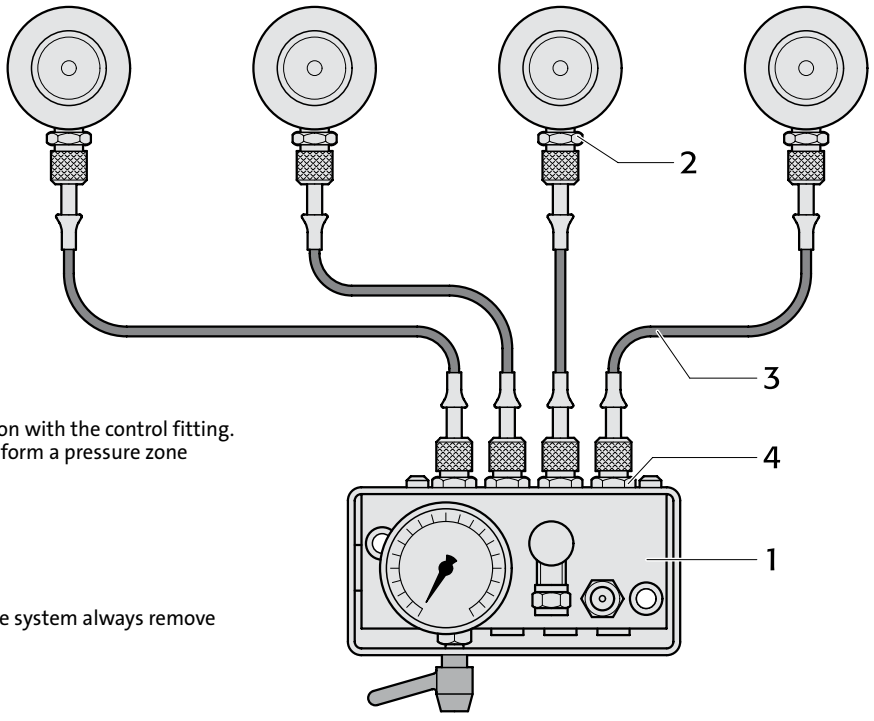
Warning:

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.

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

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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	

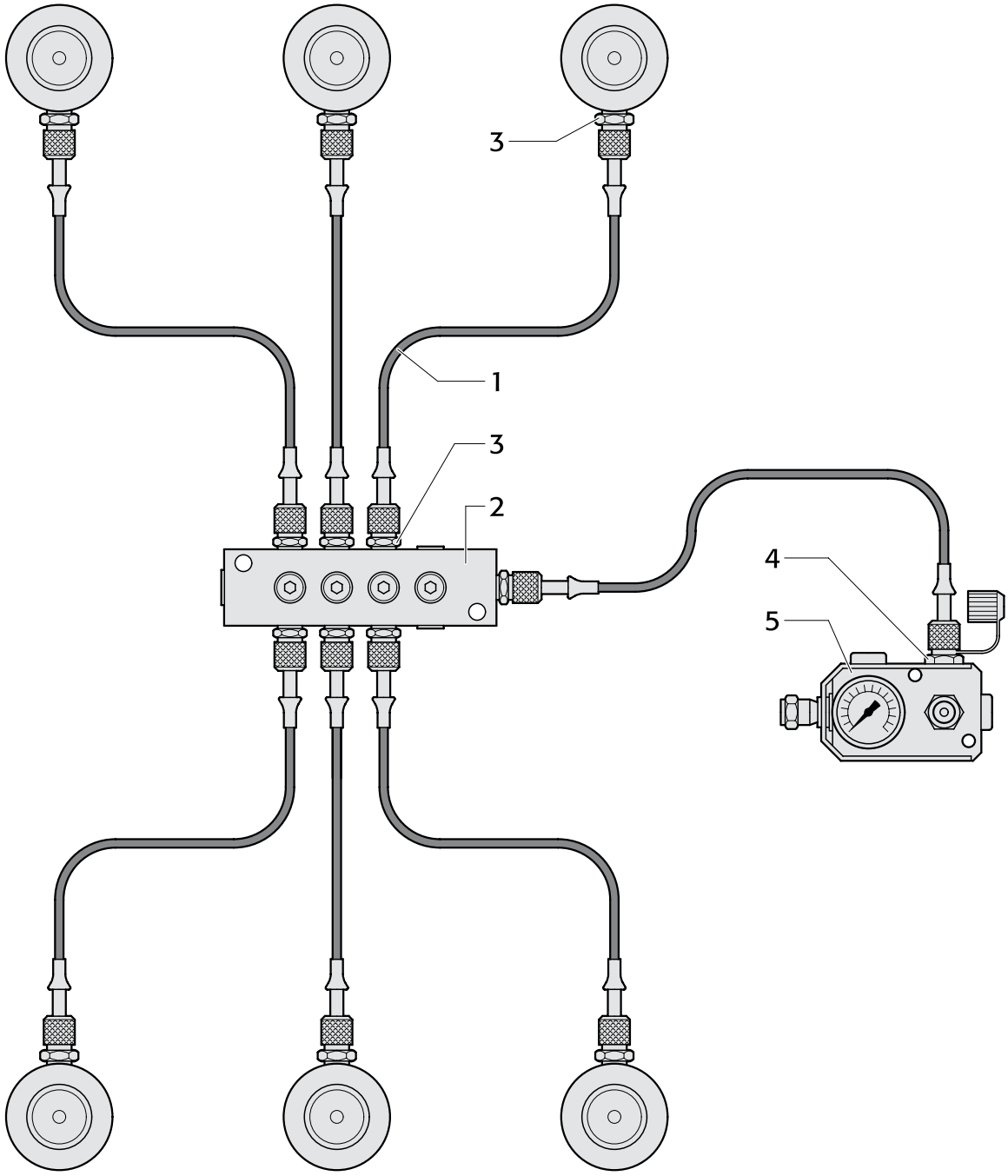
Mounting arrangement for gas springs in the Minimess system

FIBRO

2480.

Example 2:

Group series connection



Function:

The springs are interconnected and there is just one test line to the control fitting.

Note:

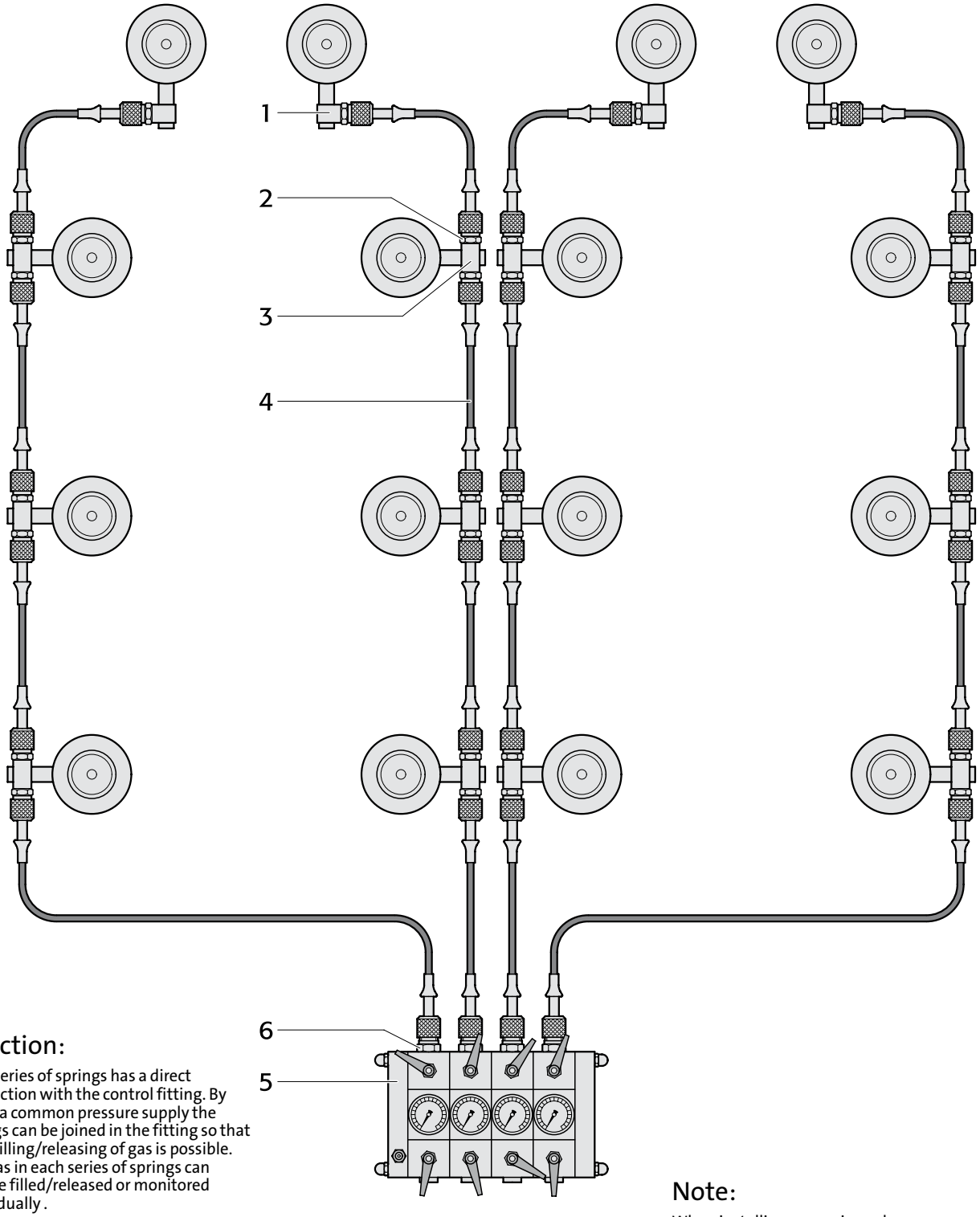
When installing gas springs in the system always remove the valve from the gas spring.

Item	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

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 .

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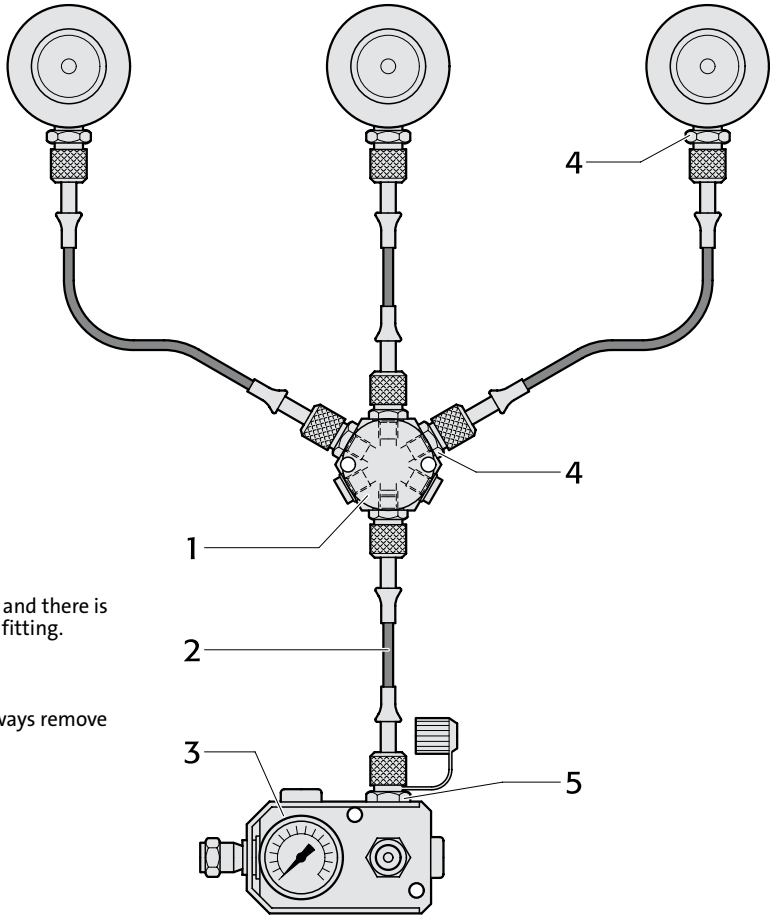
Note:

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	2480.00.39.01.004.1	Options: floor or wall mounted
6	Gauging coupling	4	2480.00.24.02	

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	

Example 4.2:

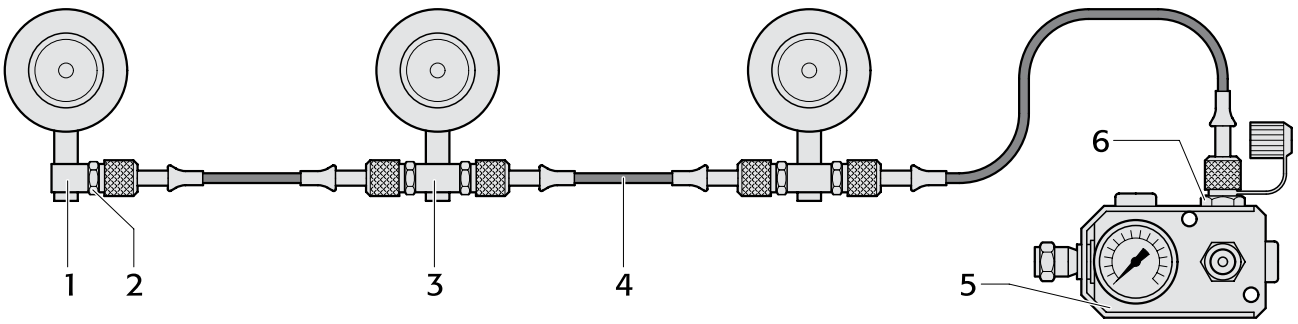
Group series connection

Function:

The springs are interconnected and there is just one test line to the control fitting.

Note:

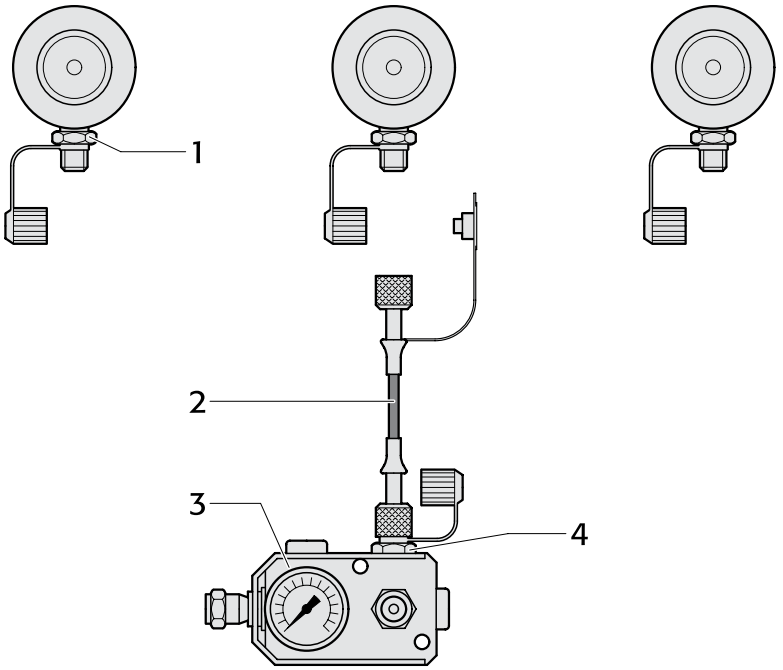
When installing gas springs always remove the valve from the gas spring.



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	

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.

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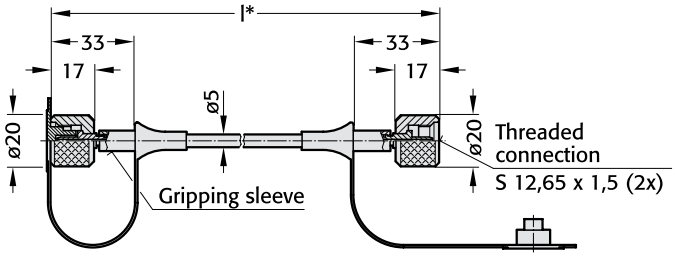
Item	Designation	Number	Order No	Comment
1	Gauging coupling	3	2480.00.24.01	
2	Measuring hose	1	2480.00.23. .	Type of connection and length as required
3	Control fitting	1	2480.00.31.01	
4	Gauging coupling	1	2480.00.24.02	

Gas Spring Accessories
Minimess – Compound Threaded Joints 2480.00.23.

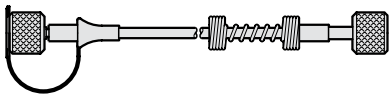
2480.00.23.01.

Gauging hose –
both ends straight



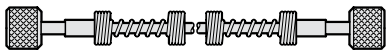
2480.00.23.01.----.1

Antikink spiral, at one end



2480.00.23.01.----.2

Antikink spiral, at both ends



2480.00.23.01.

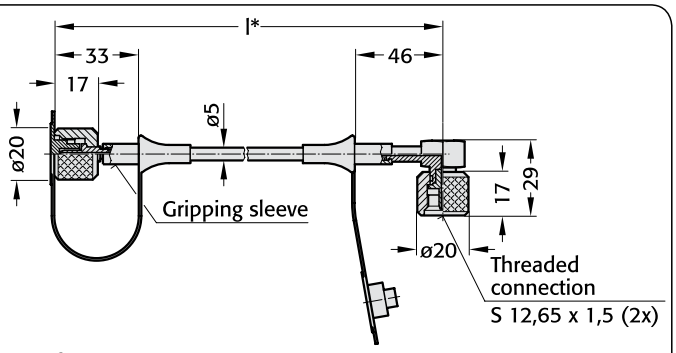
Order No		l*
2480.00.23.01.	0200	200
	0300	300
	0400	400
	0500	500
	0630	630
	0800	800
	1000	1000
	1200	1200
	1500	1500
	2000	2000
	2500	2500
	3000	3000

* other lengths available
shortest factory lengths:

without antikink protection:	90 mm
antikink protection at one end:	150 mm
antikink protection at both ends:	300 mm

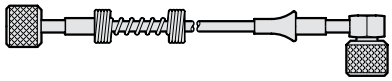
2480.00.23.02.

Gauging hose –
one end straight
90°-angle



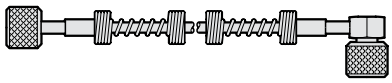
2480.00.23.02.----.1

Antikink spiral, at one end, straight



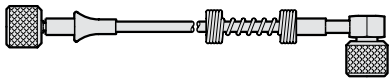
2480.00.23.02.----.2

Antikink spiral, at both ends



2480.00.23.02.----.3

Antikink spiral, at one end, 90°



2480.00.23.02.

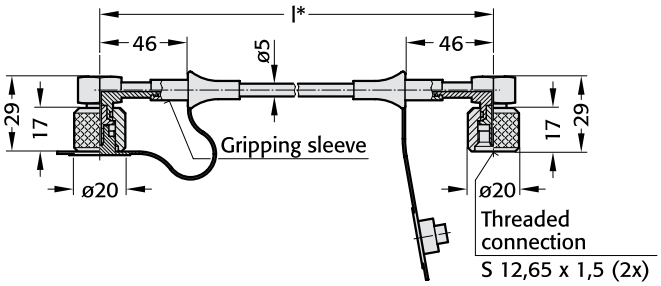
Order No		l*
2480.00.23.02.	0200	200
	0300	300
	0400	400
	0500	500
	0630	630
	0800	800
	1000	1000
	1200	1200
	1500	1500
	2000	2000
	2500	2500
	3000	3000

* other lengths available
shortest factory lengths:

without antikink protection:	90 mm
antikink protection at one end:	150 mm
antikink protection at both ends:	300 mm

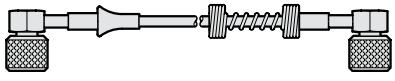
2480.00.23.03.

Gauging hose –
both ends
90°-angle



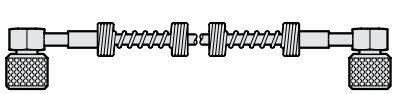
2480.00.23.03.----.3

Antikink spiral, at one end



2480.00.23.03.----.2

Antikink spiral, at both ends



2480.00.23.03.

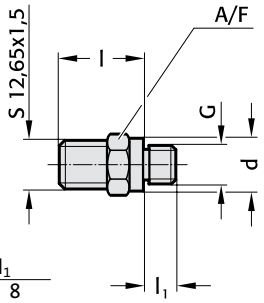
Order No		l*
2480.00.23.03.	0200	200
	0300	300
	0400	400
	0500	500
	0630	630
	0800	800
	1000	1000
	1200	1200
	1500	1500
	2000	2000
	2500	2500
	3000	3000

* other lenghts available
shortest factory lengths:

without antikink protection:	105 mm
antikink protection at one end:	150 mm
antikink protection at both ends:	300 mm

Gauging coupling
2480.00.24.01 with valve
2480.00.24.03 without valve
for connection to gas spring

Gauging coupling
2480.00.24.02 with valve
2480.00.24.04 without valve
for connection to control fitting



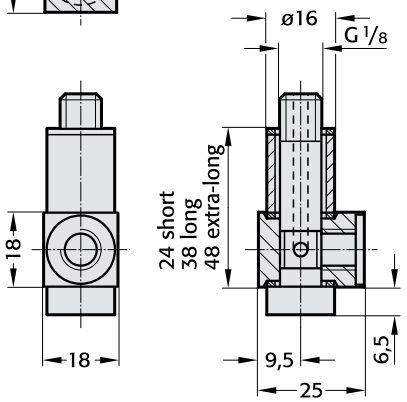
Order No	G	d	A/F	l	l_1
2480.00.24.01	G 1/8	14	14	22	8
2480.00.24.02	G 1/4	19	19	21	10
2480.00.24.03	G 1/8	14	14	22	8
2480.00.24.04	G 1/4	19	19	21	10

Note:

The gauging coupling with valve is used in standard permanent connections. The valveless gauging coupling is used in systems where changes to the filling pressure are necessary on a regular basis (e.g. die cushions).

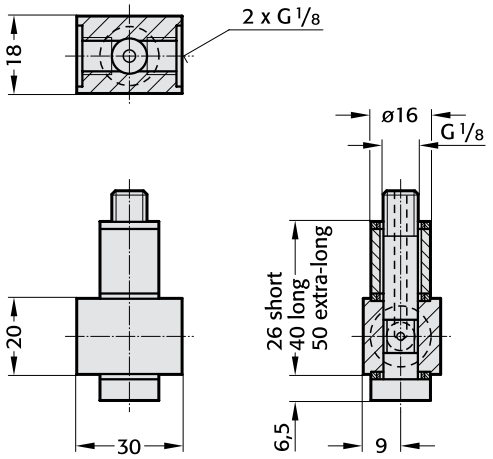
2480.00.24.16 long
2480.00.24.17 short
2480.00.24.18 extra-long

Single adapter



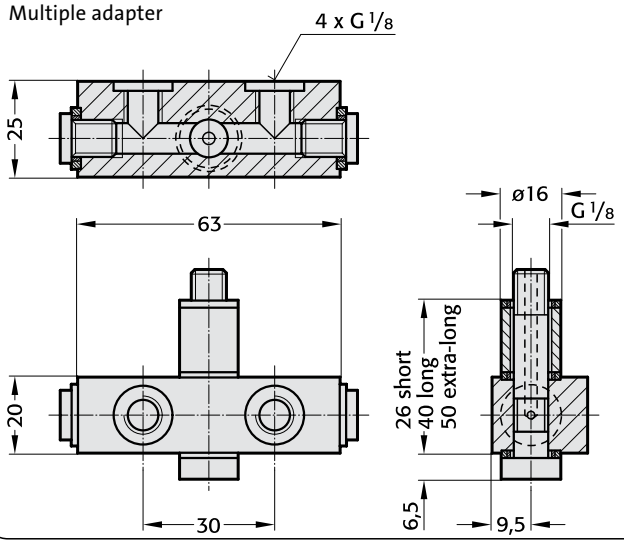
2480.00.24.13 long
2480.00.24.14 short
2480.00.24.15 extra-long

Dual adapter



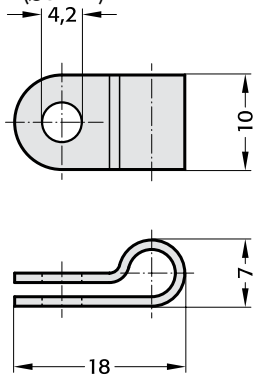
2480.00.24.10 long
2480.00.24.11 short
2480.00.24.12 extra-long

Multiple adapter



2480.00.23.12.01

Hose clamp for gauging hose
DN2 (⌀5 mm)

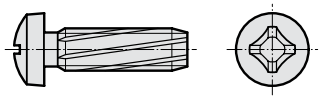


Material: Polyamide

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	7 mm
For hose/tubing outer-Ø	max. 5-25 mm
Temperature range	-30 °C to +100 °C

Material:
Polyamide

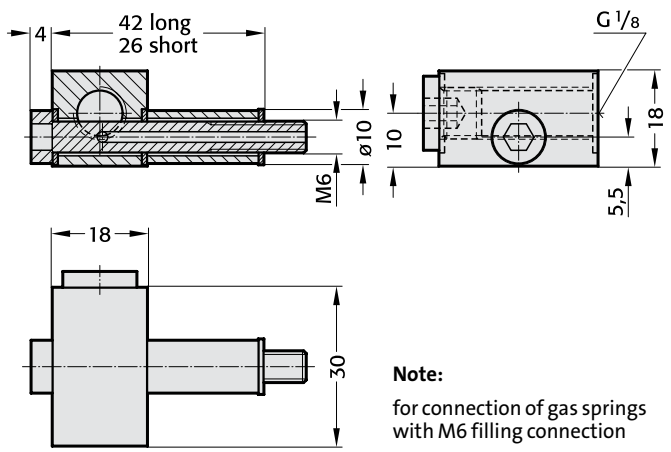
Description:

The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

Gas Spring Accessories
Minimess – Compound Threaded Joints 2480.00.24.

2480.00.24.53 horizontal, long
2480.00.24.54 horizontal, short

Double adapter

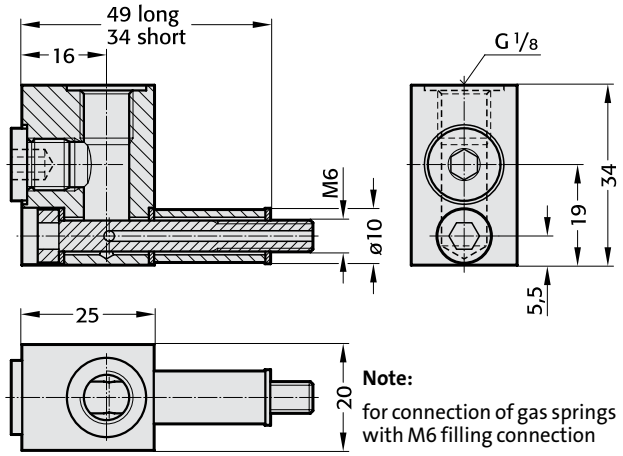


Note:

for connection of gas springs with M6 filling connection

2480.00.24.56 vertical, long
2480.00.24.57 vertical, short

Double adapter

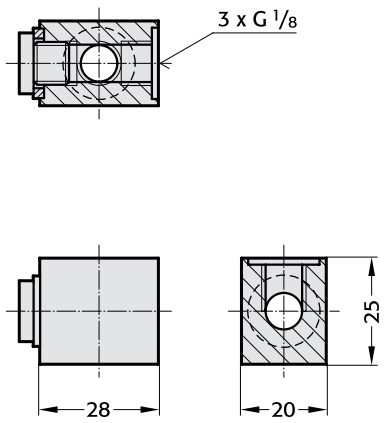


Note:

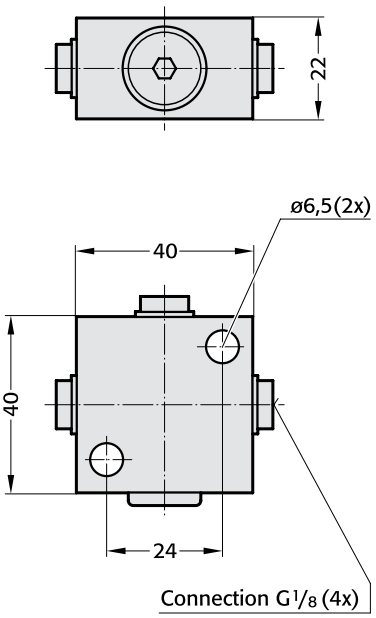
for connection of gas springs with M6 filling connection

Gas Spring Accessories
Minimess – Compound Threaded Joints 2480.00.24.

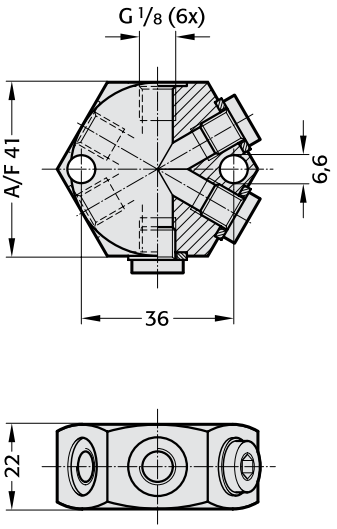
2480.00.24.30
Distributor block G 1/8
3 ports



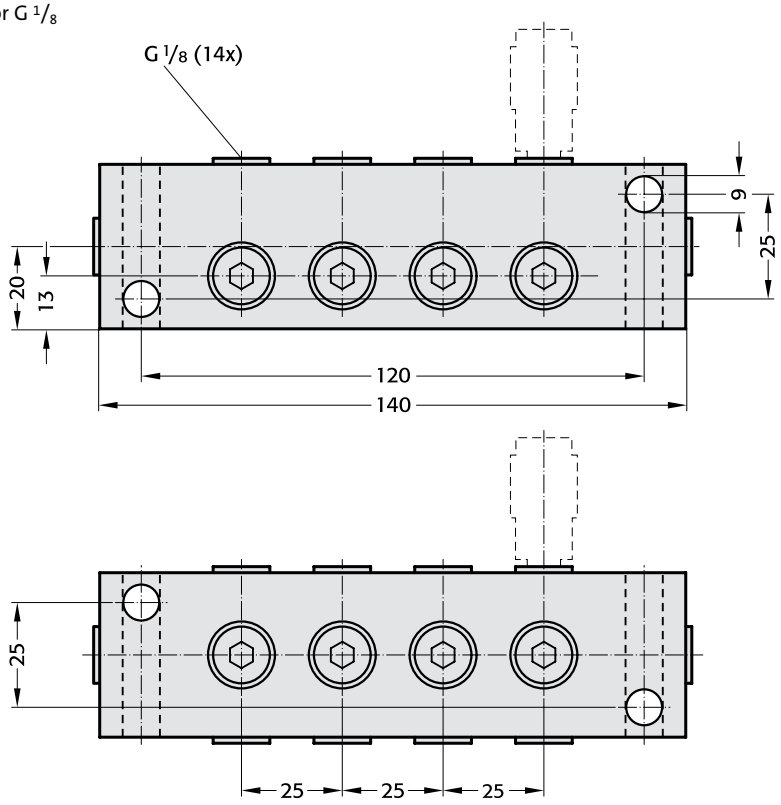
2480.00.24.34
Distributor block G 1/8
4 ports



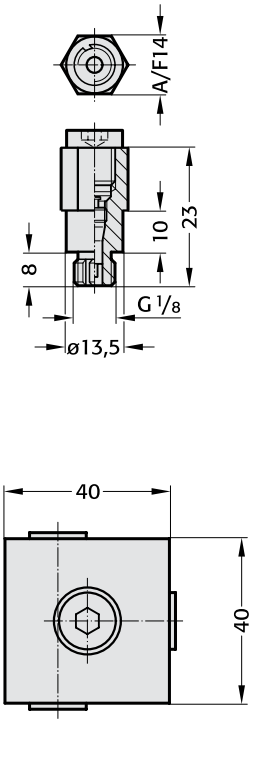
2480.00.24.31
Distributor block G 1/8
6 ports



2480.00.24.33
Distributor G 1/8
14 ports

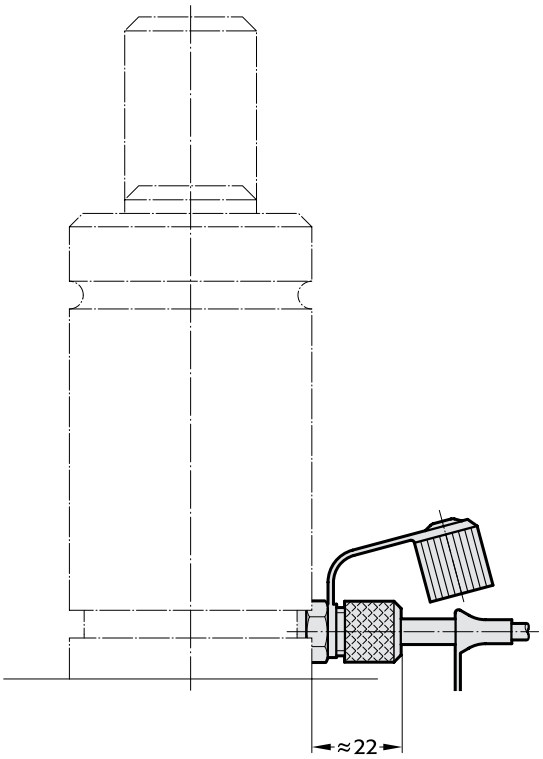


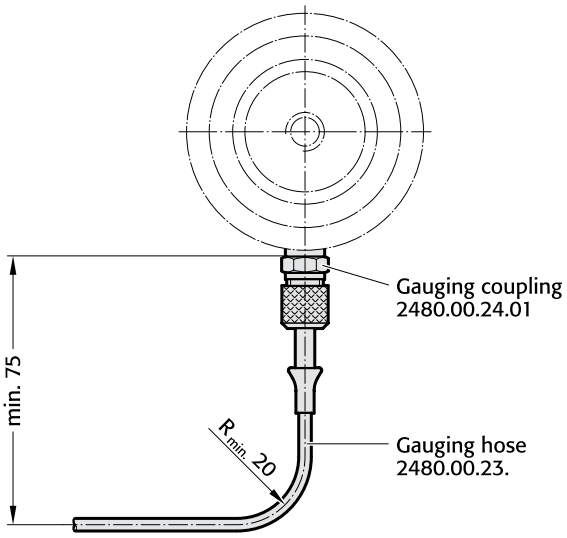
2480.00.40
Charging Adapter



2480.00.24.01

Gauging coupling with valve installed

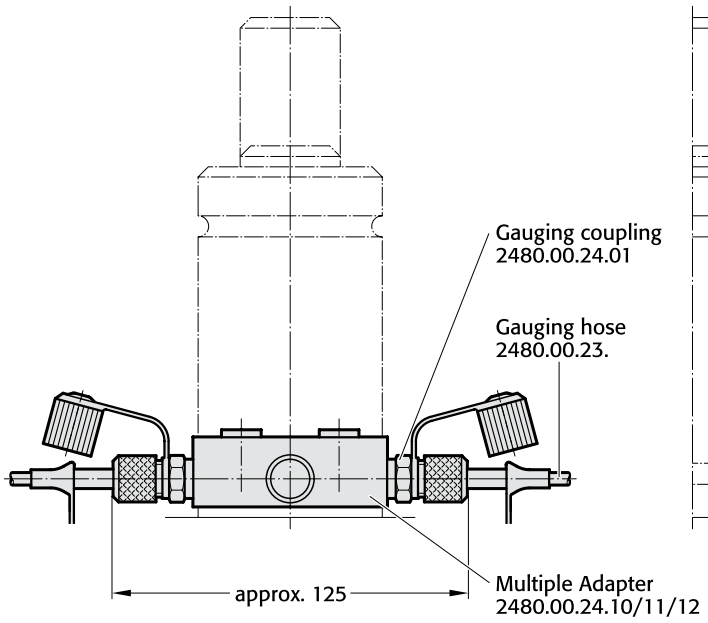




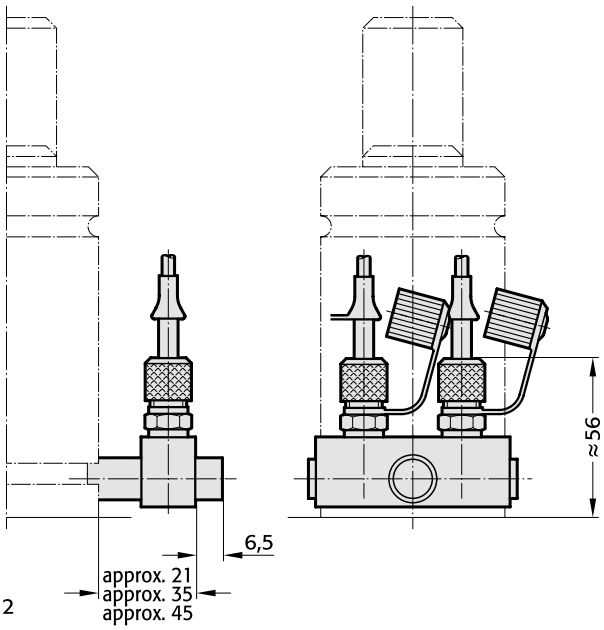
2480.00.24.10 long
11 short
12 extra-long

Multiple adapter with two gauging couplings

connected horizontally



connected vertically

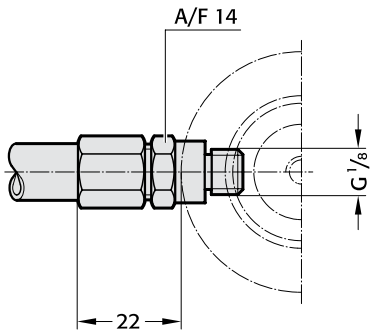


Note:

When installing or fitting a gauging coupling the valve must be removed from the gas spring.

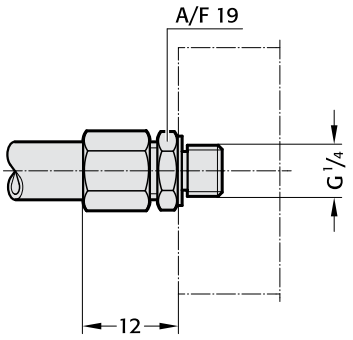
2480.00.10.01

Direct connector to gas spring



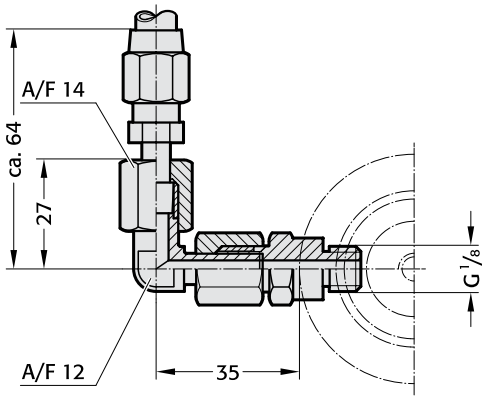
2480.00.10.03

Direct connector to control fitting



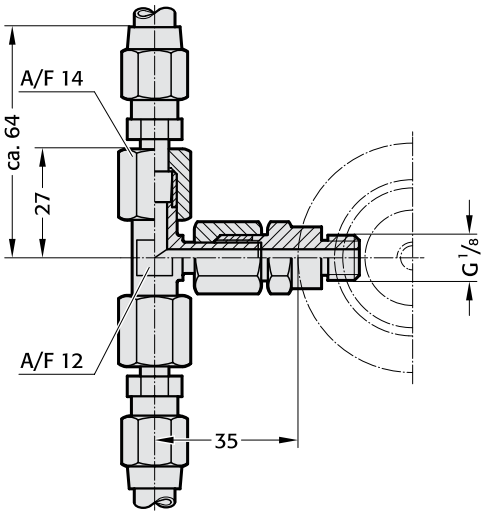
2480.00.10.10

angle connector, adjustable



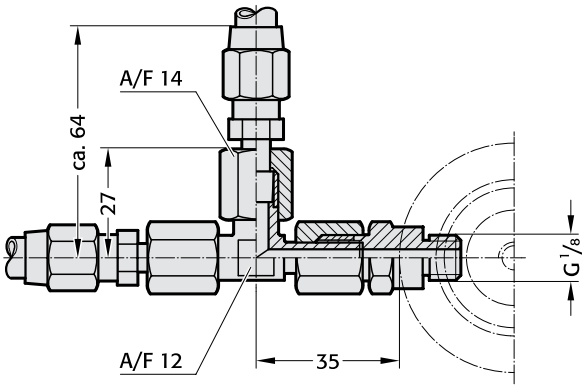
2480.00.10.11

T-connector, adjustable



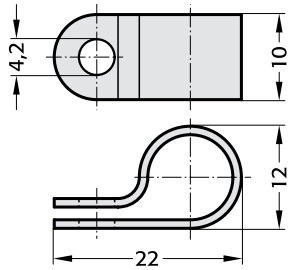
2480.00.10.12

L-connector, adjustable



2480.00.10.20.12.01

Hose clamp for gauging hose DN4 (ø9 mm)

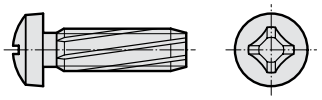


Material: Polyamide
Note:
Supplied without screws

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. 5-25 mm
Temperature range -30 °C to +100 °C

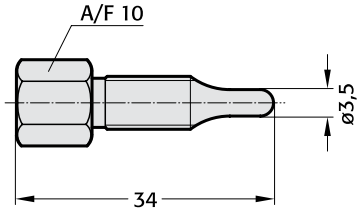
Material:
Polyamide

Description:

The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

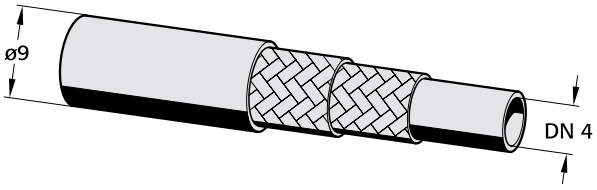
2480.00.54.01

Expansion punch for hosing



2480.00.10.20.

High-pressure hose

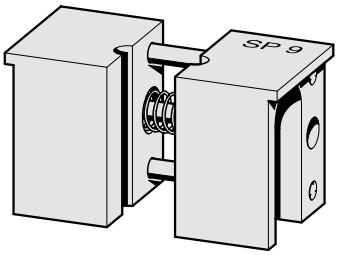


Ordering Code (example):

High pressure	=	2480.00.10.20.
length 10 m	=	0010
Order No	=	2480.00.10.20.0010

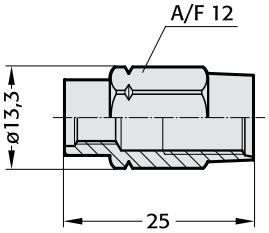
2480.00.54.02

Vice jaws for holding high-pressure hose



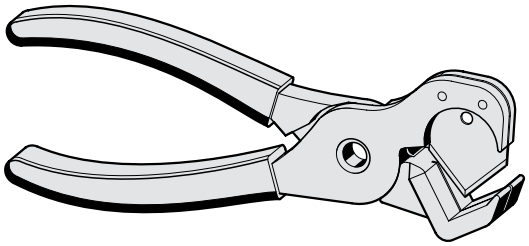
2480.00.10.21

Hose screw fitting (female)



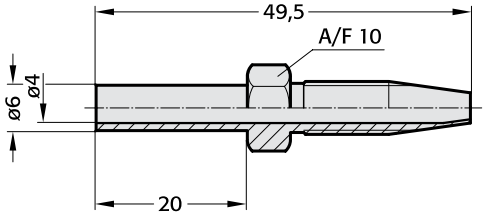
2480.00.54.03

Hose shears



2480.00.10.22

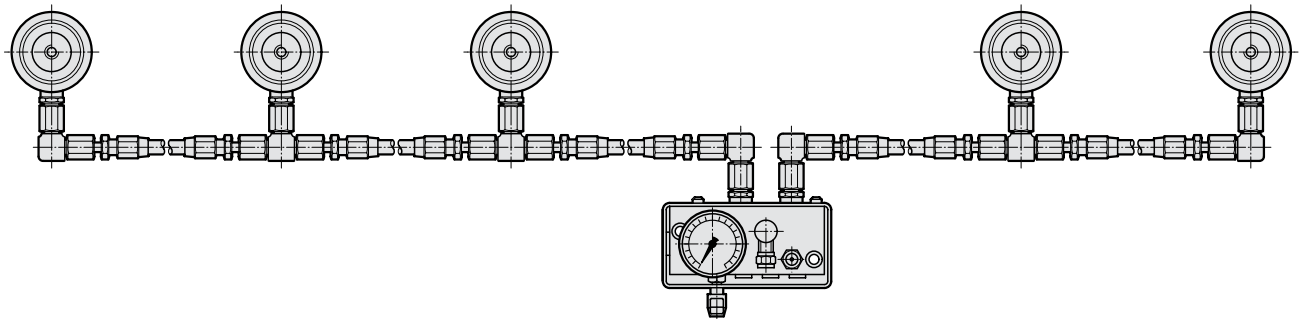
Hose screw fitting (male)

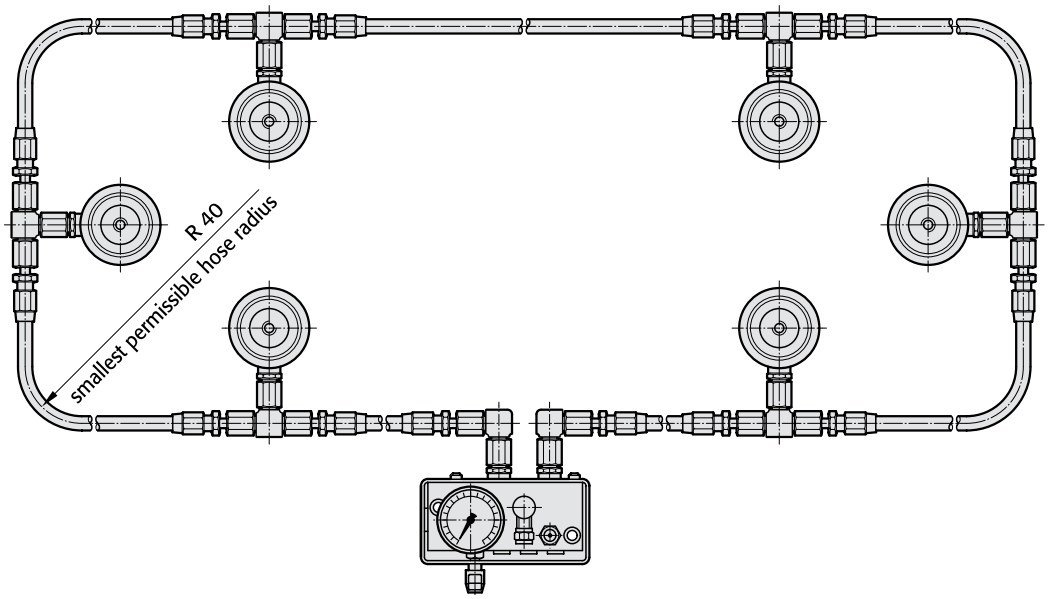


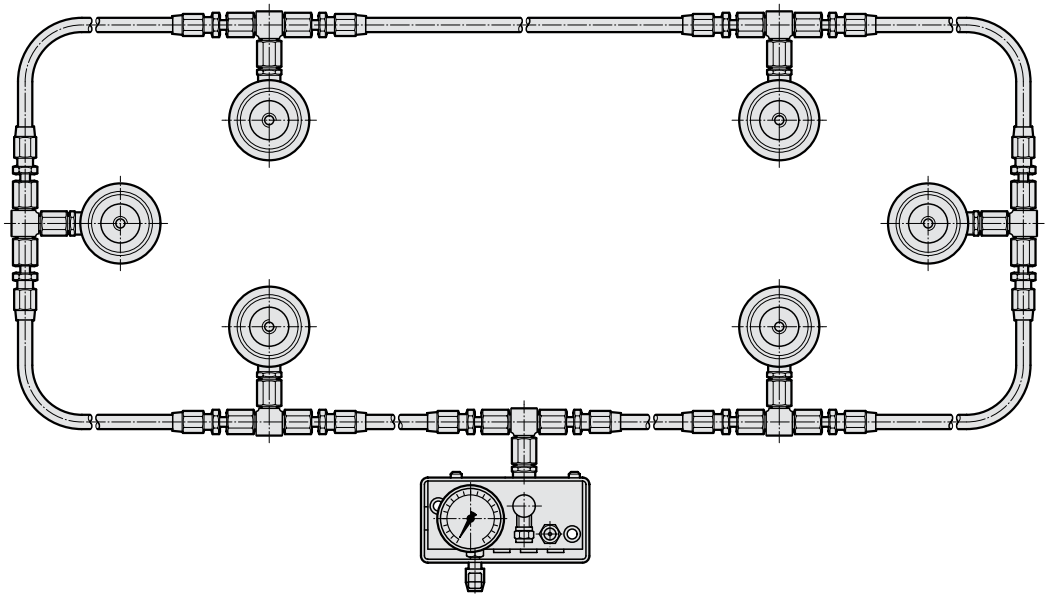
Assembly Arrangenment of Gas Springs in Servial Connection Compression Fitting

FIBRO

2480.00.10



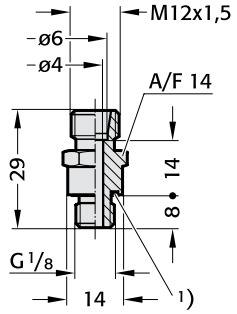




Note: When installing gas springs always remove the valve from the gas spring.

2480.00.26.03

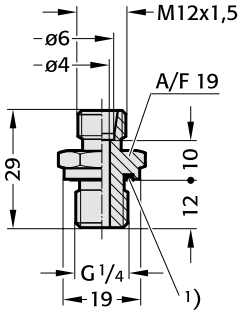
Threaded Joint G1/8



1) Eolastic-Seal ED

2480.00.26.04

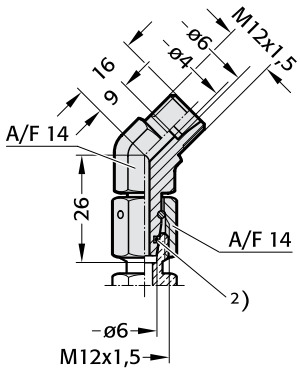
Threaded Joint G1/4



1) Eolastic-Seal ED

2480.00.26.21

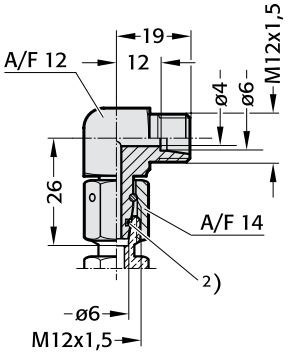
Adjustable threaded joint
45°, complete



2) O-ring

2480.00.26.22

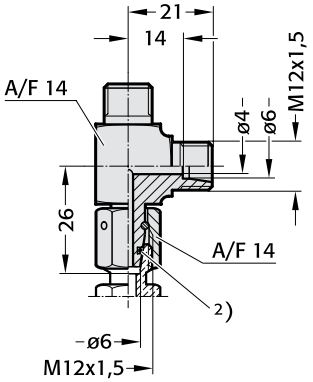
Adjustable threaded joint
90°, complete



2) O-ring

2480.00.26.23

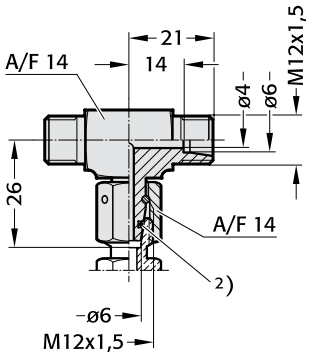
Adjustable L-Coupling,
complete



2) O-ring

2480.00.26.24

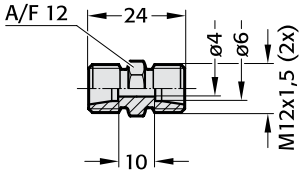
Adjustable T-Coupling,
complete



2) O-ring

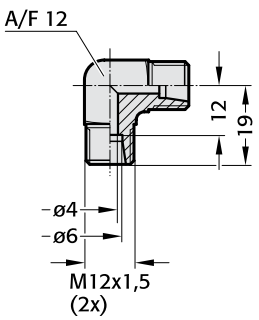
2480.00.26.25

Adapter straight,
hose to hose



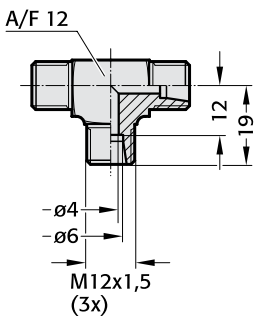
2480.00.26.26

Adapter, 90°,
hose to hose



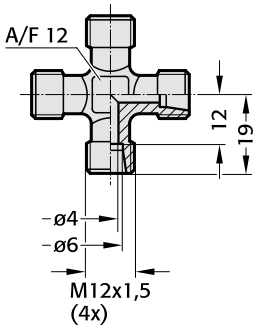
2480.00.26.27

Adapter, T,
hose to hose



2480.00.26.28

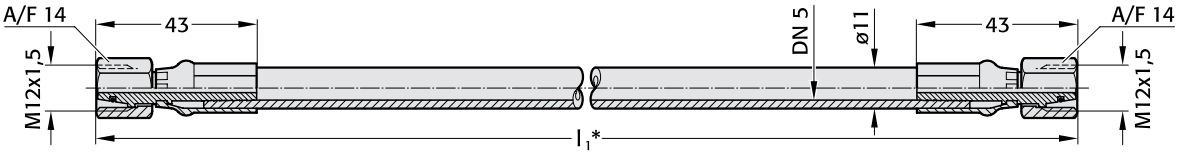
Adapter, K,
hose to hose



2480.00.25.01.

* Shortest factory lengths: 140 mm
minimum bending radius R40

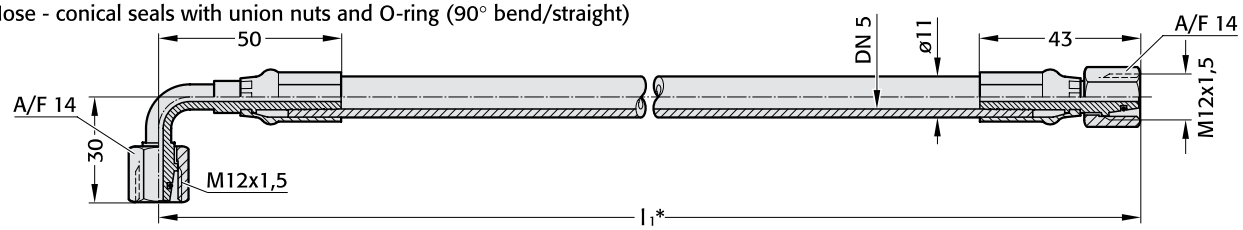
Hose - conical seals with union nuts and O-ring (straight/straight)



Dimension l_1 specified in the order, e.g. 765 mm, gives order no 2480.00.25.01.0765

2480.00.25.02.

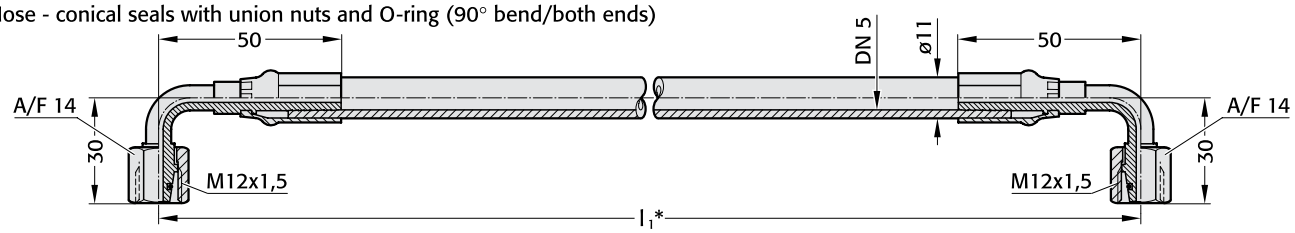
Hose - conical seals with union nuts and O-ring (90° bend/straight)



Dimension l_1 specified in the order, e.g. 765 mm, gives order no 2480.00.25.02.0765

2480.00.25.03.

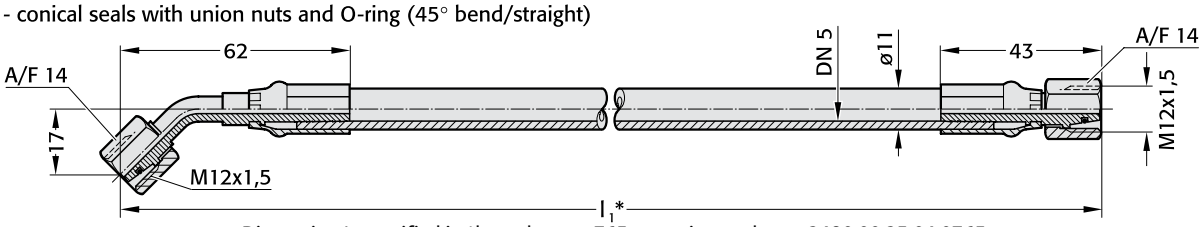
Hose - conical seals with union nuts and O-ring (90° bend/both ends)



Dimension l_1 specified in the order, e.g. 765 mm, gives order no 2480.00.25.03.0765

2480.00.25.04.

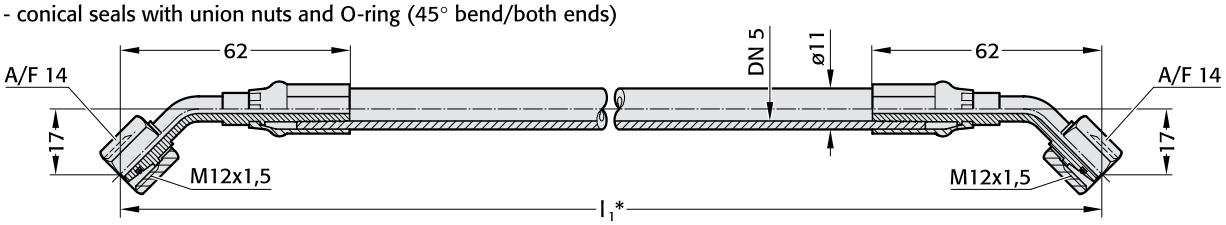
Hose - conical seals with union nuts and O-ring (45° bend/straight)



Dimension l_1 specified in the order, e.g. 765 mm, gives order no 2480.00.25.04.0765

2480.00.25.05.

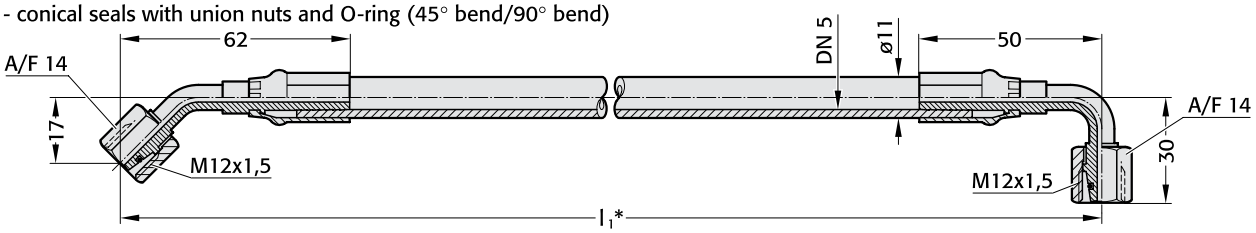
Hose - conical seals with union nuts and O-ring (45° bend/both ends)



Dimension l_1 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)



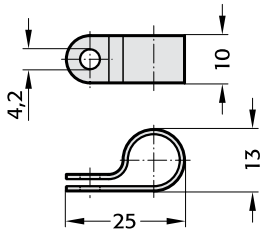
Dimension l_1 specified in the order, e.g. 765 mm, gives order no 2480.00.25.06.0765

FIBRO

Gas springs accessories
Direct connection dimensions
2480.00.26. 24°-cone threaded joint (DIN 2353 / DIN EN ISO 8434-1)

2480.00.25.12.01

Hose clamp for gauging hose
DN5 (∅ 11 mm)

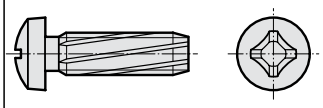


Material: Polyamide

Note:
Supplied without screws

2192.50.04.012

self-tapping screw
A M4×12 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

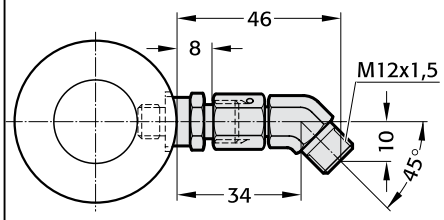
Order No	l in mm
2480.00.23.13.0001	1000
2480.00.23.13.0002	2000
2480.00.23.13.0005	5000
2480.00.23.13.0010	10000
Inner-Ø	7 mm
For hose/tubing outer-Ø	max. 5-25 mm
Temperature range	-30 °C to +100 °C

Material:
Polyamide

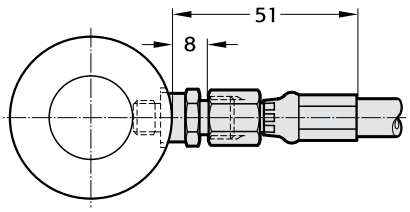
Description:

The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

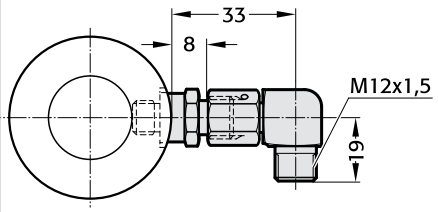
Direct connection
with 45°-elbow adaptor
2480.00.26.21



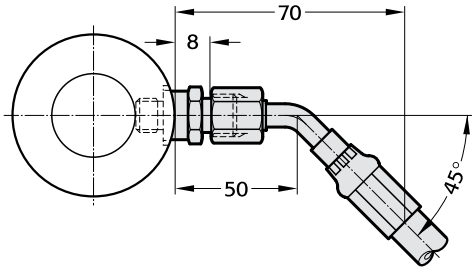
Direct connection
hose straight
adaptor 2480.00.26.03



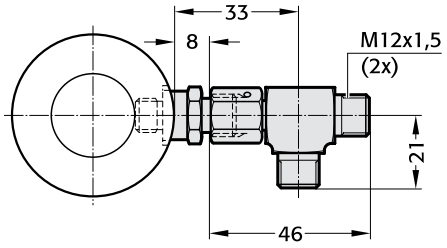
Direct connection
with 90°-elbow adaptor
2480.00.26.22



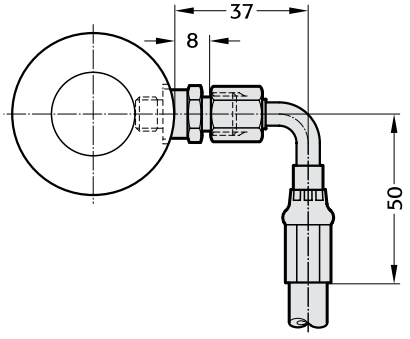
Direct connection
45° hose with
adaptor 2480.00.26.03



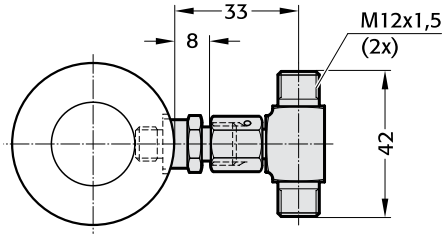
Direct connection
with L-coupling
2480.00.26.23



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 2480.00.27.

2480.00.27.01.

Order No	l*
2480.00.27.01.0200	200
0300	300
0400	400
0500	500
0630	630
0800	800
1000	1000
1200	1200
1500	1500
2000	2000
2500	2500
3000	3000

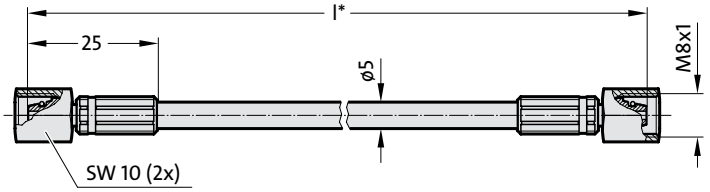
* Other lenghts available in 5 mm steps.

Shortest factory length:	
without antikink protection:	90 mm
antikink protection at one end:	150 mm
antikink protection at both ends:	300 mm

2480.00.27.01.

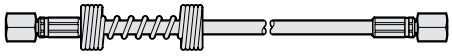
Min. bending radius R20 mm

Connection hose, 24° conus micro, straight on both sides (connection hose, sealing cone with union nut and O ring)



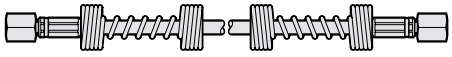
2480.00.27.01.....1

Antikink spiral, at one end



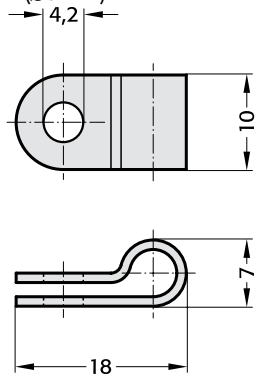
2480.00.27.01.....2

Antikink spiral, at both ends



2480.00.23.12.01

Hose clamp for gauging hose DN2 (⌀5 mm)

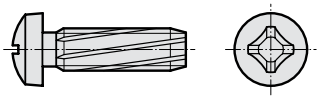


Material: Polyamide

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	7 mm
For hose/tubing outer-Ø	max. 5-25 mm
Temperature range	-30 °C to +100 °C

Material:
Polyamide

Description:

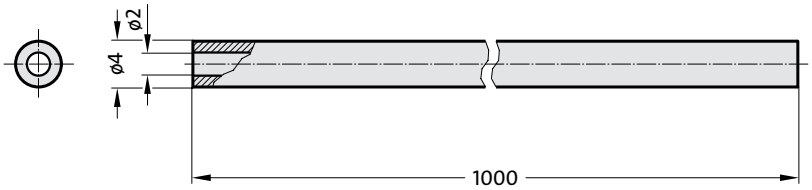
The anti-scuff spiral is used to protect against abrasion, is resistant to air, water, oil, hydraulic fluids petrol and other liquids.

2480.00.27. Gas Spring Accessories Connector system, 24° conus micro

2480.00.27.11

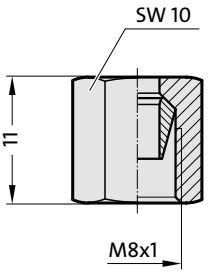
Pipe for 24° conus micro
Delivery length: 1 m

Min. bending radius R12 mm
(3x exterior diameter)



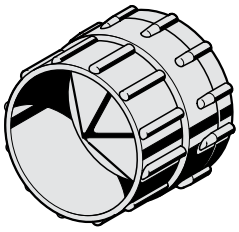
2480.00.27.11.01

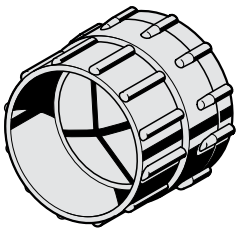
Cutting ring screw connection, 24° conus micro



2480.00.27.00.01

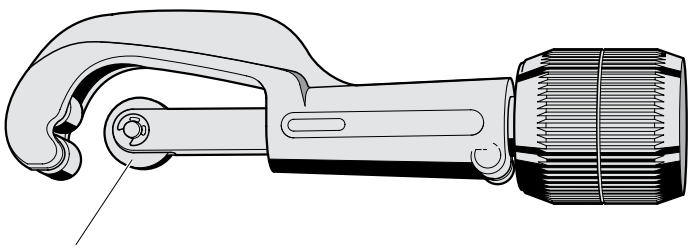
Deburring tool for 24° conus micro





2480.00.27.00.02

Pipe cutter for 24° conus micro



2480.00.27.00.02.1

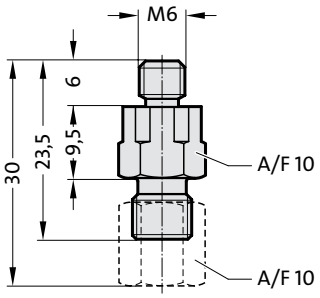
Replacement cutting wheel for
pipe cutter

Gas Spring Accessories
Connector system, 24° conus micro

2480.00.28.

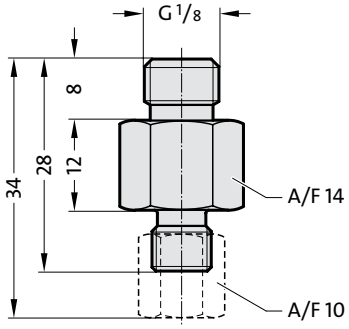
2480.00.28.01

Screw connection GE–M6–24° conus micro



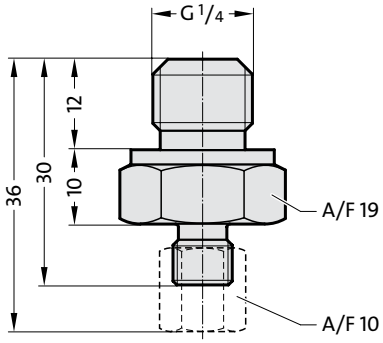
2480.00.28.02

Screw connection GE–G$^1/_8$ 24° conus micro



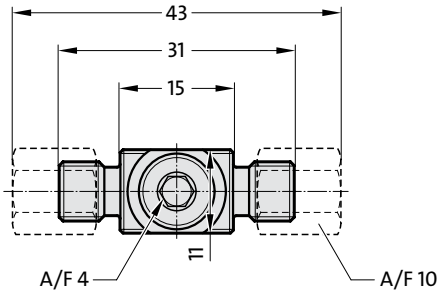
2480.00.28.03

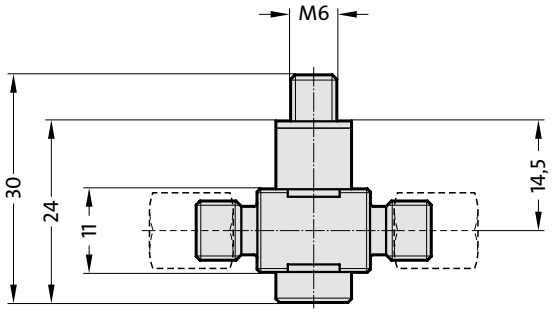
Screw connection GE–G$^1/_4$ 24° conus micro



2480.00.28.14

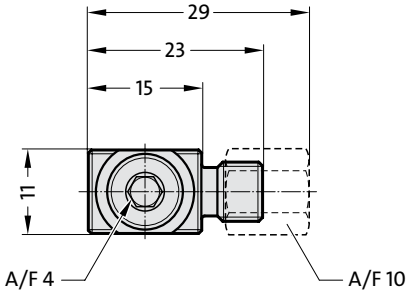
Screw connection T–24° conus micro

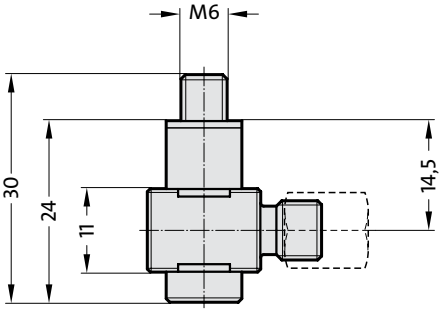




2480.00.28.17

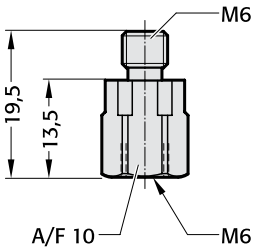
Screw connection W–24° conus micro





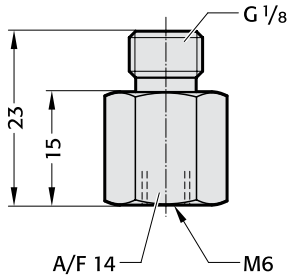
2480.00.22.06.06

Screw connection, GE–M6–M6 micro for connection to gas spring with divided wheel flange 2480.022.



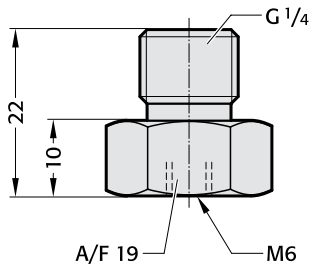
2480.00.22.18.06

Screw connection, GE–G$^1/_8$–M6 micro for 2480.00.28.14 / 2480.00.28.17



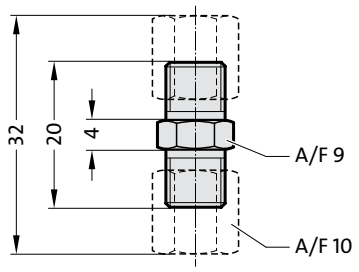
2480.00.22.14.06

Screw connection, GE–G$^1/_4$–M6 micro for 2480.00.28.14 / 2480.00.28.17



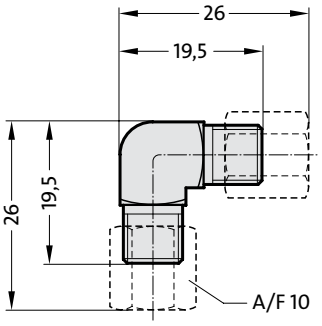
2480.00.28.25

Adapter, GE–24° conus micro
hose – hose



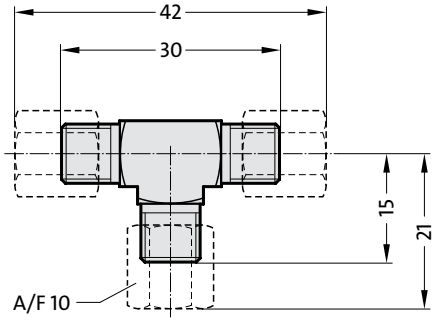
2480.00.28.26

Adapter, W–24° conus micro
hose – hose



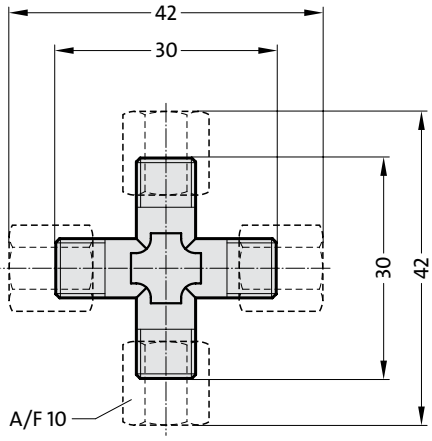
2480.00.28.27

Adapter, T–24° conus micro
hose – hose



2480.00.28.28

Adapter, K–24° conus micro
hose – hose



FIBRO

2480.00.34.11 Micro Control Fitting without pressure relief
2480.00.34.13 with pressure relief

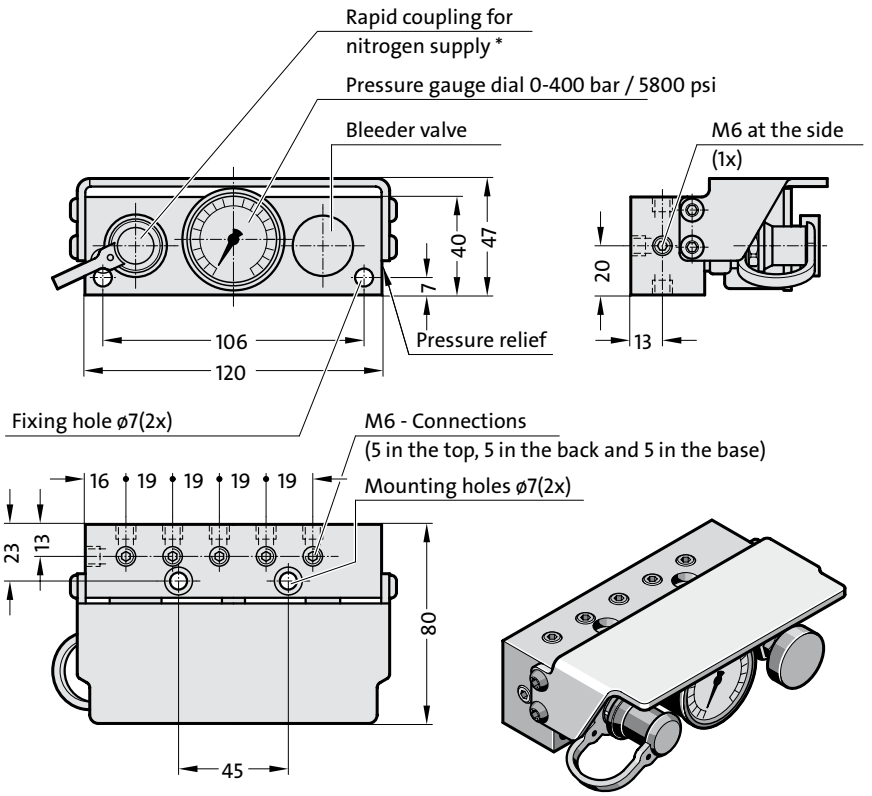
Description:

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, shutoff valve and gas bottle connector Order no: 2480.00.31.02 (to be ordered separately)

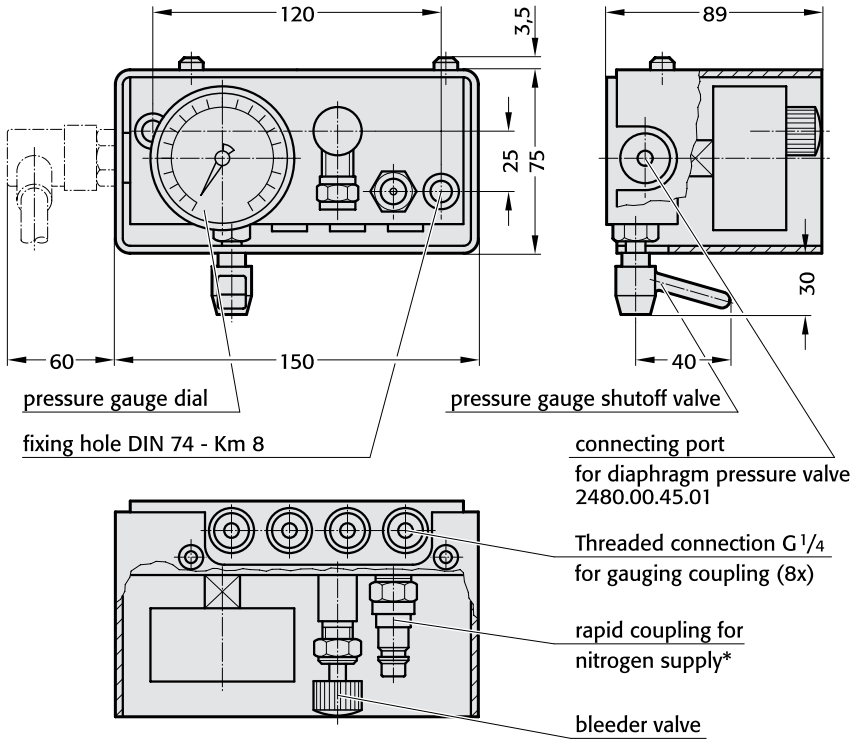
2480.00.34.11 without pressure relief
2480.00.34.13 with pressure relief



Control Fitting for Gas Springs

2480.00.30.01/.02/.03/.04 2480.00.31.01/.06/.07

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 presure of up to eight connected gas springs.

Pressure checks during operation can be effected in two ways:

a) by visual monitoring of the gauge dials.

b) automatically, by means of diaphragm pressure switch 248.00.15 The switch will stop the associated machine as soon as the charge pressure drops below the value set.

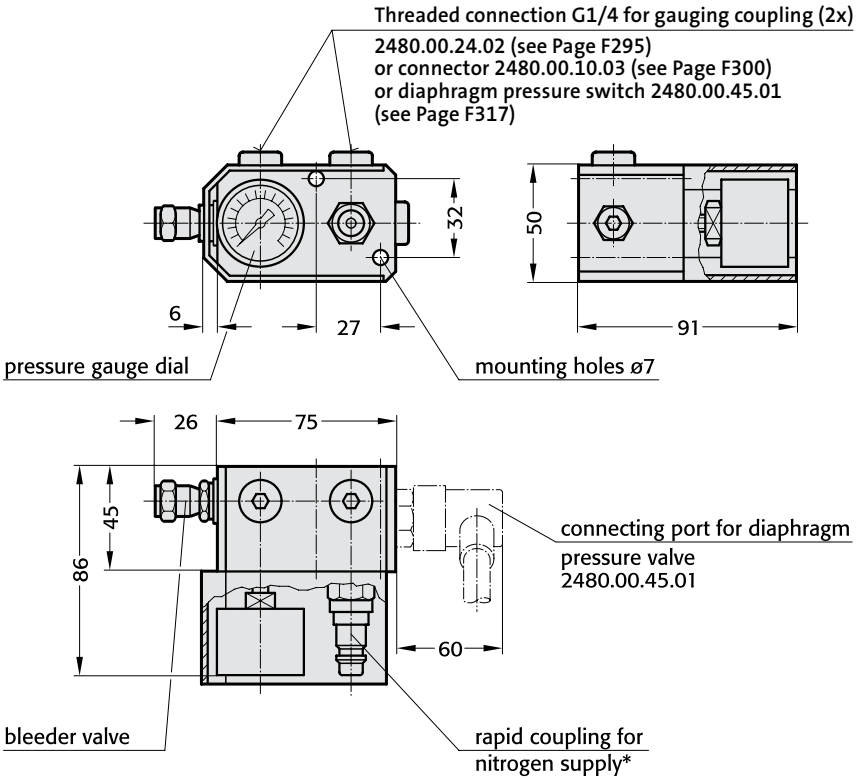
Note:

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, with pressure relief

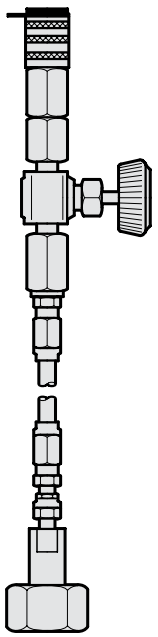


Description:

The control fitting 2480.00.31.01 performs 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)

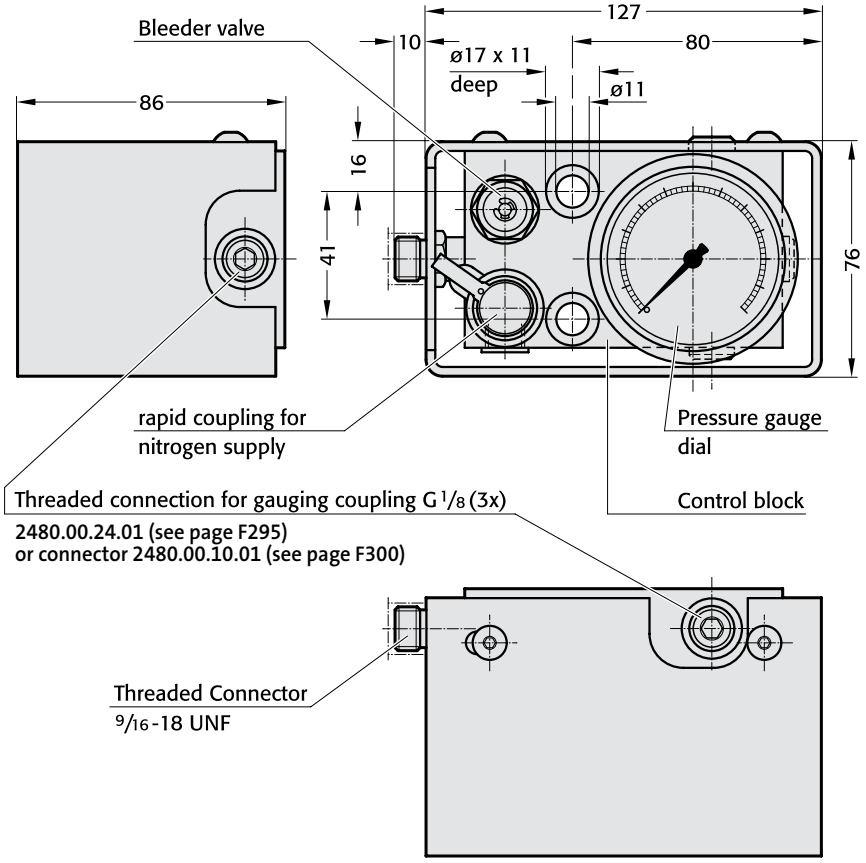


FIBRO

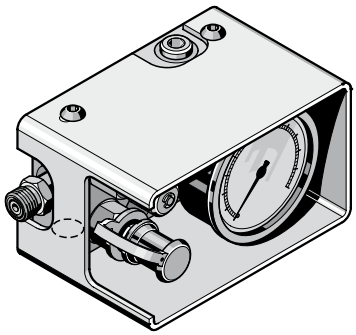
2480.00.30.13

Control fitting without pressure switch, including pressure relief

2480.00.30.13 without pressure switch, with pressure relief



2480.00.30.13



Description:

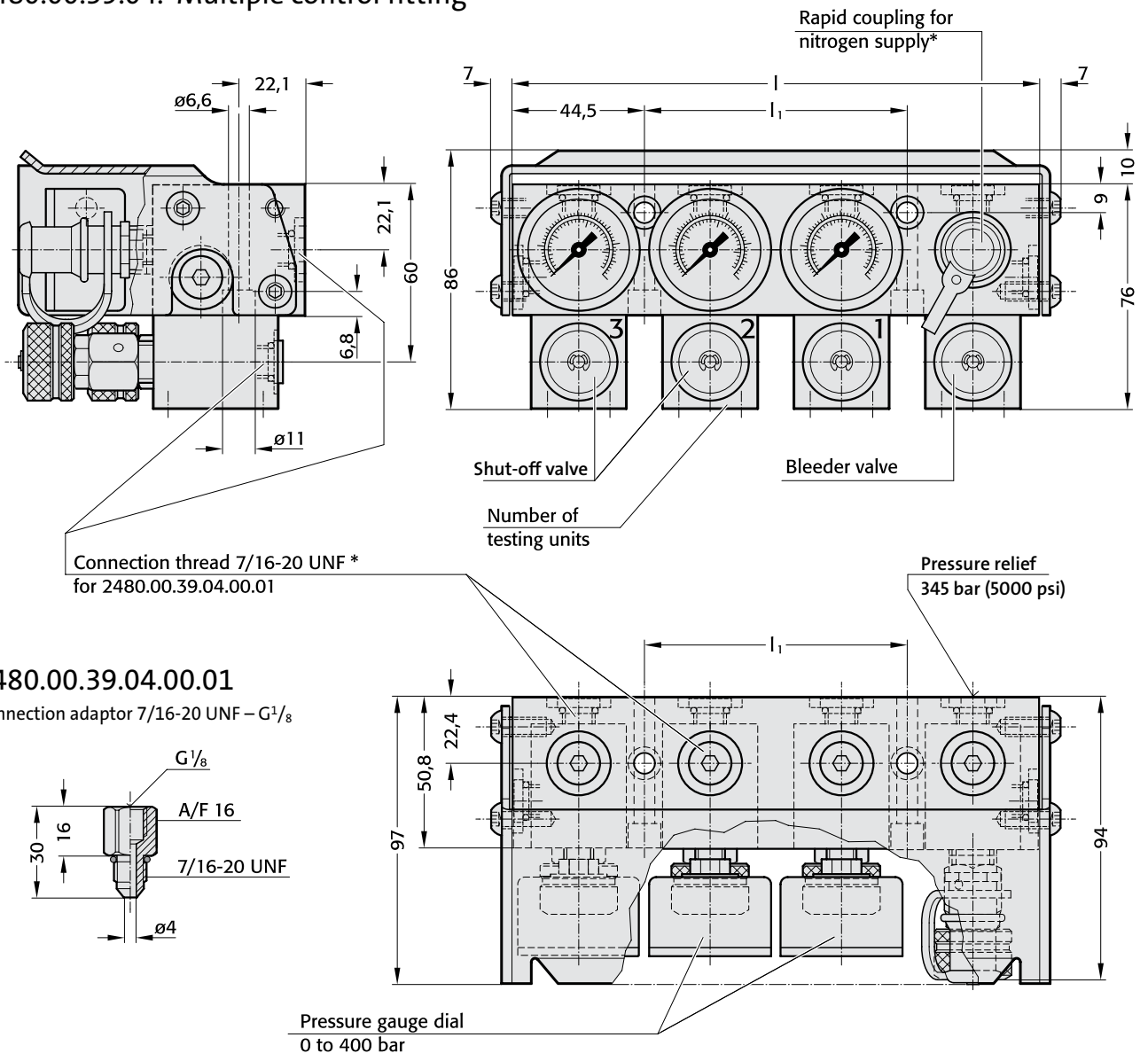
The control fitting 2480.00.30.13 is used to constantly monitor the filling pressure of one or more gas springs. The control fitting is equipped with rapid coupling for nitrogen supply and a bleeder valve. There are three G1/8 ports for simultaneous pressure checking at the control fitting.

Measuring range from
0 - 400 bar / 5800 psi.

Multiple control fitting
Connection adaptor

2480.00.39.04.
2480.00.39.04.00.01

2480.00.39.04. Multiple control fitting



2480.00.39.04.00.01

Connection adaptor 7/16-20 UNF – G1/8

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.

Note:

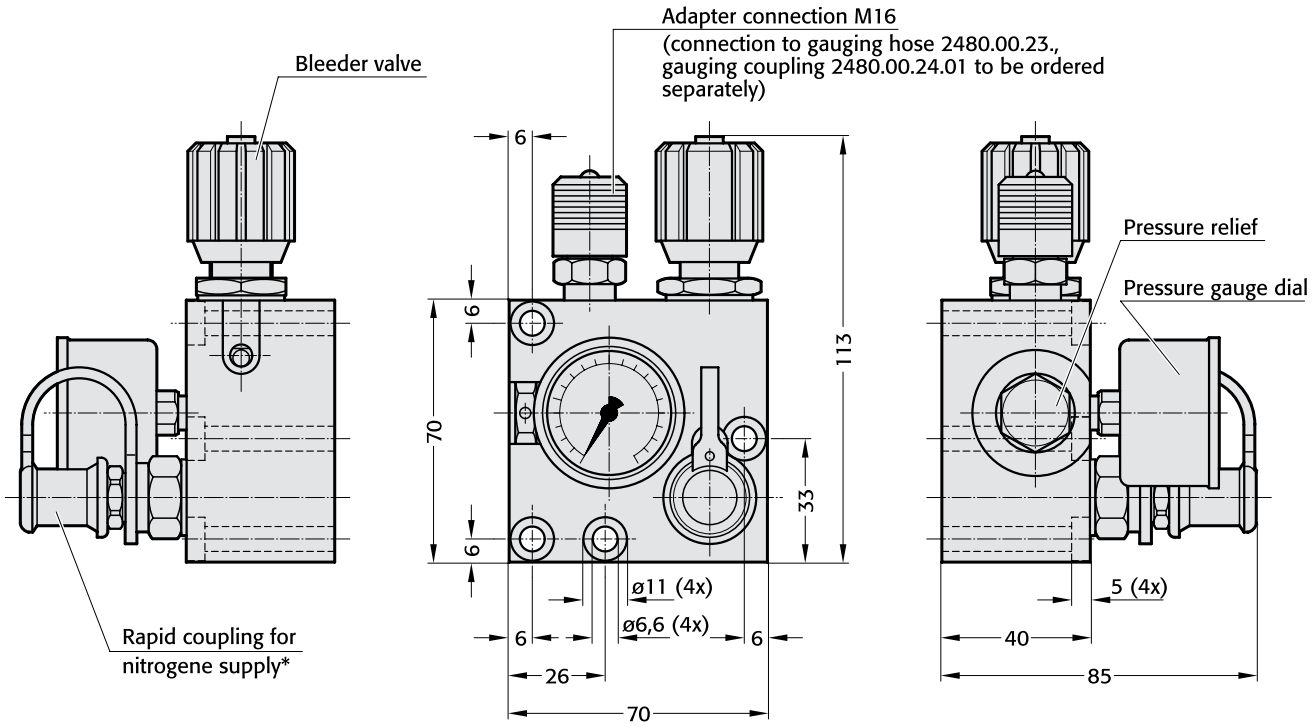
* For the connection of hose connections G1/8 the adaptor 2480.00.39.04.00.01 must be ordered separately.

2480.00.39.04.

Order no.	Qty. testing units	l	l_1
2480.00.39.04.02	2	133.5	44.5
2480.00.39.04.03	3	178.0	89.0
2480.00.39.04.04	4	222.5	133.5
2480.00.39.04.05	5	267.0	178.0
2480.00.39.04.06	6	311.5	222.5
2480.00.39.04.08	8	400.5	311.5
2480.00.39.04.10	10	489.5	400.5

2480.00.31.11 Control fitting with pressure relief

2480.00.31.11



Description:

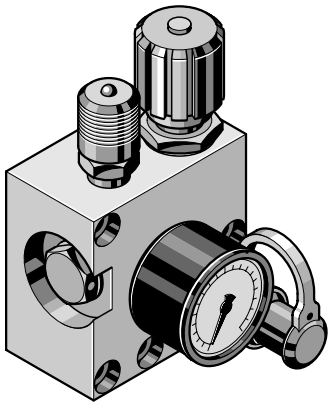
The control fitting with pressure relief 2480.00.31.11 (Faure) is used for continuous monitoring of the filling pressure of one or more gas springs (one connection $G^1/_8$-M16).
During operation the pressure can be checked by visual monitoring of the pressure gauge.

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.

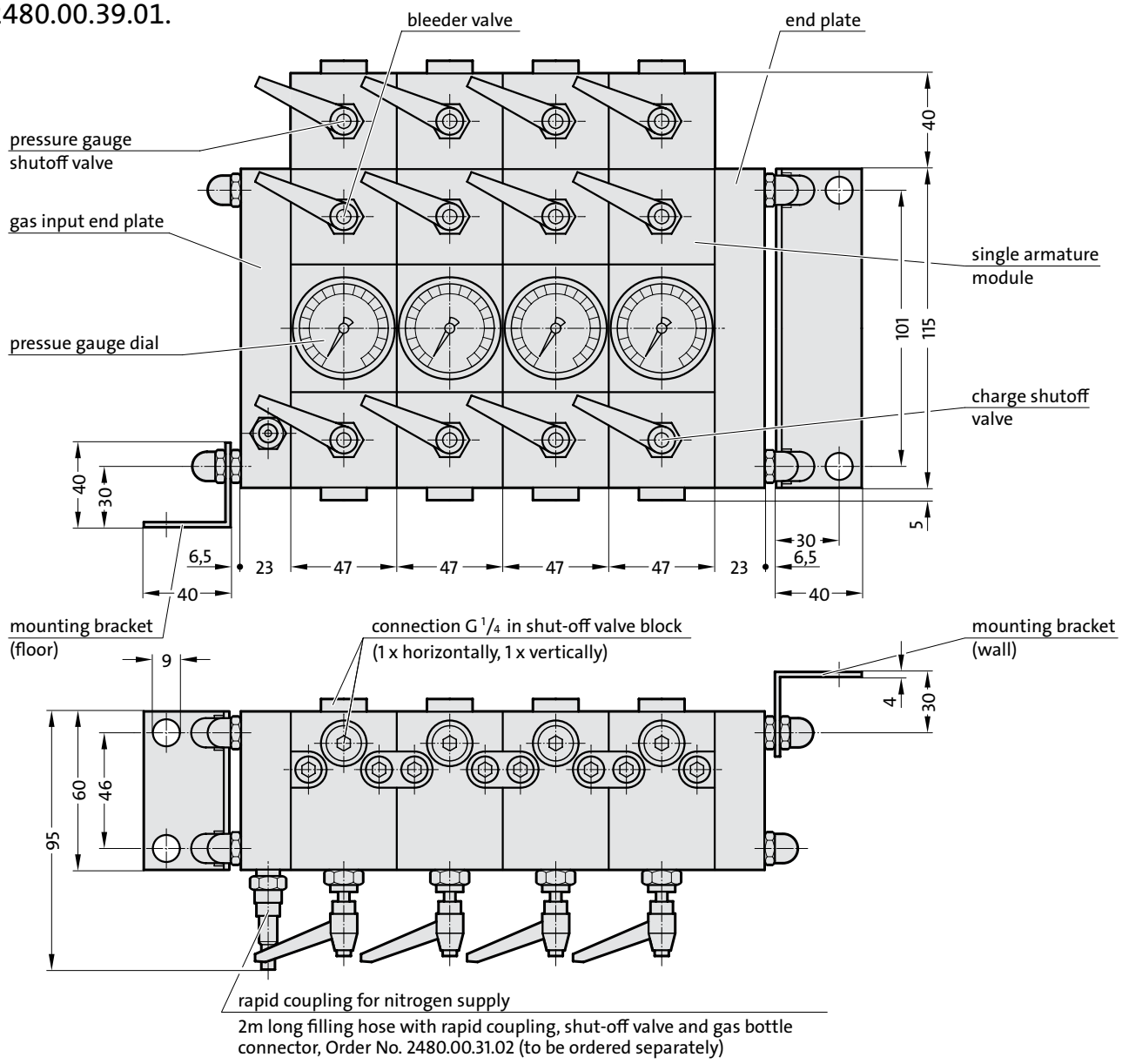
* 2 m long filling hose with rapid coupling, shut-off valve and gas bottle connector, Order no. 2480.00.31.02 (to be ordered separately)



Stacked Control Fitttings for individual control

2480.00.39.01.

2480.00.39.01.



Description:

Stacked Control fittings are required where it is necessary to control the charge pressure of each gas spring individually. The fitting models can be stacked together ad libidum.
Recharging of any to the spring units connected can be effected centrally via the rapid couplings and the appropriate charging valves. Each stack is equipped with an input end plate with rapid coupling, and an end plate sealing off the opposite side. The number of armature modules depends on the number of gas springs in question. The stack can be supplied for wall mounting or for installation on the floor.

Note:

When all charge valves are opened the springs are interconnected with one another.

Ordering Code (example):

Stacked Control fitting	= 2480.00.39.01.	
5 modules	=	005.
with floor-mount	=	1
with wall-mount	=	2
Order No	= 2480.00.39.01.	005. 1 or 2

FIBRO

2480.00.45.01 2480.00.45.02 Diaphragm Pressure Switch
2480.00.45.10 Adapter Block

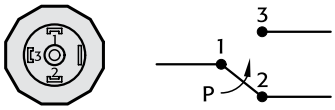
Technical Data of Diaphragm

2480.00.45.01	
switching range, adjustable	20–200 bar
switching tolerance	±3–5 bar
overpressure protection	300 bar
voltage (max.)	250 V
2480.00.45.02	
switching range, adjustable	5–50 bar
switching tolerance	±3,0 bar
overpressure protection	200 bar
voltage (max.)	250 V

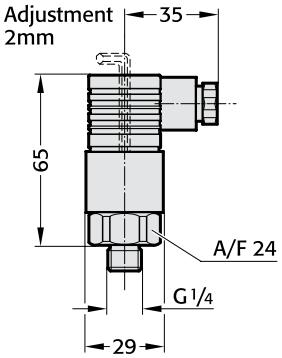
Note:

for monitoring pressure of single gas springs see adapter 2480.00.45.10

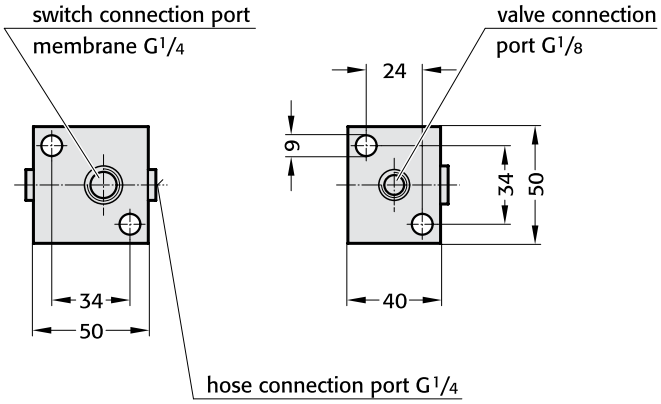
Circuit diagram for diaphragm pressure switch



2480.00.45.01 2480.00.45.02 Diaphragm Pressure Switch



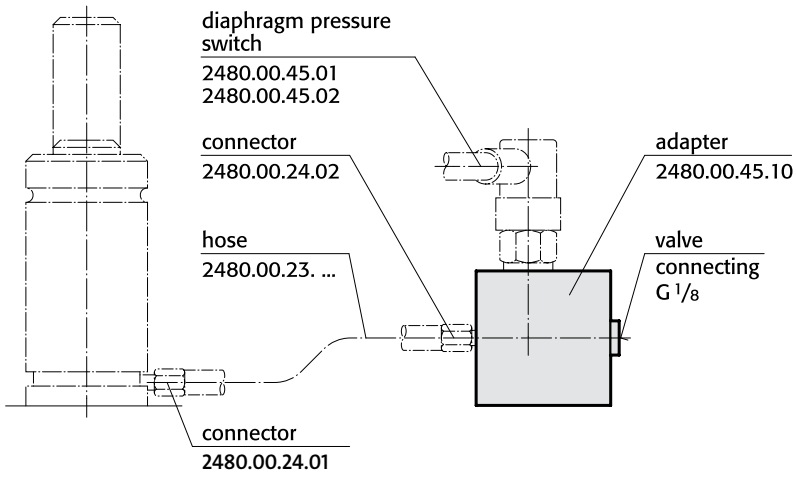
2480.00.45.10



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.

Installation Example:



Wireless Pressure Monitoring (WPM)

Wireless monitoring of gas springs

The core requirements on any pressing plant are: Automation and zero-defect production.
Prerequisite is also real-time process control.
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.

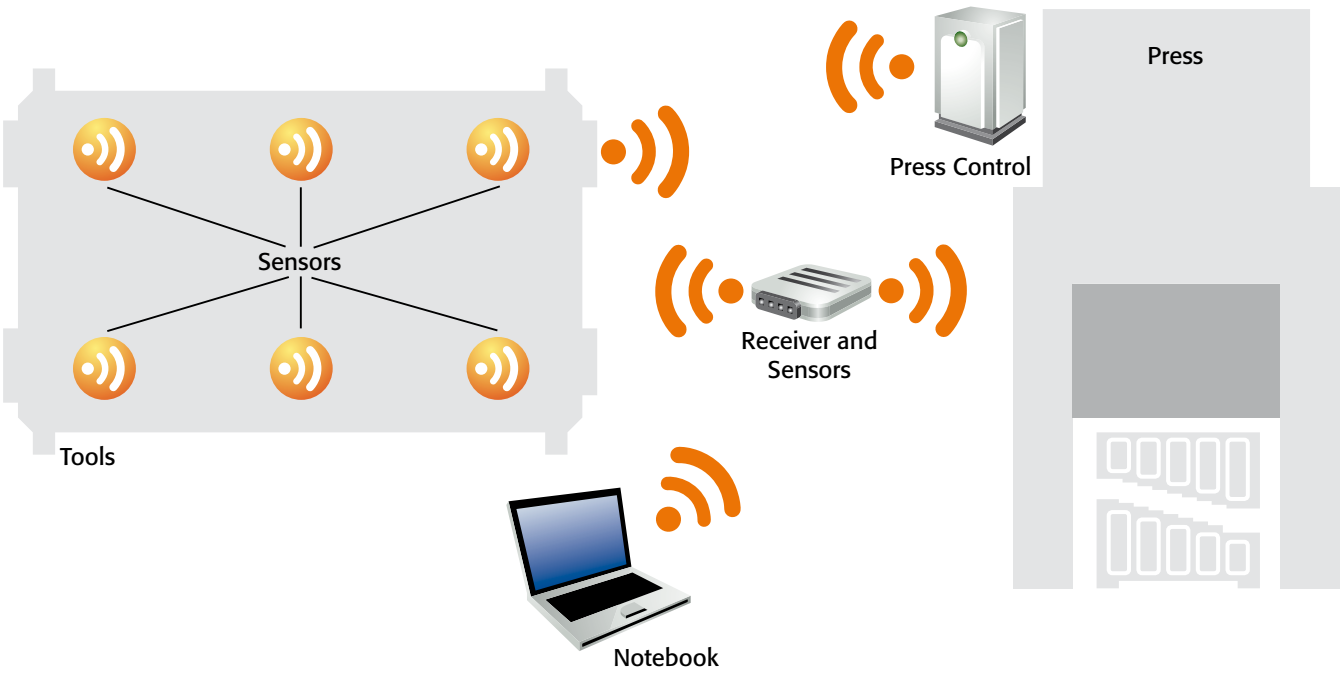
The WPM system monitors temperature and pressure in gas springs.

It consists of a coordinator and a sensor, which transmit wireless data to any designated Windows-based system. Custom software analyses the data and initialises the necessary process control and pre-emptive maintenance steps accordingly.

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. These form a PAN (Personal Area Network).
- PC with receiver:
  A device for setting up the PAN and for initial parameterisation of the tool sensors.
- Press coordinator COO, which is permanently installed on the press, and which communicates with the tool sensors and the press controller. (Customer-specific)
- Press control connection. There are various connection options available. (Customer-specific)

FIBRO

2480.00.90.20.01
2480.00.90.51.01.0

Wireless Pressure Monitoring (WPM) Receiver Software

2480.00.90.20.01

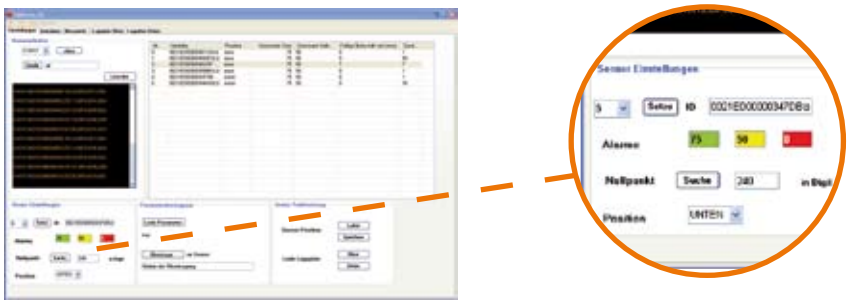
(in the scope of delivery)
Receiver, PC - USB2.0
incl. software CD for the PC

2480.00.90.20.01
Receiver, PC - USB2.0

2480.00.90.51.01.0
Software CD for PC

Measuring example

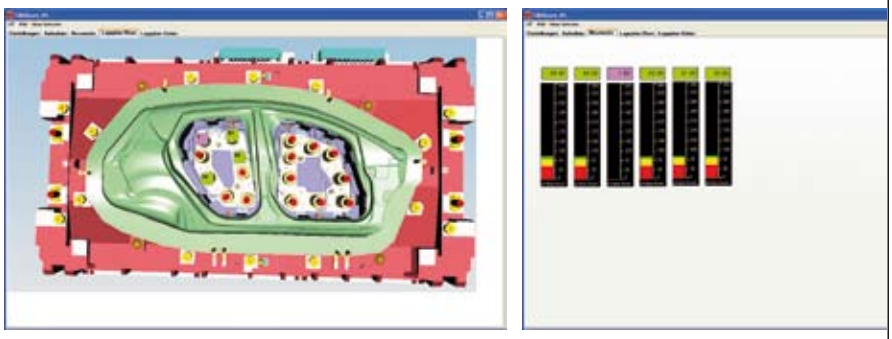
Setting and display options for pressure and temperature variance



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



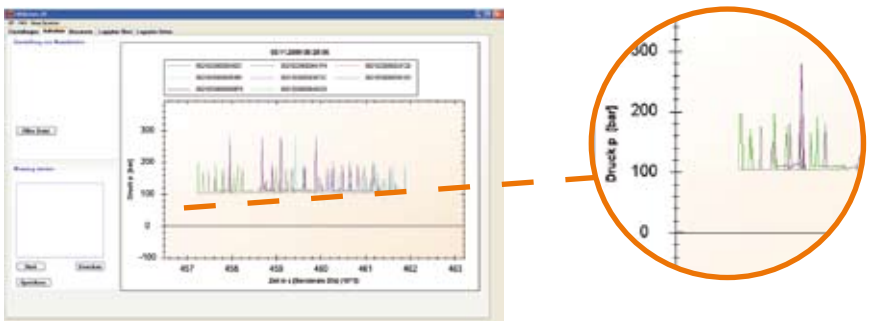
Targeted Maintenance

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)



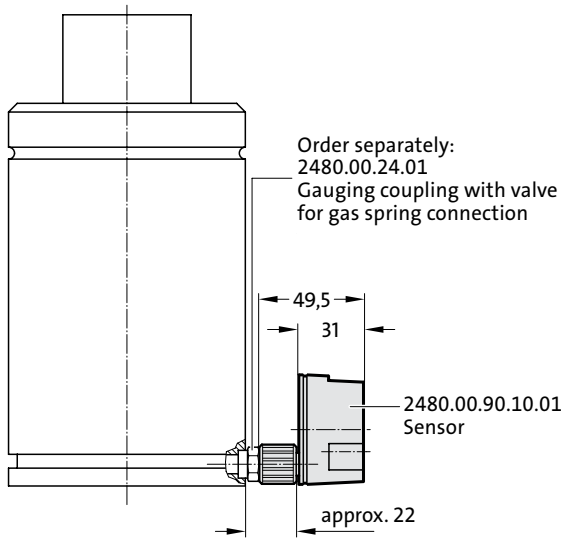
Wireless Pressure Monitoring (WPM)
Sensor
Filling adapter, Battery

FIBRO

2480.00.90.10.01

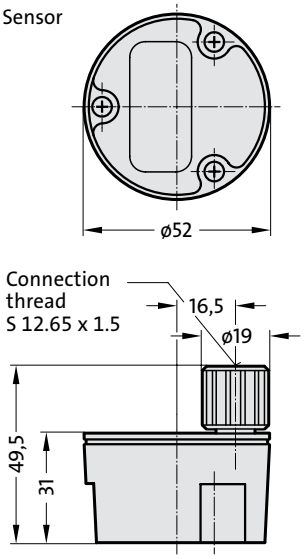
2480.00.90.10 2480.00.90.10.00.1

Mounting Example: Sensor - Gas spring connection



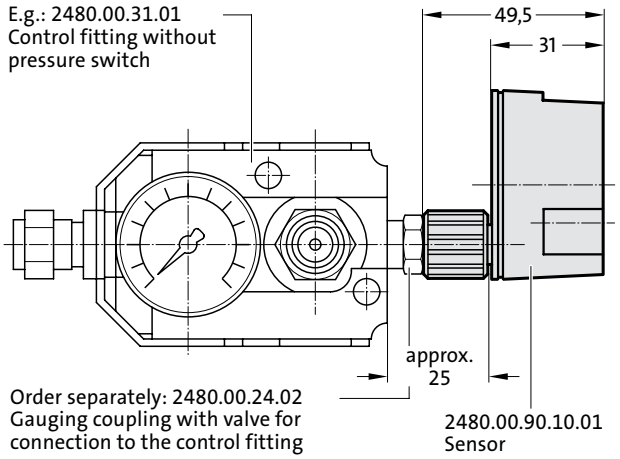
2480.00.90.10.01

Sensor



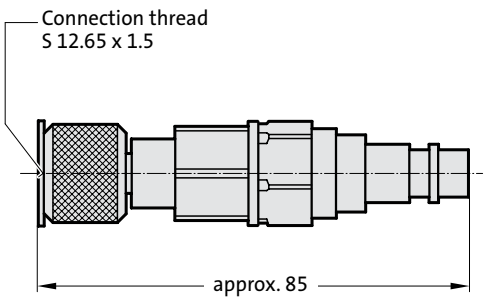
Mounting Example:

Sensor - Control fitting connection



2480.00.90.10

Filling adapter for minimess connection



2480.00.90.10.01

Sensor

Technical data:

Installation location:	any
Pressure medium:	Nitrogen - N_2
Ambient and operating temperature range:	0° C to +80°C
Storage temperature range:	-25 to 80°C
Protection type:	IP 67
Pressure range:	0 - 500 bar
Per. overload:	Factor 1.5
Hysteresis:	+/- 0.5% v. EW
Linearity:	+/- 1% of max. Setup pressure
Repeatability:	+/- 0.5% v. EW
Bursting pressure:	Factor 2.5
Seals:	FKM (Viton)
Material:	Floor plate: VA steel, with welded in sensor Housing: Plastic ABS, Colour: black
Temperature drift:	< 0.2% / 10k (0°C to 80°C)
Temperature measuring range	0 to 85°C
Mechanical connection:	Minimess connection for Gauging coupling 2480.00.24.01/.03 S 12.65 x 1.5
Energy supply sensor unit:	3.6V DC via Battery
Digital interface Sensor unit and wireless module:	SPI /I2C

2480.00.90.10.00.1

Battery for reordering
(Battery is included in the sensor's scope of delivery.)

Battery capacity 3-4 years with “normal” tool use

FIBRO

2480.00.32.21 2480.00.31.02 2480.00.32.07.

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.

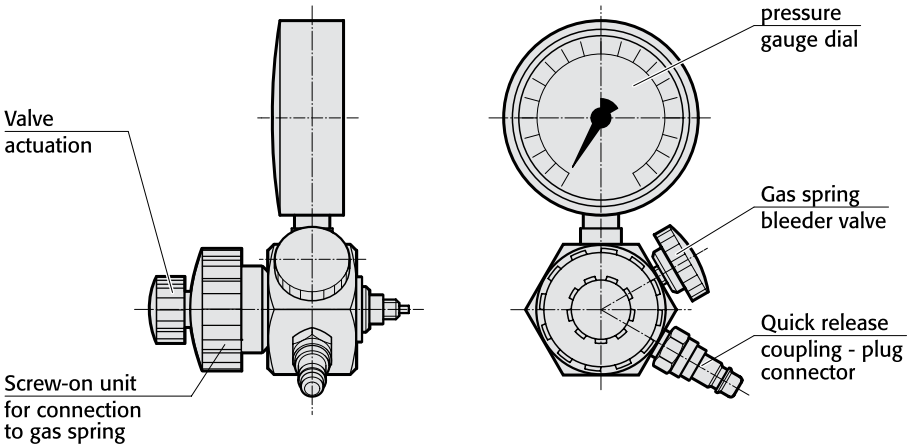
The fitting is equipped with an additional adapter 2480.00.32.11 for connecting to gas springs with G 1/8 valve connection as standard.

Note:

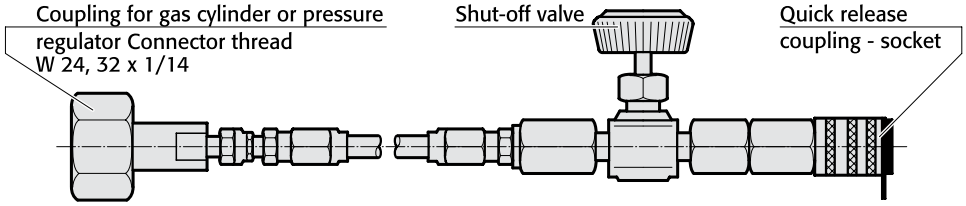
2 m long filling hose with quick release coupling, shut-off valve and gas bottle connector, order no. 2480.00.31.02 (order separately).

Other filling hose lengths to order.

2480.00.32.21 Filling and control fitting



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.

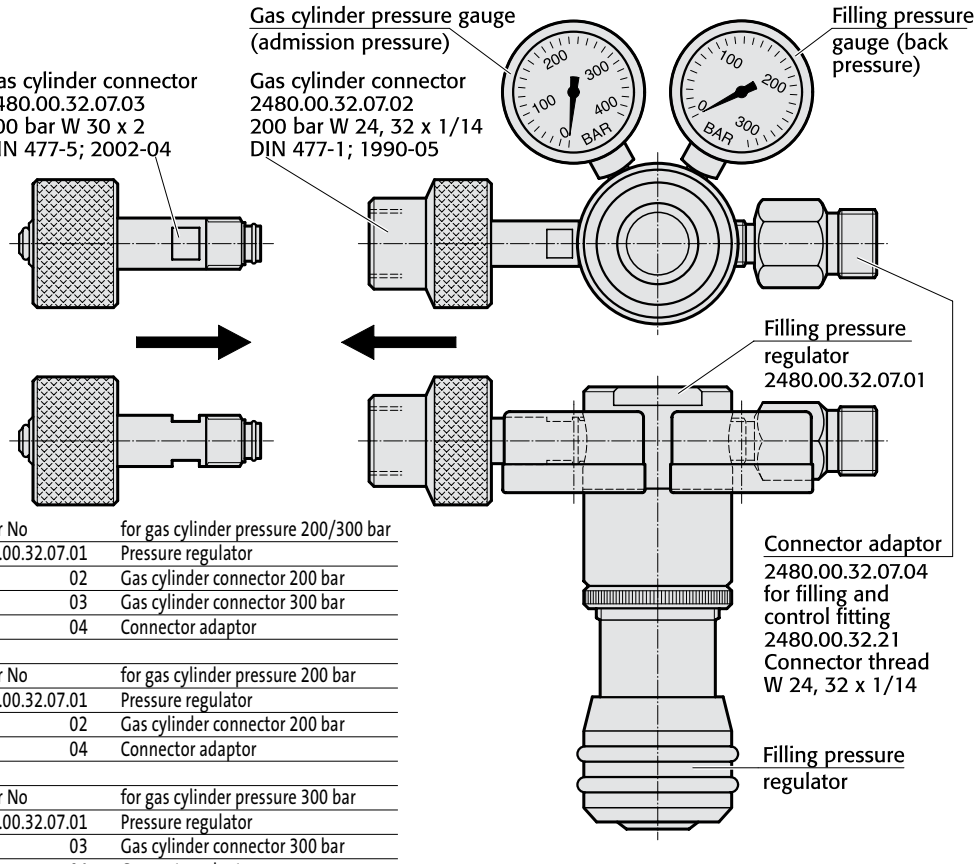
Depending on the type of gas cylinder, the gas cylinder connector used can either be the 2480.00.32.07.02 for 200 bar cylinders or the 2480.00.32.07.03 for 300 bar cylinders.

Max. admission pressure	300 bar
Back pressure	10-200 bar

Other benefits:

- 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
02	Gas cylinder connector 200 bar
03	Gas cylinder connector 300 bar
04	Connector adaptor

Order No	for gas cylinder pressure 200 bar
2480.00.32.07.01	Pressure regulator
02	Gas cylinder connector 200 bar
04	Connector adaptor

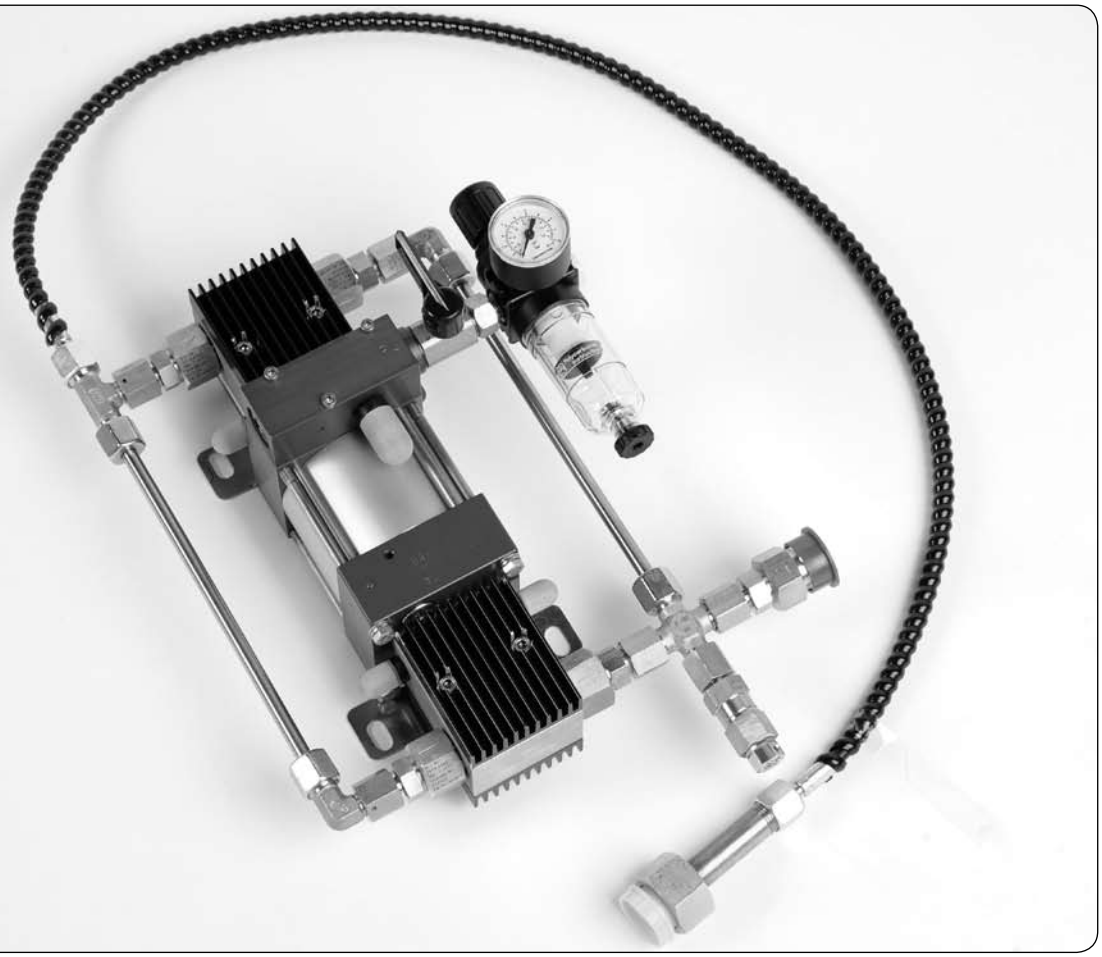
Order No	for gas cylinder pressure 300 bar
2480.00.32.07.01	Pressure regulator
03	Gas cylinder connector 300 bar
04	Connector adaptor

Compact Nitrogen Booster for Gas Spring Filling

2480.00.32.71

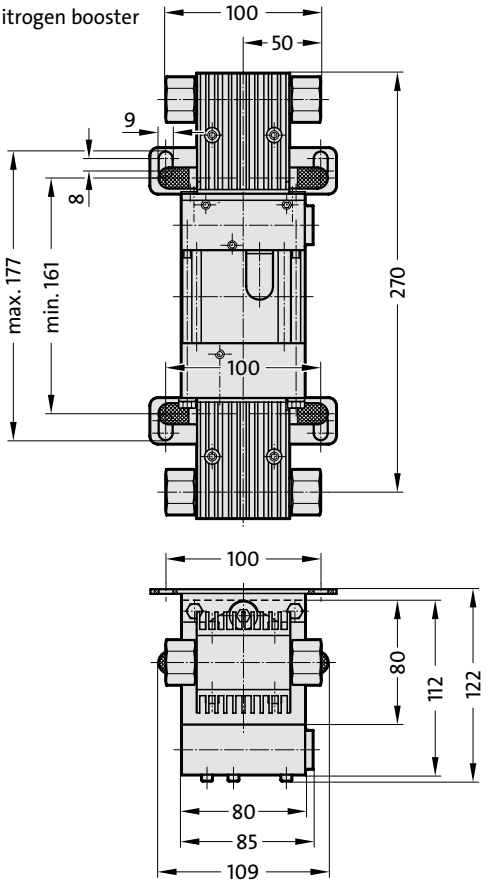
2480.00.32.71

Compact Nitrogen Booster
for Gas Spring Filling



2480.00.32.71

Compact nitrogen booster



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:

- Increased usage capacity
- Reduction of bottle replacement times
- Minimisation of bottle quantities
- Less 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.

Accessories:

A holding plate is available (2480.00.32.71.02) to secure the compact nitrogen booster to the nitrogen cylinder. The compact nitrogen booster is simply hung over the nitrogen cylinder connection.

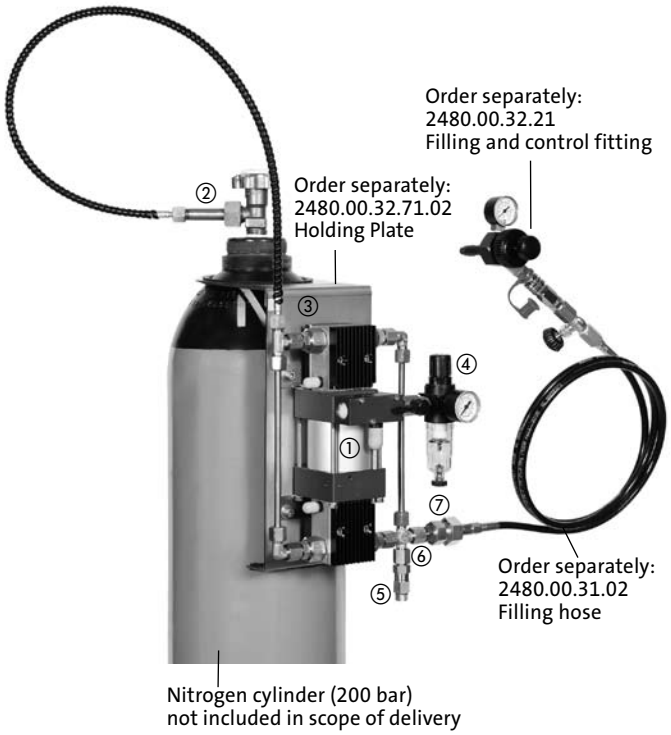
FIBRO

2480.00.32.71
2480.00.32.71.02

Compact Nitrogen Booster for Gas Spring Filling Holding Plate

Connection diagram

Compact nitrogen booster



2480.00.32.71.02

Holding Plate

① 2480.00.32.71 Compact 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 G1/4 max. 10 bar

⑤ Overpressure protection 400 bar

③ Nitrogen N_2 outlet

⑦ Connectingn thread W24, 32 x 1/14

Technical data:

Drive compressed air: 1-10 bar

Calculated operating pressure at 10 bar air drive pressure: 300 bar

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 N2 cylinder connection 200 bar

Nitrogen outlet:
N2 cylinder connection 200 bar W24, 32 x 1/14

Max. operating temperature: 60°C

Weight: approx. 7.2 kg

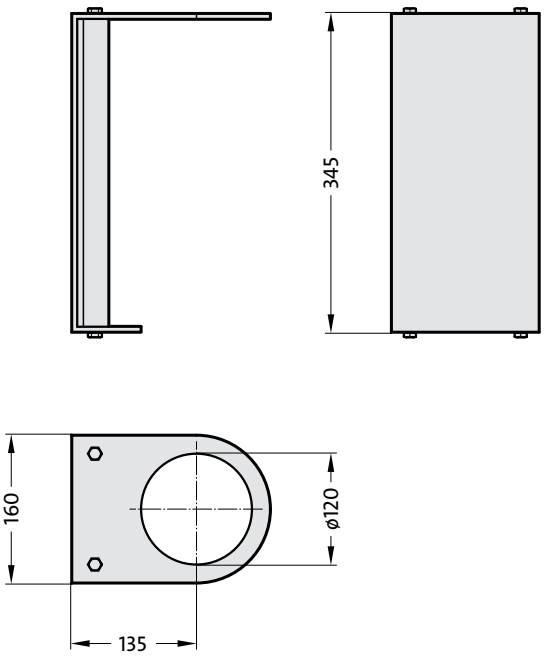
Inlet pressure: 30-300 bar

Average supply rate*: 280 NL/min

* The delivery rate is dependent on the air drive and inlet pressure.

2480.00.32.71.02

Holding Plate



Dynamometers for Gas Springs

2480.00.35.021
2480.00.35.032

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

2480.00.35.04

Dynamometers for Gas Springs

2480.00.35.04

2480.00.35.04

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.

Toolkits for assembling gas springs 2480.00.50.11

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”
16-1	2480.00.50.01.161	T-lever with heel	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:

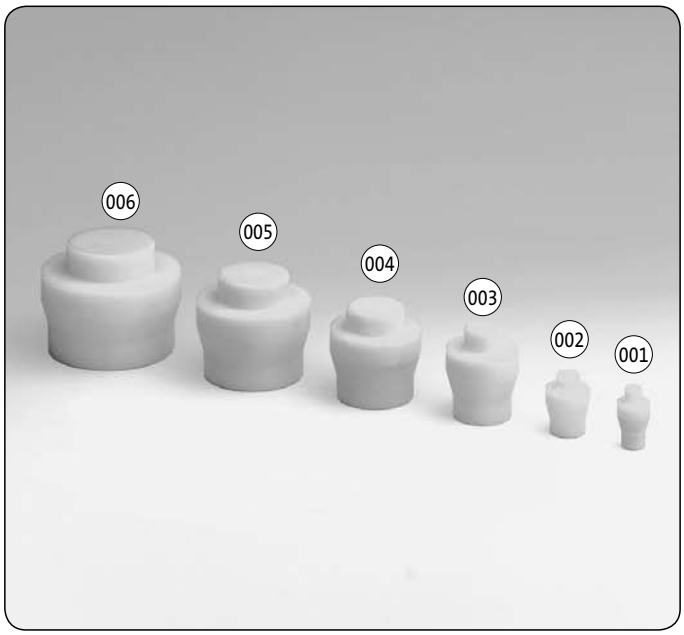
Read instructions for use before working on it.
Every tool can be ordered separately.

2480.00.50.04. 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 conel 00490
003	2480.00.50.04.003	Assembling conel 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

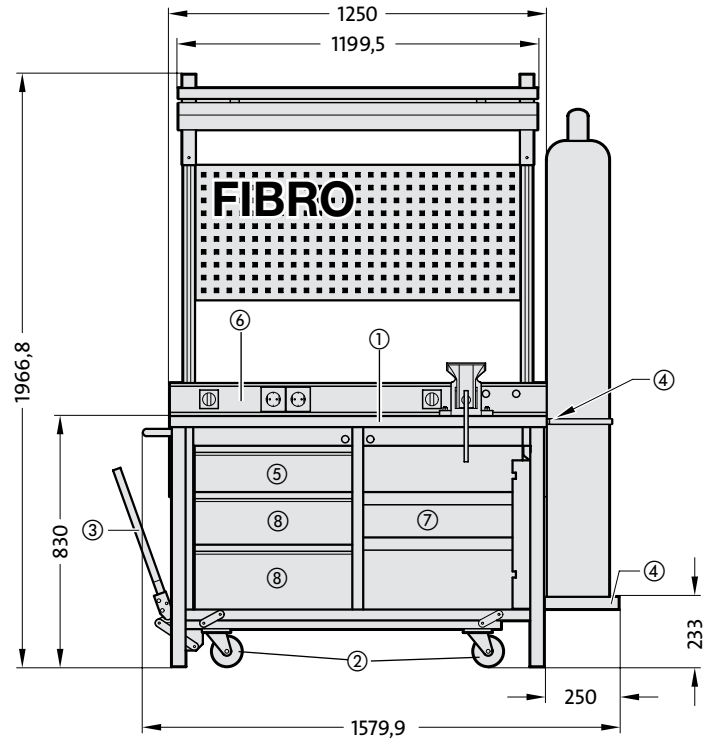


Service station, mobile, for gas springs

2480.00.50.20.

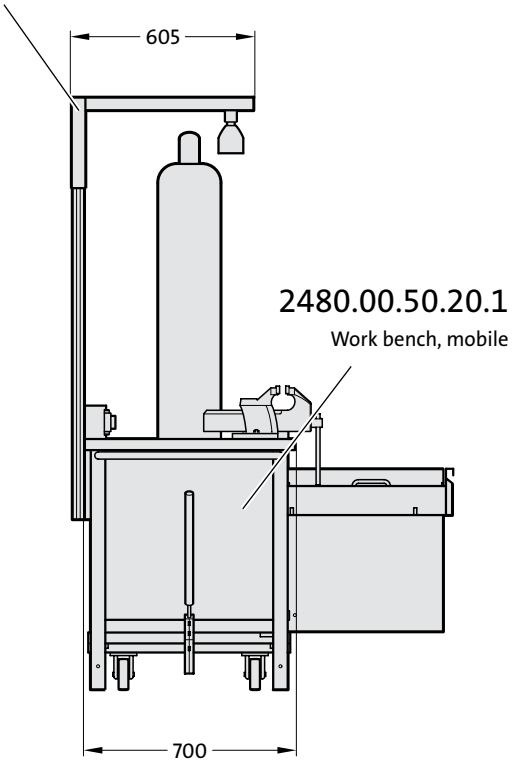
2480.00.50.20.

Service station, mobile, for gas springs



2480.00.50.20.2

Lighting unit, removable



2480.00.50.20.1

Work bench, mobile

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)

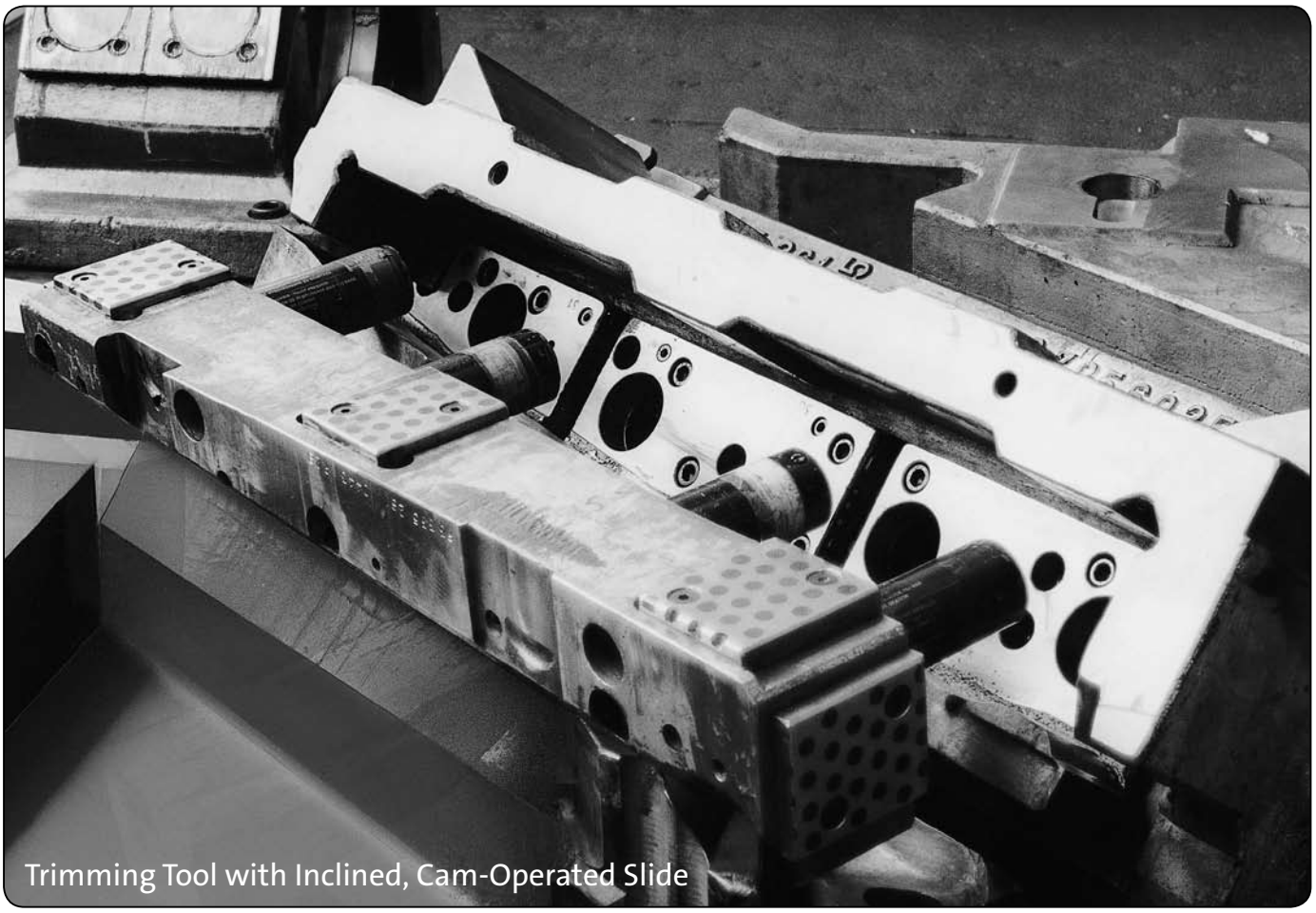
1 x ON/OFF switch for power supply, rotary switch

Accessory:

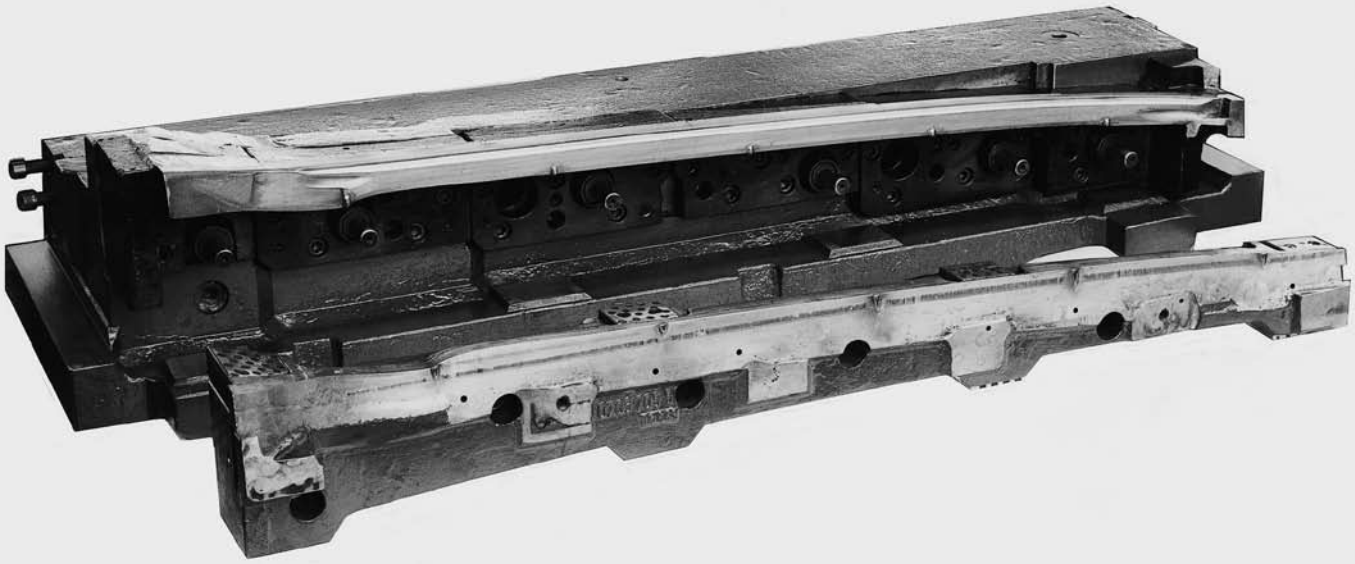
For optimised utilisation of the nitrogen bottle fill amount, a Compact Booster 2480.00.32.71 and a hose line DN4, 3 m 2480.00.32.71.05.03 can be integrated in specifically provided receiving braces in the cabinet ⑦.
The two free drawers ⑧ offer additional space for specialist tool sets 2480.00.50.11 for the repair of gas springs.

Applicaton Examples

Application Examples



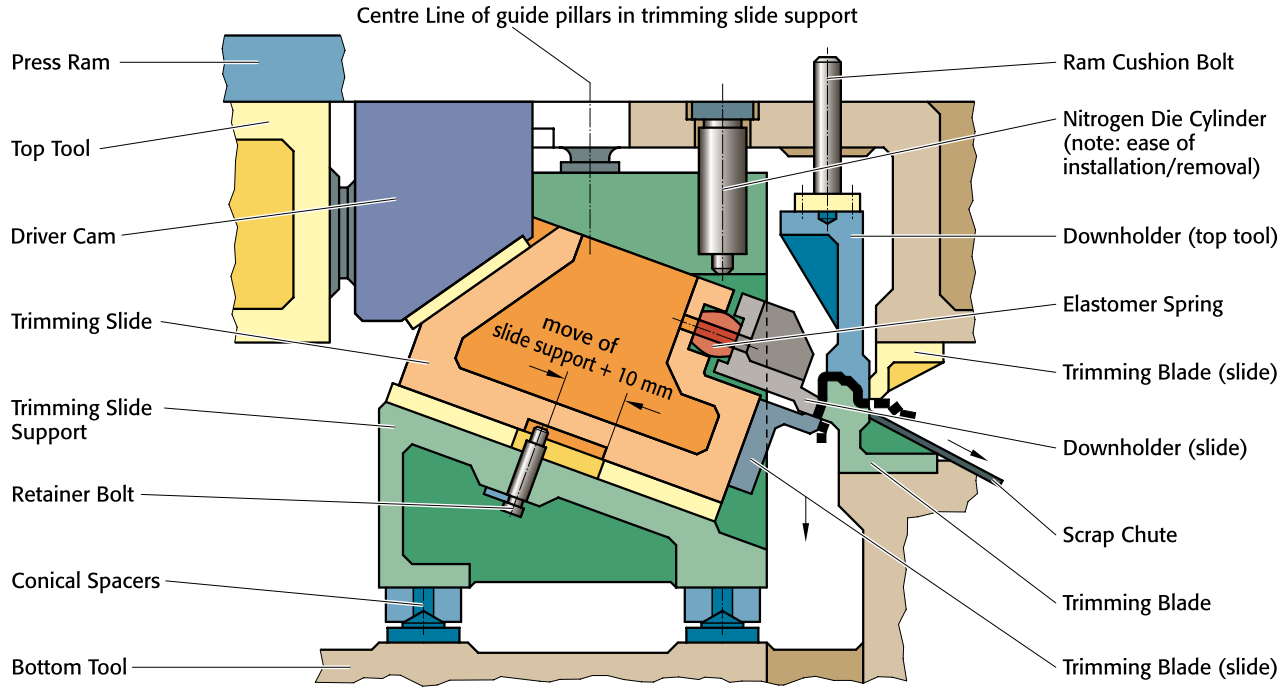
Trimming Tool with Inclined, Cam-Operated Slide



Drawing Slide of Large Forming Tool

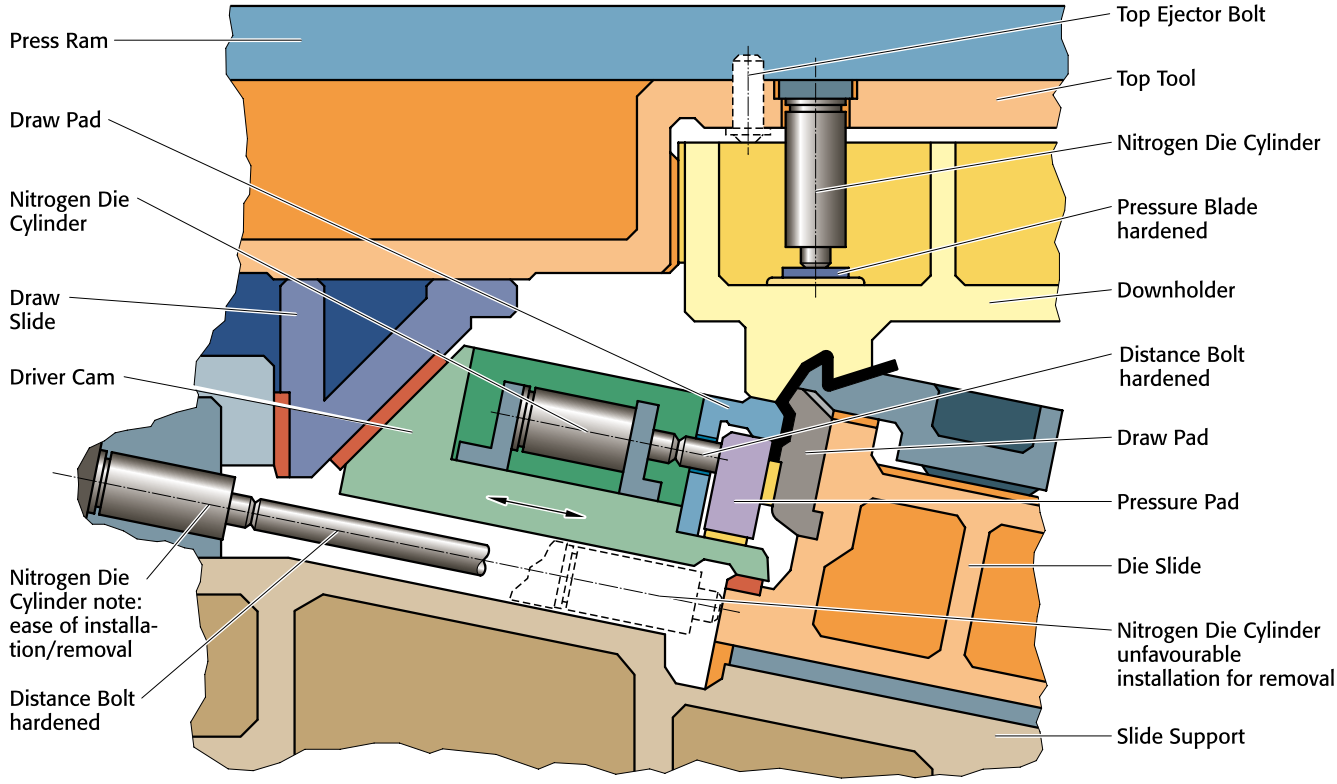
Trimming Tool with Inclined Cam Slide

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

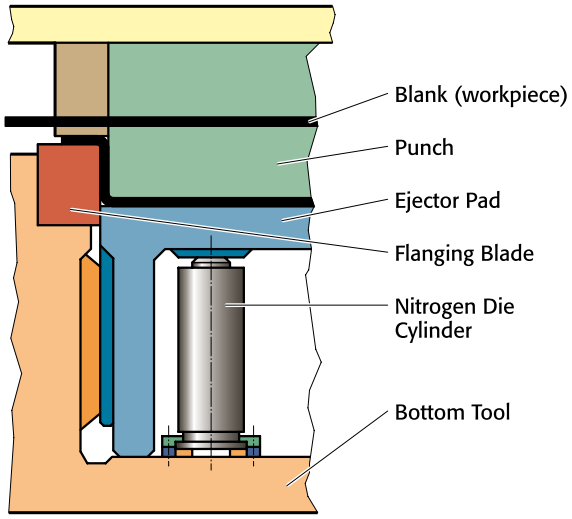
The nitrogen die cylinder for the drawing slide is easily placed into position; the safety lid secures it.
Very high forces are required in this tool for the draw pad in the slide.
The nitrogen die cylinders in the top tool serve as boosters for the insufficient ram cushion.



Application Examples

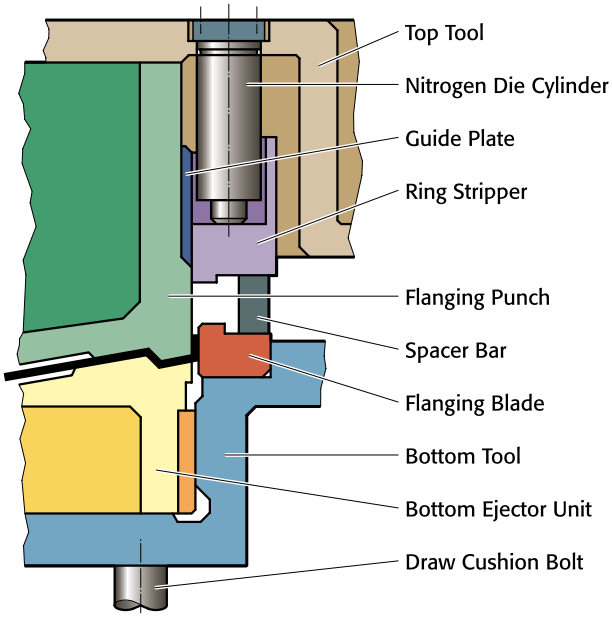
Flanging Tool with Nitrogen Die Cylinders

Where bottom ejection facilities are lacking, FIBRO Nitrogen Die Cylinders will provide reliable actuation of piece part ejectors.



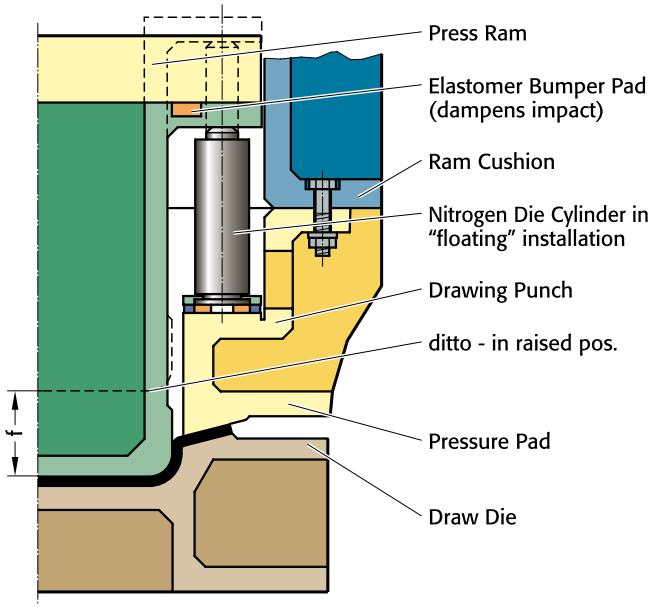
Flanging Tool with Ring Stripper

The ring stripper is actuated by nitrogen die cylinders.



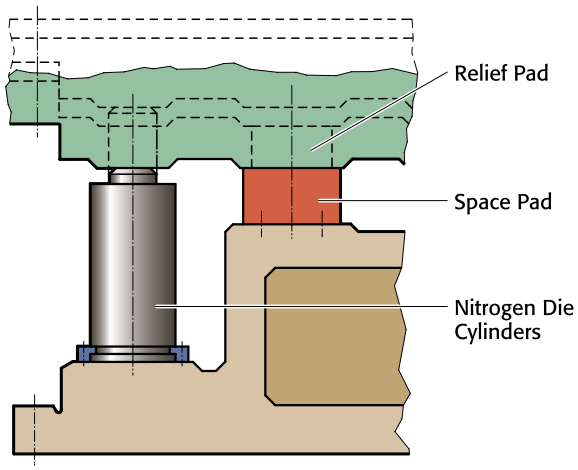
Double-Acting Drawing Tool

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.



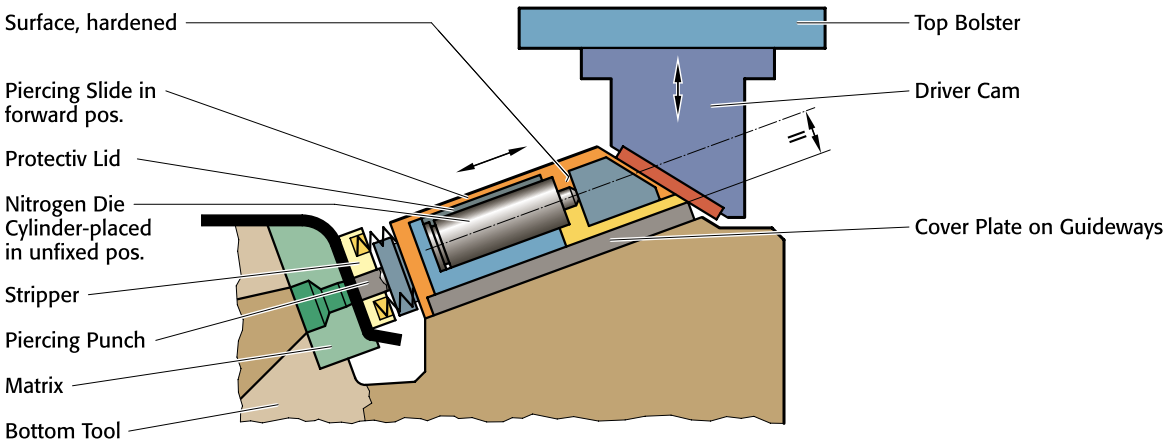
Blanking and Piercing Tool

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.



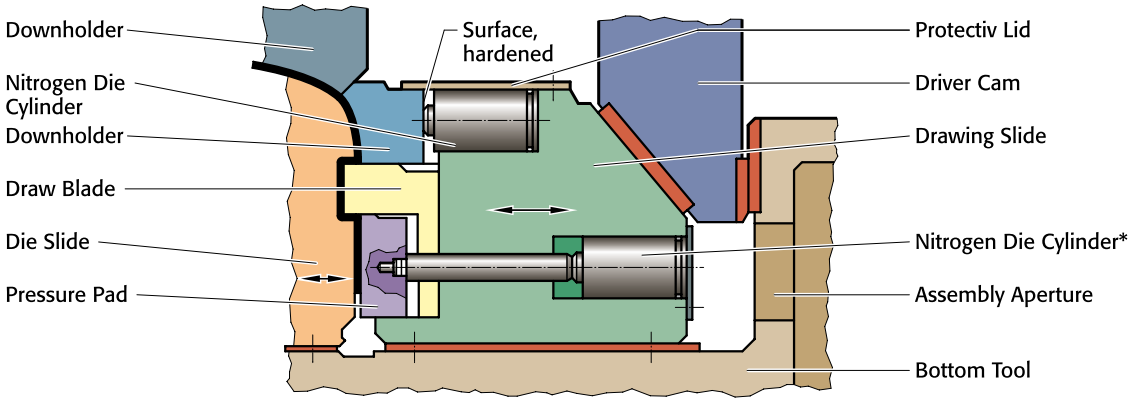
Retraction of Piercing Slide by Nitrogen Die Cylinder

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

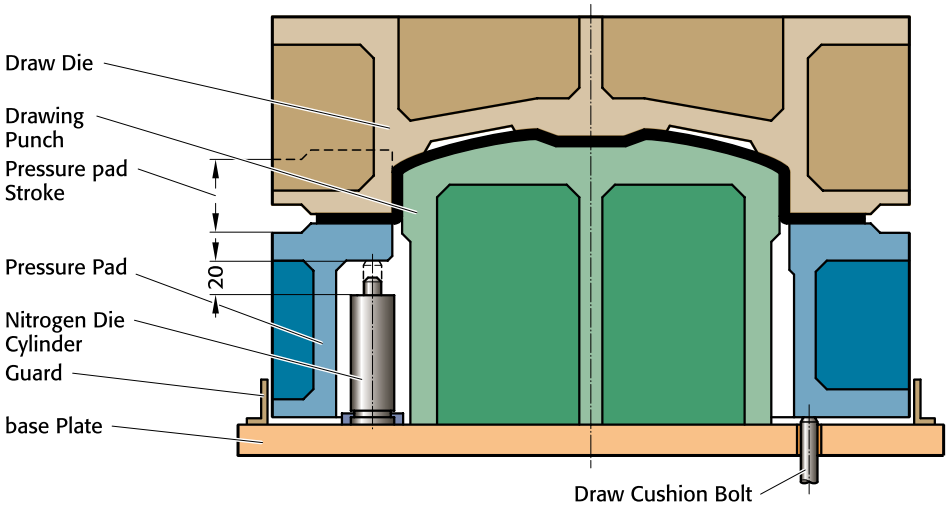
In order to prevent wrinkling, this tool requires high forces on the downholder and pressure pad.
An elegant solution was achieved with nitrogen die cylinders. Ease of cylinder installation was ensured.



*Must be secured with special flange.

Drawing Tool

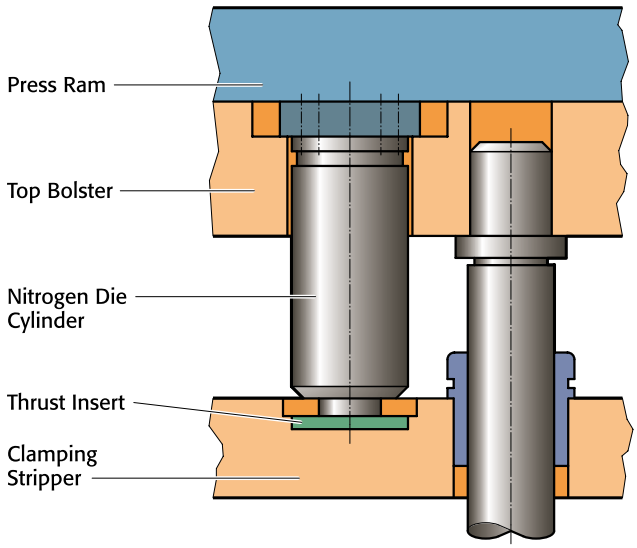
The pressure pad is actuated by nitrogen die cylinders during the final 20 mm of the draw.



Application Examples

Detail of Progression Compound Tool

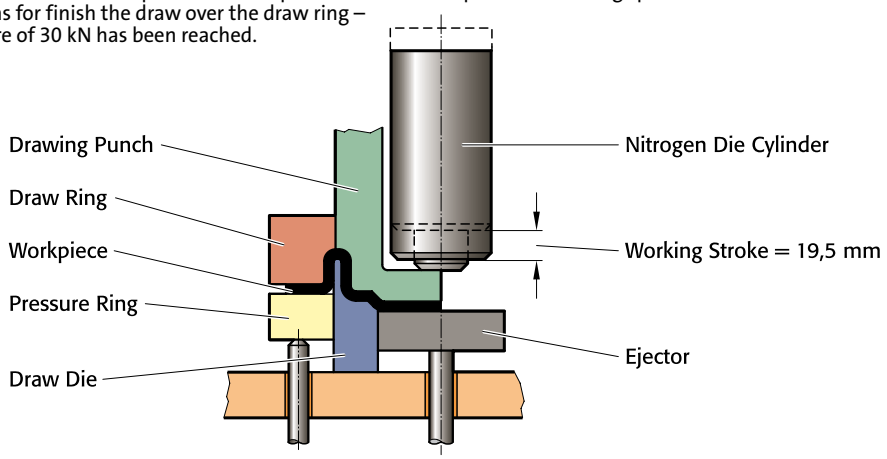
The clamping stripper is actuated by two nitrogen die cylinders 2480.12.01500.025. The units provide an initial cylinder force of 15 kN each and a stroke capacity of 25 mm – of which 20 mm are utilized.



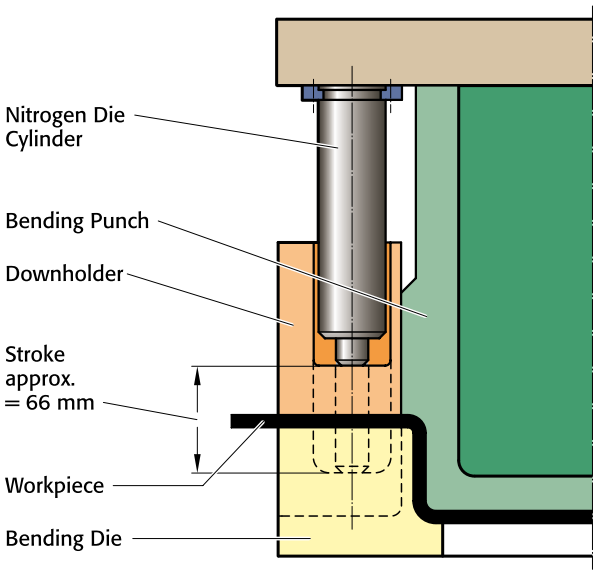
Drawing Tool

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



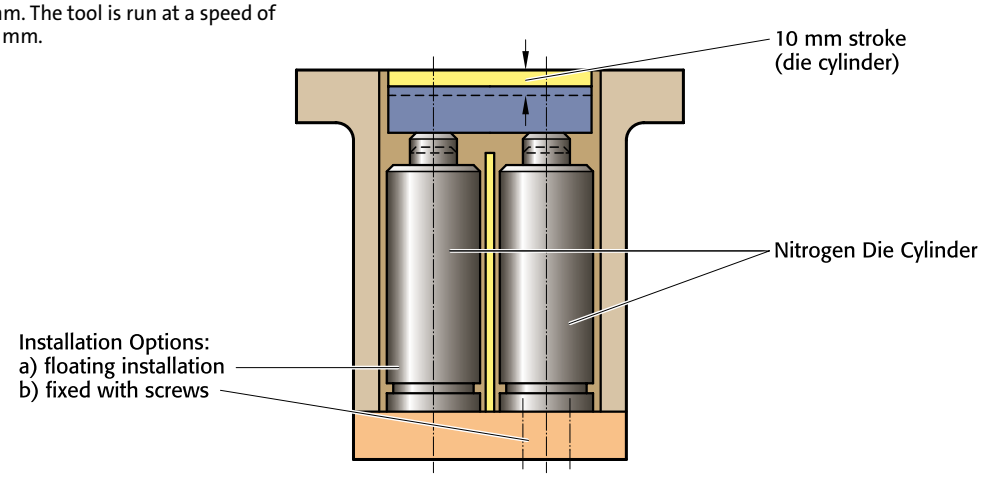
This tool employs two nitrogen die cylinders 2480.13.00750.080 for actuating the downholder. Press stroke is 92 mm. The stroke of the downholder is approx. 66 mm.

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.

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.

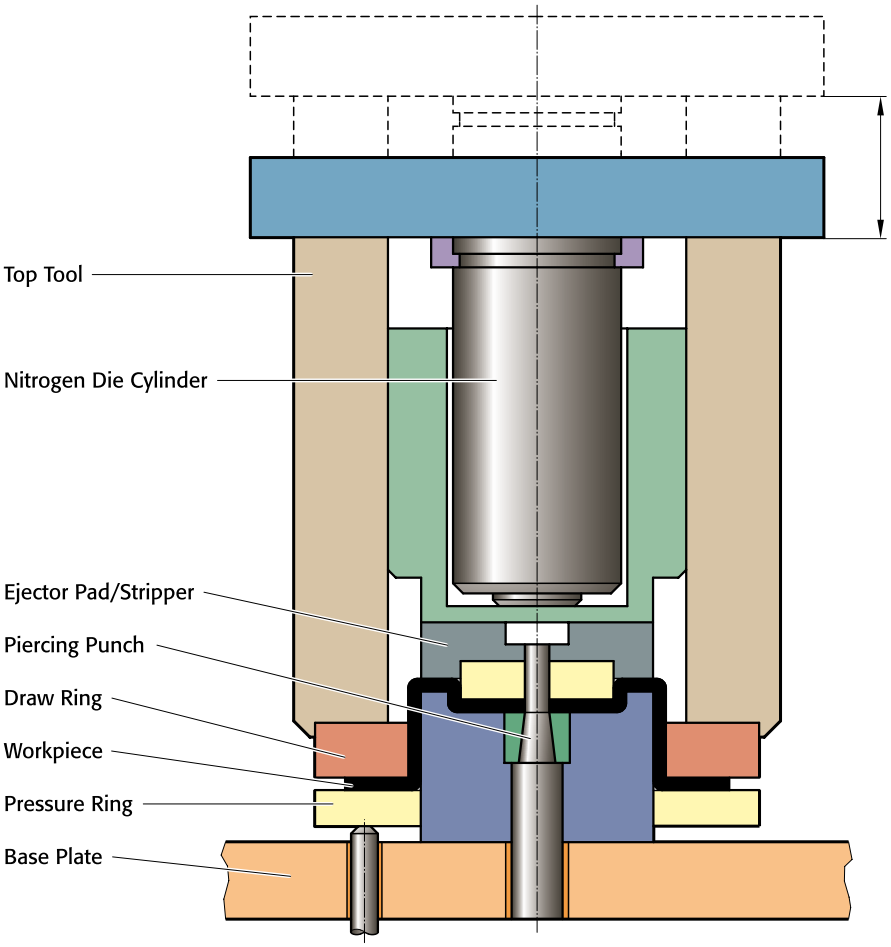
The actual working stroke is 10 mm. The tool is run at a speed of 150 SPM, with a ram stroke of 48 mm.



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.

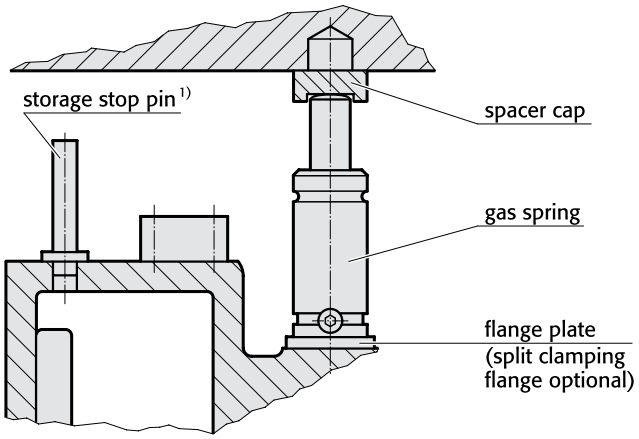
Application examples 1 and 2 show that special spacer caps are inserted prior to the tool being let down onto the gas springs – this being done whilst still in the press. During removal from the press and subsequent storage, the springs will keep the top tool elevated.

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.

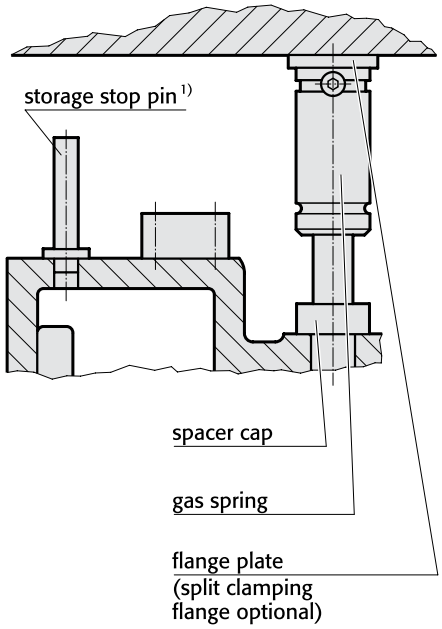
Upon being prepared for production, the springs facilitate access to the tool. Once back in the press, the spacer caps are removed and the storage springs remain inactive during the production run.

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.

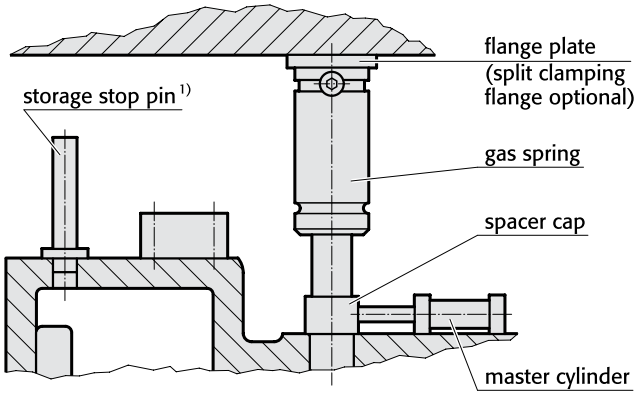
Example 1: Gas Spring fixed to bottom bolster



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