WE LOVE TECHNOLOGY

STANDARD PARTS FOR
MOULD MAKING

MEMBER OF THE LÄPPLE GROUP

All Products are registered in...

FIBRO INDIA
Standard Parts Webshop
www.fibro-india.com

FIBRO

Experience and expertise you can rely on
FIBRO Quality Assurance

FIBRO – your production partner

FIBRO – an internationally successful company.

As a market leader in Standard Parts and Rotary Indexing Tables, FIBRO provides products and solutions to ensure your production keeps moving.

So what is the secret of the FIBRO success?
Products developed in-house, tailor-made for the market with uncompromising quality.

But good products are not enough on their own.

FIBRO combines excellent products, the know-how and service competence of an internationally focused company, matched to the actual needs of customers - wherever they are.

Hassmersheim plant

Standard Parts

Today the Standard Parts Division operates from the Hassmersheim and Weinsberg works, which manufacture a comprehensive range of standard parts and maintain stocks ready for immediate despatch world-wide.
The machine tool, mechanical engineering and systems engineering product ranges have been developed to meet the needs of customers.

They include die sets, precision ground plates and flat bars, lifting and clamping devices, guide elements, oilless guide elements and precision components such as punches and matrixes, special steel compression springs, gas springs, forming materials, metal bonding agents, moulding resins, peripheral equipment for pressing and tool making, electronic thread molding units, tool slides with cam or roller slides and hydraulic cam systems.

FIBRO has become renowned world-wide for its comprehensive range of products in stock and its readiness to deliver.

FIBRO is customer-focused – world-wide. A well-developed network of sales and service points and strategic partners ensure that help is always at hand. This ensures technical advance, world-wide experience in applications and rapid availability of products.

Facts and figures on FIBRO:

- Founded in 1958
- Approx. 780 employees
- Branch offices in India, France, Poland, the USA, Singapore, Korea and China
- Over 70 representatives and service partners worldwide
- A quality management system in line with ISO 9001
- An environmental management system in line with ISO 14001

Manufacturing of precision parts

Rotary Tables

FIBRO – The worldwide pioneer in the field of rotary tables

A comprehensive range of types:

FIBROPLAN® – NC rotary table with worm drive

FIBRODYN® – NC rotary table with direct torque drive

FIBROMAX® – Heavy-duty NC rotary table with Twin Drive

FIBROTAKT® – Rotary indexing table with Hirth face gear

FIBROTOR® – Electromechanical rotary indexing table for applications that do not involve machining

Rotary tables for all applications – from flexible workpiece positioning through rotary and multiple-axis machining to assembly automation

Used in all branches of industry – from the automobile industry through solar energy to machine tools

A wide range of sizes – from micro-machining to processing of very large parts

Customer-oriented design – from the standard modular table to customer-specific special solutions

Alphabetical Content

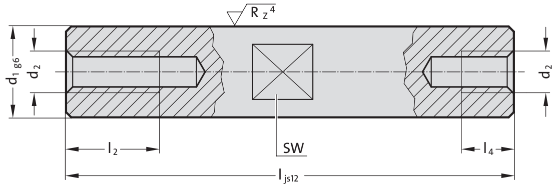
Alphabetical Content

Numerical Content

GUIDE ELEMENTS

Ejector rod

3300.10.



3300.10. Ejector rod

d_1	10	14	18	20	24	30
d_2	M6	M8	M10	M12	M12	M16
l_2	16	16	20	25	25	30
l_4	9	11	12	14	14	16
SW*	9	12	14	16	19	24
l						
60	●	●				
70	●	●				
80	●	●				
100	●	●	●	●		
120	●	●	●	●	●	
140	●	●	●	●	●	
160		●	●	●	●	
180		●	●	●	●	●
200			●	●	●	
220			●	●		●
240			●	●	●	
260						●
300						●

*SW = Width across flats

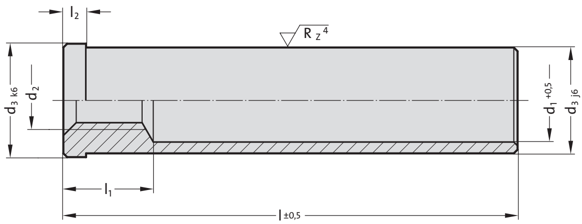
Ordering Code (example):

Ejector rod		=	3300.10.
Guide diameter d_1	10 mm	=	010.
Length l	60 mm	=	060
Order No		=	3300.10. 010. 060

Subject to alteration

Centring sleeve

3100.04.



3100.04. Centring sleeve

d_3	14	20	26	30	42	54
d_2	M6	M8	M10	M12	M16	M20
d_1	11	16	21	25	33	43
l_1	8	13	13	13	13	13
l_2	2	2	2.5	2.5	4.5	4.5
l						
20	●					
30	●	●	●			
40	●	●	●	●	●	
50	●					
60	●	●	●	●	●	●
70	●					
80	●	●	●	●	●	●
100	●	●	●	●	●	
120		●	●	●	●	●
140		●	●	●	●	
160		●	●	●	●	●
180			●	●	●	
200				●	●	●
220					●	
240				●		●
260					●	
280						●
300					●	

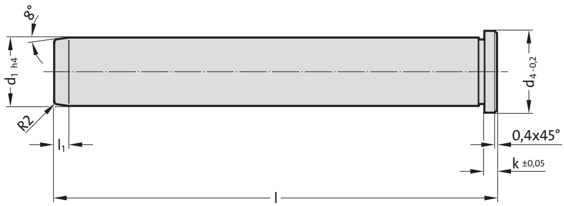
Ordering Code (example):

Centring sleeve		=	3100.04.
Guide diameter d_3	14 mm	=	014.
Length l	20 mm	=	020
Order No		=	3100.04. 014. 020

FIBRO

Guide pillar

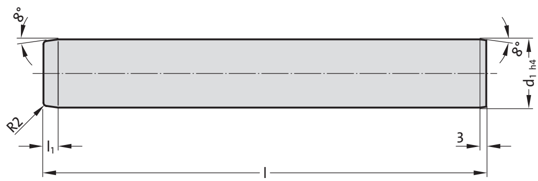
3202.12.



3202.12. Guide pillar

Order No	d_1	l	d_4	k	l_1
3202.12.012.080	12	80	16	4	4
3202.12.012.100	12	100	16	4	4
3202.12.012.120	12	120	16	4	4
3202.12.018.120	18	120	22	6	7
3202.12.018.140	18	140	22	6	7
3202.12.018.160	18	160	22	6	7
3202.12.030.160	30	160	36	6	7
3202.12.030.200	30	200	36	6	7
3202.12.030.240	30	240	36	6	7

3202.13.

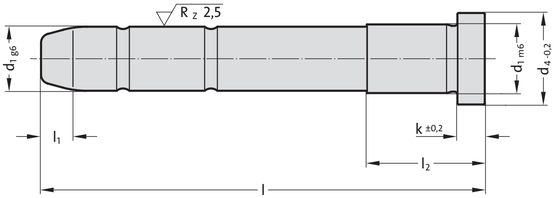


3202.13. Guide pillar

Order No	d_1	l	l_1
3202.13.012.100	12	100	3
3202.13.012.125	12	125	3
3202.13.018.125	18	125	6
3202.13.018.160	18	160	6
3202.13.030.160	30	160	6
3202.13.030.240	30	240	6

Guide pillar

3111.10.



3111.10. Guide pillar

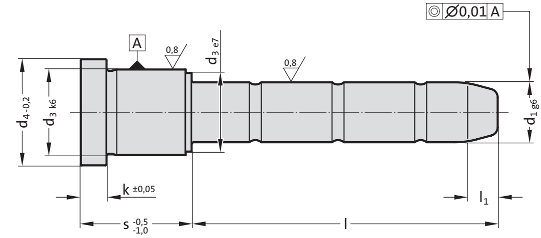
d_1	10	12	14	16	18	20	22	24	30	32	40	50	60
d_4	12	16	18	20	22	24	26	28	36	36	48	58	68
k	3	6	8	8	8	8	15	15	15	15	15	15	20
l_1	4	7	7	7	7	7	7	7	7	7	10	10	12
l	l_2												
40	17												
60	17	17	17	22									
80	22	22	22	27	27	27							
100	27	27	27	27	27	27	36	36					
120		36	36	36	36	36	46	46					
140			46	46	46	46	46	46					
160			46	46	46	46	56	56	56	56			
180					56	56	56	56					
200					56	56	76	76	56	56	56	56	
220							76	76					
240									76	76	76	76	76
300											96	96	96
360													116

Ordering Code (example):

Guide pillar		=3111.10.
Guide diameter d_1	10 mm	= 010.
Length l	40 mm	= 040
Order No		=3111.10. 010. 040

Guide pillar, shouldered

3111.20.



3111.20. Guide pillar, shouldered

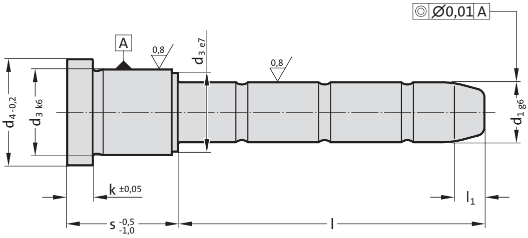
d_1	9	9	9	9	9	9	10	10	10	10	10	10	14	14	14	14	14	14	14	14	15	15	15	15	15	15	15	15
s	12	17	22	27	36	46	12	17	22	27	36	46	22	27	36	46	56	66	76	86	22	27	36	46	56	66	76	86
d_3	14	14	14	14	14	14	14	14	14	14	14	14	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
d_4	16	16	16	16	16	16	16	16	16	16	16	16	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
l_1	4	4	4	4	4	4	4	4	4	4	4	4	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
l																												
20		●						●					●	●	●	●	●				●	●	●	●	●			
25			●	●	●				●	●	●																	
30		●		●		●		●		●		●																
35		●	●	●	●			●	●	●	●		●	●	●	●	●				●	●	●	●	●			
40													●	●	●						●	●	●					
45	●			●	●	●	●			●	●	●	●	●	●	●					●	●	●	●				
50				●						●			●								●							
55			●			●			●			●	●	●	●		●	●	●	●	●	●	●		●	●	●	●
65													●	●	●	●		●			●	●	●	●		●		
70													●								●							
75						●						●			●		●						●		●			
85														●		●						●		●				
90													●								●							
95															●		●	●	●	●			●		●	●	●	●
105														●		●						●		●				
110													●								●							

Ordering Code (example):

Guide pillar, shouldered		=3111.20.
Guide diameter d_1	9 mm	= 009.
Installation length s	12 mm	= 012.
Guide length l	45 mm	= 045
Order No		=3111.20. 009. 012.045

Guide pillar, shouldered

3111.20.



3111.20. Guide pillar, shouldered

d_1	18	18	18	18	18	18	18	18	18	18	20	20	20	20	20
s	22	27	36	46	56	66	76	86	96	116	22	27	36	46	56
d_3	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
d_4	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
l															
20	●	●	●	●	●						●	●	●	●	●
25															
35	●	●	●		●						●	●	●		●
40	●	●	●								●	●	●		
45	●	●	●	●							●	●	●	●	
50	●	●	●								●	●	●		
55	●	●	●		●	●	●	●	●		●	●	●		●
60	●	●	●								●	●	●		
65	●	●	●	●							●	●	●	●	
70	●	●	●								●	●	●		
75			●		●	●	●	●					●		●
80	●	●	●								●	●	●		
85	●	●		●							●	●		●	
95			●		●	●	●	●	●				●		●
105		●		●								●		●	
115	●		●							●	●		●		
125		●										●			
135			●	●									●	●	
155															
165				●										●	

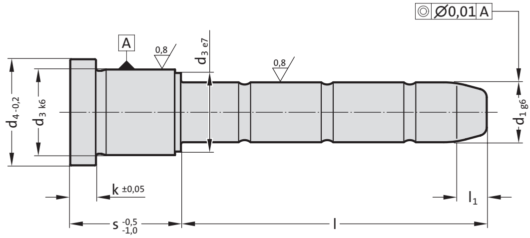
d_1	20	20	20	20	20	22	22	22	22	22	22	22	22	22	22
s	66	76	86	96	116	27	36	46	56	66	76	86	96	116	136
d_3	26	26	26	26	26	30	30	30	30	30	30	30	30	30	30
d_4	31	31	31	31	31	35	35	35	35	35	35	35	35	35	35
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
l															
20															
25						●	●	●	●		●				
35															
40															
45						●	●	●	●		●				
50						●	●	●							
55	●	●	●	●			●		●	●	●	●	●		
60						●	●	●							
65						●		●							
70						●	●	●							
75	●	●	●				●		●	●	●	●	●	●	
80						●	●	●							
85						●		●							
95	●	●	●	●			●		●	●	●	●	●		
105						●		●							
115					●		●		●		●			●	
125						●		●							
135							●								●
155														●	
165						●	●	●	●						

Ordering Code (example):

Guide pillar, shouldered		=	3111.20.
Guide diameter d_1	9 mm	=	009.
Installation length s	12 mm	=	012.
Guide length l	45 mm	=	045
Order No		=	3111.20. 009. 012. 045

Guide pillar, shouldered

3111.20.



3111.20. Guide pillar, shouldered

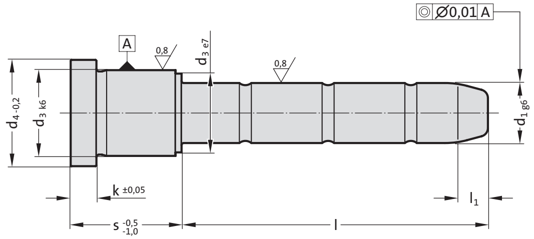
d_1	24	24	24	24	24	24	24	24	24	24	30	30	30	30	30	30	30	30	30	30	30	30	32	32	32	32	32	32	32	32	32	32	32	32
s	27	36	46	56	66	76	86	96	116	136	27	36	46	56	66	76	86	96	116	136	156	196	27	36	46	56	66	76	86	96	116	136	156	196
d_3	30	30	30	30	30	30	30	30	30	30	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
d_4	35	35	35	35	35	35	35	35	35	35	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
l																																		
25	●	●	●	●		●																												
45	●	●	●	●		●					●		●										●		●									
50	●	●	●																															
55		●		●	●	●	●	●				●		●	●	●	●	●						●		●	●	●	●	●				
60	●	●	●																															
65	●		●								●		●										●		●									
70	●	●	●																															
75		●		●	●	●	●	●	●			●		●	●	●	●	●	●					●		●	●	●	●	●	●			
80	●	●	●																															
85	●		●										●												●									
95		●		●	●	●	●	●				●		●	●	●	●	●		●				●		●	●	●	●	●		●		
105	●		●								●		●										●		●									
115		●		●		●			●			●		●	●	●	●	●	●	●	●			●		●	●	●	●	●	●	●	●	
125	●		●										●												●									
135		●								●				●	●											●	●							
155									●			●				●	●	●	●	●	●	●		●				●	●	●	●	●	●	●
165	●	●	●	●							●		●										●		●									
175														●	●											●	●							
195																						●												●

Ordering Code (example):

Guide pillar, shouldered		=	3111.20.
Guide diameter d_1	9 mm	=	009.
Installation length s	12 mm	=	012.
Guide length l	45 mm	=	045
Order No		=	3111.20. 009. 012.045

Guide pillar, shouldered

3111.20.



3111.20. Guide pillar, shouldered

d_1	40	40	40	40	40	40	40	40	40	42	42	42	42	42	42	42	42	42	50	50	50	50	50	60	60	60	60	60	60
s	56	66	76	86	96	116	136	156	196	56	66	76	86	96	116	136	156	196	96	116	136	156	196	96	116	136	156	196	246
d_3	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	66	66	66	66	66	80	80	80	80	80	80
d_4	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	72	72	72	72	72	86	86	86	86	86	86
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	10	10	10	10	10	10	10	10	10	10	10
k	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	20	20	20	20	20	20
l																													
75	●	●	●	●	●					●	●	●	●	●															
95						●	●								●	●													
115	●		●		●			●		●		●		●			●		●					●					
135		●		●		●	●				●		●		●	●				●	●	●			●	●			
155	●				●			●	●	●				●			●	●	●	●	●	●		●	●	●	●		
175			●									●											●					●	
195	●					●			●	●					●			●	●	●	●	●	●	●	●	●	●	●	●
215							●	●								●	●												
235									●									●					●				●	●	●
275																													●
315																													●

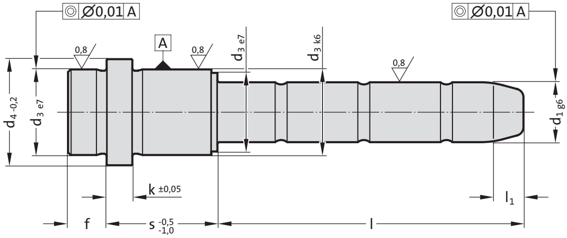
Ordering Code (example):

Guide pillar, shouldered		=3111.20.
Guide diameter d_1	9 mm	= 009.
Installation length s	12 mm	= 012.
Guide length l	45 mm	= 045
Order No		=3111.20. 009. 012.045

FIBRO

Locating guide pillar, shouldered

3111.21.



3111.21. Locating guide pillar, shouldered

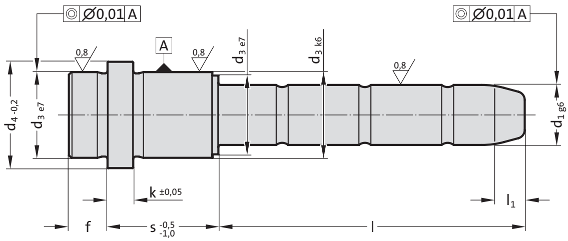
d_1	9	9	9	9	9	9	9	10	10	10	10	10	10	10	14	14	14	14	14	14	14	14	14	14	14
s	12	17	22	27	36	46	56	12	17	22	27	36	46	56	17	22	27	36	46	56	66	76	86	96	116
d_3	14	14	14	14	14	14	14	14	14	14	14	14	14	14	20	20	20	20	20	20	20	20	20	20	20
d_4	16	16	16	16	16	16	16	16	16	16	16	16	16	16	25	25	25	25	25	25	25	25	25	25	25
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	3	3	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6	6	6	6	6	6
f	3	3	3	3	3	3	3	3	3	3	3	3	3	3	9	9	9	9	9	9	9	9	9	9	9
l																									
20		●		●					●		●														
25	●	●	●	●	●			●	●	●	●	●													
30		●		●		●			●		●		●			●	●								
35		●	●		●	●	●		●	●		●	●	●	●			●	●	●					
45	●			●	●	●		●			●	●	●				●		●						
50		●		●					●		●					●									
55		●	●						●	●					●			●		●	●	●	●	●	
60							●							●											
65	●				●			●				●					●		●		●				
70		●		●		●			●		●		●			●									
75		●	●						●	●					●			●		●					●
85					●							●					●		●						
90				●							●					●									
95			●							●					●			●		●	●	●	●	●	
105																	●		●						
110																●									
125																●	●	●	●		●				
135																				●					
145																	●		●						
150																●									
155																		●							
165																	●								

Ordering Code (example):

Locating guide pillar, shouldered		=3111.21.
Guide diameter d_1	9 mm	= 009.
Installation length s	12 mm	= 012.
Guide length l	25 mm	= 025
Order No		=3111.21. 009. 012.025

Locating guide pillar, shouldered

3111.21.



3111.21. Locating guide pillar, shouldered

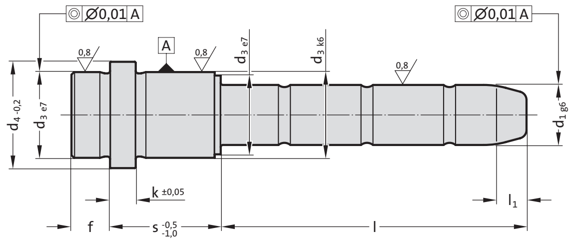
d_1	15	15	15	15	15	15	15	15	15	15	15	18	18	18	18	18	18	18	18	18	18	18	18	20	20	20	20	20	20	20	20	20	20	20	20
s	17	22	27	36	46	56	66	76	86	96	116	17	22	27	36	46	56	66	76	86	96	116	136	17	22	27	36	46	56	66	76	86	96	116	136
d_3	20	20	20	20	20	20	20	20	20	20	20	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
d_4	25	25	25	25	25	25	25	25	25	25	25	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
f	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
l																																			
30		●	●																																
35	●			●	●	●						●	●	●	●	●	●	●						●	●	●	●	●	●	●					
45			●		●								●	●		●									●	●		●							
50		●																																	
55	●			●		●	●	●	●	●		●			●		●	●	●	●	●			●			●		●	●	●	●	●		
65			●		●		●						●	●		●									●	●		●							
70		●																																	
75	●			●		●					●	●			●		●	●	●	●		●		●			●		●	●	●	●		●	
85			●		●								●	●		●									●	●		●							
90		●																																	
95	●			●		●	●	●	●	●					●		●	●	●	●	●						●		●	●	●	●	●		
105			●		●									●		●										●		●							
110		●																																	
115													●		●							●			●		●							●	
120												●												●											
125		●	●	●	●		●							●						●						●						●			
135						●									●	●			●				●				●	●			●				●
145			●		●													●												●					
150		●																																	
155				●													●												●						
165			●											●	●	●										●	●	●							
225														●	●											●	●								
245														●		●										●		●							
255															●												●								

Ordering Code (example):

Locating guide pillar, shouldered		=	3111.21.
Guide diameter d_1	9 mm	=	009.
Installation length s	12 mm	=	012.
Guide length l	25 mm	=	025
Order No		=	3111.21. 009. 012.025

Locating guide pillar, shouldered

3111.21.



3111.21. Locating guide pillar, shouldered

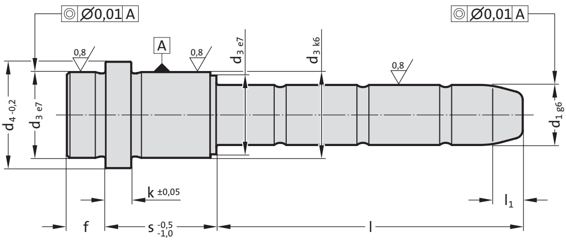
d_1	22	22	22	22	22	22	22	22	22	22	22	22	22	24	24	24	24	24	24	24	24	24	24	24	24	24	30	30	30	30	30	30	30	30	30	30	30	30
s	17	22	27	36	46	56	66	76	86	96	116	136	156	17	22	27	36	46	56	66	76	86	96	116	136	156	27	36	46	56	66	76	86	96	116	136	156	196
d_3	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	42	42	42	42	42	42	42	42	42	42	42	42
d_4	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	47	47	47	47	47	47	47	47	47	47	47	47
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
f	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
l																																						
35	●	●	●	●	●	●	●							●	●	●	●	●	●	●																		
45			●		●											●		●									●		●									
55	●	●		●		●	●	●	●	●				●	●		●		●	●	●	●	●					●		●	●	●	●	●				
65			●		●											●		●									●		●									
75	●	●		●		●	●	●	●	●	●			●	●		●		●	●	●	●	●	●				●		●	●	●	●	●	●			
85			●		●											●		●											●									
95				●		●	●	●	●	●		●					●		●	●	●	●	●		●			●		●	●	●	●	●		●		
105		●	●		●										●	●		●									●		●									
115				●		●		●			●						●		●		●			●				●		●	●	●	●	●	●	●	●	
125			●		●					●						●		●					●						●									
130		●													●																							
135				●					●			●					●					●			●					●	●							
145								●													●																	
155							●				●		●							●				●		●		●				●	●	●	●	●	●	●
165			●	●	●	●										●	●	●	●								●		●									
175																														●	●							
185																											●											
195																																						●
205			●	●	●	●										●	●	●	●															●				
225																																●	●					
245			●	●												●	●										●	●	●	●	●							
285			●	●												●	●										●	●	●									
295																														●	●							

Ordering Code (example):

Locating guide pillar, shouldered		=3111.21.
Guide diameter d_1	9 mm	= 009.
Installation length s	12 mm	= 012.
Guide length l	25 mm	= 025
Order No		=3111.21. 009. 012.025

Locating guide pillar, shouldered

3111.21.



3111.21. Locating guide pillar, shouldered

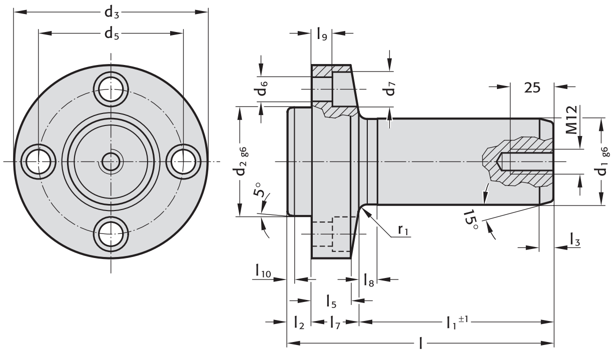
d_1	32	32	32	32	32	32	32	32	32	32	32	32	40	40	40	40	40	40	40	40	40	40	40	42	42	42	42	42	42	42	42	42	42	42
s	27	36	46	56	66	76	86	96	116	136	156	196	46	56	66	76	86	96	116	136	156	196	246	46	56	66	76	86	96	116	136	156	196	246
d_3	42	42	42	42	42	42	42	42	42	42	42	42	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
d_4	47	47	47	47	47	47	47	47	47	47	47	47	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
l_1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
k	6	6	6	6	6	6	6	6	6	6	6	6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
f	9	9	9	9	9	9	9	9	9	9	9	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
l																																		
45	●		●																															
55		●		●	●	●	●	●																										
65	●		●																															
75		●		●	●	●	●	●	●					●	●	●	●	●							●	●	●	●	●					
85			●																															
95		●		●	●	●	●	●		●			●						●	●				●						●	●			
105	●		●																															
115		●		●	●	●	●	●	●	●	●			●		●		●			●				●		●		●			●		
125			●																															
135				●	●										●		●		●	●						●		●		●	●			
155		●				●	●	●	●	●	●	●		●				●			●	●			●				●			●	●	
165	●		●										●										●	●										●
175				●	●											●											●							
185	●																																	
195												●		●					●			●			●					●			●	
205								●																										
215																				●	●										●	●		
225						●	●																											
235																						●											●	
245	●	●	●	●	●																		●											●
285	●	●	●																															
295				●	●																													

Ordering Code (example):

Locating guide pillar, shouldered		=	3111.21.
Guide diameter d_1	9 mm	=	009.
Installation length s	12 mm	=	012.
Guide length l	25 mm	=	025
Order No		=	3111.21. 009. 012.025

Guide pillar with flange

3111.31.



Material:
Steel, case hardened
Surface hardness: 62 + 2 HRC
Penetration depth: 1,2 mm

Execution:
ground

Note:
Fit for receiving bore H7.
Screws not included.

Fixing:
Use socket cap screws DIN EN ISO 4762
M 8 x 20
M 10 x 25
M 12 x 30
M 14 x 35
M 16 x 40.

3111.31. Guide pillar with flange

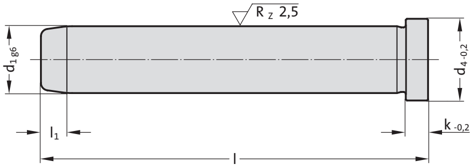
d_1	32	40	50	63	80
d_2	40	50	63	80	100
d_3	76	92	112	138	170
d_5	55	68	84	105	130
d_6	9	11	14	16	18
d_7	15	18	20	24	26
r_1	4	4	5	6	8
l_2	11	13	14	16	20
l_3	6	6	8	8	10
l_5	15.1	18.4	22.5	27.4	32.1
l_7	19	23	28	34	40
l_8	8	9	10	13	15
l_9	9	10	12	15	18
l_{10}	1.5	1.5	2	3	4
l_1	l				
67	97				
80	110	116			
95	125	131	137		
112	142	148	154	162	
132		168	174	182	192
160			202	210	220
190				240	250
224					284
436				486	

Ordering Code (example):

Guide pillar with flange		=3111.31.
Guide diameter d_1	32 mm =	032.
Guide length l_1	67 mm =	067
Order No		=3111.31. 032. 067

Guide pillar (Angle pin)

3110.11.



3110.11. Guide pillar (Angle pin)

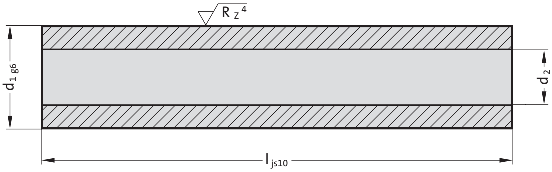
d_1	8	9	10	12	14	15	16	18	20	22	24	30	32	40	50
d_4	10	12	12	16	18	18	20	22	24	26	28	36	36	48	58
k	3	3	3	6	8	8	8	8	8	15	15	15	15	15	15
l_1	4	4	4	7	7	7	7	7	7	7	7	7	7	10	10
l															
40	●	●	●	●			●								
60	●	●	●	●	●	●	●	●	●						
80	●	●	●	●	●	●	●	●	●	●	●				
100	●	●	●	●	●	●	●	●	●	●	●	●	●		
120		●	●	●	●	●	●	●	●	●	●	●	●		
140				●	●	●	●	●	●	●	●				
160				●	●	●	●	●	●	●	●	●	●	●	●
180					●	●	●	●	●	●	●				
200							●	●	●	●	●	●	●	●	●
220										●	●				
240								●	●	●	●	●	●	●	●
300										●	●	●	●	●	●
360												●	●	●	●

Ordering Code (example):

Guide pillar (Angle pin)		=	3110.11.
Guide diameter d_1	8 mm	=	008.
Length l	40 mm	=	040
Order No		=	3110.11. 008. 040

Guide sleeve

3100.09.



3100.09. Guide sleeve

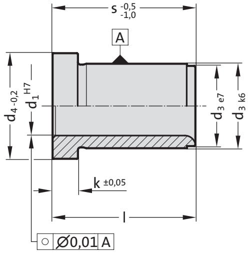
d_1	10	14	18	24	30
d_2	6.2	8.3	10.4	12.5	16.5
l					
20	●				
30	●	●			
40	●	●	●		
50	●	●			
60	●	●	●	●	
70	●	●			
80	●	●	●	●	●
100	●	●	●	●	●
120	●	●	●	●	●
140	●	●	●	●	●
160		●	●	●	●
180		●	●	●	●
200			●	●	
220			●		●
240			●	●	
260					●
300					●

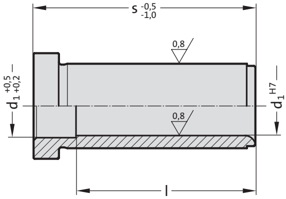
Ordering Code (example):

Guide sleeve		=	3100.09.
Guide diameter d_1	10 mm	=	010.
Length l	20 mm	=	020
Order No		=	3100.09. 010. 020

Guide Bush, headed

3120.40.





3120.40. Guide Bush, headed

d_1	s	l	d_3	d_4	k	d_1	s	l	d_3	d_4	k
9 10	9	9	14	16	3	22 24	36	36	30	35	6
9 10	12	12	14	16	3	22 24	46	46	30	35	6
9 10	17	17	14	16	3	22 24	56	56	30	35	6
9 10	22	22	14	16	3	22 24	66	66	30	35	6
9 10	27	27	14	16	3	22 24	76	76	30	35	6
9 10	36	36	14	16	3	22 24	86	86	30	35	6
9 10	46	46	14	16	3	22 24	96	96	30	35	6
9 10	56	46	14	16	3	22 24	116	96	30	35	6
9 10	66	46	14	16	3	22 24	136	96	30	35	6
12	17	17	18	23	6	22 24	156	96	30	35	6
12	22	22	18	23	6	30 32	27	27	42	47	6
12	27	27	18	23	6	30 32	36	36	42	47	6
12	36	36	18	23	6	30 32	46	46	42	47	6
12	46	46	18	23	6	30 32	56	56	42	47	6
12	56	56	18	23	6	30 32	66	66	42	47	6
14 15	12	12	20	25	6	30 32	76	76	42	47	6
14 15	17	17	20	25	6	30 32	86	86	42	47	6
14 15	22	22	20	25	6	30 32	96	96	42	47	6
14 15	27	27	20	25	6	30 32	116	116	42	47	6
14 15	36	36	20	25	6	30 32	136	116	42	47	6
14 15	46	46	20	25	6	30 32	156	116	42	47	6
14 15	56	56	20	25	6	30 32	176	116	42	47	6
14 15	66	56	20	25	6	40 42	46	46	54	60	10
14 15	76	56	20	25	6	40 42	56	56	54	60	10
14 15	86	56	20	25	6	40 42	66	66	54	60	10
14 15	96	56	20	25	6	40 42	76	76	54	60	10
16	17	17	22	27	6	40 42	86	86	54	60	10
16	22	22	22	27	6	40 42	96	96	54	60	10
16	27	27	22	27	6	40 42	116	116	54	60	10
16	36	36	22	27	6	40 42	136	136	54	60	10
16	46	46	22	27	6	40 42	156	136	54	60	10
16	56	56	22	27	6	40 42	196	136	54	60	10
18 20	17	17	26	31	6	40 42	246	136	54	60	10
18 20	22	22	26	31	6	50	76	76	66	72	10
18 20	27	27	26	31	6	50	96	96	66	72	10
18 20	36	36	26	31	6	50	116	116	66	72	10
18 20	46	46	26	31	6	50	136	136	66	72	10
18 20	56	56	26	31	6	50	156	136	66	72	10
18 20	66	66	26	31	6	50	196	136	66	72	10
18 20	76	76	26	31	6	60	76	76	80	86	20
18 20	86	76	26	31	6	60	96	96	80	86	20
18 20	96	76	26	31	6	60	116	116	80	86	20
18 20	116	76	26	31	6	60	136	136	80	86	20
22 24	17	17	30	35	6	60	156	136	80	86	20
22 24	22	22	30	35	6	60	196	136	80	86	20
22 24	27	27	30	35	6	60	246	136	80	86	20

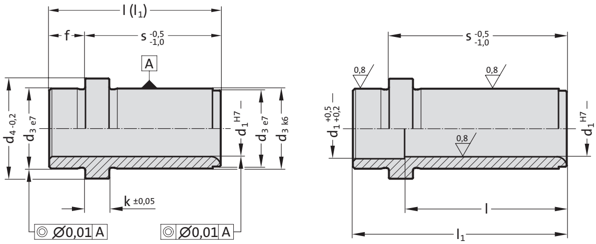
Ordering Code (example):

Guide Bush, headed		= 3120.40.
Guide diameter d_1	9 mm	= 009.
Length s	9 mm	= 009
Order No		= 3120.40. 009. 009

FIBRO

Locating guide bush, headed

3120.42.



3120.42. Locating guide bush, headed

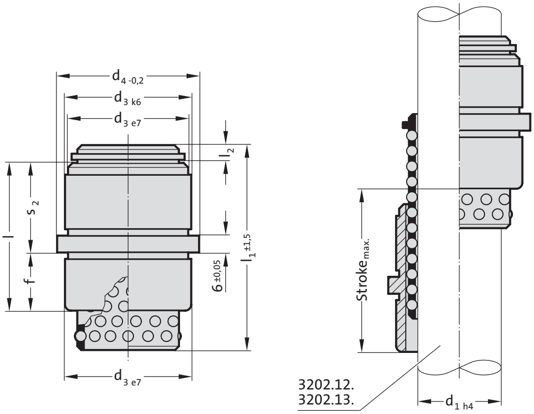
d_1	s	l	l_1	d_3	d_4	f	k	d_1	s	l	l_1	d_3	d_4	f	k
9 10	12	15	15	14	16	3	3	22 24	36	45	45	30	35	9	6
9 10	17	20	20	14	16	3	3	22 24	46	55	55	30	35	9	6
9 10	22	25	25	14	16	3	3	22 24	56	65	65	30	35	9	6
9 10	27	30	30	14	16	3	3	22 24	66	75	75	30	35	9	6
9 10	36	39	39	14	16	3	3	22 24	76	85	85	30	35	9	6
9 10	46	46	49	14	16	3	3	22 24	86	95	95	30	35	9	6
9 10	56	46	59	14	16	3	3	22 24	96	105	105	30	35	9	6
9 10	66	46	69	14	16	3	3	22 24	116	96	125	30	35	9	6
14 15	17	26	26	20	25	9	6	22 24	136	96	145	30	35	9	6
14 15	22	31	31	20	25	9	6	22 24	156	96	165	30	35	9	6
14 15	27	36	36	20	25	9	6	30 32	27	36	36	42	47	9	6
14 15	36	45	45	20	25	9	6	30 32	36	45	45	42	47	9	6
14 15	46	55	55	20	25	9	6	30 32	46	55	55	42	47	9	6
14 15	56	56	65	20	25	9	6	30 32	56	65	65	42	47	9	6
14 15	66	56	75	20	25	9	6	30 32	66	75	75	42	47	9	6
14 15	76	56	85	20	25	9	6	30 32	76	85	85	42	47	9	6
14 15	86	56	95	20	25	9	6	30 32	86	95	95	42	47	9	6
14 15	96	56	105	20	25	9	6	30 32	96	105	105	42	47	9	6
14 15	116	56	125	20	25	9	6	30 32	116	125	125	42	47	9	6
18 20	17	26	26	26	31	9	6	30 32	136	116	145	42	47	9	6
18 20	22	31	31	26	31	9	6	30 32	156	116	165	42	47	9	6
18 20	27	36	36	26	31	9	6	30 32	176	116	185	42	47	9	6
18 20	36	45	45	26	31	9	6	30 32	196	116	205	42	47	9	6
18 20	46	55	55	26	31	9	6	40 42	46	58	58	54	60	12	10
18 20	56	65	65	26	31	9	6	40 42	56	68	68	54	60	12	10
18 20	66	75	75	26	31	9	6	40 42	66	78	78	54	60	12	10
18 20	76	76	85	26	31	9	6	40 42	76	88	88	54	60	12	10
18 20	86	76	95	26	31	9	6	40 42	86	98	98	54	60	12	10
18 20	96	76	105	26	31	9	6	40 42	96	108	108	54	60	12	10
18 20	116	76	125	26	31	9	6	40 42	116	128	128	54	60	12	10
18 20	136	76	145	26	31	9	6	40 42	136	136	148	54	60	12	10
22 24	17	26	26	30	35	9	6	40 42	156	136	168	54	60	12	10
22 24	22	31	31	30	35	9	6	40 42	196	136	208	54	60	12	10
22 24	27	36	36	30	35	9	6	40 42	246	136	258	54	60	12	10

Ordering Code (example):

Locating guide bush, headed		= 3120.42.
Guide diameter d_1	9 mm	= 009.
Length with collar s	12 mm	= 012
Order No		= 3120.42. 009. 012

Ball bearing guide, complete

3120.65.



3120.65. Ball bearing guide, complete

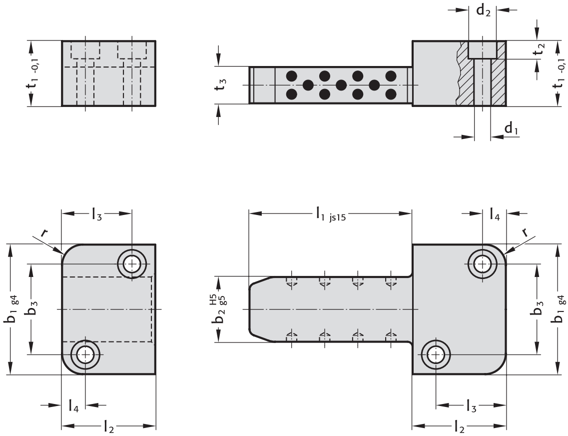
d_1	l	l_1	l_2	d_3	d_4	f	s_2	$Stroke_{max.}$
12	24	40	2.1	22	26	6	18	50
12	24	56	2.1	22	26	6	18	82
18	34	45	3	30	35	11	23	44
18	34	56	3	30	35	11	23	66
18	34	71	3	30	35	11	23	96
30	54	56	4.8	46	52	21	33	32
30	54	75	4.8	46	52	21	33	78
30	54	95	4.8	46	52	21	33	110

Ordering Code (example):

Ball bearing guide, complete		=3120.65.
Guide diameter d_1	12 mm	= 012.
Length of ball cage l_1	40 mm	= 040
Order No		=3120.65. 012.040

Rectangular Guide, Steel with solid lubricant

3131.40.



Material:

Steel with solid lubricant
Surface: case hardened, 580+40 HV 30

Steel
Surface: case hardened, 700+60 HV 30

Note:

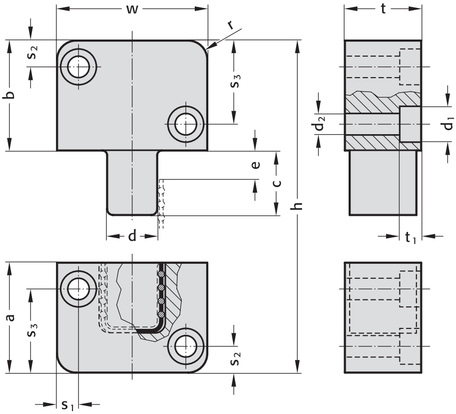
The maximum operating temperature is 200°C.

3131.40. Rectangular Guide, Steel with solid lubricant

Order No	l_2	b_2	l_1	b_1	r	t_1	t_2	t_3	d_1	d_2	b_3	l_3	l_4
3131.40.022.016.020	22	16	20	40	6	20	6.8	11	6.6	11	26	15	7
3131.40.022.016.040	22	16	40	40	6	20	6.8	11	6.6	11	26	15	7
3131.40.027.020.025	27	20	25	45	6	22	6.8	13	6.6	11	31	19	7
3131.40.027.020.050	27	20	50	45	6	22	6.8	13	6.6	11	31	19	7
3131.40.036.025.032	36	25	32	50	8	25	6.8	14	6.6	11	35	27	9
3131.40.036.025.063	36	25	63	50	8	25	6.8	14	6.6	11	35	27	9
3131.40.046.032.040	46	32	40	63	8	32	9	19	9	15	45	35	11
3131.40.046.032.080	46	32	80	63	8	32	9	19	9	15	45	35	11
3131.40.056.040.050	56	40	50	85	10	36	11	22	11	18	60	40	15
3131.40.056.040.100	56	40	100	85	10	36	11	22	11	18	60	40	15
3131.40.066.050.056	66	50	56	100	10	40	13	24	14	20	74	48	18
3131.40.066.050.112	66	50	112	100	10	40	13	24	14	20	74	48	18

Rectangular guide, Steel with Rollers

3131.80.



Description:

The rectangular guides with rollers guarantee the greatest precisi-onwhen their mould is moved together. The rectangular guides must always be installed in the outer area of the mould plates to ensure problem-free functionality.
Advantages: no play or friction, low maintenance and no lubrication

Material:

Steel
Hardness: 56-58 HRC
Surface: burnished

Note:

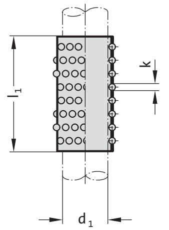
The maximum operating temperature is 150°C.

3131.80. Rectangular guide, Steel with Rollers

Order No	t	w	a	b	c	d	e	h	r	s_1	s_2	s_3	d_1	d_2	t_1
3131.80.032.063	32	63	46	46	27	21	12.1	92	8	9	11	35	15	9	9
3131.80.040.100	40	100	66	66	36	33	19.5	132	10	13	18	48	20	13.5	13

Ball cage, small dimension
Guide bush for ball bearing, small dimension

206.51.



Material:

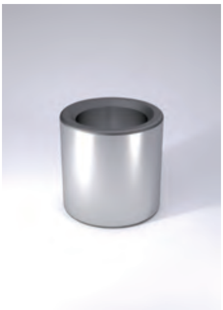
Cage: Brass
Balls: Steel hardened (DIN 5401)

206.51. Ball cage, small dimension

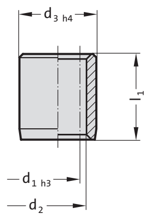
d_1	3	4	5	6	8
k	1	1	1	1	1
l_1	Total number of balls				
10	21	21	29	36	
15	35	35	49	61	61
20	49	49	69	69	69
25		64	89	89	89
30			109	109	109
40					149

Ordering Code (example):

Ball cage, small dimension		=206.51.
Guide diameter d_1	3 mm =	003.
Length l_1	10 mm =	010
Order No		=206.51. 003. 010



206.54.



Material:

Roller bearing steel 100 Cr 6
Hardness: hardened to 60 + 4 HRC
Remarks: available in stainless steel on request

Execution:

Guide bush bores d_2 fine-honed to IT3

Note:

Assembly guide lines / Dimensional requirements and tolerances at the end of chapter D.

Ordering Code (example):

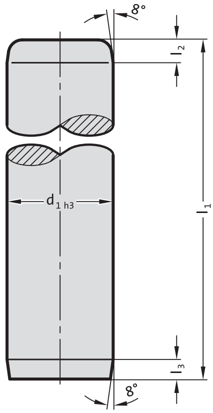
Guide bush for ball bearing, small dimension		=206.54.
Guide diameter d_1	3 mm =	003.
Length l_1	10 mm =	010
Order No		=206.54. 003. 010

206.54. Guide bush for ball bearing, small dimension

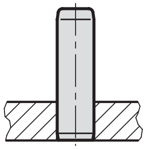
d_1	3	4	5	6	8
d_2	5	6	7	8	10
d_3	7	8	10	11	14
l_1					
10	●	●	●		
15	●	●	●	●	●
20	●	●	●	●	●
25		●	●	●	●
30			●	●	●
35				●	●
40					●

Guide pillar DIN 9825/ISO 9182-2

202.19.



Mounting example



Material:

Steel, (Core strength: ≥ 900 N/mm²) surface hardened
Surface hardness: 60 + 3 HRC, Hardness penetration ≥ 1,8 mm (up to
Ø 12, troughhardened)

Execution:

fine-ground and superfinished
Method of manufacturing entails that centre holes are not concentric
with O.D.

202.19. Guide pillar DIN 9825/ISO 9182-2

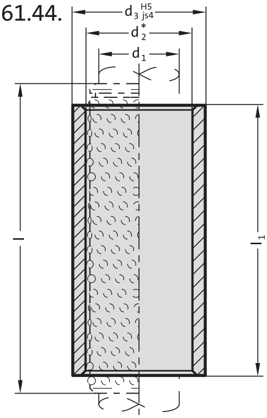
d_1	3	4 5	6	8	10	11 12	15 16	19 20	24 25	30 32	38 40	48 50	60 63	80
l_2	2	2	2	3	3	3	4	4	6	6	6	8	8	8
l_3	2	2	2	3	3	3	3	3	3	3	3	3	3	3
l_1														
30	●													
40	●	●	●											
50	●	●	●	●										
60	●	●	●	●										
80	●	●	●	●		●								
90					●	●	●							
100		●	●	●	●	●	●	●	●					
112					●	●	●	●	●					
125			●	●	●	●	●	●	●	●				
140			●	●	●	●	●	●	●	●				
160			●	●		●	●	●	●	●	●			
180							●	●	●	●	●	●		
200							●	●	●	●	●	●		
224							●	●	●	●	●	●		
250							●	●	●	●	●	●	●	
280							●	●	●	●	●	●	●	●
315							●	●	●	●	●	●	●	●
355							●	●	●	●	●	●	●	●
400								●	●	●	●	●	●	●
450									●	●	●	●	●	●
500									●	●	●	●	●	●
550											●	●	●	●
600											●	●	●	●
700											●	●	●	●
800											●	●	●	●

Ordering Code (example):

Guide pillar DIN 9825/ISO 9182-2		=202.19.	
Guide diameter d_1	3 mm	=	003.
Length l_1	30 mm	=	030.
Order No		=202.19.003.030	

Guide bush for ball bearing, ISO 9448-3

2061.44.



Material:
Tool steel, hardened 62 ± 2 HRC

Execution:
Bearing surfaces honed,
outside diameter precision ground.

Slip-Fit Bonding:
The position of the bearing is given by push fit holes tolerance H5. The adhesive (order no. 281.648) provides optimum push retention whilst offering the following :
- high accuracy and stiffness
- no problems to find position when changing bushings

We do not recommend to press fit for the same reasons mentioned above.

2061.44. Guide bush for ball bearing, ISO 9448-3

d_1	8	10	11	12	15	16	19	20	24	25	30	32	38	40	48	50	60	63	80
d_2	11	14	15	16	21	22	25	26	30	31	38	40	46	48	56	58	68	71	92
d_3	18	22	22	22	28	28	32	32	40	40	48	48	58	58	70	70	85	85	105
l_1 / l*																			
30 / 40	●	●	●	●															
23 / 40		●	●	●															
37 / 40		●	●	●															
23 / 45					●	●	●	●	●	●									
30 / 45					●	●	●	●	●	●	●	●	●	●					
37 / 45					●	●	●	●	●	●									
47 / 56					●	●	●	●	●	●	●	●							
60 / 71					●	●	●	●	●	●	●	●							
77 / 95							●	●	●	●	●	●	●	●	●	●	●	●	
37 / 50											●	●	●	●	●	●			
95 / 120											●	●	●	●	●	●	●	●	
47 / 63													●	●	●	●			
60 / 80													●	●	●	●			
120 / 140													●	●	●	●	●	●	●
60 / 95																	●	●	

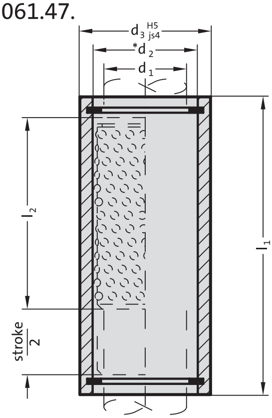
*l = Nominal ordering length of ball cage - prefered length

Ordering Code (example):

Guide bush for ball bearing, ISO 9448-3		=2061.44.		
Guide diameter d_1	8 mm	=	008.	
Installation length l_1	30 mm	=		030.
Order No		=2061.44.	008.	030

Guide bush for ball bearing, with stroke limitation

2061.47.



Material:
Tool steel, hardened 62 ± 2 HRC

Execution:
Bearing surfaces honed,
outside diameter precision ground.

Slip-Fit Bonding:
The position of the bearing is given by push fit holes tolerance H5. The adhesive (order no. 281.648) provides optimum push retention whilst offering the following :
- high accuracy and stiffness
- no problems to find position when changing bushings

We do not recommend to press fit for the same reasons mentioned above.

2061.47. Guide bush for ball bearing, with stroke limitation

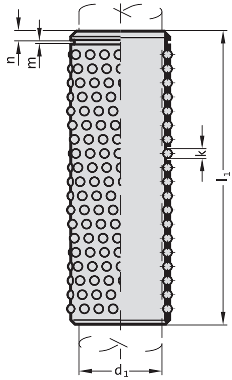
d_1	15 16	19 20	24 25	30 32	38 40	48 50	60 63
d_2	21 22	25 26	30 31	38 40	46 48	56 58	68 71
d_3	28	32	40	48	58	70	85
l_1 / l_2*							
60 / 44	●						
77 / 44		●	●				
95 / 50				●			
120 / 65					●		
120 / 80						●	
120 / 95							●

*l_2 = Manufacturing length of ball cage

Ordering Code (example):

Guide bush for ball bearing, with stroke limitation		=2061.47.
Guide diameter d_1	15 mm	= 015.
Installation length l_1	60 mm	= 060.
Order No		=2061.47. 015.060

Ball cage with circlip groove, Brass



Material:
Cage: Brass
Balls: Steel hardened (DIN 5401)

206.71. Ball cage with circlip groove, Brass

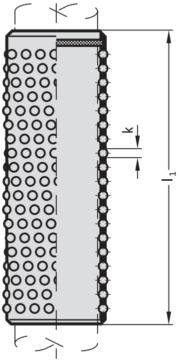
d_1	20	16	24 25	19	8	10 11 12	30	32	15	38 40	48	50	60 63	80
k	3	3	3	3	1.5	2	4	4	3	4	4	4	4	6
n	1.6	1.6	1.6	1.6	-	1.1	2.1	2.1	1.6	2.1	2.1	2.1	2.1	3
m	1.3	1.3	1.6	1.3	-	1.1	1.85	1.85	1.3	1.85	2.15	2.15	2.65	3.15
l / l_1		Total number of balls												
24 / 24	80	64												
28 / 28	100	80												
31 / 32	120		120	120										
40 / 39					80	176								
40 / 40			160				120	120						
45 / 44	180	144	180	180					144					
45 / 45							140	140		168				
50 / 50							160	160		192	224	224		
56 / 55							180	180		216				
56 / 56	240	192	240	240					192					
56 / 57						272								
63 / 64		224							224					
63 / 65										264	308	308		
71 / 70							240	240						
71 / 72	320	256	320	320					256					
75 / 75							260							
80 / 80	360		360	360			280	280		336	392	392		
95 / 95							340	340		408	476	476	544	
95 / 96	440		440	440										
105 / 105							380	380		456	532	532	608	
120 / 119														540
120 / 120			560				440	440		528	616	616	704	
128 / 128												616		
140 / 140							520	520		624	728	728	832	648
160 / 160							600	600		720	840	840	960	
160 / 161														756
180 / 180										816	952	952	1088	
180 / 182														864
200 / 200										912	1064	1064	1216	
200 / 203														972
240 / 238														1152
240 / 240										1104	1288	1288	1472	

Ordering Code (example):

Ball cage with circlip groove, Brass		=206.71.		
Guide diameter d_1	8 mm	=	008.	
Nominal ordering length of ball cage l	40 mm	=		040
Order No		=206.71.008.		040

Ball cage with assembly aid, Brass

206.73.



Material:

Cage: Brass
Balls: Steel hardened (DIN 5401)

206.73. Ball cage with assembly aid, Brass

d_1	10	11 12	15	16	19	20	24 25	30 32	38 40	48 50	60 63	80
k	2	2	3	3	3	3	3	4	4	4	4	6
l / l_1	Total number of balls											
40 / 39	176	176										
56 / 57	272	272										
45 / 44			144	144	180	180	180					
56 / 56			192	192	240	240	240					
63 / 64			224	224								
71 / 72			256	256	320	320	320					
24 / 24				64		80						
28 / 28				80		100						
31 / 32					120	120	120					
80 / 80					360	360	360	280	336	392		
95 / 96					440	440	440					
40 / 40							160	120				
120 / 120							560	440	528	616	704	
45 / 45								140	168			
50 / 50								160	192	224		
56 / 55								180	216			
71 / 70								240				
95 / 95								340	408	476	544	
105 / 105								380	456	532	608	
140 / 140								520	624	728	832	648
160 / 160								600	720	840	960	
63 / 65									264	308		
180 / 180									816	952	1088	
200 / 200									912	1064	1216	
240 / 240									1104	1288	1472	
120 / 119												540
160 / 161												756
180 / 182												864
200 / 203												972
240 / 238												1152

Ordering Code (example):

Ball cage with assembly aid, Brass		=	206.73.
Guide diameter d_1	10 mm	=	010.
Nominal ordering length of ball cage l	40 mm	=	040
Order No		=	206.73. 010.040

OILLESS GUIDE ELEMENTS

Oilless guide elements
General description

Oilless Guide Elements with embedded solid lubricants are used in applications of linear or rotary motion in toolmaking, general machine construction and similar engineering uses. The structure of the base material provides closely spaced deposits of solid lubricant – properties and specifications as per table below.

The elements satisfy highest demands in terms of load bearing capacity at low sliding speeds, within an extensive temperature band.

The lubricant deposits are arranged in staggered geometrical patterns, thus ensuring optimal lubrication effect along the sliding motion, especially with counter bearings which are hardened and ground.

The sliding surfaces should be lightly greased with lithium grease emulsion, prior to commissioning.

On flat guideways and pillar guides, from 25 to 30 per cent of the sliding surfaces consist of lubricant deposits. Surfaces of counter bearings must have a ground finish, preferably with a lay parallel with the sliding motion.

Choice of element-type

Standard:

– for general uses at temperatures up to 200°C

Special Types on request

Advantages of oilless guide elements

– good emergency sliding properties
– highest carrying capacity at low speed
– use under water or with chemical solutions
– extremely wide temperature resistance – hot and cold
– damping properties in presence of vibration

Oilless guide elements – Material data

chemical composition	CU 60–66% Al 5,0–7,5% Fe 2,0–4,0% Mn 2,5–5,0% Zn 17,5–31,5%
specific density kg/dm³	8,2
tensile strength Rm N/mm²	770
Brinell hardness HB 10	180–210
shear strength N/mm²	560
yield limit Rp 0,2 N/mm²	450
elongation to fracture A5 %	8
elongation %	12
modulus of elasticity kN/mm²	105–115
stroking velocity m/min	15
co-efficient of friction	0,04–0,10
temperature conductance W/(m × K)	45–55
temperature resistance °C	+300
co-efficient of thermal expansion /°C	$1{,}6–2{,}0 \times 10^{-5}$
co-efficient of shrinkage %	1,8–2,3
electric conductance m/(Ω × mm²)	7–8
alt. flexural strength N/mm²	±150
ratio sliding surface to lubricant deposits (%)	25–30

PV value

The permissible bearing load is determined from the pressure and the PV value, which defines the bearing wear.

The PV value is the product of surface pressure (P) and running velocity (V).

The permissible bearing load is determined from the PV value.

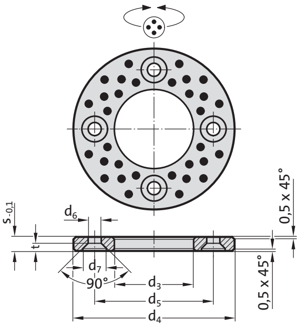
PV = P × V (N/cm² × m/min.)
P = F/A (N/cm²)
F = max. load (N)
A = projected area of the bearing

Surface pressure, temperature, speed and lubrication

Surface pressure max. (N/cm²)	Temp. (C°)	Speed (m/min.)	PV value (N/cm² × m/min)	Lubrication
5000	80	30	10000	Initial
3000	150	60	20000	Pressure lubrication

Thrust washer, Bronze with solid lubricant

2053.70.



Material:
Bronze with solid lubricant, oilless lubricating

Note:
For combination loads use together with Bushes 2052.70.
Screws not included.

Fixing:
from d_3 = 10,2 2 X M3
from d_3 = 20,2 2 X M5
from d_3 = 40,2 2 X M6
from d_3 = 50,3 4 X M6
from d_3 = 60,3 4 X M8
from d_3 = 90,5 4 X M10

2053.70. Thrust washer, Bronze with solid lubricant

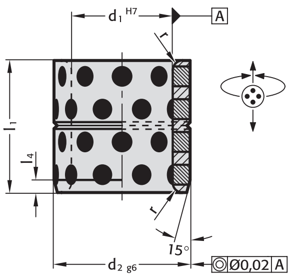
d_1	10	12	13	14	15	16	18	20	25	30	35	40	45	50	55	60	65	70	75	80	90	100	120
d_3	10.2	12.2	13.2	14.2	15.2	16.2	18.2	20.2	25.2	30.2	35.2	40.2	45.3	50.3	55.3	60.3	65.3	70.3	75.3	80.3	90.5	100.5	120.5
d_4	30	40	40	40	50	50	50	50	55	60	70	80	90	100	110	120	125	130	140	150	170	190	200
d_5	20	28	28	28	28	28	35	35	40	45	50	60	67.5	75	85	90	95	100	110	120	140	160	175
d_6	3.4	3.4	3.4	3.4	3.4	3.4	3.4	5.5	5.5	5.5	5.5	6.6	6.6	6.6	6.6	9	9	9	9	9	11	11	11
d_7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	11.5	11.5	11.5	11.5	13.7	13.7	13.7	13.7	18.3	18.3	18.3	18.3	18.3	22.7	22.7	22.7
s	3	3	3	3	3	3	3	5	5	5	5	7	7	8	8	8	8	10	10	10	10	10	10
t	1.8	1.8	1.8	1.8	1.8	1.8	1.8	3	3	3	3	3.6	3.6	3.6	3.6	4.6	4.6	4.6	4.6	4.6	5.9	5.9	5.9

Ordering Code (example):

Thrust washer, Bronze with solid lubricant		=2053.70.
Guide diameter d_1	10 mm =	010
Order No		=2053.70. 010

Guide bush, Bronze with solid lubricant

3120.70.



Material:
Bronze with solid lubricant, oilless lubricating

Fixing:
Connecting with adhesive or if needed secure with threaded pin or flat mushroom head screw 2192.61.

3120.70. Guide bush, Bronze with solid lubricant

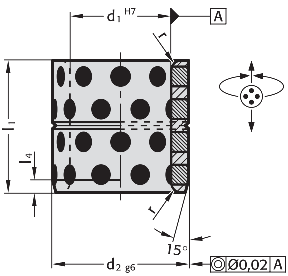
d_1	8	10	10	12	13	14	15	16	18	19	20	20	20	24	25	25	25	28	30	30	30	31.5	32	35	35	38	40	40
d_2	12	14	15	18	19	20	21	22	24	25	26	28	30	32	32	33	35	38	38	40	42	40	42	44	45	48	50	55
r	0.5	0.5	0.5	0.5	0.5	0.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.5	1.5	1.5
l_4	2	2	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
l_1																												
8	●	●																										
10	●	●	●	●	●	●	●	●																				
12	●	●		●		●	●	●																				
15	●	●		●	●	●	●	●	●			●																
16				●	●		●	●	●			●	●			●	●											
20		●		●	●	●	●	●	●			●	●			●	●		●	●					●		●	
25				●		●	●	●	●			●	●			●	●		●	●				●	●		●	●
30				●		●	●	●	●			●	●			●	●	●	●	●		●	●	●	●	●	●	●
35								●	●			●	●			●	●		●	●				●	●		●	●
37										●		●																
40								●	●		●	●	●			●	●	●	●	●		●	●	●	●	●	●	●
47														●		●												
50												●			●	●	●		●	●				●	●		●	●
60																●			●	●	●		●	●	●		●	●
70																											●	
77																										●	●	
80																											●	

Ordering Code (example):

Guide bush, Bronze with solid lubricant		=3120.70.	
Guide diameter d_1	8 mm	=	008.
External diameter d_2	12 mm	=	012.
Installation length l_1	8 mm	=	008
Order No		=3120.70.008.	012.008

Guide bush, Bronze with solid lubricant

3120.70.



Material:
Bronze with solid lubricant, oilless lubricating

Fixing:
Connecting with adhesive or if needed secure with threaded pin or flat mushroom head screw 2192.61.

3120.70. Guide bush, Bronze with solid lubricant

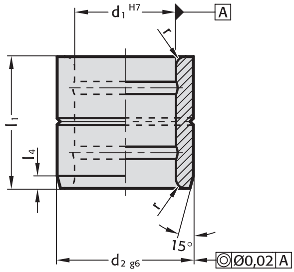
d_1	45	45	45	50	50	50	55	60	60	63	65	70	70	75	75	80	80	85	90	100	110	120	125	130	140	150	160
d_2	55	56	60	60	62	65	70	74	75	75	80	85	90	90	95	96	100	100	110	120	130	140	145	150	160	170	180
r	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
l_4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
l_1																											
30	●	●	●	●	●	●		●	●																		
35	●	●	●	●	●			●	●			●															
40	●	●	●	●	●	●	●	●	●			●				●	●										
50	●	●	●	●	●	●	●	●	●		●	●	●			●	●										
60	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●							
70			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●							
80			●	●		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
95				●																							
100						●			●			●		●	●	●	●		●	●	●	●	●	●	●	●	●
120										●						●	●		●	●	●	●	●	●			
130																								●			
140																	●			●		●			●		
150																										●	●

Ordering Code (example):

Guide bush, Bronze with solid lubricant		=3120.70.
Guide diameter d_1	8 mm	= 008.
External diameter d_2	12 mm	= 012.
Installation length l_1	8 mm	= 008
Order No		=3120.70.008. 012.008

Guide bush, Bronze

3120.71.



Material:
Bronze

Fixing:
Connecting with adhesive or if needed secure with threaded pin or flat mushroom head screw 2192.61.

3120.71. Guide bush, Bronze

d_1	8	10	10	12	13	14	15	16	18	19	20	20	20	24	25	25	25	28	30	30	30	31.5	32	35	35	38	40	40
d_2	12	14	15	18	19	20	21	22	24	25	26	28	30	32	32	33	35	38	38	40	42	40	42	44	45	48	50	55
r	0.5	0.5	0.5	0.5	0.5	0.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.5	1.5	1.5
l_4	2	2	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
l_1																												
8	●	●																										
10	●	●	●	●	●	●	●	●																				
12	●	●		●		●	●	●																				
15	●	●		●	●	●	●	●	●			●																
16				●	●		●	●	●			●	●			●	●											
20		●		●	●	●	●	●	●			●	●			●	●		●	●					●		●	
25				●		●	●	●	●			●	●			●	●		●	●				●	●		●	●
30				●		●	●	●	●			●	●			●	●	●	●	●		●	●	●	●	●	●	●
35								●	●			●	●			●	●		●	●				●	●		●	●
37										●		●																
40								●	●		●	●	●			●	●	●	●	●		●	●	●	●	●	●	●
47														●		●												
50												●			●	●	●		●	●				●	●		●	●
60																●			●	●	●		●	●	●		●	●
70																											●	
77																										●	●	
80																											●	

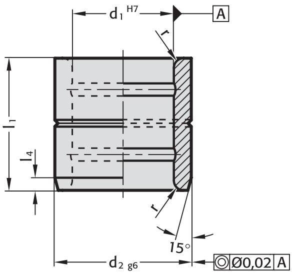
Ordering Code (example):

Guide bush, Bronze		=3120.71.		
Guide diameter d_1	8 mm	=	008.	
External diameter d_2	12 mm	=		012.
Installation length l_1	8 mm	=		008
Order No		=3120.71.008. 012.008		

 Subject to alteration

Guide bush, Bronze

3120.71.



Material:
Bronze

Fixing:
Connecting with adhesive or if needed secure with threaded pin or flat mushroom head screw 2192.61.

3120.71. Guide bush, Bronze

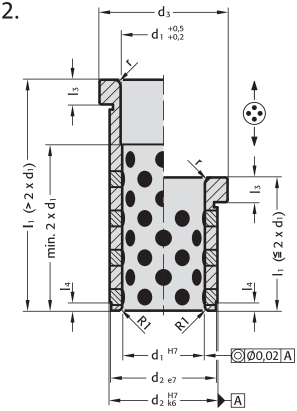
d_1	45	45	45	50	50	50	55	60	60	63	65	70	70	75	75	80	80	85	90	100	110	120	125	130	140	150	160
d_2	55	56	60	60	62	65	70	74	75	75	80	85	90	90	95	96	100	100	110	120	130	140	145	150	160	170	180
r	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
l_4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
l_1																											
30	●	●	●	●	●	●		●	●																		
35	●	●	●	●	●			●	●			●															
40	●	●	●	●	●	●	●	●	●			●				●	●										
50	●	●	●	●	●	●	●	●	●		●	●	●			●	●										
60	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●							
70			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●							
80			●	●		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
95				●																							
100						●			●			●		●	●	●	●		●	●	●	●	●	●	●	●	●
120										●						●	●		●	●	●	●	●	●			
130																								●			
140																	●			●		●			●		
150																										●	●

Ordering Code (example):

Guide bush, Bronze		=3120.71.	
Guide diameter d_1	8 mm	=	008.
External diameter d_2	12 mm	=	012.
Installation length l_1	8 mm	=	008
Order No		=3120.71.008. 012.008	

Guide bush with collar, Bronze with solid lubricant

2087.72.



Material:

Bronze with solid lubricant, oilless lubricating

Attention:

Bushes can only be used with axial motion!

2087.72. Guide bush with collar, Bronze with solid lubricant

d_1	9 10	12	14 15	16	18 20	22 24	25	30 32	40 42	50	60
d_2	14	18	20	22	26	30	32	42	54	66	80
d_3	16	23	25	27	31	35	38	47	60	72	86
r	0.5	1	1	2	2	3	3	3	3	3	3
l_3	3	6	6	6	6	6	6	6	10	10	20
l_4	1.5	2	2	2	2	3	3	4	5	5	5
l_1											
12	●										
17	●	●	●	●	●	●					
22	●	●	●	●	●	●					
27	●	●	●	●	●	●		●			
36	●	●	●	●	●	●		●			
46	●	●	●	●	●	●	●	●	●		
56	●	●	●	●	●	●	●	●	●		
66					●	●	●	●	●		
76					●	●	●	●	●	●	
86						●	●	●	●	●	
96						●		●	●	●	●
116								●	●	●	●
136									●	●	●
156									●	●	●
196										●	●

Ordering Code (example):

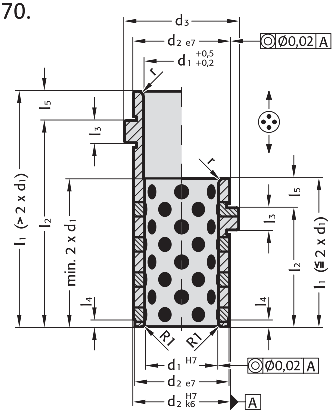
Guide bush with collar, Bronze with solid lubricant		=2087.72.		
Guide diameter d_1	9 mm =		009.	
Total length l_1	12 mm=			012
Order No		=2087.72.	009.	012

Guide bush with collar, Bronze with solid lubricant

2087.70. Guide bush with collar, Bronze with solid lubricant

d_1	9 10	14 15	18 20	22 24	30 32	40 42
d_2	14	20	26	30	42	54
d_3	16	25	31	35	47	60
l_3	3	6	6	6	6	10
l_4	1.5	2	2	3	4	5
l_5	3	6	8	8	8	12
r	0.5	1	2	3	3	3
l_1 l_2						
15 12	●					
20 17	●					
25 22	●					
30 27	●					
39 36	●					
49 46	●					
59 56	●					
69 66	●					
23 17		●				
28 22		●				
33 27		●				
42 36		●				
52 46		●				
62 56		●				
72 66		●				
82 76		●				
92 86		●				
25 17			●	●		
30 22			●	●		
35 27			●	●	●	
44 36			●	●	●	
54 46			●	●	●	
64 56			●	●	●	
74 66			●	●	●	
84 76			●	●	●	
94 86			●	●	●	
104 96			●	●	●	
124 116			●	●	●	
144 136				●	●	
164 156				●		
58 46						●
68 56						●
78 66						●
88 76						●
98 86						●
108 96						●
128 116						●
148 136						●
168 156						●
208 196						●

2087.70.



Material:

Bronze with solid lubricant, oilless lubricating

Attention:

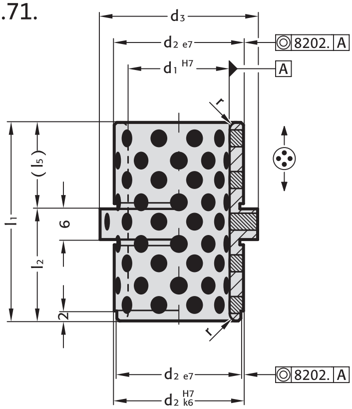
Bushes can only be used with axial motion!

Ordering Code (example):

Guide bush with collar, Bronze with solid lubricant		=2087.70.
Guide diameter d_1	9 mm =	009.
Length with collar l_2	12 mm=	012
Order No		=2087.70.009.012

Guide bush with collar, Bronze with solid lubricant

2087.71.



Material:
Bronze with solid lubricant, oilless lubricating

Attention:
Bushes can only be used with axial motion!

2087.71. Guide bush with collar, Bronze with solid lubricant

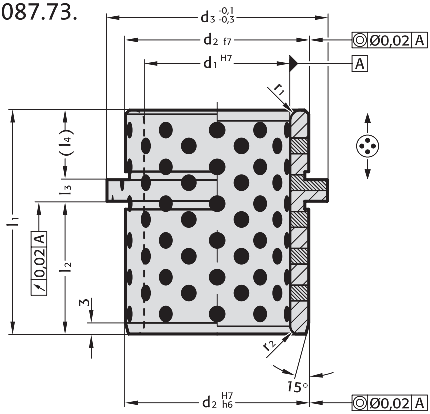
d_1	14 15	18 20	22 24	30 32
d_2	20	26	30	42
d_3	25	31	35	47
r	1	1.5	2	2
l_1	26	39	49	63
l_2	17	22	27	36
l_5	9	17	22	27

Ordering Code (example):

Guide bush with collar, Bronze with solid lubricant		=2087.71.
Guide diameter d_1	14 mm=	014.
Length with collar l_2	17 mm=	017
Order No		=2087.71.014.017

Guide bush with collar, Bronze with solid lubricant

2087.73.



Material:
Bronze with solid lubricant, oilless lubricating

Attention:
Bushes can only be used with axial motion!

2087.73. Guide bush with collar, Bronze with solid lubricant

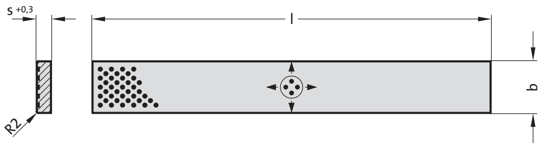
d_1	25	30	40	40	50	50	60	63	63	63
d_2	35	42	50	50	63	63	80	80	80	80
d_3	40	47	60	60	72	72	86	90	90	90
r_1	3	3	4	4	4	4	3	4	4	4
r_2	2	2	2	2	3	3	3	3	3	3
l_1	43	43	60	64	77	92	78	95	100	108
l_2	24	24	35.5	39.5	44.5	55.5	49	55.5	62.5	62.5
l_3	7.5	7.5	6	6	8	8	7.5	8	8	8
l_4	11.5	11.5	18.5	18.5	24.5	28.5	21.5	31.5	29.5	37.5

Ordering Code (example):

Guide bush with collar, Bronze with solid lubricant		=2087.73.
Guide diameter d_1	25 mm =	025.
Total length l_1	43 mm =	043
Order No		=2087.73. 025.043

Flat guide bar, Bronze with solid lubricant

2961.71.



2961.71. Flat guide bar, Bronze with solid lubricant

Order No	b	s	l	l	l
			305	605	1005
2961.71.020.004.0305	20	4	●		
2961.71.025.005.0305	25	5	●		
2961.71.030.004.0305	30	4	●		
2961.71.030.006.0305	30	6	●	●	
2961.71.030.008.0305	30	8	●	●	
2961.71.030.010.0305	30	10	●	●	●
2961.71.030.012.0305	30	12	●	●	●
2961.71.035.010.0305	35	10	●	●	●
2961.71.040.005.0305	40	5	●	●	
2961.71.040.006.0305	40	6	●	●	
2961.71.040.008.0305	40	8	●	●	●
2961.71.040.010.0305	40	10	●	●	●
2961.71.040.012.0605	40	12		●	●
2961.71.040.016.0605	40	16		●	●
2961.71.050.010.0305	50	10	●	●	●
2961.71.050.012.0605	50	12		●	●
2961.71.050.020.0605	50	20		●	●
2961.71.060.012.0605	60	12		●	●
2961.71.060.016.0605	60	16		●	●
2961.71.080.010.0305	80	10	●	●	●
2961.71.080.012.0605	80	12		●	●
2961.71.080.016.0605	80	16		●	●
2961.71.080.020.0605	80	20		●	●
2961.71.080.025.0605	80	25		●	●
2961.71.100.016.0605	100	16		●	●
2961.71.100.020.0605	100	20		●	●
2961.71.100.025.0605	100	25		●	●
2961.71.125.020.0605	125	20		●	●
2961.71.125.025.0605	125	25		●	●
2961.71.160.025.0605	160	25		●	●

Material:
Bronze with solid lubricant, oilless lubricating

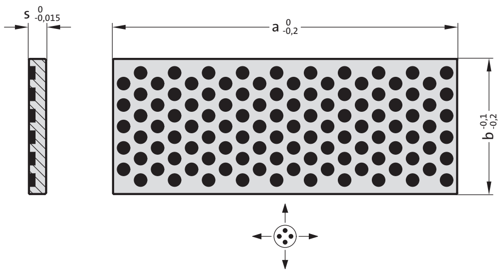
Execution:
Sliding faces ground.

Ordering Code (example):

Flat guide bar, Bronze with solid lubricant		=2961.71.
Width b	20 mm	= 020.
Thickness s	4 mm	= 004.
Length l	305 mm	= 0305
Order No		=2961.71. 020. 004. 0305

Flat guide bar, Bronze with solid lubricant

2961.76.



Material:
Bronze with solid lubricant, oilless lubricating

Execution:
Sliding faces ground.

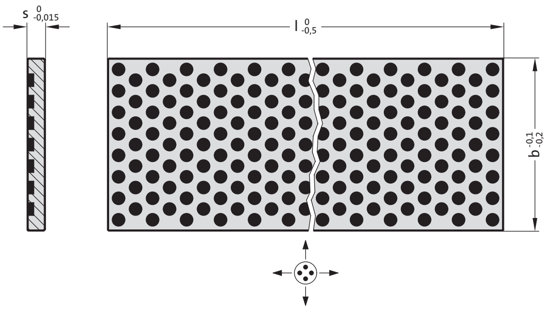
2961.76. Flat guide bar, Bronze with solid lubricant

Order No	b	s	a
2961.76.025.005.050	25	5	50
2961.76.025.005.071	25	5	71
2961.76.025.005.090	25	5	90
2961.76.025.006.050	25	6	50
2961.76.025.006.063	25	6	63
2961.76.025.006.080	25	6	80
2961.76.025.006.100	25	6	100
2961.76.025.006.125	25	6	125
2961.76.040.005.050	40	5	50
2961.76.040.005.071	40	5	71
2961.76.040.005.090	40	5	90
2961.76.040.006.080	40	6	80
2961.76.040.006.100	40	6	100
2961.76.040.006.125	40	6	125
2961.76.040.006.160	40	6	160
2961.76.040.006.200	40	6	200
2961.76.063.006.080	63	6	80
2961.76.063.006.100	63	6	100
2961.76.063.006.125	63	6	125
2961.76.063.006.160	63	6	160
2961.76.063.008.125	63	8	125
2961.76.063.008.160	63	8	160
2961.76.063.008.200	63	8	200
2961.76.063.008.250	63	8	250
2961.76.063.008.315	63	8	315

FIBRO

Flat guide bar, Bronze with solid lubricant

2961.77.



Material:
Bronze with solid lubricant, oilless lubricating

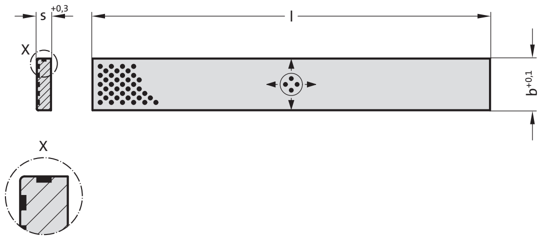
Execution:
Sliding faces ground.

2961.77. Flat guide bar, Bronze with solid lubricant

Order No	b	s	l
2961.77.025.006.500	25	6	500
2961.77.040.006.500	40	6	500
2961.77.063.008.500	63	8	500
2961.77.080.010.500	80	10	500

Flat guide bar with two sliding surfaces, Bronze with solid lubricant

2961.73.



Material:
Bronze with solid lubricant, oilless lubricating

Execution:
Sliding faces ground.

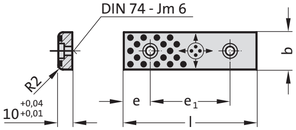
2961.73. Flat guide bar with two sliding surfaces, Bronze with solid lubricant

Order No	b	s	l	l
			305	605
2961.73.025.005.0305	25	5	●	
2961.73.030.006.0305	30	6	●	
2961.73.035.010.0605	35	10		●
2961.73.040.008.0605	40	8		●
2961.73.040.012.0605	40	12		●
2961.73.050.010.0605	50	10		●
2961.73.060.016.0605	60	16		●
2961.73.080.012.0605	80	12		●
2961.73.080.020.0605	80	20		●
2961.73.100.020.0605	100	20		●

Flat guide bar, Bronze with solid lubricant

2961.70.

A



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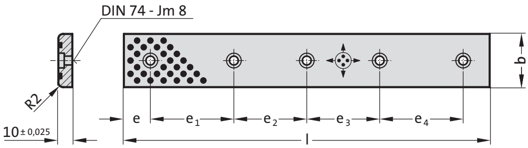
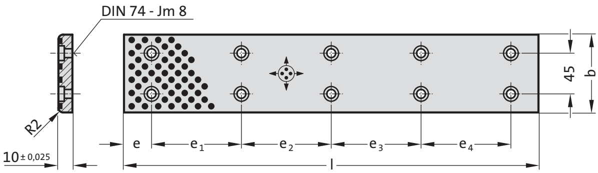


E



Material:
Bronze with solid lubricant, oilless lubricating

Execution:
Sliding faces ground.

Note:
Screws are not included.

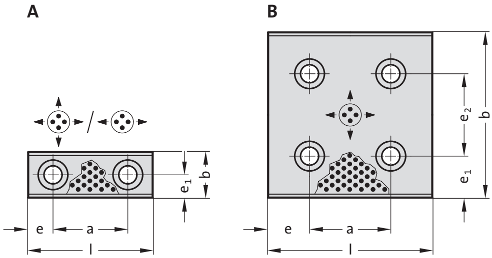
Fixing:
Use socket cap screws DIN 7984.

2961.70. Flat guide bar, Bronze with solid lubricant

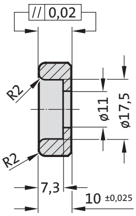
Order No	Shape	b	l	e	e_1	e_2	e_3	e_4	Number of screw holes
2961.70.018.075	A	18	75	15	45	-	-	-	2
2961.70.018.100	A	18	100	25	50	-	-	-	2
2961.70.018.125	A	18	125	25	75	-	-	-	2
2961.70.018.150	A	18	150	25	100	-	-	-	2
2961.70.028.075	A	28	75	15	45	-	-	-	2
2961.70.028.100	A	28	100	25	50	-	-	-	2
2961.70.028.125	A	28	125	25	75	-	-	-	2
2961.70.028.150	A	28	150	25	100	-	-	-	2
2961.70.035.100	F	35	100	20	60	-	-	-	2
2961.70.035.150	F	35	150	20	55	55	-	-	3
2961.70.035.200	F	35	200	20	55	50	55	-	4
2961.70.035.250	F	35	250	20	70	70	70	-	4
2961.70.035.300	F	35	300	20	65	65	65	65	5
2961.70.035.350	F	35	350	20	80	75	75	80	5
2961.70.038.075	A	38	75	15	45	-	-	-	2
2961.70.038.100	A	38	100	25	50	-	-	-	2
2961.70.038.125	A	38	125	25	75	-	-	-	2
2961.70.038.150	A	38	150	25	100	-	-	-	2
2961.70.048.075	A	48	75	15	45	-	-	-	2
2961.70.048.100	A	48	100	25	50	-	-	-	2
2961.70.048.125	A	48	125	25	75	-	-	-	2
2961.70.048.150	A	48	150	25	100	-	-	-	2
2961.70.050.100	F	50	100	20	60	-	-	-	2
2961.70.050.150	F	50	150	20	55	55	-	-	3
2961.70.050.200	F	50	200	20	55	50	55	-	4
2961.70.050.250	F	50	250	20	70	70	70	-	4
2961.70.050.300	F	50	300	20	65	65	65	65	5
2961.70.050.350	F	50	350	20	80	75	75	80	5
2961.70.050.400	F	50	400	20	90	90	90	90	5
2961.70.075.150	E	75	150	20	110	-	-	-	4
2961.70.075.200	E	75	200	20	80	80	-	-	6
2961.70.075.250	E	75	250	20	105	105	-	-	6
2961.70.075.300	E	75	300	20	85	90	85	-	8
2961.70.075.400	E	75	400	20	120	120	120	-	8
2961.70.075.500	E	75	500	20	115	115	115	115	10

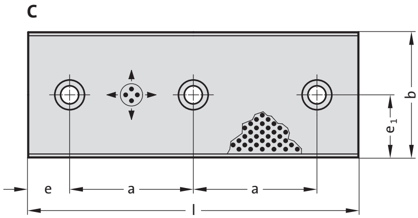
Flat guide bar, Bronze with solid lubricant

2961.75.



2961.75.





Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws are not included.

Attention:
Direction of motion of flat guide bars with a width of b = 28 and 38 mm only in longitudinal direction.

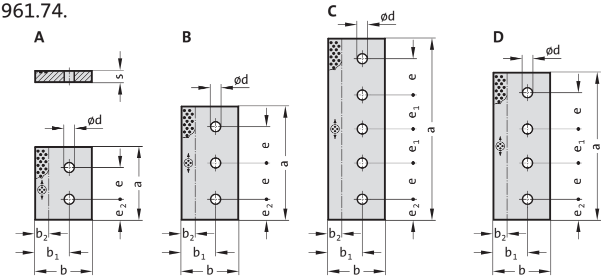
Fixing:
Use socket cap screws DIN 7984 M10.

2961.75. Flat guide bar, Bronze with solid lubricant

Order No	Shape	b	l	e	a	e_1	e_2	Number of screw holes
2961.75.028.075	A	28	75	15	45	14	-	2
2961.75.028.100	A	28	100	25	50	14	-	2
2961.75.028.125	A	28	125	25	75	14	-	2
2961.75.028.150	A	28	150	25	100	14	-	2
2961.75.038.075	A	38	75	15	45	19	-	2
2961.75.038.100	A	38	100	25	50	19	-	2
2961.75.038.125	A	38	125	25	75	19	-	2
2961.75.038.150	A	38	150	25	100	19	-	2
2961.75.048.075	A	48	75	15	45	24	-	2
2961.75.048.100	A	48	100	25	50	24	-	2
2961.75.048.125	A	48	125	25	75	24	-	2
2961.75.048.150	A	48	150	25	100	24	-	2
2961.75.048.200	A	48	200	50	100	24	-	2
2961.75.058.075	A	58	75	15	45	29	-	2
2961.75.058.100	A	58	100	25	50	29	-	2
2961.75.058.125	A	58	125	25	75	29	-	2
2961.75.058.150	A	58	150	25	100	29	-	2
2961.75.058.200	A	58	200	50	100	29	-	2
2961.75.075.075	A	75	75	15	45	37.5	-	2
2961.75.075.100	A	75	100	25	50	37.5	-	2
2961.75.075.125	A	75	125	25	75	37.5	-	2
2961.75.075.150	A	75	150	25	100	37.5	-	2
2961.75.075.200	C	75	200	25	75	37.5	-	3
2961.75.100.100	B	100	100	25	50	25	50	4
2961.75.100.125	B	100	125	25	75	25	50	4
2961.75.100.150	B	100	150	25	100	25	50	4
2961.75.100.200	B	100	200	25	150	25	50	4
2961.75.100.250	B	100	250	25	200	25	50	4
2961.75.125.150	B	125	150	25	100	37.5	50	4
2961.75.125.200	B	125	200	25	150	37.5	50	4
2961.75.125.250	B	125	250	25	200	37.5	50	4
2961.75.150.150	B	150	150	25	100	25	100	4
2961.75.150.200	B	150	200	25	150	25	100	4

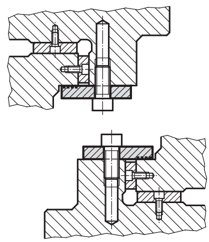
Retaining plate, Bronze with solid lubricant, VDI 3357

2961.74.



2961.74. Retaining plate, Bronze with solid lubricant, VDI 3357

Mounting example



Order No	Shape	b	s	a	b_2	b_1	d	e	e_1	e_2	Number of screw holes
2961.74.035.10.160	A	35	10	160	10	20	11	70	-	45	2
2961.74.035.10.200	A	35	10	200	10	20	11	110	-	45	2
2961.74.035.10.250	B	35	10	250	10	20	11	80	-	45	3
2961.74.045.15.160	A	45	15	160	15	30	13.5	70	-	45	2
2961.74.045.15.200	A	45	15	200	15	30	13.5	110	-	45	2
2961.74.045.15.250	B	45	15	250	15	30	13.5	80	-	45	3
2961.74.055.15.160	A	55	15	160	20	35	17.5	70	-	45	2
2961.74.055.15.200	A	55	15	200	20	35	17.5	110	-	45	2
2961.74.055.15.250	B	55	15	250	20	35	17.5	80	-	45	3
2961.74.075.25.160	A	75	25	160	25	40	17.5	70	-	45	2
2961.74.075.25.200	A	75	25	200	25	40	17.5	110	-	45	2
2961.74.075.25.250	B	75	25	250	25	40	17.5	80	-	45	3
2961.74.085.28.240	B	85	28	240	30	60	22	95	-	25	3
2961.74.085.28.300	D	85	28	300	30	60	22	85	80	25	4
2961.74.085.28.350	D	85	28	350	30	60	22	100	100	25	4
2961.74.085.28.400	D	85	28	400	30	60	22	115	120	25	4
2961.74.085.28.450	C	85	28	450	30	60	22	100	100	25	5
2961.74.085.30.160	A	85	30	160	30	60	22	70	-	45	2
2961.74.085.30.200	A	85	30	200	30	60	22	110	-	45	2
2961.74.085.30.250	B	85	30	250	30	60	22	80	-	45	3
2961.74.085.30.300	B	85	30	300	30	60	22	105	-	45	3
2961.74.085.30.350	B	85	30	350	30	60	22	130	-	45	3
2961.74.085.30.400	C	85	30	400	30	60	22	80	75	45	5
2961.74.100.25.160	A	100	25	160	30	60	17.5	70	-	45	2
2961.74.100.25.200	A	100	25	200	30	60	17.5	110	-	45	2
2961.74.100.25.250	B	100	25	250	30	60	17.5	80	-	45	3
2961.74.100.25.400	C	100	25	400	30	60	17.5	80	75	45	5
2961.74.100.30.160	A	100	30	160	30	60	22	70	-	45	2
2961.74.100.30.200	A	100	30	200	30	60	22	110	-	45	2
2961.74.100.30.250	B	100	30	250	30	60	22	80	-	45	3
2961.74.100.30.400	C	100	30	400	30	60	22	80	75	45	5
2961.74.125.25.160	A	125	25	160	30	75	17.5	70	-	45	2
2961.74.125.25.200	A	125	25	200	30	75	17.5	110	-	45	2
2961.74.125.25.250	B	125	25	250	30	75	17.5	80	-	45	3
2961.74.125.25.300	D	125	25	300	30	80	26	85	80	25	4
2961.74.125.25.350	D	125	25	350	30	80	26	100	100	25	4
2961.74.125.25.400.1	D	125	25	400	30	80	26	115	120	25	4
2961.74.125.25.400	C	125	25	400	30	75	17.5	80	75	45	5
2961.74.125.25.450	C	125	25	450	30	80	26	100	100	25	5
2961.74.125.25.500	C	125	25	500	30	80	26	110	115	25	5
2961.74.125.30.160	A	125	30	160	30	75	22	70	-	45	2
2961.74.125.30.200	A	125	30	200	30	75	22	110	-	45	2
2961.74.125.30.250	B	125	30	250	30	75	22	80	-	45	3
2961.74.125.30.300	B	125	30	300	30	75	22	105	-	45	3
2961.74.125.30.350	B	125	30	350	30	75	22	130	-	45	3
2961.74.125.30.400	C	125	30	400	30	75	22	80	75	45	5
2961.74.125.30.450	C	125	30	450	30	75	22	80	95	50	5
2961.74.125.30.500	C	125	30	500	30	75	22	80	120	50	5

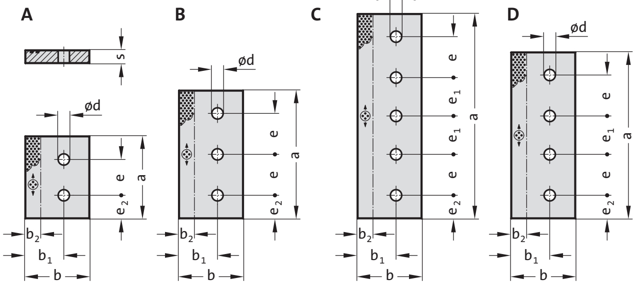
Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762.

Retaining plate, Steel with solid lubricant, VDI 3357

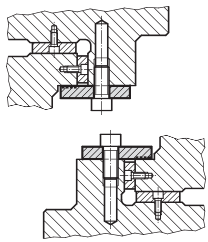
2961.81.



2961.81. Retaining plate, Steel with solid lubricant, VDI 3357

Order No	Shape	b	s	a	b_2	b_1	d	e	e_1	e_2	Number of screw holes
2961.81.035.10.160	A	35	10	160	10	20	11	70	-	45	2
2961.81.035.10.200	A	35	10	200	10	20	11	110	-	45	2
2961.81.035.10.250	B	35	10	250	10	20	11	80	-	45	3
2961.81.045.15.160	A	45	15	160	15	30	13.5	70	-	45	2
2961.81.045.15.200	A	45	15	200	15	30	13.5	110	-	45	2
2961.81.045.15.250	B	45	15	250	15	30	13.5	80	-	45	3
2961.81.055.15.160	A	55	15	160	20	35	17.5	70	-	45	2
2961.81.055.15.200	A	55	15	200	20	35	17.5	110	-	45	2
2961.81.055.15.250	B	55	15	250	20	35	17.5	80	-	45	3
2961.81.075.25.160	A	75	25	160	25	40	17.5	70	-	45	2
2961.81.075.25.200	A	75	25	200	25	40	17.5	110	-	45	2
2961.81.075.25.250	B	75	25	250	25	40	17.5	80	-	45	3
2961.81.085.28.240	B	85	28	240	30	60	22	95	-	25	3
2961.81.085.28.300	D	85	28	300	30	60	22	85	80	25	4
2961.81.085.28.350	D	85	28	350	30	60	22	100	100	25	4
2961.81.085.28.400	D	85	28	400	30	60	22	115	120	25	4
2961.81.085.28.450	C	85	28	450	30	60	22	100	100	25	5
2961.81.085.30.160	A	85	30	160	30	60	22	70	-	45	2
2961.81.085.30.200	A	85	30	200	30	60	22	110	-	45	2
2961.81.085.30.250	B	85	30	250	30	60	22	80	-	45	3
2961.81.085.30.300	B	85	30	300	30	60	22	105	-	45	3
2961.81.085.30.350	B	85	30	350	30	60	22	130	-	45	3
2961.81.085.30.400	C	85	30	400	30	60	22	80	75	45	5
2961.81.100.25.160	A	100	25	160	30	60	17.5	70	-	45	2
2961.81.100.25.200	A	100	25	200	30	60	17.5	110	-	45	2
2961.81.100.25.250	B	100	25	250	30	60	17.5	80	-	45	3
2961.81.100.25.400	C	100	25	400	30	60	17.5	80	75	45	5
2961.81.100.30.160	A	100	30	160	30	60	22	70	-	45	2
2961.81.100.30.200	A	100	30	200	30	60	22	110	-	45	2
2961.81.100.30.250	B	100	30	250	30	60	22	80	-	45	3
2961.81.100.30.400	C	100	30	400	30	60	22	80	75	45	5
2961.81.125.25.160	A	125	25	160	30	75	17.5	70	-	45	2
2961.81.125.25.200	A	125	25	200	30	75	17.5	110	-	45	2
2961.81.125.25.250	B	125	25	250	30	75	17.5	80	-	45	3
2961.81.125.25.300	D	125	25	300	30	80	26	85	80	25	4
2961.81.125.25.350	D	125	25	350	30	80	26	100	100	25	4
2961.81.125.25.400	C	125	25	400	30	75	17.5	80	75	45	5
2961.81.125.25.400.1	D	125	25	400	30	80	26	115	120	25	4
2961.81.125.25.450	C	125	25	450	30	80	26	100	100	25	5
2961.81.125.25.500	C	125	25	500	30	80	26	110	115	25	5
2961.81.125.30.160	A	125	30	160	30	75	22	70	-	45	2
2961.81.125.30.200	A	125	30	200	30	75	22	110	-	45	2
2961.81.125.30.250	B	125	30	250	30	75	22	80	-	45	3
2961.81.125.30.300	B	125	30	300	30	75	22	105	-	45	3
2961.81.125.30.350	B	125	30	350	30	75	22	130	-	45	3
2961.81.125.30.400	C	125	30	400	30	75	22	80	75	45	5
2961.81.125.30.450	C	125	30	450	30	75	22	80	95	50	5
2961.81.125.30.500	C	125	30	500	30	75	22	80	120	50	5

Mounting example



Material:
Steel, surface hardened. Sliding faces with embedded solid lubricant.

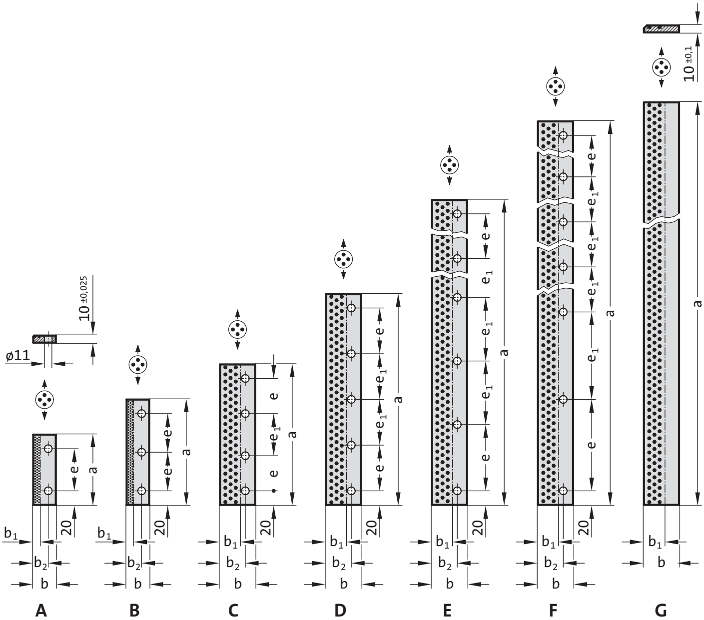
Note:
Screws are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762.

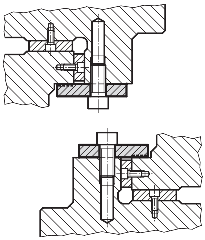
FIBRO

Retaining plate, Bronze with solid lubricant

2961.78.



Mounting example



Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws are not included.

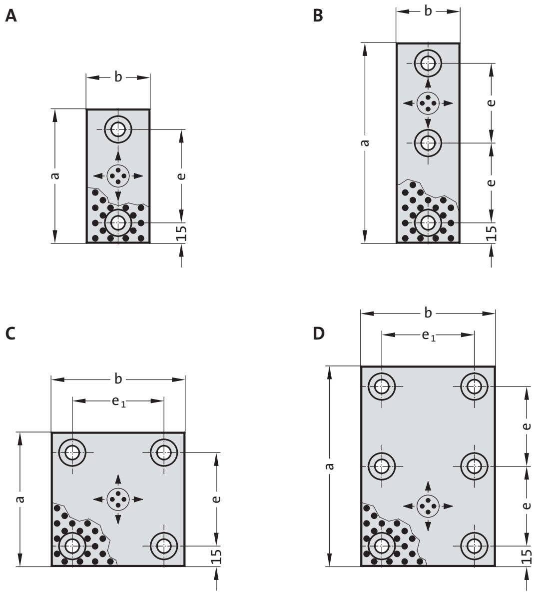
Fixing:
Use socket cap screws DIN EN ISO 4762 M10.

2961.78. Retaining plate, Bronze with solid lubricant

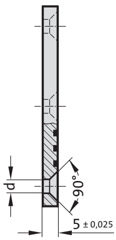
Order No	Shape	a	b	b_1	b_2	e	e_1	Number of screw holes
2961.78.032.0100	A	100	32	10	21	60	-	2
2961.78.032.0150	B	150	32	10	21	55	-	3
2961.78.032.0160	B	160	32	10	21	60	-	3
2961.78.050.0200	C	200	50	30	36	50	60	4
2961.78.050.0250	C	250	50	30	36	70	70	4
2961.78.050.0300	D	300	50	30	36	65	65	5
2961.78.050.0350	D	350	50	30	36	80	75	5
2961.78.050.0400	D	400	50	30	36	90	90	5
2961.78.050.0500	E	500	50	30	36	95	90	6
2961.78.050.0600	E	600	50	30	36	115	110	6
2961.78.050.0800	F	800	50	30	36	130	125	7
2961.78.050.0605	G	605	50	30	36	-	-	-
2961.78.050.1005	G	1005	50	30	36	-	-	-

Sliding pad, small dimension, Bronze with solid lubricant

2960.72.



2960.72.



Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws are not included.

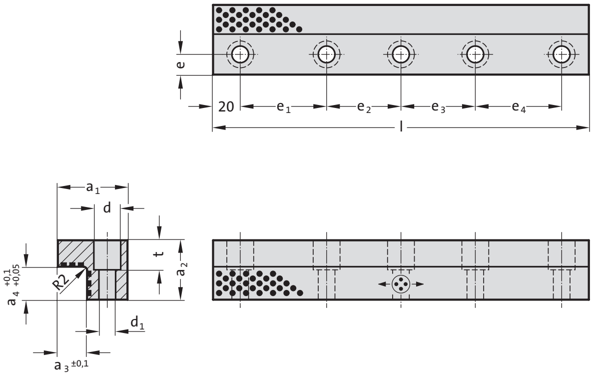
Fixing:
Use countersunk cap screws DIN 7991/ISO 10642.

2960.72. Sliding pad, small dimension, Bronze with solid lubricant

Order No	Shape	b	a	e	e_1	d	Number of screw holes
2960.72.018.050	A	18	50	20	-	6.5	2
2960.72.018.075	A	18	75	45	-	6.5	2
2960.72.018.100	A	18	100	70	-	6.5	2
2960.72.018.150	B	18	150	60	-	6.5	3
2960.72.028.050	A	28	50	20	-	9	2
2960.72.028.075	A	28	75	45	-	9	2
2960.72.028.100	A	28	100	70	-	9	2
2960.72.028.150	B	28	150	60	-	9	3
2960.72.038.050	A	38	50	20	-	9	2
2960.72.038.075	A	38	75	45	-	9	2
2960.72.038.100	A	38	100	70	-	9	2
2960.72.038.150	B	38	150	60	-	9	3
2960.72.048.075	A	48	75	45	-	9	2
2960.72.048.100	A	48	100	70	-	9	2
2960.72.048.125	A	48	125	95	-	9	2
2960.72.048.150	B	48	150	60	-	9	3
2960.72.075.075	C	75	75	45	45	9	4
2960.72.075.100	C	75	100	70	45	9	4
2960.72.075.125	C	75	125	95	45	9	4
2960.72.075.150	D	75	150	60	45	9	6
2960.72.100.100	C	100	100	70	70	9	4
2960.72.100.125	C	100	125	95	70	9	4
2960.72.100.150	D	100	150	60	70	9	6

Angled guide gib, Bronze with solid lubricant

2962.70.



Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws are not included.

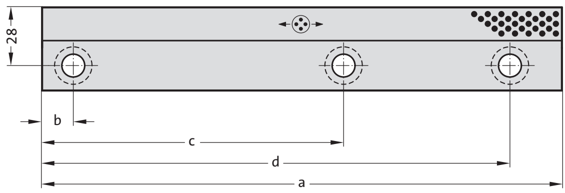
Fixing:
Use socket cap screws DIN EN ISO 4762.

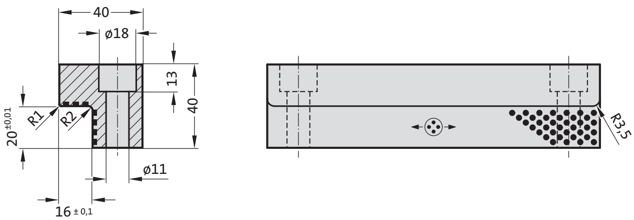
2962.70. Angled guide gib, Bronze with solid lubricant

Order No	a_1	a_2	l	a_3	a_4	e	e_1	e_2	e_3	e_4	d	d_1	t	Number of screw holes
2962.70.026.100	26	20	100	8	10	9	60	-	-	-	15	9	9.6	2
2962.70.026.150	26	20	150	8	10	9	55	55	-	-	15	9	9.6	3
2962.70.026.200	26	20	200	8	10	9	55	50	55	-	15	9	9.6	4
2962.70.032.100	32	30	100	10	15	11	60	-	-	-	-	11	-	2
2962.70.032.150	32	30	150	10	15	11	55	55	-	-	-	11	-	3
2962.70.032.200	32	30	200	10	15	11	55	50	55	-	-	11	-	4
2962.70.032.250	32	30	250	10	15	11	70	70	70	-	-	11	-	4
2962.70.050.200	50	45	200	22	25	14	55	50	55	-	18	11	25	4
2962.70.050.250	50	45	250	22	25	14	70	70	70	-	18	11	25	4
2962.70.050.300	50	45	300	22	25	14	65	65	65	65	18	11	25	5
2962.70.050.350	50	45	350	22	25	14	80	75	75	80	18	11	25	5

Angled guide gib, Bronze with solid lubricant, CNOMO

2962.70.45.





Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws are not included.

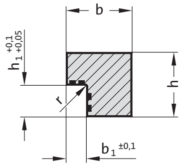
Fixing:
Use socket cap screws DIN EN ISO 4762 M10.

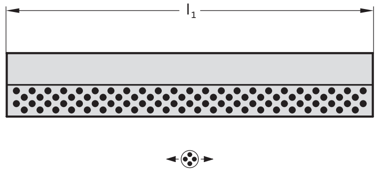
2962.70.45. Angled guide gib, Bronze with solid lubricant, CNOMO

Order No	a	b	c	d	Number of screw holes
2962.70.45.040.160	160	15	145	-	2
2962.70.45.040.250	250	15	145	225	3

Angled guide gib, Bronze with solid lubricant

2962.71.





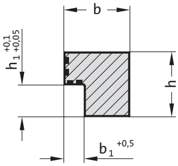
Material:
Bronze with solid lubricant, oilless lubricating

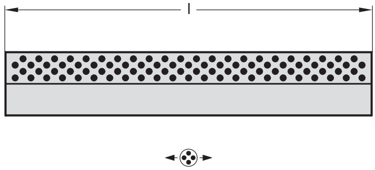
2962.71. Angled guide gib, Bronze with solid lubricant

Order No	b	h	b_1	h_1	l	l	l
					305	605	1005
2962.71.020.012.0305	20	12	5	6	●		
2962.71.025.015.0305	25	15	7	8	●		
2962.71.030.020.0305	30	20	9	12	●		
2962.71.032.030.0605	32	30	10	15		●	●
2962.71.035.035.0605	35	35	12	24		●	●
2962.71.050.045.0605	50	45	22	25		●	●
2962.71.050.050.0605	50	50	16	34		●	●

Angled guide gib, Bronze with solid lubricant

2962.72.





Material:

Bronze with solid lubricant, oilless lubricating

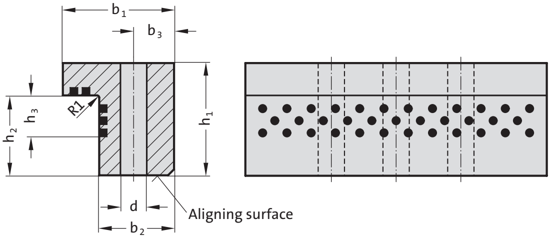
2962.72. Angled guide gib, Bronze with solid lubricant

Order No	b	h	b_1	h_1	l	l	l
					205	320	605
2962.72.015.012.0205	15	12	5	5	●		
2962.72.020.017.0205	20	17	5	7	●	●	
2962.72.020.022.0205	20	22	5	7	●	●	
2962.72.028.027.0205	28	27	8	10	●	●	●
2962.72.028.036.0205	28	36	8	10	●	●	●
2962.72.028.046.0205	28	46	8	10	●	●	●
2962.72.040.066.0205	40	66	12	22	●	●	●
2962.72.040.086.0205	40	86	12	26	●	●	●

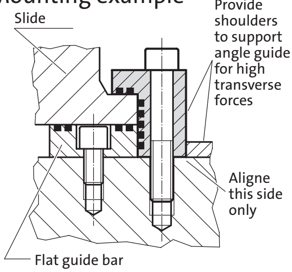
FIBRO

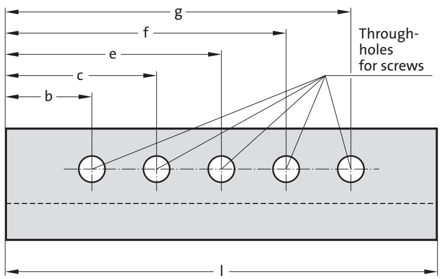
Angled guide gib, Bronze with solid lubricant

2962.73.



Mounting example





Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws are not included.

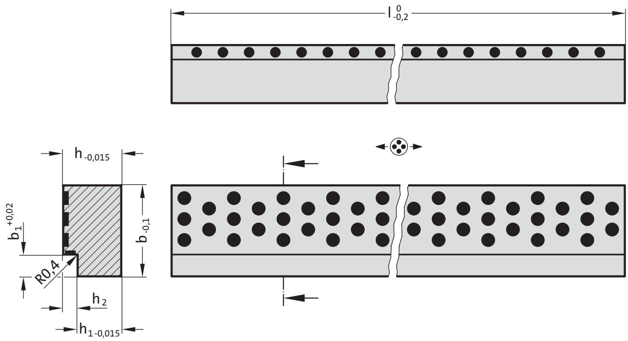
Fixing:
Use socket cap screws DIN EN ISO 4762.

2962.73. Angled guide gib, Bronze with solid lubricant

Order No	b_1	h_1	l	b_2	b_3	h_2	h_3	b	c	e	f	g	d	Number of screw holes
2962.73.025.125	25	15.5	125	18	9	8.5	6	27.5	-	-	-	97.5	9	2
2962.73.025.160	25	15.5	160	18	9	8.5	6	27.5	-	-	-	132.5	9	2
2962.73.032.125	32	30.5	125	22	11	15.5	9	27.5	-	-	-	97.5	11	2
2962.73.032.160	32	30.5	160	22	11	15.5	9	27.5	-	-	-	132.5	11	2
2962.73.032.200	32	30.5	200	22	11	15.5	9	27.5	-	-	-	172.5	11	2
2962.73.045.100	45	50.5	100	30	15	34.5	18	27.5	-	-	-	72.5	13.5	2
2962.73.045.160	45	50.5	160	30	15	34.5	18	27.5	-	-	-	132.5	13.5	2
2962.73.055.100	55	55.5	100	37	20	39.5	23	27.5	-	-	-	72.5	13.5	2
2962.73.055.160	55	55.5	160	37	20	39.5	23	27.5	-	-	-	132.5	13.5	2
2962.73.070.160	70	75.5	160	50	30	55.5	35	35	-	-	-	125	17.5	2
2962.73.070.200	70	75.5	200	50	30	55.5	35	35	-	-	-	165	17.5	2
2962.73.070.250	70	75.5	250	50	30	55.5	35	35	-	125	-	215	17.5	3
2962.73.070.400	70	75.5	400	50	30	55.5	35	35	125	200	275	365	17.5	5
2962.73.085.160	85	90.5	160	63	38	65.5	45	42.5	-	-	-	117.5	22	2
2962.73.085.200	85	90.5	200	63	38	65.5	45	42.5	-	-	-	157.5	22	2
2962.73.085.250	85	90.5	250	63	38	65.5	45	42.5	-	125	-	207.5	22	3
2962.73.085.400	85	90.5	400	63	38	65.5	45	42.5	125	200	275	357.5	22	5

Angled guide gib, Bronze with solid lubricant

2962.81.



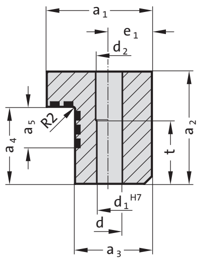
Material:
Bronze with solid lubricant, oilless lubricating

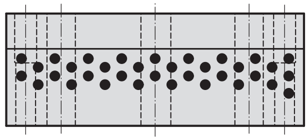
2962.81. Angled guide gib, Bronze with solid lubricant

Order No	h	b	l	h_1	h_2	b_1
2962.81.016.115.040	16	11.5	40	12	4	6
2962.81.016.115.050	16	11.5	50	12	4	6
2962.81.016.115.063	16	11.5	63	12	4	6
2962.81.016.115.080	16	11.5	80	12	4	6
2962.81.016.155.050	16	15.5	50	11	5	8
2962.81.016.155.063	16	15.5	63	11	5	8
2962.81.016.155.080	16	15.5	80	11	5	8
2962.81.016.155.100	16	15.5	100	11	5	8
2962.81.020.195.063	20	19.5	63	15	5	8
2962.81.020.195.080	20	19.5	80	15	5	8
2962.81.020.195.100	20	19.5	100	15	5	8
2962.81.020.195.125	20	19.5	125	15	5	8
2962.81.020.245.080	20	24.5	80	15	5	8
2962.81.020.245.100	20	24.5	100	15	5	8
2962.81.020.245.125	20	24.5	125	15	5	8
2962.81.020.245.160	20	24.5	160	15	5	8
2962.81.025.315.100	25	31.5	100	19	6	10
2962.81.025.315.125	25	31.5	125	19	6	10
2962.81.025.315.160	25	31.5	160	19	6	10
2962.81.025.315.200	25	31.5	200	19	6	10
2962.81.025.395.125	25	39.5	125	19	6	10
2962.81.025.395.160	25	39.5	160	19	6	10
2962.81.025.395.200	25	39.5	200	19	6	10
2962.81.025.395.250	25	39.5	250	19	6	10
2962.81.032.495.160	32	49.5	160	24	8	12
2962.81.032.495.200	32	49.5	200	24	8	12
2962.81.032.495.250	32	49.5	250	24	8	12
2962.81.032.495.315	32	49.5	315	24	8	12

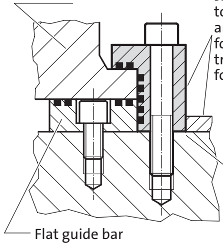
Angled guide gib, Bronze with solid lubricant

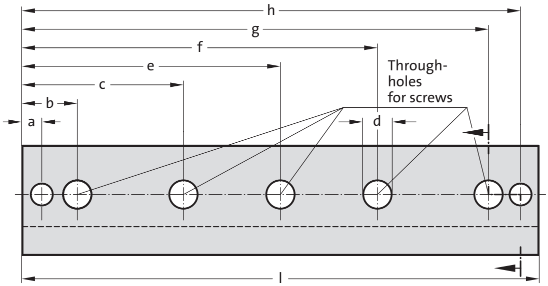
2962.82.





Mounting example





Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws and pins are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762 and dowel pins DIN 7979.

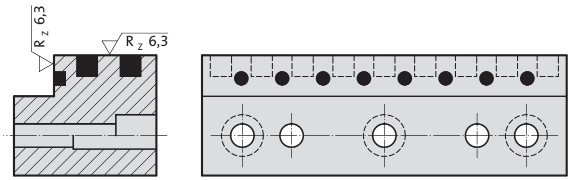
2962.82. Angled guide gib, Bronze with solid lubricant

Order No	a_1	a_2	l	a_3	a_4	a_5	a	b	c	e	e_1	f	g	h	d	d_1	d_2	t	Number of screw holes
2962.82.055.100	55	55	100	37	39	23	10	27.5	-	-	20	-	72.5	90	13.5	10	11	30	2
2962.82.055.160	55	55	160	37	39	23	10	27.5	-	-	20	-	132.5	150	13.5	10	11	30	2
2962.82.070.160	70	75	160	50	55	35	12.5	35	-	-	30	-	125	147.5	17.5	12	13	30	2
2962.82.070.200	70	75	200	50	55	35	12.5	35	-	-	30	-	165	187.5	17.5	12	13	30	2
2962.82.070.250	70	75	250	50	55	35	12.5	35	-	125	30	-	215	237.5	17.5	12	13	30	3
2962.82.070.400	70	75	400	50	55	35	12.5	35	125	200	30	275	365	387.5	17.5	12	13	30	5
2962.82.085.160	85	90	160	63	65	45	15	42.5	-	-	38	-	117.5	145	22	16	17	30	2
2962.82.085.200	85	90	200	63	65	45	15	42.5	-	-	38	-	157.5	185	22	16	17	30	2
2962.82.085.250	85	90	250	63	65	45	15	42.5	-	125	38	-	207.5	235	22	16	17	30	3
2962.82.085.400	85	90	400	63	65	45	15	42.5	125	200	38	275	357.5	385	22	16	17	30	5

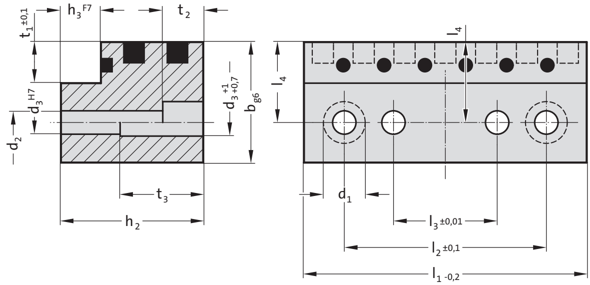
Angled guide gib, Bronze with solid lubricant

2962.83.

B



A



Material:
Bronze with solid lubricant, oilless lubricating

Note:
Screws and pins are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762 and dowel pins DIN 7979.

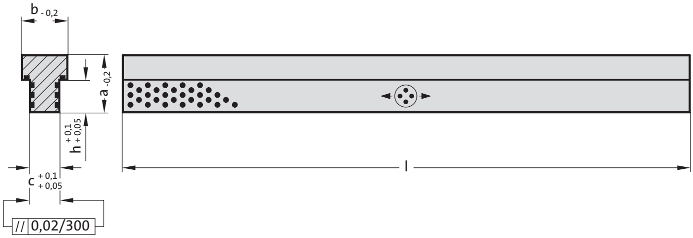
2962.83. Angled guide gib, Bronze with solid lubricant

Order No	Shape	b	h_1*	h_2	l_1	h_3	t_1	l_2	l_3	l_4	d_1	d_2	d_3	t_2	t_3	Number of screw holes
2962.83.016.012.050	A	16	12	11	50	4	5	34	14	9.5	10	5.5	5	5.7	-	2
2962.83.016.012.071	A	16	12	11	71	4	5	55	35	9.5	10	5.5	5	5.7	-	2
2962.83.016.012.090	B	16	12	11	90	4	5	74	54	9.5	10	5.5	5	5.7	-	3
2962.83.020.020.080	A	20	20	19	80	5	5	64	40	12	11	6.6	6	6.8	9.5	2
2962.83.020.020.100	A	20	20	19	100	5	5	84	60	12	11	6.6	6	6.8	9.5	2
2962.83.020.020.125	B	20	20	19	125	5	5	109	85	12	11	6.6	6	6.8	9.5	3
2962.83.025.032.100	A	25	32	31	100	6	6	80	50	15.5	15	9	8	9	19	2
2962.83.025.032.125	A	25	32	31	125	6	6	105	75	15.5	15	9	8	9	19	2
2962.83.025.032.160	B	25	32	31	160	6	6	140	110	15.5	15	9	8	9	19	3
2962.83.030.050.125	A	30	50	49	125	8	7	95	55	18	18	11	10	11	34	2
2962.83.030.050.160	A	30	50	49	160	8	7	130	90	18	18	11	10	11	34	2
2962.83.030.050.200	B	30	50	49	200	8	7	170	130	18	18	11	10	11	34	3

*h_1 = Nominal ordering height

T-Guide bar, Bronze with solid lubricant

2964.77.

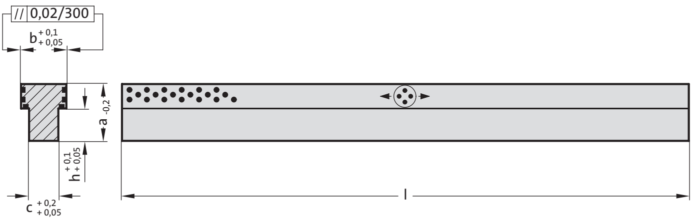


Material:
Bronze with solid lubricant,
oilless lubricating

2964.77. T-Guide bar, Bronze with solid lubricant

Order No	a	b	c	h	l
2964.77.012.018.0350	12	18	8	5	350
2964.77.025.022.0350	25	22	12	15	350
2964.77.035.028.0350	35	28	18	20	350

2964.78.



Material:
Bronze with solid lubricant,
oilless lubricating

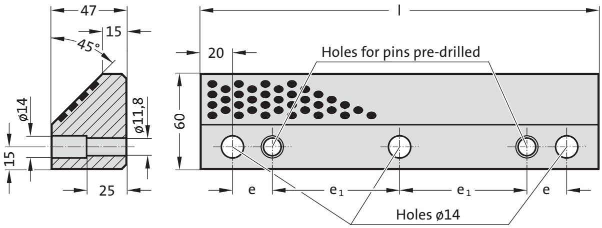
2964.78. T-Guide bar, Bronze with solid lubricant

Order No	a	b	c	h	l
2964.78.012.018.0350	12	18	8	5	350
2964.78.025.022.0350	25	22	12	15	350
2964.78.035.028.0350	35	28	18	20	350

Single-sided prismatic guide, Bronze with solid lubricant

2965.81.

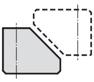
A



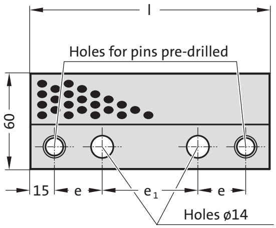
Material:
Bronze with solid lubricant, oilless lubricating

Note:
Matching single-sided prismatic sliding blocks 2965.83.
Screws and pins are not included.

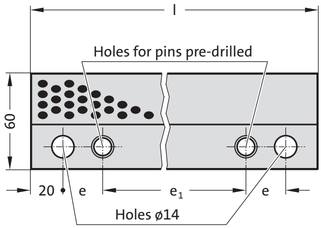
Fixing:
Use socket cap screws DIN EN ISO 4762 M12.



B



C



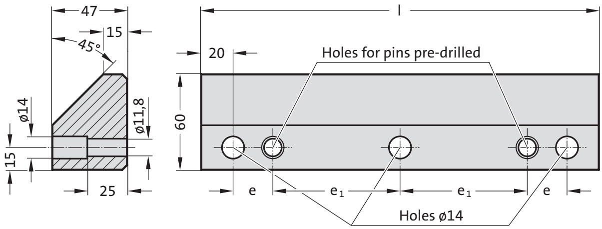
2965.81. Single-sided prismatic guide, Bronze with solid lubricant

Order No	Shape	l	e	e_1	Number of screw holes
2965.81.060.047.0150	B	150	30	60	2
2965.81.060.047.0200	C	200	25	110	3
2965.81.060.047.0250	A	250	25	80	3
2965.81.060.047.0300	A	300	30	100	3

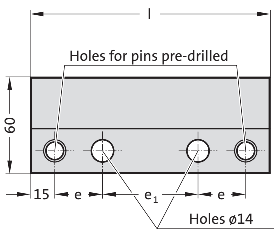
Single-sided prismatic sliding block, Steel

2965.83.

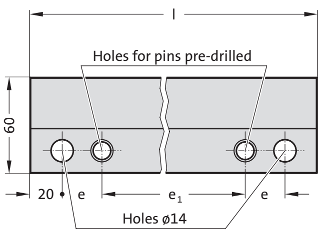
A



B



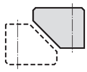
C



Material:
Steel, sliding faces surface hardened

Note:
Matching single-sided prismatic guides 2965.81.
Screws and pins are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762 M12.

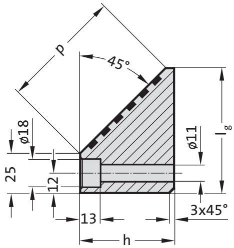


2965.83. Single-sided prismatic sliding block, Steel

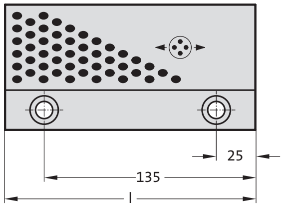
Order No	Shape	l	e	e_1	Number of screw holes
2965.83.060.047.0150	B	150	30	60	2
2965.83.060.047.0200	C	200	25	110	3
2965.83.060.047.0250	A	250	25	80	3
2965.83.060.047.0300	A	300	30	100	3

Single-sided prismatic guide, Bronze with solid lubricant, CNOMO

2965.80.45.



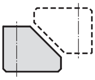
A



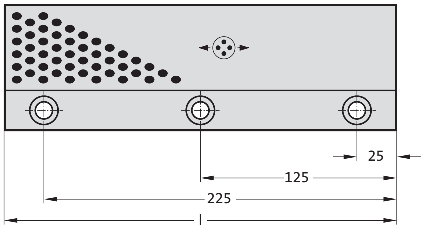
Material:
Bronze with solid lubricant, oilless lubricating

Note:
Matching single-sided prismatic sliding blocks 2965.82.45.
Screws and pins are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762 M10.



B

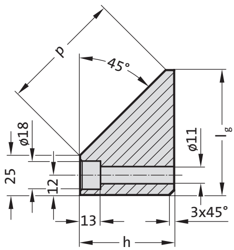


2965.80.45. Single-sided prismatic guide, Bronze with solid lubricant, CNOMO

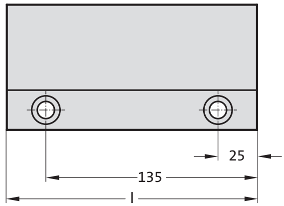
Order No	Shape	l_g	h	l	p	Number of screw holes
2965.80.45.060.045.160	A	60	45	160	50	2
2965.80.45.060.045.250	B	60	45	250	50	3
2965.80.45.080.060.160	A	80	60	160	80	2
2965.80.45.080.060.250	B	80	60	250	80	3

Single-sided prismatic sliding block, Steel, CNOMO

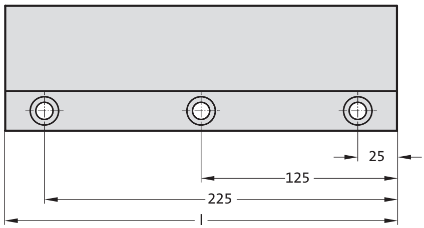
2965.82.45.



A



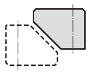
B



Material:
Steel, sliding faces surface hardened

Note:
Matching single-sided prismatic guides 2965.80.45.
Screws and pins are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762 M10.

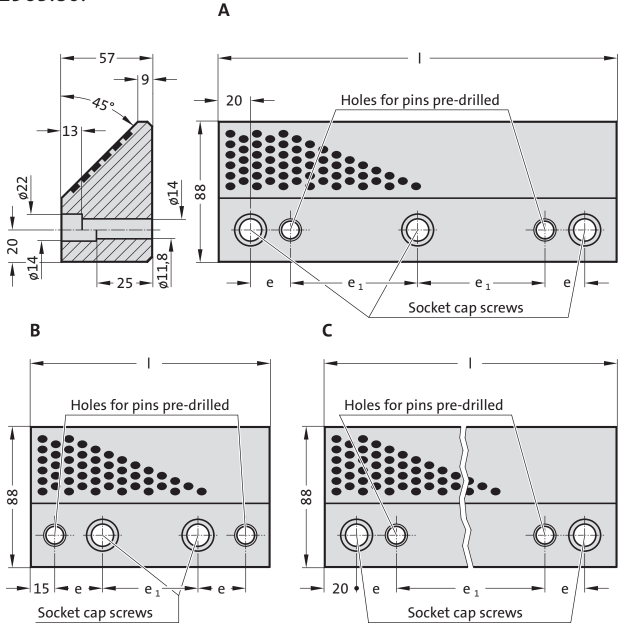


2965.82.45. Single-sided prismatic sliding block, Steel, CNOMO

Order No	Shape	l_g	h	l	p	Number of screw holes
2965.82.45.060.045.160	A	60	45	160	50	2
2965.82.45.060.045.250	B	60	45	250	50	3
2965.82.45.080.060.160	A	80	60	160	80	2
2965.82.45.080.060.250	B	80	60	250	80	3

Single-sided prismatic guide, Bronze with solid lubricant

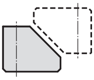
2965.80.



Material:
Bronze with solid lubricant, oilless lubricating

Note:
Matching single-sided prismatic sliding blocks 2965.82.
Screws and pins are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762 M12.

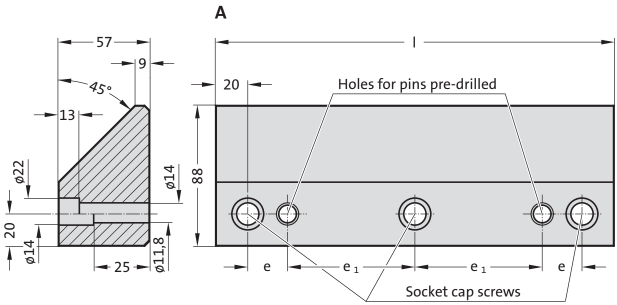


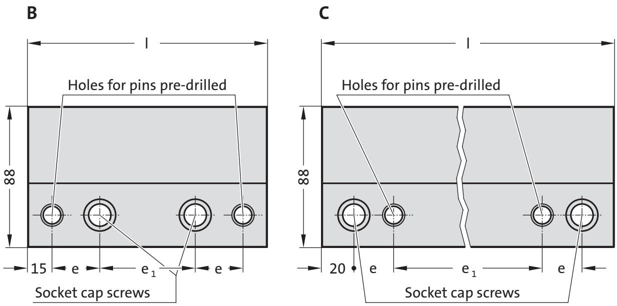
2965.80. Single-sided prismatic guide, Bronze with solid lubricant

Order No	Shape	l	e	e_1	Number of screw holes
2965.80.088.057.0150	B	150	30	60	2
2965.80.088.057.0200	C	200	25	110	3
2965.80.088.057.0250	A	250	25	80	3
2965.80.088.057.0300	A	300	30	100	3

Single-sided prismatic sliding block, Steel

2965.82.

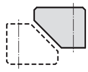




Material:
Steel, sliding faces surface hardened

Note:
Matching single-sided prismatic guides 2965.80.
Screws and pins are not included.

Fixing:
Use socket cap screws DIN EN ISO 4762 M12.



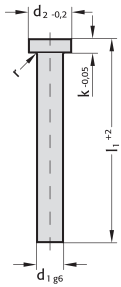
2965.82. Single-sided prismatic sliding block, Steel

Order No	Shape	l	e	e_1	Number of screw holes
2965.82.088.057.0150	B	150	30	60	2
2965.82.088.057.0200	C	200	25	110	3
2965.82.088.057.0250	A	250	25	80	3
2965.82.088.057.0300	A	300	30	100	3

FORMING / DEMOULDING

Ejector pin, hardened, DIN ISO 6751

237.1.



Material:

WS
Order No 237.1.
Hardness:
Shaft 60 ± 2 HRC
Head 45 ± 5 HRC

WS = Alloy Tool Steel

Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics: Hard and tough tool steel, medium wear resistance.

Execution:

Shank hardened and precision ground.
Head hot upset-forged.

237.1. Ejector pin, hardened, DIN ISO 6751

d_1	d_2	k	r	l_1	l_1	l_1	l_1	l_1	l_1	l_1	l_1	l_1	l_1	l_1
				40	63	80	100	125	160	200	250	315	400	500
1	2.5	1.2	0.2	●	●	●	●	●	●	●				
1.1	2.5	1.2	0.2	●	●	●	●	●	●	●				
1.2	2.5	1.2	0.2	●	●	●	●	●	●	●				
1.3	3	1.5	0.2	●	●	●	●	●	●	●				
1.4	3	1.5	0.2	●	●	●	●	●	●	●				
1.5	3	1.5	0.2	●	●	●	●	●	●	●				
1.6	3	1.5	0.2	●	●	●	●	●	●	●				
1.7	3	1.5	0.2	●	●	●	●	●	●	●				
1.8	3	1.5	0.2	●	●	●	●	●	●	●				
1.9	3	1.5	0.2	●	●	●	●	●	●	●				
2	4	2	0.2	●	●	●	●	●	●	●	●	●		
2.2	4	2	0.2				●	●	●	●	●	●		
2.5	5	2	0.3	●	●	●	●	●	●	●	●	●		
2.7	5	2	0.3				●	●	●	●	●	●		
3	6	3	0.3	●	●	●	●	●	●	●	●	●	●	●
3.2	6	3	0.3				●	●	●	●	●	●	●	
3.5	7	3	0.3				●	●	●	●	●	●	●	
3.7	7	3	0.3				●	●	●	●	●	●	●	
4	8	3	0.3	●	●	●	●	●	●	●	●	●	●	●
4.2	8	3	0.3				●	●	●	●	●	●	●	
4.5	8	3	0.3				●	●	●	●	●	●	●	

Ordering Code (example):

Ejector pin, hardened, DIN ISO 6751		=237.1.
Shaft diameter d_1	1 mm	= 0100.
Length l_1	40 mm	= 040
Order No		=237.1.0100.040

Ejector pin, hardened, DIN ISO 6751

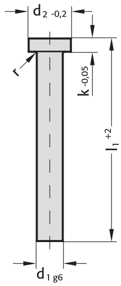
Material:
WS
Order No 237.1.
Hardness:
Shaft 60 ± 2 HRC
Head 45 ± 5 HRC

WS = Alloy Tool Steel
Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics: Hard and tough tool steel, medium wear resistance.

Execution:
Shank hardened and precision ground.
Head hot upset-forged.

237.1.



237.1. Ejector pin, hardened, DIN ISO 6751

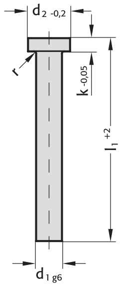
d_1	d_2	k	r	l_1 40	l_1 63	l_1 80	l_1 100	l_1 125	l_1 160	l_1 200	l_1 250	l_1 315	l_1 400	l_1 500	l_1 630	l_1 800	l_1 1000	l_1 1250	l_1 1600
4.7	8	3	0.3				●	●	●	●	●	●	●						
5	10	3	0.3	●	●	●	●	●	●	●	●	●	●	●	●	●			
5.2	10	3	0.3				●	●	●	●	●	●	●	●					
5.5	10	3	0.3				●	●	●	●	●	●	●	●					
6	12	5	0.5	●	●	●	●	●	●	●	●	●	●	●	●	●			
6.2	12	5	0.5				●	●	●	●	●	●	●	●	●				
6.5	12	5	0.5				●	●	●	●	●	●	●	●					
7	12	5	0.5				●	●	●	●	●	●	●	●	●				
8	14	5	0.5		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
8.2	14	5	0.5				●	●	●	●	●	●	●	●	●	●			
8.5	14	5	0.5				●	●	●	●	●	●	●	●	●				
9	14	5	0.5				●	●	●	●	●	●	●	●	●				
10	16	5	0.5			●	●	●	●	●	●	●	●	●	●	●	●	●	●
10.2	16	5	0.5				●	●	●	●	●	●	●	●	●				
10.5	16	5	0.5				●	●	●	●	●	●	●	●	●				
11	16	5	0.5						●	●	●	●	●	●	●				
12	18	7	0.8			●	●	●	●	●	●	●	●	●	●	●	●		
12.2	18	7	0.8					●	●	●	●	●	●	●					
12.5	18	7	0.8				●	●	●	●	●	●	●	●	●				
14	22	7	0.8			●	●	●	●	●	●	●	●	●	●	●	●		
16	22	7	0.8				●	●	●	●	●	●	●	●	●	●	●		
18	24	7	0.8						●	●	●	●	●	●	●				
20	26	8	1						●	●	●	●	●	●	●	●	●		

Ordering Code (example):

Ejector pin, hardened, DIN ISO 6751		=237.1.
Shaft diameter d_1	1 mm	= 0100.
Length l_1	40 mm	= 040
Order No		=237.1.0100.040

Ejector pin, nitrided, DIN ISO 6751

237.8.



Material:

NWA
Order No 237.8.
Hardness:
Shaft* ≥ 950 HV 0,3
Head 45 ± 5 HRC
Core strength > 1400 N/mm²

NWA = Hot-Work Tool Steel – Suitable for Nitriding

Material No 1.2344 or similar.

Characteristics: Chrome-Molybdenum-Chrome-Molybdenum-Vanadium hot working die steel; core strength: > 1400 N/mm²; temperature resistant up to 650°C; surface hardness (nitrided) ≧ 950 HV 0,3.

Execution:

Shank nitrided and precision ground.
Head hot upset-forged.

Note:

*Owing to thinness of nitrided skin, hardness testing on shank restricted to Vickers only.
Test load = 3 N max.

237.8. Ejector pin, nitrided, DIN ISO 6751

d_1	d_2	k	r	l_1 100	l_1 125	l_1 160	l_1 200	l_1 250	l_1 315	l_1 400	l_1 500	l_1 630	l_1 800
1.5	3	1.5	0.2	●	●	●	●						
2	4	2	0.2	●	●	●	●	●					
2.2	4	2	0.2	●	●	●	●						
2.4	5	2	0.2	●	●	●	●	●	●				
2.5	5	2	0.3	●	●	●	●	●	●				
2.7	5	2	0.3	●	●	●	●						
2.9	5	2	0.3	●	●	●	●	●	●				
3	6	3	0.3	●	●	●	●	●	●	●	●		
3.2	6	3	0.3	●	●	●	●	●	●	●			
3.4	6	3	0.3	●	●	●	●	●	●				
3.5	7	3	0.3	●	●	●	●	●	●	●			
3.7	7	3	0.3	●	●	●	●	●	●	●			
3.9	7	3	0.3	●	●	●	●	●	●				
4	8	3	0.3	●	●	●	●	●	●	●	●		
4.2	8	3	0.3	●	●	●	●	●	●	●			
4.4	8	3	0.3	●	●	●	●	●	●				
4.5	8	3	0.3	●	●	●	●	●	●	●			
4.7	8	3	0.3	●	●	●	●	●	●				
4.9	8	3	0.3	●	●	●	●	●	●				
5	10	3	0.3	●	●	●	●	●	●	●	●	●	●
5.2	10	3	0.3	●	●	●	●	●	●	●	●		
5.4	10	3	0.3	●	●	●	●	●	●				
5.5	10	3	0.3	●	●	●	●	●	●	●	●		
5.7	10	3	0.3	●	●	●	●	●	●				
5.9	10	3	0.3	●	●	●	●	●	●				
6	12	5	0.5	●	●	●	●	●	●	●	●	●	●

Ordering Code (example):

Ejector pin, nitrided, DIN ISO 6751		=237.8.
Shaft diameter d_1	1.5 mm	= 0150.
Length l_1	100 mm	= 100
Order No		=237.8.0150.100

Ejector pin, nitrided, DIN ISO 6751

Material:
NWA
Order No 237.8.
Hardness:
Shaft* ≥ 950 HV 0,3
Head 45 ± 5 HRC
Core strength > 1400 N/mm²

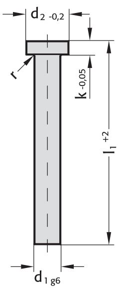
NWA = Hot-Work Tool Steel – Suitable for Nitriding
Material No 1.2344 or similar.

Characteristics: Chrome-Molybdenum-Chrome-Molybdenum-Vanadium hot working die steel; core strength: > 1400 N/mm²; temperature resistant up to 650°C; surface hardness (nitrided) ≧ 950 HV 0,3.

Execution:
Shank nitrided and precision ground.
Head hot upset-forged.

Note:
*Owing to thinness of nitrided skin, hardness testing on shank restricted to Vickers only.
Test load = 3 N max.

237.8.



237.8. Ejector pin, nitrided, DIN ISO 6751

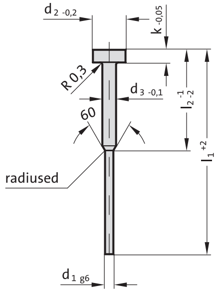
d_1	d_2	k	r	l_1 100	l_1 125	l_1 160	l_1 200	l_1 250	l_1 315	l_1 400	l_1 500	l_1 630	l_1 800	l_1 1000
6.2	12	5	0.5	●	●	●	●	●	●	●	●	●		
6.5	12	5	0.5	●	●	●	●	●	●	●	●			
6.7	12	5	0.5	●	●	●	●	●	●					
6.9	12	5	0.5	●	●	●	●	●	●					
7	12	5	0.5	●	●	●	●	●	●	●	●	●		
7.2	12	5	0.5	●	●	●	●	●	●					
7.8	12	5	0.5	●	●	●	●	●	●					
8	14	5	0.5	●	●	●	●	●	●	●	●	●	●	●
8.2	14	5	0.5	●	●	●	●	●	●	●	●	●	●	
8.4	14	5	0.5	●	●	●	●	●	●					
8.5	14	5	0.5	●	●	●	●	●	●	●	●	●		
9	14	5	0.5	●	●	●	●	●	●	●	●	●		
9.7	14	5	0.5	●	●	●	●	●	●					
10	16	5	0.5	●	●	●	●	●	●	●	●	●	●	●
10.2	16	5	0.5	●	●	●	●	●	●	●	●	●	●	
10.5	16	5	0.5	●	●	●	●	●	●	●	●	●		
11	16	5	0.5	●	●	●	●	●	●	●	●	●		
12	18	7	0.8	●	●	●	●	●	●	●	●	●	●	●
12.2	18	7	0.8	●	●	●	●	●	●	●	●	●	●	
12.5	18	7	0.8	●	●	●	●	●	●	●	●	●	●	
14	22	7	0.8	●	●	●	●	●	●	●	●	●	●	●
16	22	7	0.8	●	●	●	●	●	●	●	●	●	●	●
18	24	7	0.8			●	●	●	●	●	●	●	●	●
20	26	8	1			●	●	●	●	●	●	●	●	●
25	32	10	1				●	●	●	●	●	●	●	●
32	40	10	1				●	●	●	●	●	●	●	●

Ordering Code (example):

Ejector pin, nitrided, DIN ISO 6751		=237.8.
Shaft diameter d_1	1.5 mm	= 0150.
Length l_1	100 mm	= 100
Order No		=237.8.0150.100

Ejector pin, hardened, round stepped, DIN ISO 8694

238.1.



Material:
WS
Order No 238.1.
Hardness:
Shaft 60 ± 2 HRC
Head 45 ± 5 HRC

WS = Alloy Tool Steel
Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics: Hard and tough tool steel, medium wear resistance.

Execution:
Shank hardened and precision ground.
Head hot upset-forged.

238.1. Ejector pin, hardened, round stepped, DIN ISO 8694

				l_1	63	80	100	125	160	200
d_1	d_2	d_3	k	l_2	30	32	50	50	63	80
0.8	4	2	2		●	●	●	●	●	
0.9	4	2	2		●	●	●	●	●	
1	4	2	2		●	●	●	●	●	●
1.1	4	2	2		●	●	●	●	●	●
1.2	4	2	2		●	●	●	●	●	●
1.3	4	2	2		●	●	●	●	●	●
1.4	4	2	2		●	●	●	●	●	●
1.5	6	3	3		●	●	●	●	●	●
1.6	6	3	3			●	●	●	●	●
1.7	6	3	3			●	●	●	●	●
1.8	6	3	3			●	●	●	●	●
1.9	6	3	3			●	●	●	●	●
2	6	3	3			●	●	●	●	●
2.1	6	3	3				●	●	●	●
2.2	6	3	3			●	●	●	●	●
2.3	6	3	3				●	●	●	●
2.4	6	3	3				●	●	●	●
2.5	6	3	3				●	●	●	●

Ordering Code (example):

Ejector pin, hardened, round stepped, DIN ISO 8694		=238.1.	
Diameter d_1	0.8 mm	=	0080.
Length l_1	63 mm	=	063
Order No		=238.1.0080.	063

Ejector pin, nitrided, round stepped, DIN ISO 8694

Material:
NWA
Order No 238.8.
Hardness:
Shaft* ≥ 950 HV 0,3
Head 45 ± 5 HRC
Core strength > 1400 N/mm²

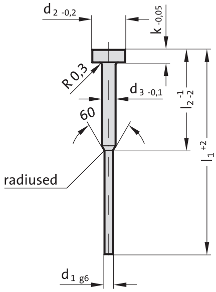
NWA = Hot-Work Tool Steel – Suitable for Nitriding
Material No 1.2344 or similar.

Characteristics: Chrome-Molybdenum-Chrome-Molybdenum-Vanadium hot working die steel; core strength: > 1400 N/mm²; temperature resistant up to 650°C; surface hardness (nitrided) ≧ 950 HV 0,3.

Execution:
Shank nitrided and precision ground.
Head hot upset-forged.

Note:
*Owing to thinness of nitrided skin, hardness testing on shank restricted to Vickers only.
Test load = 3 N max.

238.8.



238.8. Ejector pin, nitrided, round stepped, DIN ISO 8694

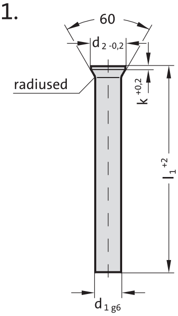
d_1	d_2	d_3	k	l1 / l2	63 / 30	80 / 32	100 / 50	125 / 50	160 / 63	200 / 80
0.8	4	2	2		●	●	●	●	●	
0.9	4	2	2		●	●	●	●	●	
1	4	2	2		●	●	●	●	●	
1.1	4	2	2		●	●	●	●	●	
1.2	4	2	2		●	●	●	●	●	
1.3	4	2	2		●	●	●	●	●	
1.4	4	2	2		●	●	●	●	●	
1.5	6	3	3		●	●	●	●	●	●
1.6	6	3	3			●	●	●	●	●
1.7	6	3	3			●	●	●	●	●
1.8	6	3	3			●	●	●	●	●
1.9	6	3	3			●	●	●	●	●
2	6	3	3			●	●	●	●	●
2.2	6	3	3			●	●	●	●	●
2.5	6	3	3				●	●	●	●

Ordering Code (example):

Ejector pin, nitrided, round stepped, DIN ISO 8694		=238.8.
Diameter d_1	0.8 mm	= 0080.
Length l_1	63 mm	= 063
Order No		=238.8. 0080. 063

Ejector pin, hardened, similar to DIN 1530 Shape D

239.1.



Material:
WS
Order No 239.1.
Hardness:
Shaft 60 ± 2 HRC
Head 45 ± 5 HRC

WS = Alloy Tool Steel
Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics: Hard and tough tool steel, medium wear resistance.

Execution:
Shank hardened and precision ground.
Head hot upset-forged.

239.1. Ejector pin, hardened, similar to DIN 1530 Shape D

d_1	d_2	k	l_1 40	l_1 60	l_1 71	l_1 80	l_1 100	l_1 125	l_1 160	l_1 200	l_1 250	l_1 315
0.8	1.4	0.5					●	●	●	●		
0.9	1.6	0.5					●	●	●	●		
1	1.8	0.5	●	●	●	●	●	●	●	●		
1.1	1.8	0.5			●		●	●	●	●		
1.2	2	0.5			●		●	●	●	●		
1.25	2	0.5					●	●	●	●		
1.3	2	0.5			●		●	●	●	●		
1.4	2.2	0.5			●		●	●	●	●		
1.5	2.2	0.5	●	●	●	●	●	●	●	●		
1.6	2.5	0.5			●		●	●	●	●		
1.7	2.5	0.5			●		●	●	●	●		
1.75	2.8	0.5					●	●	●	●		
1.8	2.8	0.5			●		●	●	●	●		
1.9	2.8	0.5			●		●	●	●	●		
2	3	0.5	●	●	●	●	●	●	●	●	●	
2.1	3.2	0.5			●		●	●	●	●		
2.2	3.2	0.5			●		●	●	●	●	●	
2.25	3.2	0.5					●	●	●	●		
2.3	3.5	0.5			●		●	●	●	●		
2.4	3.5	0.5			●		●	●	●	●		
2.5	3.5	0.5	●	●	●	●	●	●	●	●	●	
2.6	4	0.5			●		●	●	●	●		
2.7	4	0.5			●		●	●	●	●	●	
2.75	4	0.5			●		●	●	●	●		
2.8	4	0.5			●		●	●	●	●		
2.9	4	0.5			●		●	●	●	●		
3	4.5	0.5	●	●	●	●	●	●	●	●	●	●
3.1	4.5	0.5			●		●	●	●	●		
3.2	4.5	0.5			●		●	●	●	●		

Ordering Code (example):

Ejector pin, hardened, similar to DIN 1530 Shape D		=239.1.	
Shaft diameter d_1	0.8 mm	= 0080.	
Length l_1	100 mm	=	100
Order No		=239.1.0080.	100

Ejector pin, hardened, similar to DIN 1530 Shape D

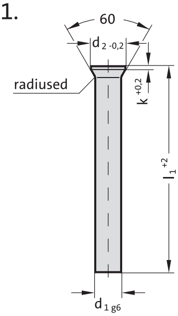
Material:
WS
Order No 239.1.
Hardness:
Shaft 60 ± 2 HRC
Head 45 ± 5 HRC

WS = Alloy Tool Steel
Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics: Hard and tough tool steel, medium wear resistance.

Execution:
Shank hardened and precision ground.
Head hot upset-forged.

239.1.



239.1. Ejector pin, hardened, similar to DIN 1530 Shape D

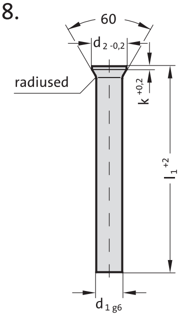
d_1	d_2	k	l_1 40	l_1 60	l_1 71	l_1 80	l_1 100	l_1 125	l_1 160	l_1 200	l_1 250	l_1 315
3.25	4.5	0.5			●		●	●	●	●		
3.5	5	0.5			●	●	●	●	●	●	●	●
3.6	5	0.5			●		●	●	●	●		
3.75	5	0.5					●	●	●	●		
4	5.5	0.5	●	●	●	●	●	●	●	●	●	●
4.1	5.5	0.5			●		●	●	●	●		
4.2	5.5	0.5			●		●	●	●	●		
4.25	5.5	0.5					●	●	●	●		
4.5	6	0.5			●		●	●	●	●		
4.6	6	0.5			●		●	●	●	●		
5	6.5	0.5	●	●	●	●	●	●	●	●	●	●
5.1	6.5	0.5			●		●	●	●	●		
5.2	6.5	0.5			●		●	●	●	●		
5.25	6.5	0.5					●	●	●	●		
5.5	7	0.5		●	●	●	●	●	●	●	●	●
6	8	0.5	●	●	●	●	●	●	●	●	●	●
6.2	8	1				●	●	●	●	●	●	●
6.5	9	1			●	●	●	●	●	●	●	●
7	9	1			●	●	●	●	●	●	●	●
7.5	10	1			●		●	●	●	●	●	●
8	10	1		●	●	●	●	●	●	●	●	●
8.2	10	1					●	●	●	●	●	●
8.5	11	1			●		●	●	●	●	●	●
9	11	1			●		●	●	●	●	●	●
10	12	1			●	●	●	●	●	●	●	●
12	14	1				●	●	●	●	●	●	●
14	16	1.5					●	●	●	●	●	●
16	18	1.5					●	●	●	●	●	●

Ordering Code (example):

Ejector pin, hardened, similar to DIN 1530 Shape D		=239.1.		
Shaft diameter d_1	0.8 mm	=	0080.	
Length l_1	100 mm	=		100
Order No		=239.1.0080.		100

Ejector pin, nitrided, similar to DIN 1530 Shape D

239.8.



Material:
NWA
Order No 239.8.
Hardness:
Shaft* ≥ 950 HV 0,3
Head 45 ± 5 HRC
Core strength > 1400 N/mm²

NWA = Hot-Work Tool Steel – Suitable for Nitriding
Material No 1.2344 or similar.

Characteristics: Chrome-Molybdenum-Chrome-Molybdenum-Vanadium hot working die steel; core strength: > 1400 N/mm²; temperature resistant up to 650°C; surface hardness (nitrided) ≧ 950 HV 0,3.

Execution:
Shank nitrided and precision ground.
Head hot upset-forged.

Note:
*Owing to thinness of nitrided skin, hardness testing on shank restricted to Vickers only. Test load = 3 N max.

239.8. Ejector pin, nitrided, similar to DIN 1530 Shape D

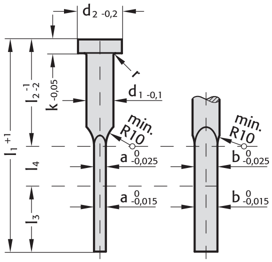
d_1	d_2	k	l_1 100	l_1 125	l_1 160	l_1 200	l_1 250	l_1 315
3	4.5	0.5	●	●	●	●	●	
4	5.5	0.5	●	●	●	●	●	●
5	6.5	0.5	●	●	●	●	●	●
6	8	0.5	●	●	●	●	●	●
8	10	1	●	●	●	●	●	●
10	12	1	●	●	●	●	●	●
12	14	1	●	●	●	●	●	●
14	16	1.5			●	●	●	●
16	18	1.5			●	●	●	●

Ordering Code (example):

Ejector pin, nitrided, similar to DIN 1530 Shape D		=239.8.	
Shaft diameter d_1	3 mm	=	300.
Length l_1	100 mm	=	100
Order No		=239.8.	300.100

Flat ejector pin, hardened, similar to DIN ISO 8693

263.1.



Material:
WS
Order No 263.1.
Hardness:
Shaft 60 ± 2 HRC
Head 45 ± 5 HRC

WS = Alloy Tool Steel
Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics: Hard and tough tool steel, medium wear resistance.

Execution:
Shank hardened and precision ground.
Head hot upset-forged.

Note:
Special dimensions a and b available on request.

263.1. Flat ejector pin, hardened, similar to DIN ISO 8693

d_1	4	4.2	4.2	4.2	5	5	5	6	6	6	6	8	8	8	10	10	12	12
d_2	8	8	8	8	10	10	10	12	12	12	12	14	14	14	16	16	18	18
k	3	3	3	3	3	3	3	5	5	5	5	5	5	5	5	5	7	7
r	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8
a	1	0.8	1	1.2	1	1.2	1.5	1	1.2	1.5	2	1.2	1.5	2	1.5	2	2	2.5
b	3.5	3.8	3.8	3.8	4.5	4.5	4.5	5.5	5.5	5.5	5.5	7.5	7.5	7.5	9.5	9.5	11.5	11.5
l_1 l_2 l_3 l_4																		
63 30 25 10	●	●	●															
80 40 30 10	●	●	●	●	●	●		●	●									
100 50 40 10	●	●	●	●	●	●	●	●	●	●	●	●						
125 60 50 15	●	●	●	●	●	●	●	●	●	●	●	●	●					
160 80 50 30			●	●	●	●	●	●	●	●	●	●	●	●	●			
200 100 60 40				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
250 125 60 65													●	●	●	●	●	●
315 160 70 85																●	●	●

Ordering Code (example):

Flat ejector pin, hardened, similar to DIN ISO 8693		=263.1.
Width a	1 mm	= 10.
Length b	3.5 mm	= 035.
Length l_1	63 mm	= 063
Order No		=263.1.10.035.063

Flat ejector pin, nitrided, similar to DIN ISO 8693

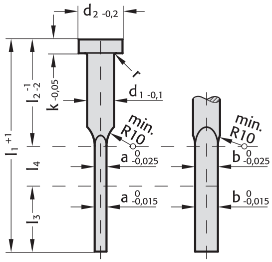
Material:
NWA
Order No 263.8.
Hardness:
Shaft* ≥ 950 HV 0,3
Head 45 ± 5 HRC
Core strength > 1400 N/mm²

NWA = Hot-Work Tool Steel – Suitable for Nitriding
Material No 1.2344 or similar.
Characteristics: Chrome-Molybdenum-Chrome-Molybdenum-Vanadium hot working die steel; core strength: > 1400 N/mm²; temperature resistant up to 650°C; surface hardness (nitrided) ≧ 950 HV 0,3.

Execution:
Shank nitrided and precision ground.
Head hot upset-forged.

Note:
*Owing to thinness of nitrided skin, hardness testing on shank restricted to Vickers only.
Test load = 3 N max.
Special dimensions a and b available on request.

263.8.



263.8. Flat ejector pin, nitrided, similar to DIN ISO 8693

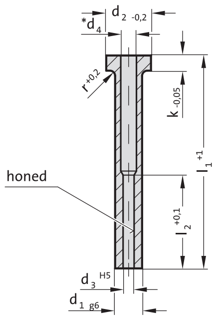
d_1	4	4.2	4.2	4.2	5	5	5	6	6	6	6	8	8	8	10	10	12	12	16	16
d_2	8	8	8	8	10	10	10	12	12	12	12	14	14	14	16	16	18	18	22	22
k	3	3	3	3	3	3	3	5	5	5	5	5	5	5	5	5	7	7	7	7
r	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.8	0.8
a	1	0.8	1	1.2	1	1.2	1.5	1	1.2	1.5	2	1.2	1.5	2	1.5	2	2	2.5	2	2.5
b	3.5	3.8	3.8	3.8	4.5	4.5	4.5	5.5	5.5	5.5	5.5	7.5	7.5	7.5	9.5	9.5	11.5	11.5	15.5	15.5
l_1 l_2 l_3 l_4																				
63 30 25 10	●	●	●																	
80 40 30 10	●	●	●	●	●	●		●	●											
100 50 40 10	●	●	●	●	●	●	●	●	●	●		●								
125 60 50 15		●	●	●	●	●	●	●	●	●	●	●	●							
160 80 50 30			●	●	●	●	●	●	●	●	●	●	●	●	●					
200 100 60 40				●			●			●	●	●	●	●	●	●	●	●	●	●
250 125 60 65													●	●	●	●	●	●	●	●
315 160 70 85														●	●	●	●	●	●	●
400 200 95 105																●	●	●	●	●

Ordering Code (example):

Flat ejector pin, nitrided, similar to DIN ISO 8693		=263.8.
Width a	1 mm =	10.
Length b	3.5 mm=	35.
Length l_1	63 mm =	63
Order No		=263.8. 10.35.63

Ejector sleeve, hardened, DIN ISO 8405

264.1.



Material:
WS
Order No 264.1.
Hardness:
Shaft 60 ± 2 HRC
Head 45 ± 5 HRC

WS = Alloy Tool Steel
Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics: Hard and tough tool steel, medium wear resistance.

Execution:
Shank hardened and precision ground.
Head hot upset-forged.
Guide bore precision ground and honed.
*up to ∅ d_4 = 4,5 tolerance +0,2/-0,1
*from ∅ d_4 = 5 tolerance +0,3/-0,1

264.1. Ejector sleeve, hardened, DIN ISO 8405

d_1	d_3	d_4	d_2	k	r	l_2	l_1 70	l_1 75	l_1 80	l_1 90	l_1 100	l_1 125	l_1 150	l_1 175	l_1 200	l_1 225	l_1 250	l_1 275
2.5	1.25	1.6	5	2	0.3	20	●		●	●	●							
3	1.5	1.8	6	3	0.3	35		●			●	●	●					
3	1.6	1.9	6	3	0.3	35		●			●	●	●	●				
4	2	2.5	8	3	0.3	35		●			●	●	●	●	●	●		
4	2.2	2.4	8	3	0.3	35		●			●	●	●	●	●	●		
5	2.5	3	10	3	0.3	35		●			●	●	●	●	●	●		
5	2.7	3	10	3	0.3	45		●			●	●	●	●	●	●		
5	3	3.5	10	3	0.3	45		●			●	●	●	●	●	●	●	
5	3.2	3.5	10	3	0.3	45		●			●	●	●	●	●	●	●	
6	3.5	4	12	5	0.5	45		●			●	●	●	●	●	●	●	
6	3.7	4	12	5	0.5	45		●			●	●	●	●	●	●	●	
6	4	4.3	12	5	0.5	45		●			●	●	●	●	●	●	●	●
8	4.2	5	14	5	0.5	45		●			●	●	●	●	●	●	●	●
8	5	5.5	14	5	0.5	45		●			●	●	●	●	●	●	●	●
8	5.2	5.5	14	5	0.5	45		●			●	●	●	●	●	●	●	●
10	6	6.5	16	5	0.5	45		●			●	●	●	●	●	●	●	●
10	6.2	6.5	16	5	0.5	45		●			●	●	●	●	●	●	●	●
12	8	8.5	20	7	0.8	45		●			●	●	●	●	●	●	●	●
12	8.2	8.5	20	7	0.8	45		●			●	●	●	●	●	●	●	●
14	10	10.5	22	7	0.8	45		●			●	●	●	●	●	●	●	●
14	10.5	11	22	7	0.8	45		●			●	●	●	●	●	●	●	●
16	12	12.5	22	7	0.8	45		●			●	●	●	●	●	●	●	●
16	12.5	13	22	7	0.8	45		●			●	●	●	●	●	●	●	●

Ordering Code (example):

Ejector sleeve, hardened, DIN ISO 8405		=264.1.
Diameter ejector pin d_3	1.25 mm=	0125.
Length l_1	70 mm =	070
Order No		=264.1.0125.070

Ejector sleeve, nitrided, DIN ISO 8405

Material:
NWA
Order No 264.8.
Hardness:
Shaft** ≥ 950 HV 0,3
Head 45 ± 5 HRC
Tensile Strength (core) > 1400 N/mm²

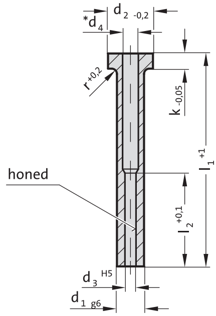
NWA = Hot-Work Tool Steel – Suitable for Nitriding
Material No 1.2344 or similar.

Characteristics:
Chrome-Molybdenum-Chrome-Molybdenum-Vanadium hot working die steel; core strength: > 1400 N/mm²; temperature resistant up to 650°C; surface hardness (nitrided) ≧ 950 HV 0,3.

Execution:
Shank nitrided and precision ground.
Head hot upset-forged.
Guide bore precision ground and honed.
*up to ∅ d_4 = 4,5 tolerance +0,2/-0,1
*from ∅ d_4 = 5 tolerance +0,3/-0,1

Note:
**Owing to thinness of nitrided skin, hardness testing on shank restricted to Vickers only.
Test load = 3 N max.

264.8.



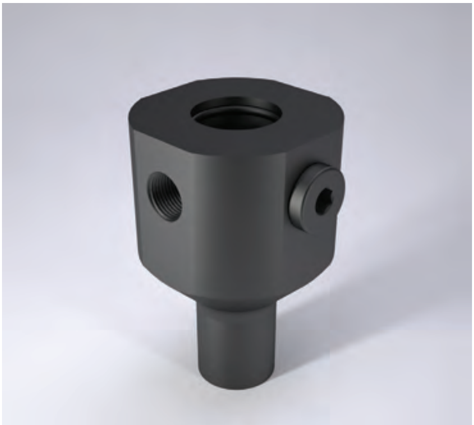
264.8. Ejector sleeve, nitrided, DIN ISO 8405

d_1	d_3	d_4	d_2	k	r	l_2	l_1 75	l_1 100	l_1 125	l_1 150	l_1 175	l_1 200	l_1 225	l_1 250	l_1 275
3	1.5	1.8	6	3	0.3	35	●	●	●	●					
3	1.6	1.9	6	3	0.3	35	●	●	●	●					
4	2	2.5	8	3	0.3	35	●	●	●	●					
4	2.2	2.4	8	3	0.3	35	●	●	●	●					
5	2.5	3	10	3	0.3	35	●	●	●	●					
5	2.7	3	10	3	0.3	45	●	●	●	●					
5	3	3.5	10	3	0.3	45	●	●	●	●	●				
5	3.2	3.5	10	3	0.3	45	●	●	●	●	●				
6	3.5	4	12	5	0.5	45	●	●	●	●	●				
6	3.7	4	12	5	0.5	45	●	●	●	●	●				
6	4	4.3	12	5	0.5	45	●	●	●	●	●	●			
8	4.2	5	14	5	0.5	45	●	●	●	●	●	●			
8	5	5.5	14	5	0.5	45	●	●	●	●	●	●			
8	5.2	5.5	14	5	0.5	45	●	●	●	●	●	●			
10	6	6.5	16	5	0.5	45	●	●	●	●	●	●	●	●	
10	6.2	6.5	16	5	0.5	45	●	●	●	●	●	●	●	●	
12	8	8.5	20	7	0.8	45	●	●	●	●	●	●	●	●	●
12	8.2	8.5	20	7	0.8	45	●	●	●	●	●	●	●	●	●
14	10	10.5	22	7	0.8	45		●	●	●	●	●	●	●	●
14	10.2	10.5	22	7	0.8	45		●	●	●	●	●	●	●	●
16	12	12.5	22	7	0.8	45		●	●	●	●	●	●	●	●

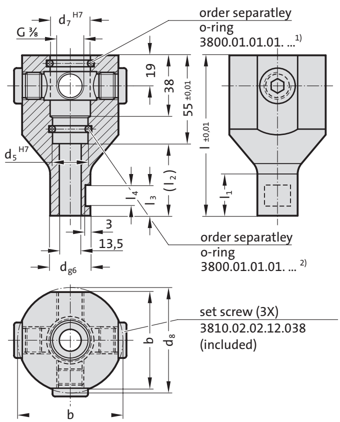
Ordering Code (example):

Ejector sleeve, nitrided, DIN ISO 8405		=2648.
Diameter ejector pin d_3	1.5 mm=	150.
Length l_1	75 mm =	75
Order No		=2648. 150.75

Quill holder for core tempering



3820.10.



Description:
The quill holder is preferably used with bolt guide 2967.10. and quills with internal bore for slider tempering. 4 connections make it possible to implement tempering circuits either directly or in series.

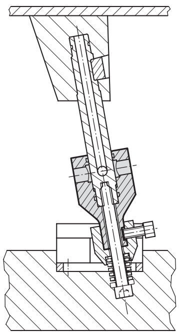
Material:
Stainless steel

3820.10. Quill holder for core tempering

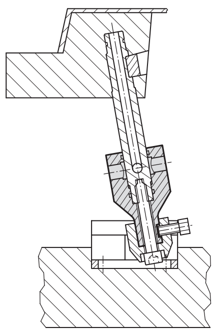
Order No	d	d_7	d_8	d_5	b	l	l_1	l_2	l_3	l_4
3820.10.025.025	25	25	65	22	60	100	26	45	19	13
3820.10.030.030	30	30	70	27	65	105	31	50	22	14.5
3820.10.040.040	40	40	80	37	75	115	41	60	28	16.5

Mounting example

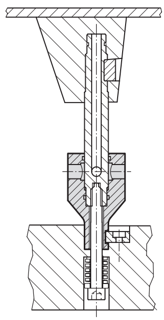
1. Swivelled
   Slider without sealing surfaces



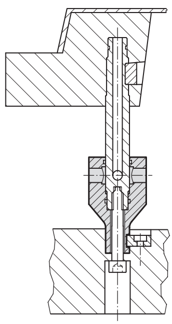
2. Swivelled
   Slider with sealing surfaces



3. Not swivelled
   Slider without sealing surfaces

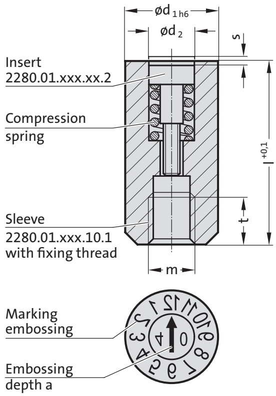


4. Not swivelled
   Slider with sealing surfaces

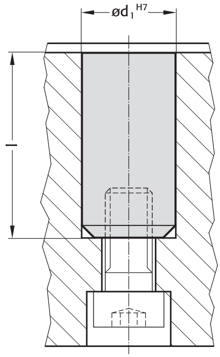


Date stamp complete, embossed lettering

2280.01.



Mounting example



Material:
1.2767, hardened HRC 54±2, ground

Note:
The sleeve and insert can be ordered separately (see ordering example).

Description:
- sleeve with engraving
- adjustable insert with display arrow and year (can be rotated using an ordinary screwdriver)
- metric thread for fixing
- mirror image engraving

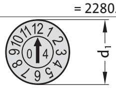
Mounting:
Fixing:
Screw in the insert in a clockwise direction until it is flush with the top edge and set to the required position.
Setting:
Set the insert by turning clockwise or anti-clockwise. When correctly set, the insert of a stamp with d_1 = 6 mm (.060.) is typically a maximum of 0.1 mm above or below the top edge of the sleeve.
Changing:
To change the insert turn it anti-clockwise to remove.

2280.01. Date stamp complete, embossed lettering

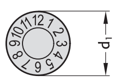
d_1	d_2	l	m	t	s	a
4	2.5	14	2	2	0.2	0.3
5	3.1	17	3	3	0.2	0.4
6	3.1	17	3	3	0.2	0.4
8	4.6	20	4	4	0.35	0.4
10	4.6	20	5	4	0.35	0.4
12	6.4	25	6	6	0.5	0.6
16	8.4	33	8	8	0.6	0.6

Ordering examples:

Date insert, complete	= 2280.	
Standard version	=	01.
Sleeve diameter d_1 = 5	=	050.
Sleeve with display: Months (1-12)	=	10.
Insert with display: Arrow + year (variable) e.g. 2004	=	04
Order No	= 2280.01.050.10.04	



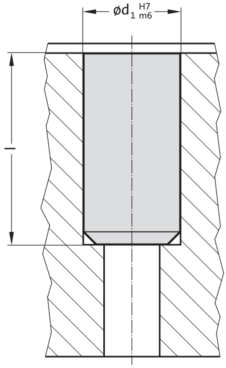
Date insert, Sleeve	= 2280.	
Standard version	=	01.
Sleeve diameter d_1 = 5	=	050.
Sleeve with display: Months (1-12)	=	10.
Sleeve	=	1
Order No	= 2280.01.050.10.1	



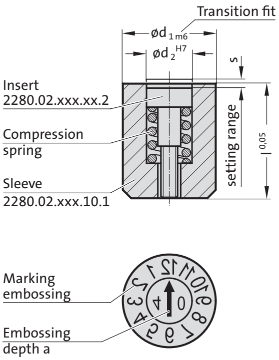
Date insert, Insert	= 2280.	
Standard version	=	01.
Sleeve diameter d_1 = 5	=	050.
Insert with display: Arrow + year (variable) e.g. 2004	=	04.
Insert	=	2
Order No	= 2280.01.050.04.2	

Date stamp complete (short version), embossed lettering

Mounting example



2280.02.



Material:
1.2767, hardened HRC 54±2, ground

Note:
The sleeve and insert can be ordered separately (see ordering example).

Description:
- sleeve with engraving
- adjustable insert with display arrow and year (can be rotated using an ordinary screwdriver)
- metric thread for fixing
- mirror image engraving

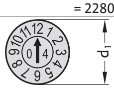
Mounting:
Fixing:
Screw in the insert in a clockwise direction until it is flush with the top edge and set to the required position.
Setting:
Set the insert by turning clockwise or anti-clockwise. When correctly set, the insert of a stamp with d_1 = 6 mm (.060.) is typically a maximum of 0.1 mm above or below the top edge of the sleeve.
Changing:
To change the insert turn it anti-clockwise to remove.

2280.02. Date stamp complete (short version), embossed lettering

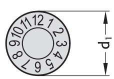
d_1	d_2	l	s	a
2.6	1.4	4	0.2	0.3
3	1.5	4	0.2	0.3
4	2.1	5	0.25	0.3
5	3.1	8	0.2	0.4
6	3.1	8	0.2	0.4
8	4.4	10	0.25	0.4
10	5.2	12	0.35	0.4
12	6.2	14	0.35	0.6

Ordering examples:

Date insert, complete	= 2280.
Standard version	= 02.
Sleeve diameter d_1 = 5	= 050.
Sleeve with display: Months (1-12)	= 10.
Insert with display: Arrow + year (variable) e.g. 2004	= 04
Order No	= 2280.01.050.10.04



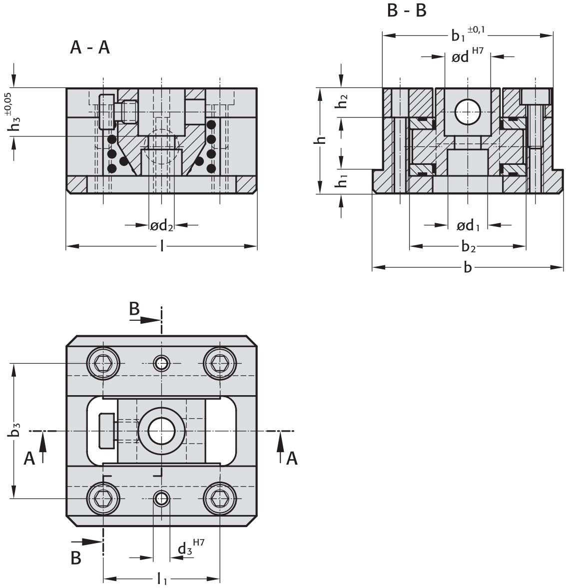
Date insert, Sleeve	= 2280.
Standard version	= 02.
Sleeve diameter d_1 = 5	= 050.
Sleeve with display: Months (1-12)	= 10.
Sleeve	= 1
Order No	= 2280.01.050.10.1



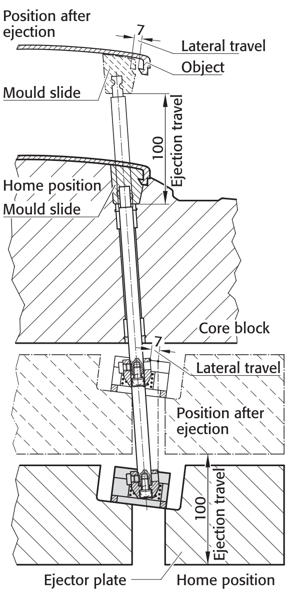
Date insert, Insert	= 2280.
Standard version	= 02.
Sleeve diameter d_1 = 5	= 050.
Insert with display: Arrow + year (variable) e.g. 2004	= 04.
Insert	= 2
Order No	= 2280.01.050.04.2

Bolt guide

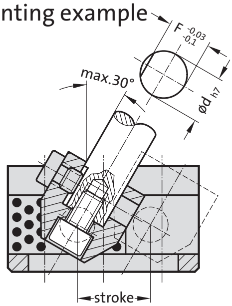
2967.10.



Application example



Mounting example



2967.10. Bolt guide

Order No	d	Stroke	b	l	h	b_1	b_2	b_3	l_1	h_1	h_2	h_3	d_1	d_2	d_3	F
2967.10.08.010	8	10	33	32	22	30	19	24	20	5	7	8	8	4	3	7
2967.10.10.018	10	18	45	45	27	40	25	32	30	5	8	10	10	5	4	9
2967.10.12.020	12	20	57	50	32	51	31	39	35	7	10	12	11	7	6	11
2967.10.16.025	16	25	65	65	36	58	38	46	40	8	10	16	14	9	6	14.5
2967.10.20.030	20	30	80	80	42	72	44	56	55	11	12	20	17	11	8	18
2967.10.25.035	25	35	93	90	50	85	52	66	65	15	15	25	20	14	10	22.5
2967.10.30.040	30	40	101	100	55	93	60	74	70	15	15	30	20	14	10	27
2967.10.35.045	35	45	120	120	62	110	70	85	80	15	18	35	20	14	10	32
2967.10.40.050	40	50	130	135	70	120	80	95	90	15	18	40	26	17.5	10	36
2967.10.45.055	45	55	140	150	80	130	90	105	110	15	20	45	26	17.5	10	40

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 Shorehardness ratings 80, 90, 95, are made from polyurethane elastomers. Benefits include high spring forces and good resilient damping behaviour.

FIBROELAST® Springs

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

Disc Springs

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

FIBRO Gas springs

close a gap where ever the accent is on 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.

COMPRESSION SPRING

DIN ISO 10243

Service Data for Limited-/ Extended Spring Life

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

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

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

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

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

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

Working temperature

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

Extended Spring Life: Spring Displacement Values

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

Calculation of Spring Forces

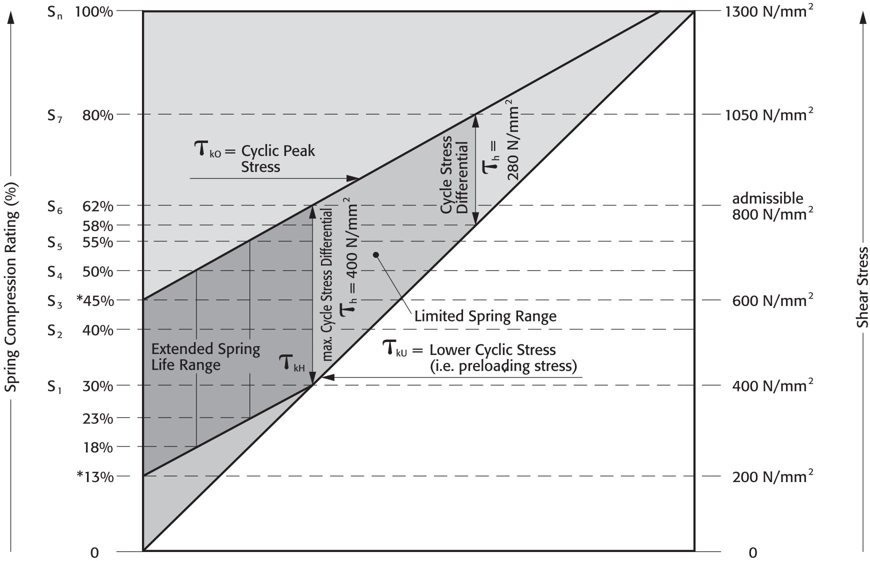
Simple multiplication of the spring coefficient R with the applicable displacement S (mm) yields the spring force value (N).

Spring Force versus Spring Displacement

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

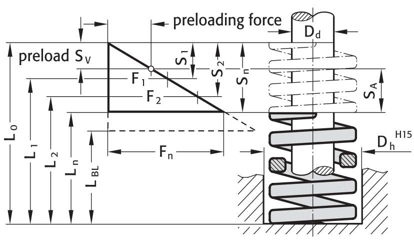
Cyclic stress maxima/minima as applicable to extended/limited life of FIBRO High-Performance Compression Springs

241.



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

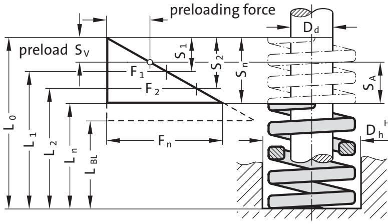
D_h	=	diameter of guide sleeve
D_d	=	diameter of guide pin
L_0	=	free length of spring
$L_1 ... L_n$	=	length of loaded spring (mm), as related to spring
L_{BL}	=	length of compacted spring (i.e. wire-to-wire)
$F_1 ... F_n$	=	forces (N) as related to lenght of spring $L_1 ... L_n$
$S_{v1} ... S_{v7}$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



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

Notice: 80% compression must not be exceeded!

High performance compression spring, XSF, Colour "Violet"

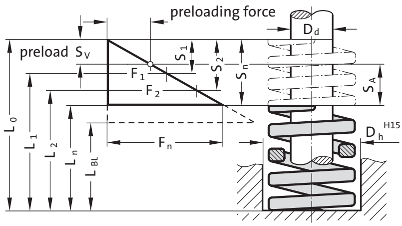


D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \dots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1 \dots F_n$ = forces (N) as related to length of spring $L_1 \dots L_n$
$S_{V1} \dots S_{V7}$ = recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$
$S_1 \dots S_n$ = compr. as related to spring forces $F_1 \dots F_n$
R = spring rate (N/mm)
$S_{A1} \dots S_{A7}$ = working stroke (mm)

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

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

High performance compression spring, XSF, Colour "Violet"

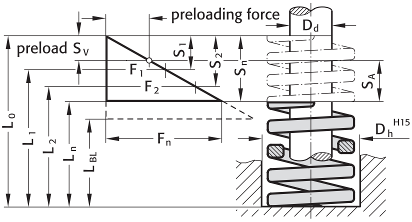


D_h = dia. of guide sleeve
D_d = diameter of guide pin
L_0 = free length of spring
$L_1 \dots L_n$ = length of loaded spring (mm) as related to spring forces $F_1 \dots F_n$
L_{BL} = length of compacted spring (i.e. wire-to-wire)
$F_1 \dots F_n$ = forces (N) as related to length of spring $L_1 \dots L_n$
$S_{V1} \dots S_{V7}$ = recommend. preload. compression, as relat. to compress. $S_1 \dots S_7$
$S_1 \dots S_n$ = compr. as related to spring forces $F_1 \dots F_n$
R = spring rate (N/mm)
$S_{A1} \dots S_{A7}$ = working stroke (mm)

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

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

High Performance Compression Springs
DIN ISO 10243



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

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

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

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

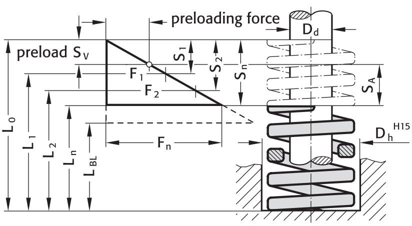
241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue"

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

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

High Performance Compression Springs DIN ISO 10243

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



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

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

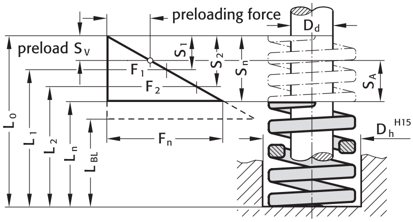
					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.10.025	10,0	5,0	25	22,6	4,9	2,0	2,9	111	5,5	2,7	2,8	124	7,1	5,2	1,9	160	8,9	16,1	201,1
241.16.10.032	10,0	5,0	32	17,7	6,4	2,7	3,7	113	7,3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

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

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

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

High Performance Compression Springs
DIN ISO 10243



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

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

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

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

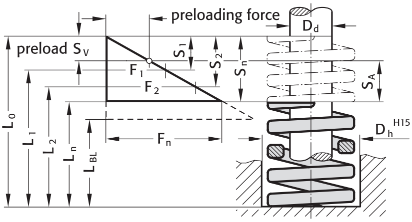
241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue"

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

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

High Performance Compression Springs DIN ISO 10243

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



FIBRO

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

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

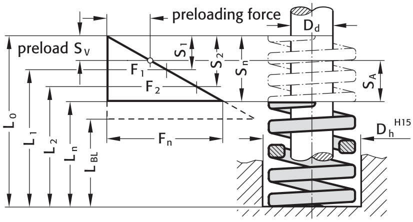
					55% stroke				62% stroke				80% stroke				100% stroke		
Order No	D_h	D_d	L_0	R	S_5	S_{v5}	S_{A5}	F_5	S_6	S_{v6}	S_{A6}	F_6	S_7	S_{v7}	S_{A7}	F_7	S_n	L_n	F_n
241.16.13.025	12,5	6,3	25	42,2	4,8	2,0	2,8	203	5,4	2,6	2,8	228	7,0	5,0	2,0	295	8,7	16,3	367,1
241.16.13.032	12,5	6,3	32	33,4	6,1	2,5	3,6	204	6,8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

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

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

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

High Performance Compression Springs
DIN ISO 10243



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

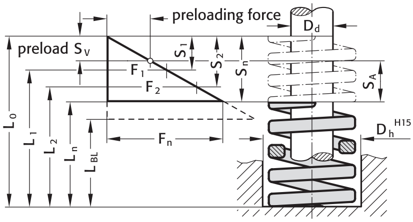
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

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

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

High Performance Compression Springs
DIN ISO 10243

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

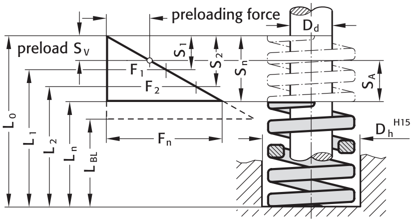


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

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

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

High Performance Compression Springs
DIN ISO 10243



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

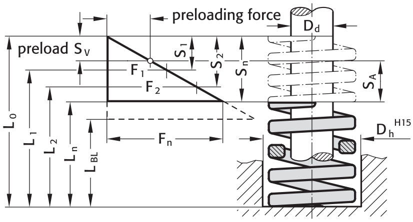
241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

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

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

High Performance Compression Springs
DIN ISO 10243

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

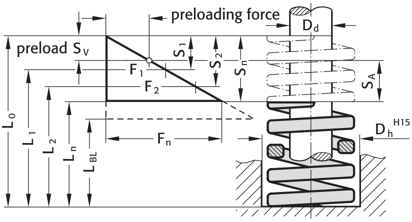


241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow“

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

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

High Performance Compression Springs DIN ISO 10243



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

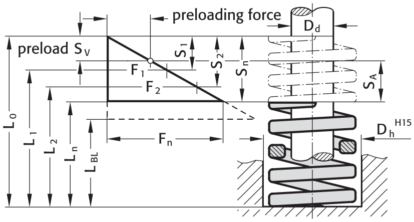
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

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

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

High Performance Compression Springs DIN ISO 10243

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

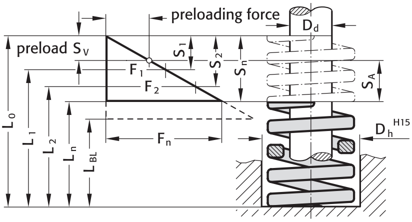


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

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

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

High Performance Compression Springs
DIN ISO 10243



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

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

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

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

High Performance Compression Springs
DIN ISO 10243

D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

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

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

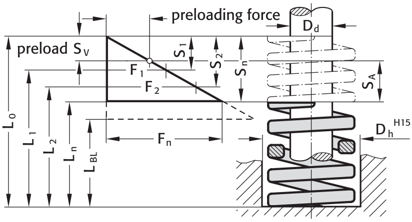
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$

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

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

R = spring rate (N/mm)

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



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

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

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

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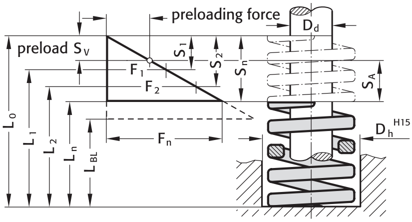
High Performance Compression Springs DIN ISO 10243



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

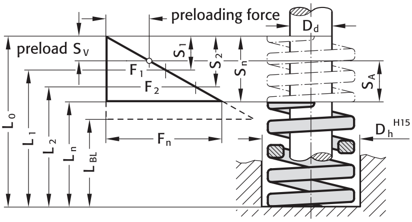
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

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

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

High Performance Compression Springs
DIN ISO 10243

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

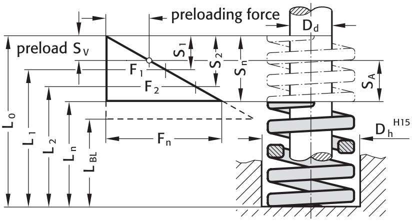


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

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

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

High Performance Compression Springs
DIN ISO 10243



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

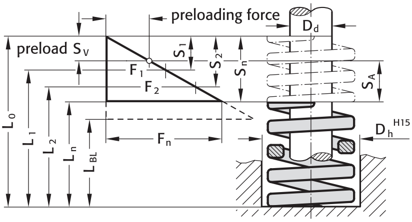
241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

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

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

High Performance Compression Springs
DIN ISO 10243

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

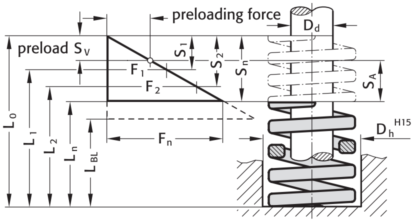


241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow“

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

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

High Performance Compression Springs
DIN ISO 10243



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

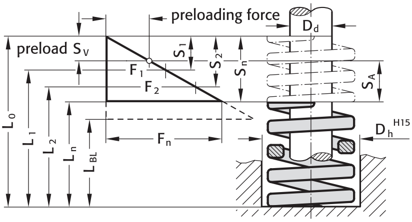
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

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

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

High Performance Compression Springs
DIN ISO 10243

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



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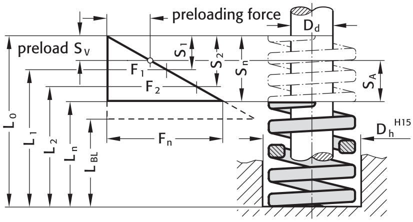
241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

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

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

High Performance Compression Springs
DIN ISO 10243



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

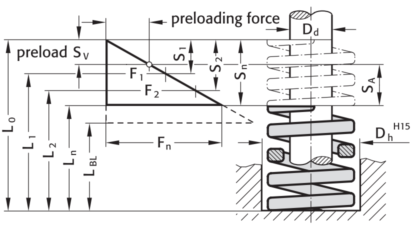
241.16. High Performance Compression Springs DIN ISO 10243 Colour: „Red“

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

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

High Performance Compression Springs
DIN ISO 10243

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

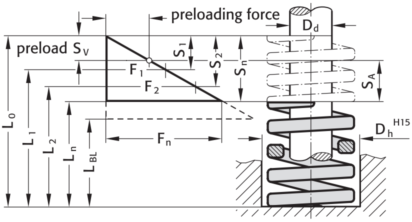


241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow“

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

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

High Performance Compression Springs DIN ISO 10243



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

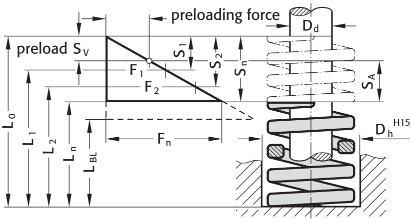
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

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

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

High Performance Compression Springs
DIN ISO 10243

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

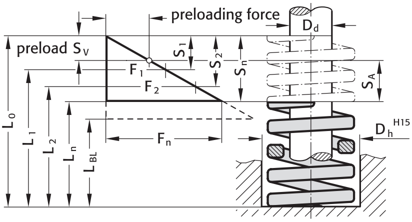


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

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

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

High Performance Compression Springs DIN ISO 10243



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

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

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

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

High Performance Compression Springs
DIN ISO 10243

FIBRO

D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

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

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

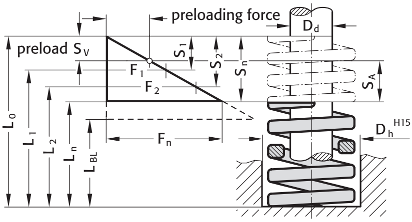
$F_1 ... F_n$ = forces (N) as related to length of spring $L_1 ... L_n$

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

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

R = spring rate (N/mm)

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

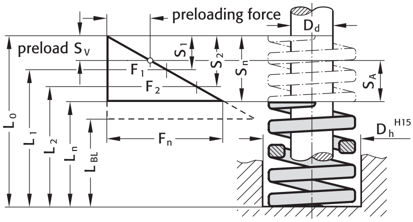


241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow“

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

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

High Performance Compression Springs DIN ISO 10243



D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

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

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

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

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

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

R = spring rate (N/mm)

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

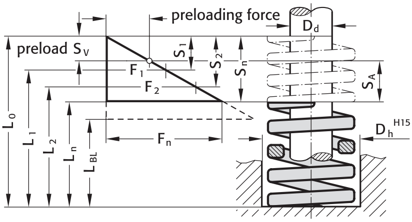
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

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

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

High Performance Compression Springs
DIN ISO 10243

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



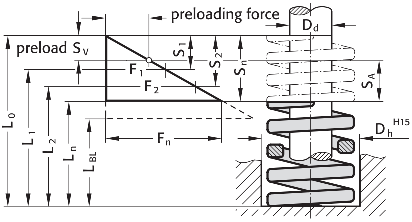
241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

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

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

High Performance Compression Springs DIN ISO 10243

FIBRO



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

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

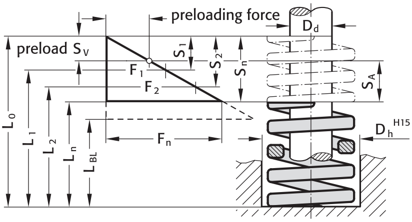
					30% Stroke				40% Stroke				45% Stroke				50% Stroke			
Order No	D_h	D_d	L_0	R	S_1	S_{v1}	S_{A1}	F_1	S_2	S_{v2}	S_{A2}	F_2	S_3	S_{v3}	S_{A3}	F_3	S_4	S_{v4}	S_{A4}	F_4
241.16.50.064	50,0	25,0	64	413,0	6,5	2,8	3,7	2685	8,6	2,8	5,8	3552	9,7	2,8	6,9	4006	10,8	3,9	6,9	4460
241.16.50.076	50,0	25,0	76	339,4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

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

High Performance Compression Springs
DIN ISO 10243

FIBRO

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

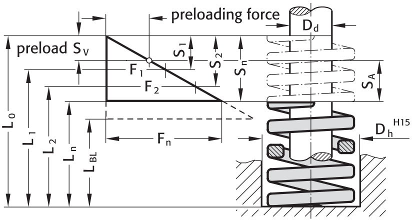


241.17. High Performance Compression Springs DIN ISO 10243 Colour: „Yellow“

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

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

High Performance Compression Springs
DIN ISO 10243



D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

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

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

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

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

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

R = spring rate (N/mm)

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

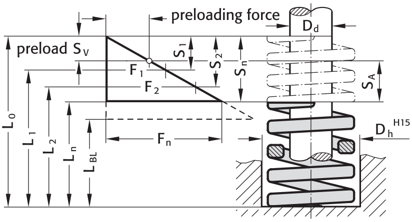
241.14. High Performance Compression Springs DIN ISO 10243 Colour: „Green“

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

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

High Performance Compression Springs
DIN ISO 10243

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

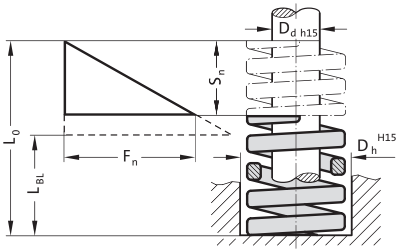


241.15. High Performance Compression Springs DIN ISO 10243 Colour: „Blue“

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

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

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



D_h = dia. of guide sleeve

D_d = diameter of guide pin

L_0 = free length of spring

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

F_n = Spring force in N

S_n = Stroke

R = spring rate (N/mm)

Description:

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

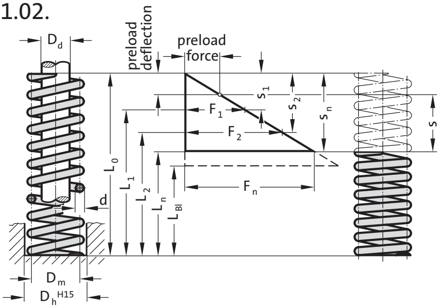
241.19. High performance compression spring, 3XLF, Colour "White"

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

Round wire compression spring

FIBRO

241.02.



Material:

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

Execution:

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

Note:

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

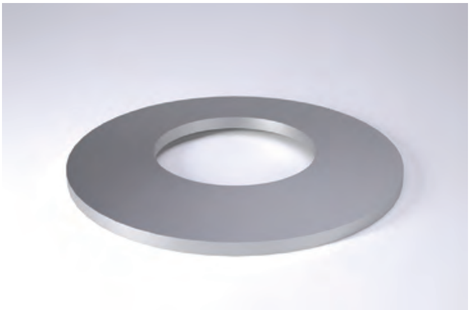
D_h = diameter of guide sleeve
D_m = mean coil diameter
D_d = diameter of guide pin
d = diameter of spring wire
L_0 = free length of spring
$L_1...L_n$ = lengths of loaded spring as related to spring forces $F_1...F_n$
R = spring rate [N/mm]
L_{Bl} = length of compacted spring (i.-e. wire-to-wire)
$F_1...F_n$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

241.02. Round wire compression spring

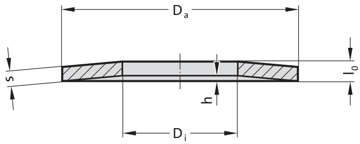
Order No	D_h	D_d	D_m	d	L_0	R	s_1	F_1 [N]*	l_1	s_2	F_2 [N]**	l_2	s_n	F_n [N]***	L_n	i_f
241.02.11.040	11	6.5	8.5	1.5	40	8.08	11.3	91	28.7	13.7	110	26.3	16.1	130	23.9	10.5
241.02.13.055	13	8.5	10.5	1.5	55	3.8	20.8	79	34.2	25.2	95	29.8	29.7	112	25.3	12
241.02.15.040	15	9.5	12	2	40	11.93	12.3	146	27.7	15	178	25	17.6	210	22.4	8
241.02.15.050	15	9.5	12	2	50	10	17.5	175	32.5	21.2	212	28.8	25	250	25	9.5
241.02.16.040	16	10.5	13	2	40	11	14	154	26	17	187	23	20	220	20	7
241.02.18.085	18	12	14.75	2.25	85	5.92	30.8	182	54.2	37.4	221	47.6	44	260	41	14
241.02.19.045	19	11	14.5	3	45	35	9.8	343	35.2	11.9	416	33.1	14	490	31	8
241.02.19.050	19	11	14.5	3	50	30	11.2	336	38.8	13.6	408	36.4	16	480	34	8.5
241.02.19.083	19.5	9	14	4	83	75	12.6	945	70.4	15.3	1147	67.7	18	1350	65	16
241.02.20.035	20.5	10	15	4	35	170	5.6	952	29.4	6.8	1156	28.2	8	1360	27	4.5
241.02.20.090	20.5	9	14.5	4.5	90	97.8	12.3	1202	77.7	15	1467	75	17.6	1714	72.4	4
241.02.21.035	21	13.5	17	2.5	35	13.32	10.5	139	24.5	12.7	169	22.3	15	200	20	6
241.02.21.040	21	12	16.25	3	40	32.1	9.8	314	30.2	11.9	381	28.1	14	450	26	5.5
241.02.22.095	22	14.5	18	2.5	95	4.1	34.2	140	60.8	41.5	170	53.5	48.8	200	46.2	17
241.02.22.040	22.5	12	17	4	40	105.5	7.7	812	32.3	9.3	981	30.7	11	1160	29	5
241.02.23.045	23	14.5	18.5	3	45	25.7	15	385	30	18.2	467	26.8	21.4	550	23.6	5
241.02.23.050	23	12.5	17.5	4	50	74.3	11	817	39	13.3	988	36.7	15.6	1160	34.4	6.5
241.02.26.024	26.5	16	21	4	24	133.2	5	666	19	6.1	812	17.9	7.2	960	16.8	2
241.02.30.070	30	13	20.8	7	70	341	7.7	2625	62.3	9.3	3171	60.7	11	3750	59	8
241.02.32.070	32	21	26	4	70	24.2	23.8	575	46.2	28.9	700	41.1	34	822	36	6
241.02.32.150	32	16	23.5	6.5	150	103.6	19.6	2030	130.4	23.8	2465	126	28	2900	122	14
241.02.34.125	34	19	26	6	125	67.2	22.4	1505	102.6	27.2	1827	97.8	32	2150	93	11.5
241.02.44.130	44	25	34	8	130	108.2	25.2	2726	104.8	30.6	3310	99.4	36	3895	94	10
241.02.44.200	44	25	34	8	200	62.7	43.4	2721	156.6	52.7	3304	147.3	62	3887	137.7	17
241.02.48.067	48	25	36	10	67	640	6.3	4032	60.7	7.6	4864	59.4	9	5760	58	3.5
241.02.49.050	49	29	38.5	8.5	50	337	7.7	2594	42.3	9.3	3134	40.7	11	3707	39	2.5
241.02.55.200	55	30	42	11	200	157	30.1	4725	169.9	36.6	5746	163.4	43	6750	157	13
241.02.58.050	58	39	48	8	50	151.2	9.8	1481	40.2	11.9	1799	38.1	14	2117	36	2.5
241.02.63.180	63	38	50	11	180	121	30.1	3642	149.9	36.6	4428	143.4	43	5203	137	10

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

Disc spring DIN 2093



242.01.



Material:

50 CrV 4 Vanadium Spring Steel

Note:

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

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

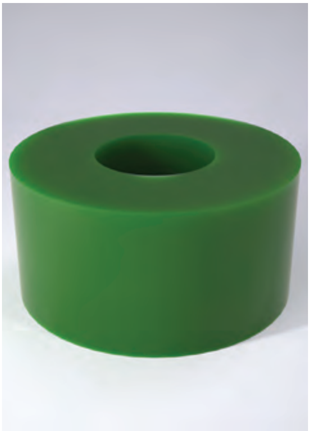
242.01. Disc spring DIN 2093

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

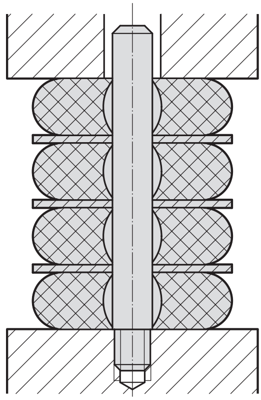
FIBROFLEX*

*Polyurethan

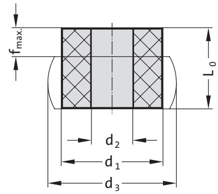
FIBROFLEX®-Elastomer spring for FIBROFLEX®-Spring system



Mounting example



244.1.



Description:

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

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

Note:

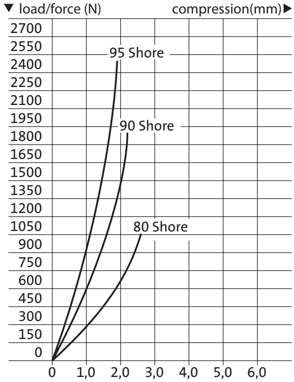
Physical and chemical properties of FIBROFLEX®-Elastomer – see at the beginning of chapter G.
Dowel pins (235./2351.1.) or guide pins (244.5.), recommended for stacks higher than 1,5 x d_2.

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

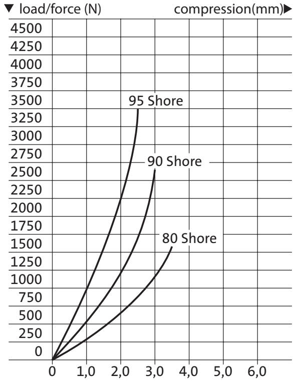
Order No	Spring hardness	d_1	d_2	d_3	L_0	f max.	F max. [N]
244.1.16.5	80 Shore A	16	6.5	20	7.5	2.6	1060
244.1.20.5	80 Shore A	20	8.5	26	10	3.5	1580
244.1.25.5	80 Shore A	25	10.5	32	12.5	4.3	2670
244.1.32.5	80 Shore A	32	13.5	40	15	5.2	4500
244.1.40.5	80 Shore A	40	13.5	50	17.5	6.1	7200
244.1.16.6	90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

FIBROFLEX®-Elastomer spring for FIBROFLEX®-Spring system

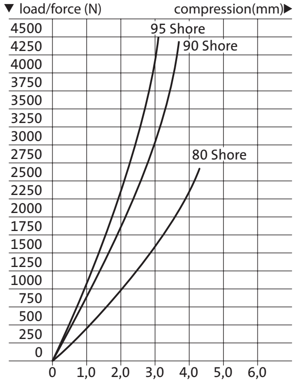
244.1.16. – ⌀ 16



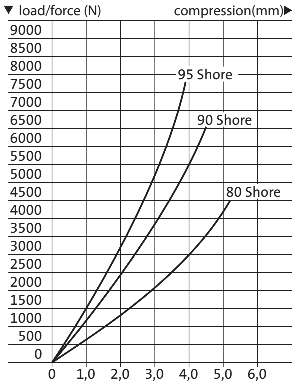
244.1.20. – ⌀ 20



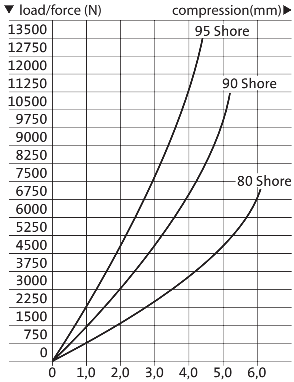
244.1.25. – ⌀ 25



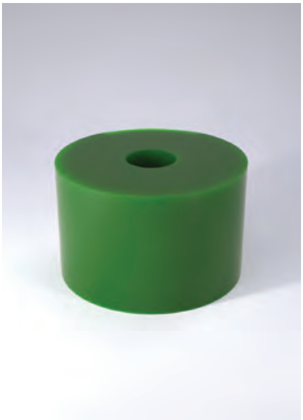
244.1.32. – ⌀ 32



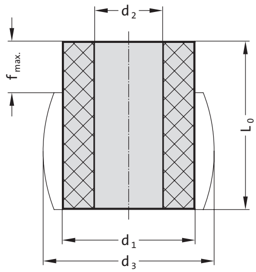
244.1.40. – ⌀ 40



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



246.5.



Description:

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

Material:

Polyurethan 80 Shore A
Colour: green

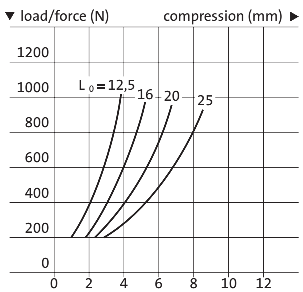
Note:

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

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

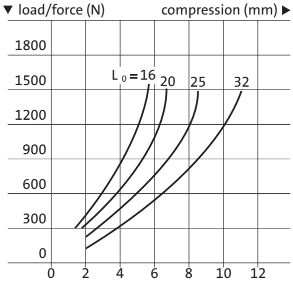
Order No	d_1	L_0	d_2	d_3	f max.	F max. [N]
246.5.016.012	16	12.5	6.5	21	4.3	1020
246.5.016.016	16	16	6.5	21	5.6	980
246.5.016.020	16	20	6.5	21	7	950
246.5.016.025	16	25	6.5	21	8.7	940
246.5.020.016	20	16	8.5	26	5.6	1530
246.5.020.020	20	20	8.5	26	7	1510
246.5.020.025	20	25	8.5	26	8.7	1500
246.5.020.032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

246.5.016.
Ø 16/80 Shore A

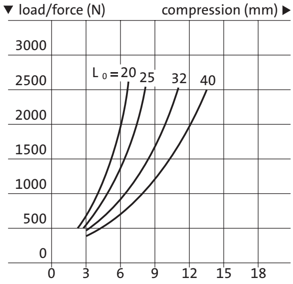


FIBROFLEX®-Tubular Spring Elements 80 Shore A

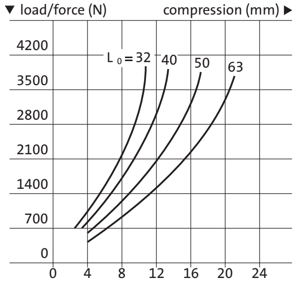
246.5.020.
Ø 20/80 Shore A



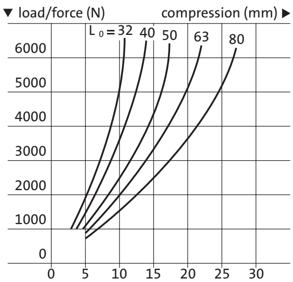
246.5.025.
Ø 25/80 Shore A



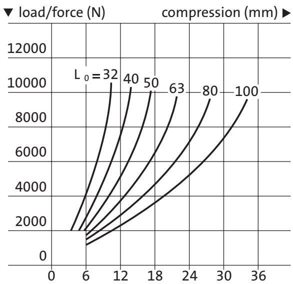
246.5.032.
Ø 32/80 Shore A



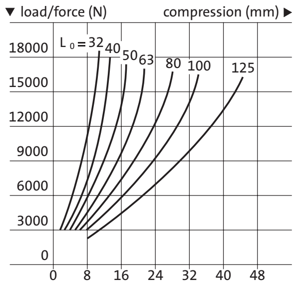
246.5.040.
Ø 40/80 Shore A



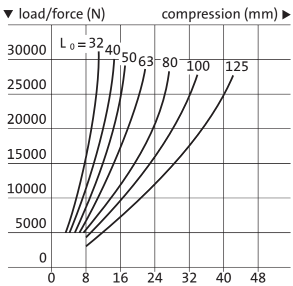
246.5.050.
Ø 50/80 Shore A



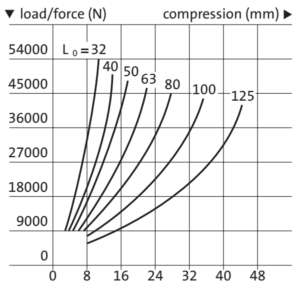
246.5.063.
Ø 63/80 Shore A



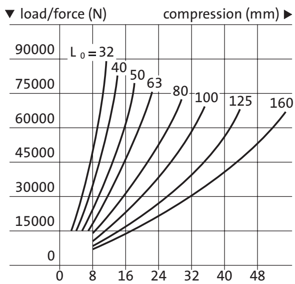
246.5.080.
Ø 80/80 Shore A



246.5.100.
Ø 100/80 Shore A

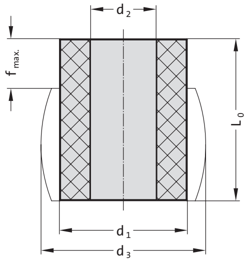


246.5.125.
Ø 125/80 Shore A



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

246.6.



Description:

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

Material:

Polyurethan 90 Shore A
Colour: yellow

Note:

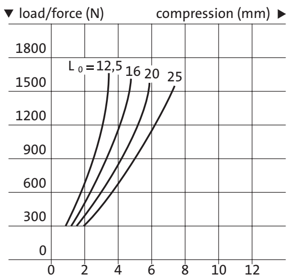
The physical properties of polyurethane elastomers means that they have a tendency to settle. The extent of such settlement is dependent on the internal heat of friction, speed and number of load changes, the spring travel and the Shore hardness.
Settlement may be as much as 4 to 7% of the spring length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

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

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

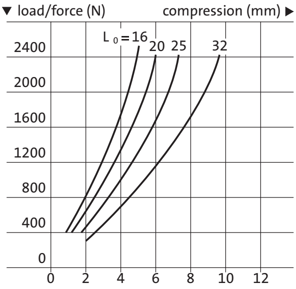
Order No	d_1	L_0	d_2	d_3	f max.	F max. [N]
246.6.100.080	100	80	21	130	24	75000
246.6.100.100	100	100	21	130	30	73000
246.6.100.125	100	125	21	130	37.5	71000
246.6.125.032	125	32	27	160	9.6	150000
246.6.125.040	125	40	27	160	12	142500
246.6.125.050	125	50	27	160	15	132000
246.6.125.063	125	63	27	160	18.9	125000
246.6.125.080	125	80	27	160	24	118000
246.6.125.100	125	100	27	160	30	115000
246.6.125.125	125	125	27	160	37.5	113000
246.6.125.160	125	160	27	160	48	111300

246.6.016.
Ø 16/90 Shore A

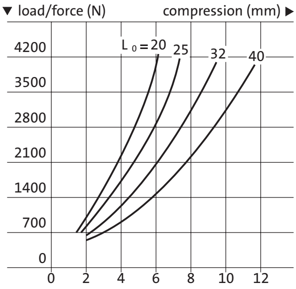


FIBROFLEX®-Tubular Spring Elements 90 Shore A

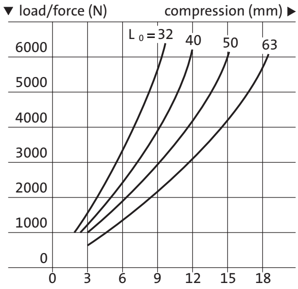
246.6.020.
Ø 20/90 Shore A



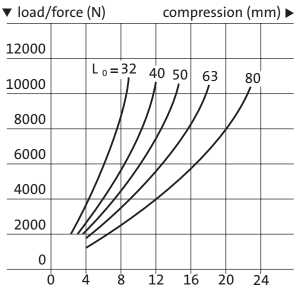
246.6.025.
Ø 25/90 Shore A



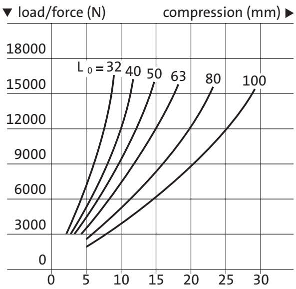
246.6.032.
Ø 32/90 Shore A



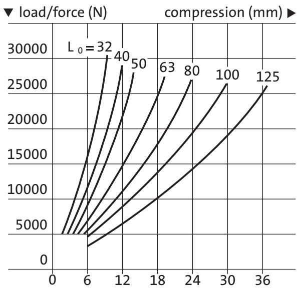
246.6.040.
Ø 40/90 Shore A



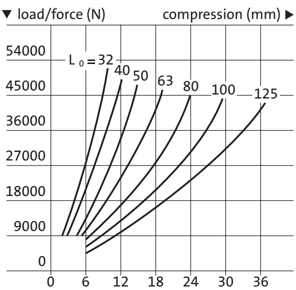
246.6.050.
Ø 50/90 Shore A



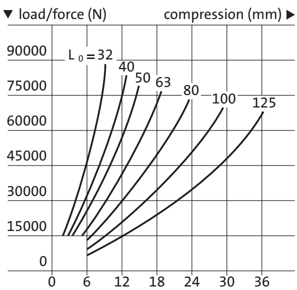
246.6.063.
Ø 63/90 Shore A



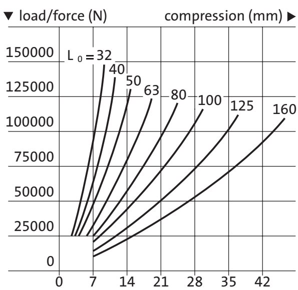
246.6.080.
Ø 80/90 Shore A



246.6.100.
Ø 100/90 Shore A

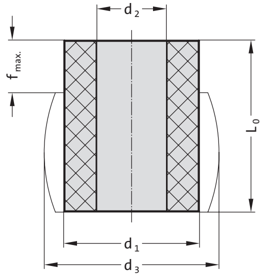


246.6.125.
Ø 125/90 Shore A



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

246.7.



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

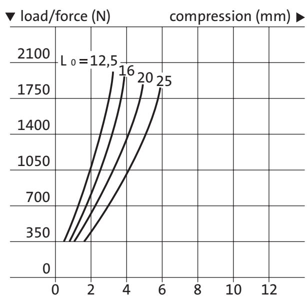
Material:
Polyurethan 95 Shore A
Colour: red

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

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

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

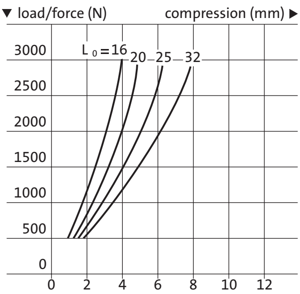
246.7.016.
Ø 16/95 Shore A



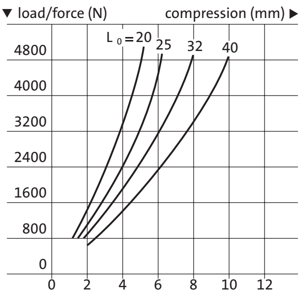
FIBROFLEX®-Tubular Spring Elements 95 Shore A

FIBRO

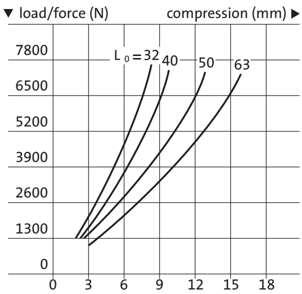
246.7.020.
Ø 20/95 Shore A



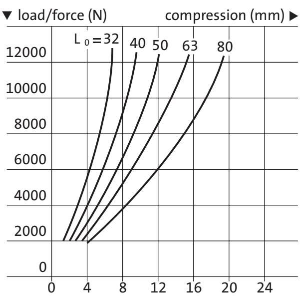
246.7.025.
Ø 25/95 Shore A



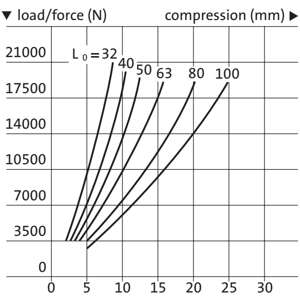
246.7.032.
Ø 32/95 Shore A



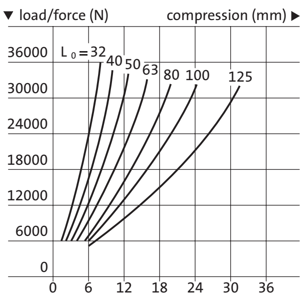
246.7.040.
Ø 40/95 Shore A



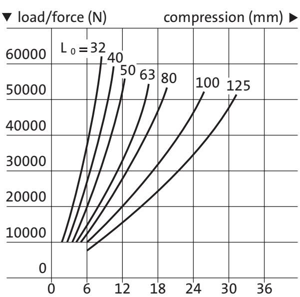
246.7.050.
Ø 50/95 Shore A



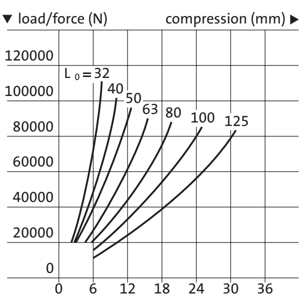
246.7.063.
Ø 63/95 Shore A



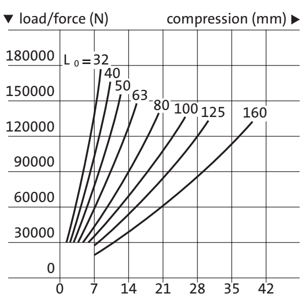
246.7.080.
Ø 80/95 Shore A



246.7.100.
Ø 100/95 Shore A

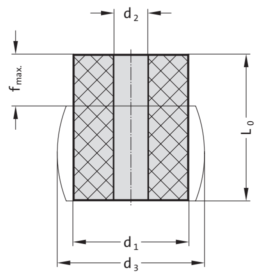


246.7.125.
Ø 125/95 Shore A



FIBROELAST® Tubular spring element 70 Shore A

2461.4.



Material:

Polyester-based polyurethane 70 Shore A
Colour: white

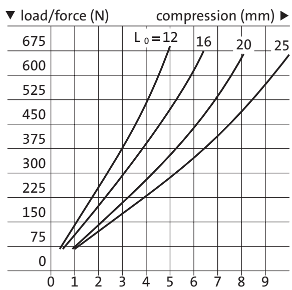
Note:

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

2461.4. FIBROELAST® Tubular spring element 70 Shore A

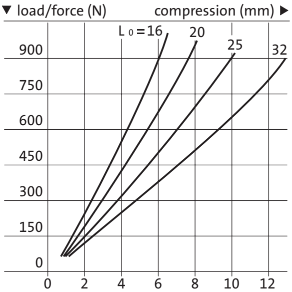
Order No	d_1	L_0	d_2	d_3	f max.
2461.4.016.012	16	12	6.5	21	4.8
2461.4.016.016	16	16	6.5	21	6.4
2461.4.016.020	16	20	6.5	21	8
2461.4.016.025	16	25	6.5	21	10
2461.4.020.016	20	16	8.5	26	6.4
2461.4.020.020	20	20	8.5	26	8
2461.4.020.025	20	25	8.5	26	10
2461.4.020.032	20	32	8.5	26	12.8
2461.4.025.020	25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

2461.4.016.
∅ 16/70 Shore A

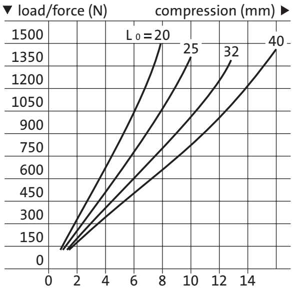


FIBROELAST®-Tubular Spring Elements 70 Shore A

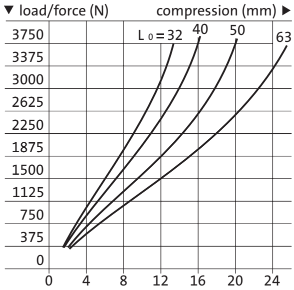
2461.4.020.
Ø 20/70 Shore A



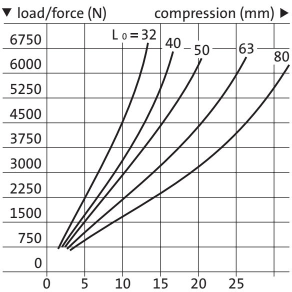
2461.4.025.
Ø 25/70 Shore A



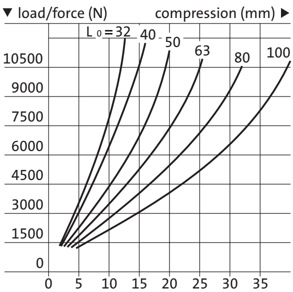
2461.4.032.
Ø 32/70 Shore A



2461.4.040.
Ø 40/70 Shore A



2461.4.050.
Ø 50/70 Shore A



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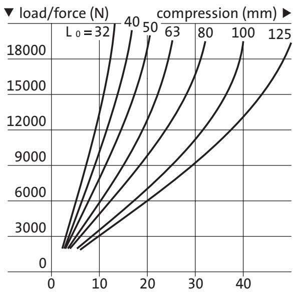
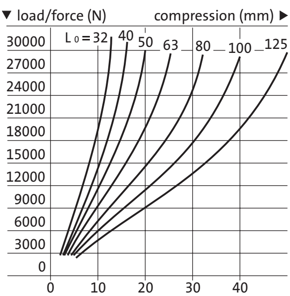
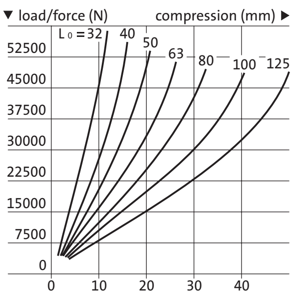
Ø 63/70 Shore A



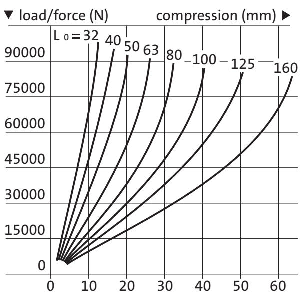
2461.4.080.
Ø 80/70 Shore A



2461.4.100.
Ø 100/70 Shore A

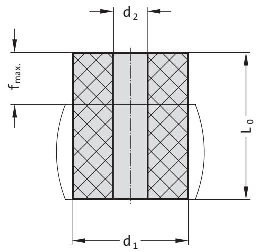


2461.4.125.
Ø 125/70 Shore A



Tubular Spring Element, Rubber 70 Shore A

2461.2.



Material:

Chloroprene rubber 70 shore A
Colour: black

Note:

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

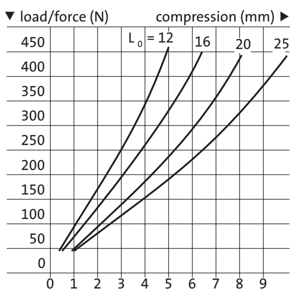
Physical characteristics:

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

2461.2. Tubular Spring Element, Rubber 70 Shore A

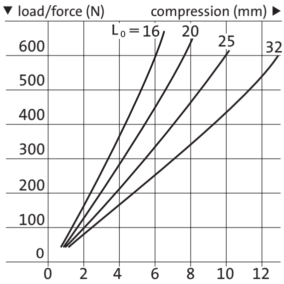
Order No	d_1	L_0	d_2	f max.
2461.2.016.012	16	12	6.5	4.8
2461.2.016.016	16	16	6.5	6.4
2461.2.016.020	16	20	6.5	8.0
2461.2.016.025	16	25	6.5	10.0
2461.2.020.016	20	16	8.5	6.4
2461.2.020.020	20	20	8.5	8.0
2461.2.020.025	20	25	8.5	10.0
2461.2.020.032	20	32	8.5	12.8
2461.2.025.020	25	20	10.5	8.0
2461.2.025.025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

2461.2.016.
Ø 16/70 Shore A

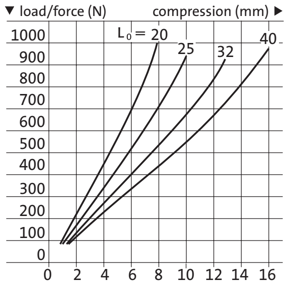


Tubular Spring Elements, Rubber 70 Shore A

2461.2.020.
Ø 20/70 Shore A



2461.2.025.
Ø 25/70 Shore A



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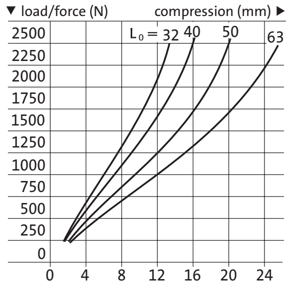
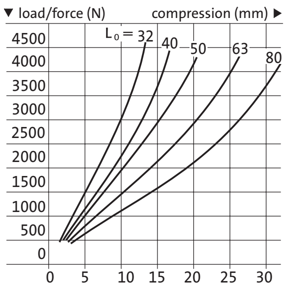
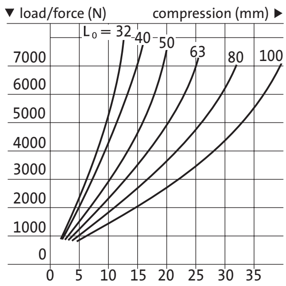
Ø 32/70 Shore A



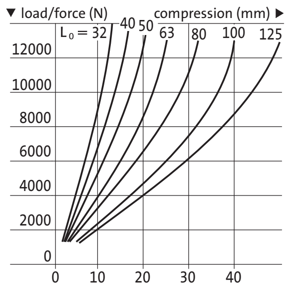
2461.2.040.
Ø 40/70 Shore A



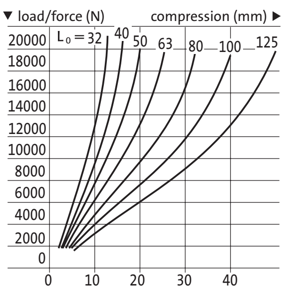
2461.2.050.
Ø 50/70 Shore A



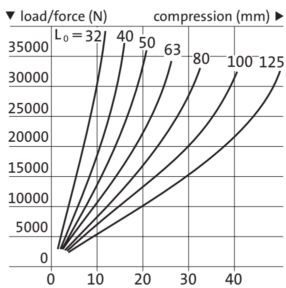
2461.2.063.
Ø 63/70 Shore A



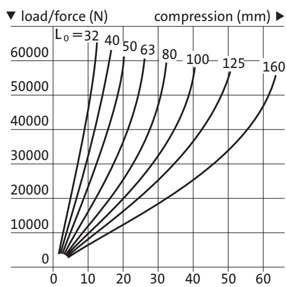
2461.2.080.
Ø 80/70 Shore A



2461.2.100.
Ø 100/70 Shore A

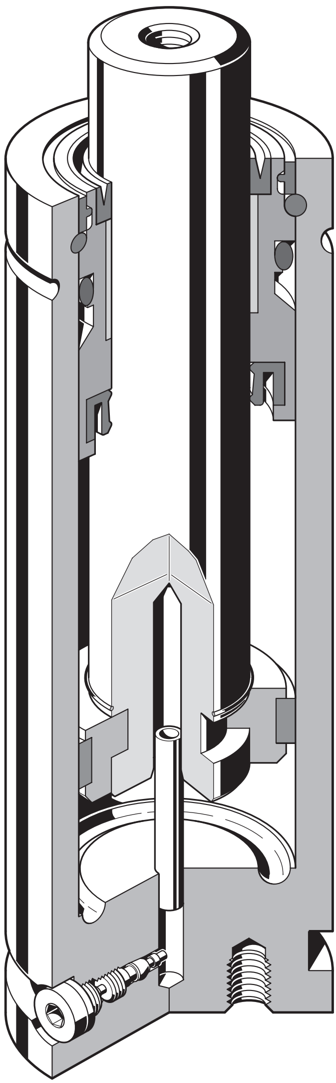


2461.2.125.
Ø 125/70 Shore A

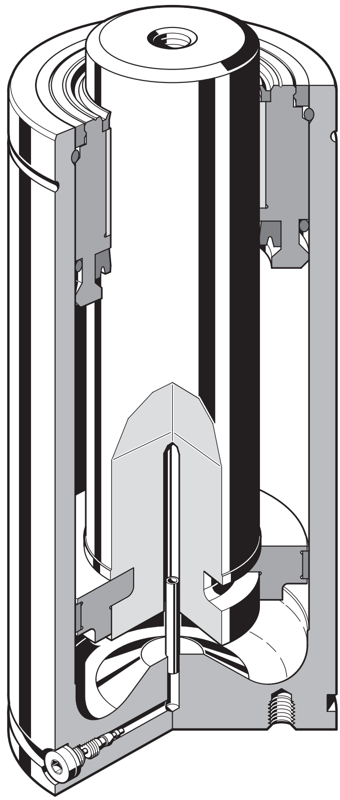


NITROGEN GAS SPRINGS

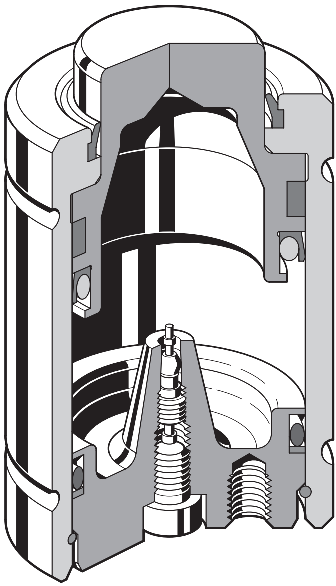
Gas spring
Two-Chamber system



2480.12.



2480.13.



2490.

FIBRO Gas springs

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

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

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

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

Instructions are included with every delivery of Gas springs.

Application examples see at the end of chapter F.

Functioning

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

Pressure Build-Up

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

Working temperature

The spring temperature should not exceed as per specified temperature (80°C - 120°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 2014/68/EU.

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

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

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

Maintenance

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

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

Attention

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

Warning

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

Accessories

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

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

Warning signs

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

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

Size 35x50 mm

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

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

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

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

Size 75x105 mm

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

Size 110x150 mm

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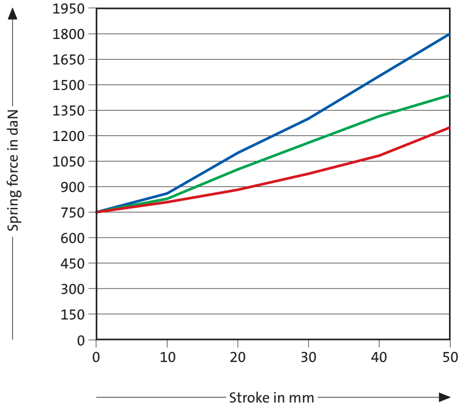
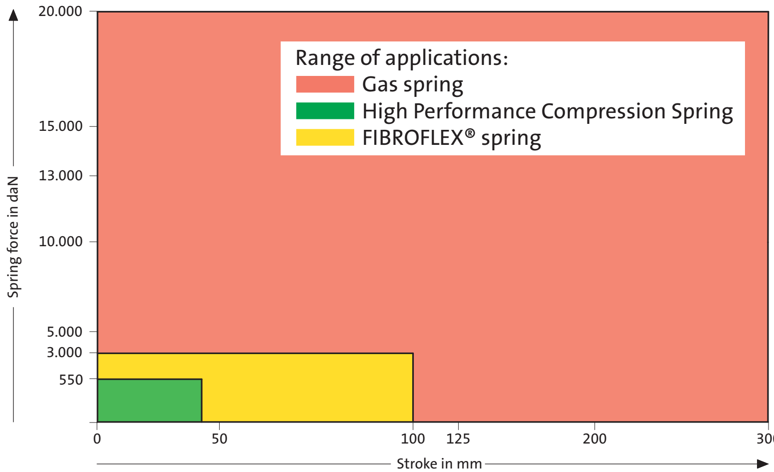
english	2480.00.110.150.2
french	2480.00.110.150.3
italian	2480.00.110.150.4
spanish	2480.00.110.150.5
polish	2480.00.110.150.PL
czech	2480.00.110.150.CZ
turkish	2480.00.110.150.TR
chinese	2480.00.110.150.CN

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



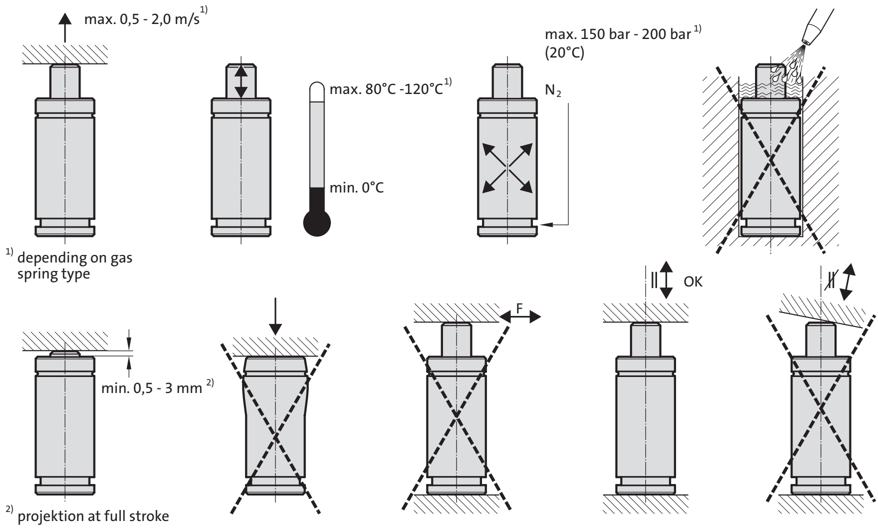
Force increase diagram:
Initial spring force 750 daN
– Gas spring
– High Performance Compression Spring
– FIBROFLEX® spring



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 carrying and servicing the gas spring.
- ► Do not use the gas spring in such a way that the piston rod is realised freely from its compressed position, as this could cause internal damage to the gas spring.
- ► Make sure the gas spring is mounted parallel to the direction of the compression stroke.
- ► Ensure the contact surface of the piston rod top is perpendicular to the direction of the compression stroke and is sufficiently hardened.
- ► The gas spring should not be subjected to the side loads.
- ► Protect the piston rod against mechanical damage and contact with fluids.
- ► We do not recommend the last 5 mm or 10% 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./2497.00.20. from spring until all gas pressure has been discharged.

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

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

FIBRO safety features [1)]

APPROVED PED 2014/68/EU
for
2 Million strokes

PED approval for 2 million strokes

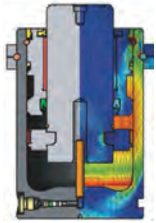
FIBRO gas springs are developed, manufactured and tested for a minimum of 2 million* full strokes in accordance with DGRL 2014/68/EU. The springs deliver this full performance at the maximum permissible limits in terms of filling pressure and operating temperature - even when combined with any of the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

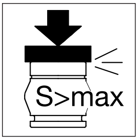
* Calculation value for durability

The benefit for you:

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

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





Overstroke protection

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

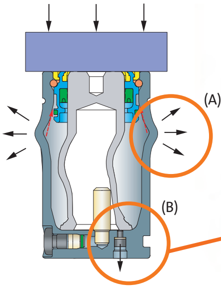
FIBRO gas springs are different:
in the event of an overstroke and depending on the spring type the patented protection system will ensure that either the cylinder wall of the gas spring is deformed in a predefined manner (A) or the piston rod destroys a rupture bolt in the floor of the cylinder (B),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

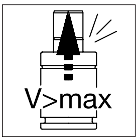
The benefit for you:

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

Possible causes of triggering:

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





Return stroke protection

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

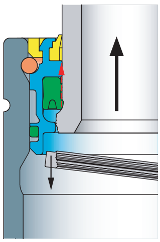
FIBRO gas springs are different:
special guides and a patented safety stop in the piston rods ensure your safety. If the speed is too high during the return stroke, the collar on the piston rod will automatically break. The integrated safety stop then destroys the seal, which allows the gas to escape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

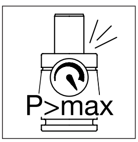
The benefit for you:

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

Possible causes of triggering:

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





Overpressure protection

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

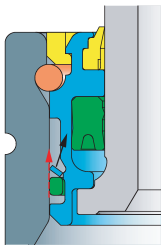
FIBRO gas springs are different:
if the pressure rises above the maximum permitted value, the safety collar on the sealing set is automatically destroyed. The gas then escapes into the atmosphere and the gas spring is depressurised.

The benefit for you:

▶ No risk of bursting parts in the event of overpressure

Possible causes of triggering:

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

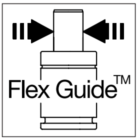


After a protection function is triggered, the spring cannot be repaired and can no longer be used. It must be replaced completely.

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

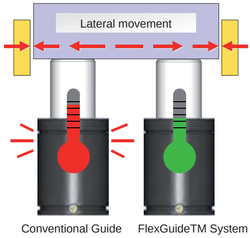
Gas springs – The Safer Choice

FIBRO reliability features



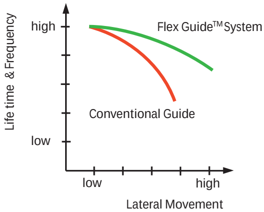
Flexible guides: The Flex Guide™ System

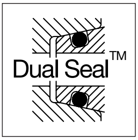
The Flex Guide™ System is a flexible guide in the gas spring which absorbs lateral movements of the piston rod. It minimises friction and lowers the operating temperature.



The benefits for you:

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





Safe hose connections: The Dual Seal™ System

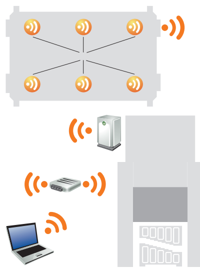
The FIBRO Dual Seal™ System combines a metal seal with a soft elastomer seal. On hose connection systems, the system provides two leak-tight connections and prevents rotation.

The benefits for you:

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

Wireless monitoring: The Wireless Pressure Monitoring (WPM) System

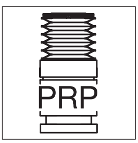
The optional Wireless Pressure Monitoring System (WPM) (patent pending) wirelessly monitors the pressure and temperature of FIBRO gas springs. Before a defective part is produced, the press operator receives a message from the WPM and can take appropriate action.



The benefits for you:

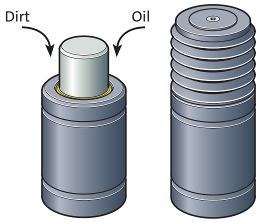
- **Preventative quality assurance**
- **High process reliability**
- **Minimised tool down time**
- **Reduced maintenance and costs**

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



Protected piston rods: FIBRO Concertina Shrouds

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



The benefits for you:

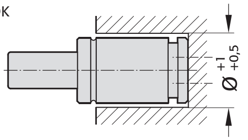
- **Significantly longer service life for gas springs under harsh operating conditions**

Installation instructions
FML Gas springs

Mounting examples

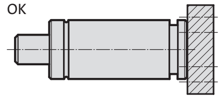
Mounting possibilities for gas springs are listed below.
For additional information on mounting, see the corresponding pages in the catalogue.

OK



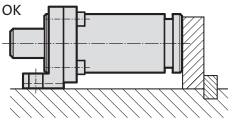
Screw mounted at the base

OK

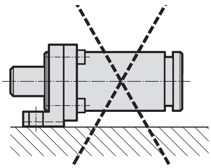


Screw mounted at the base with 2480.011.

OK



Fastened with 2480.044./045./047.



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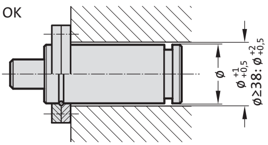
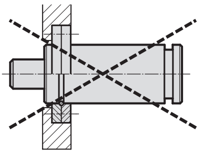
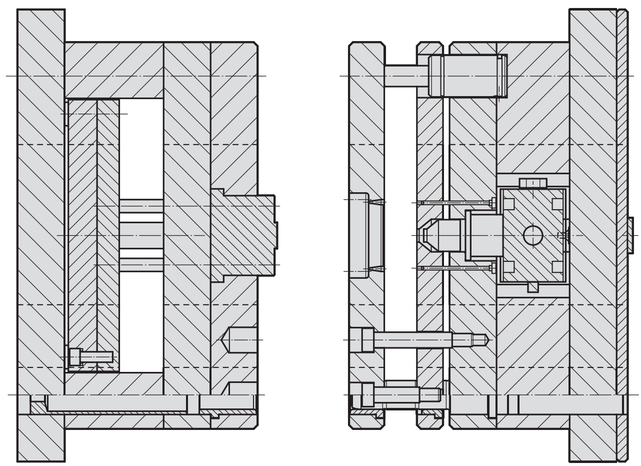


Fastened with 2480.055./057./064.



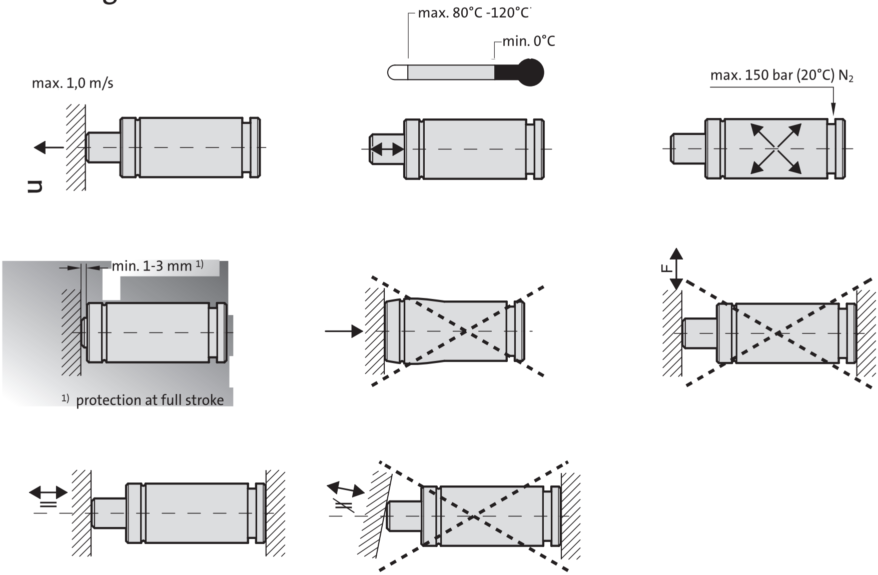
Installation principle:



Mounting directions
FML Gas springs

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

Mounting instructions

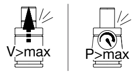


- ► Secure the gas spring to the tool/machine whenever possible, using the threaded hole(s) in the base of the gas spring or a suitable flange. Never exceed the maximum torque values for the threads in the base of the gas spring: (M6 = 10 Nm; M8 = 24 Nm; M10 = 45 Nm; M12 = 80 Nm)
- ► The threaded hole in the piston rod top should not be used for mounting purposes. It is only to be used when carrying and servicing the gas spring.
- ► Do not use the gas spring in such a way that the piston rod is realised freely from its compressed position, as this could cause internal damage to the gas spring.
- ► Make sure the gas spring is mounted parallel to the direction of the compression stroke.
- ► Ensure the contact surface of the piston rod top is perpendicular to the direction of the compression stroke and is sufficiently hardened.
- ► The gas spring should not be subjected to the side loads.
- ► Protect the piston rod against mechanical damage and contact with fluids.
- ► We do not recommend the last 5 mm or 10% of the nominal stroke be utilised.
- ► The maximum charging pressure as a function of the working temperature 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.

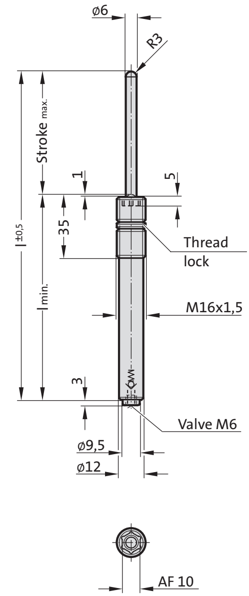
GAS SPRINGS and SPRING PLUNGERS

- Temperature upto 120° c

Gas spring (Spring plunger) MOULD LINE, with hexagon socket



3479.030.



Description:

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

Note:

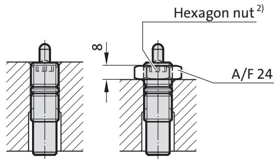
Worn gas springs cannot be repaired, they have to be replaced completely.

Pressure medium: Nitrogen - N_2
Max. filling pressure depends on working temperature:
150 bar (20°C) at 0°C-80°C
125 bar (20°C) at 80°C-100°C
115 bar (20°C) at 100°C-120°C
Min. filling pressure: 25 bar (20°C)
Working temperature: 0°C to +120°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
20 (at 0°C-80°C)
15 (at 80°C-100°C)
10 (at 100°C-120°C)
Max. piston speed: 1.0 m/s

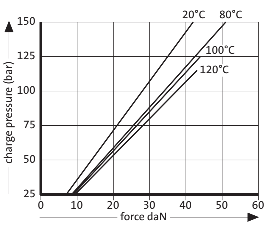
2) Hexagon nut order supplementary:
2480.004.00040.1 (M16 x 1,5)

3479.030.
Gas spring (Spring plunger) MOULD LINE, with hexagon socket

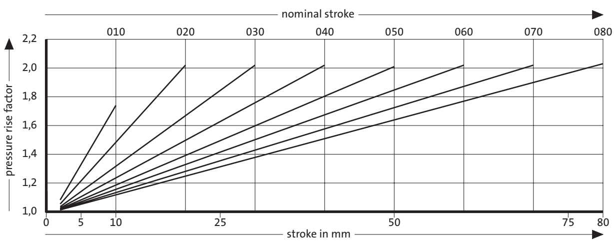
Order No	$Stroke_{max.}$	$l_{min.}$	l
3479.030.00040.010	10	55	65
3479.030.00040.020	20	65	85
3479.030.00040.030	30	75	105
3479.030.00040.040	40	85	125
3479.030.00040.050	50	95	145
3479.030.00040.060	60	105	165
3479.030.00040.070	70	115	185
3479.030.00040.080	80	125	205



Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas spring (Spring plunger) MOULD LINE, with hexagon socket

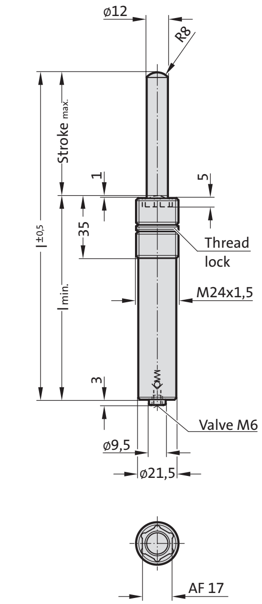
Description:
Spring plungers are used as ejectors, damper pins, fixing and retaining pins in many sectors of the tool-, jig- and fixture-making industries. Assembly requires the use of special FIBRO insertion tool (2470.12.010.017).

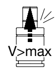
Note:
Worn gas springs cannot be repaired, they have to be replaced completely.

Pressure medium: Nitrogen - N_2
Max. filling pressure depends on working temperature:
150 bar (20°C) at 0°C-80°C
125 bar (20°C) at 80°C-100°C
115 bar (20°C) at 100°C-120°C
Min. filling pressure: 25 bar (20°C)
Working temperature: 0°C to +120°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
20 (at 0°C-80°C)
15 (at 80°C-100°C)
10 (at 100°C-120°C)
Max. piston speed: 1.0 m/s

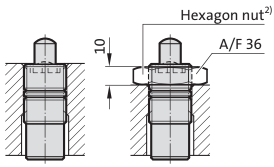
2) Hexagon nut order supplementary: 2480.004.00170

3479.032.



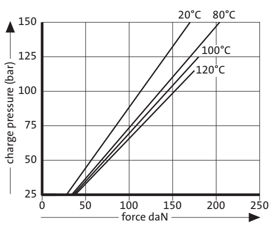


3479.032.
Gas spring (Spring plunger) MOULD LINE, with hexagon socket

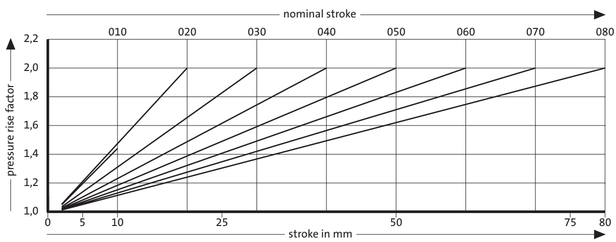


Order No	$Stroke_{max.}$	$l_{min.}$	l
3479.032.00170.010	10	55	65
3479.032.00170.020	20	65	85
3479.032.00170.030	30	75	105
3479.032.00170.040	40	85	125
3479.032.00170.050	50	95	145
3479.032.00170.060	60	105	165
3479.032.00170.070	70	115	185
3479.032.00170.080	80	125	205

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise

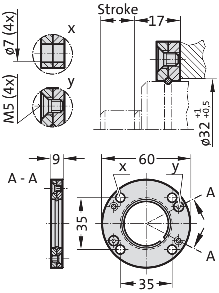


Pressure rise factor accounts for displacement but not external influences!

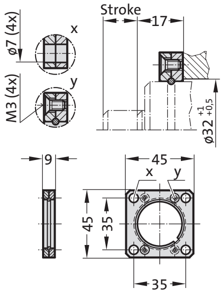
FIBRO

Gas spring MOULD LINE
Mounting variations

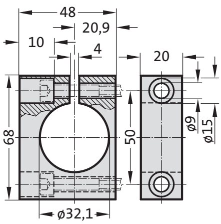
2480.055.00150



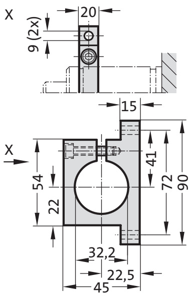
2480.057.00150



2480.044.03.00150 [2)]



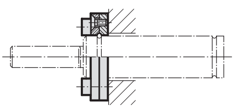
2480.044.00150 [2)]

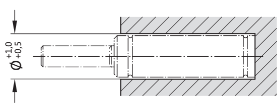


Note:

[2)] Caution:
Spring force must be absorbed by stop surface!

Mounting example:





Gas spring MOULD LINE

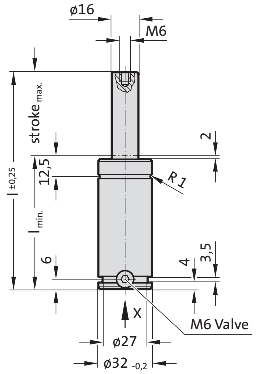
Note:

Initial spring force at 150 bar/20°C is 300 daN

Order No. for spare parts kit: 3487.12.00300

Pressure medium: Nitrogen - N_2
Max. filling pressure depends on working temperature:
150 bar (20°C) at 0°C-80°C
125 bar (20°C) at 80°C-100°C
115 bar (20°C) at 100°C-120°C
Min. filling pressure: 25 bar (20°C)
Working temperature: 0°C to +120°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
20 (at 0°C-80°C)
15 (at 80°C-100°C)
10 (at 100°C-120°C)
Max. piston speed: 1.0 m/s

3487.12.00300.



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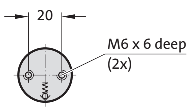
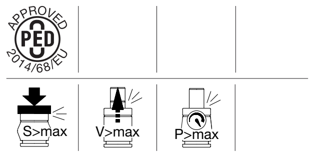


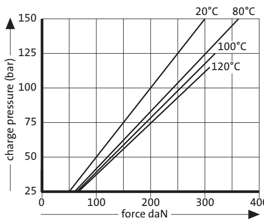


3487.12.00300.
Gas spring MOULD LINE

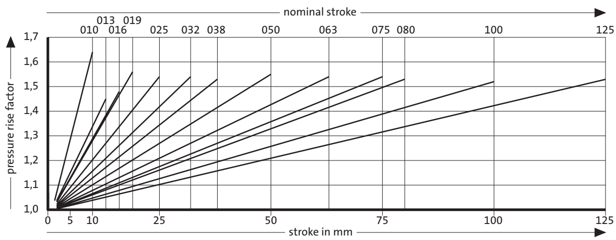
Order No*	Stroke max.	l min.	l
3487.12.00300.010	10	40	50
3487.12.00300.013	13	43	56
3487.12.00300.016	16	46	62
3487.12.00300.019	19	49	68
3487.12.00300.025	25	55	80
3487.12.00300.032	32	62	94
3487.12.00300.038	38	68	106
3487.12.00300.050	50	80	130
3487.12.00300.063	63	93	156
3487.12.00300.075	75	105	180
3487.12.00300.080	80	110	190
3487.12.00300.100	100	130	230
3487.12.00300.125	125	155	280

*Stroke lengths 100 and 125 only by request!

Initial spring force
versus charge pressure



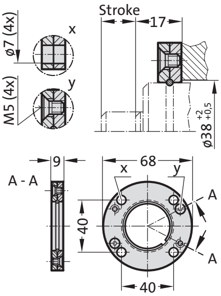
Spring force Diagram displacement versus stroke rise



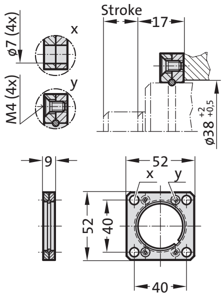
Pressure rise factor accounts for displacement but not external influences!

Gas spring MOULD LINE
Mounting variations

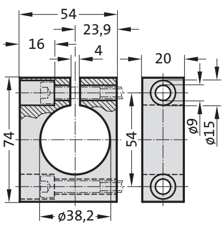
2480.055.00250



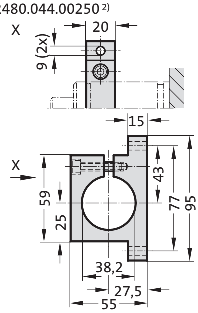
2480.057.00250



2480.044.03.00250 2)



2480.044.00250 2)



Note:

2) Caution:
Spring force must be absorbed by stop surface!

Gas spring MOULD LINE

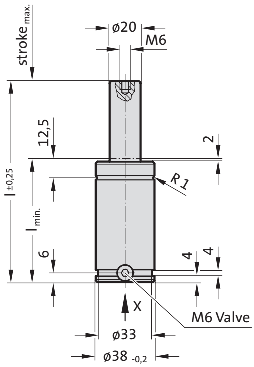
Note:

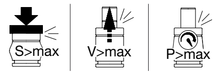
Initial spring force at 150 bar/20°C is 500 daN

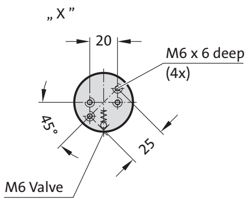
Order No. for spare parts kit: 3487.12.00500

Pressure medium: Nitrogen - N_2
Max. filling pressure depends on working temperature:
150 bar (20°C) at 0°C-80°C
125 bar (20°C) at 80°C-100°C
115 bar (20°C) at 100°C-120°C
Min. filling pressure: 25 bar (20°C)
Working temperature: 0°C to +120°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
20 (at 0°C-80°C)
15 (at 80°C-100°C)
10 (at 100°C-120°C)
Max. piston speed: 1.0 m/s

3487.12.00500.





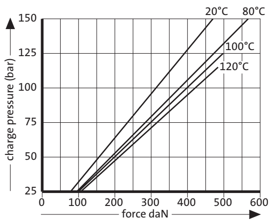


3487.12.00500.
Gas spring MOULD LINE

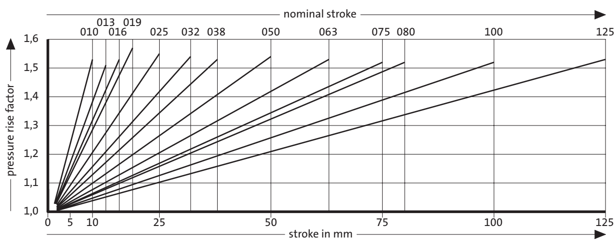
Order No*	Stroke$_{max.}$	l$_{min.}$	l
3487.12.00500.010	10	40	50
3487.12.00500.013	13	43	56
3487.12.00500.016	16	46	62
3487.12.00500.019	19	49	68
3487.12.00500.025	25	55	80
3487.12.00500.032	32	62	94
3487.12.00500.038	38	68	106
3487.12.00500.050	50	80	130
3487.12.00500.063	63	93	156
3487.12.00500.075	75	105	180
3487.12.00500.080	80	110	190
3487.12.00500.100	100	130	230
3487.12.00500.125	125	155	280

*Stroke lengths 100 and 125 only by request!

Initial spring force
versus charge pressure



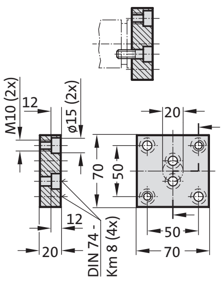
Spring force Diagram displacement versus stroke rise



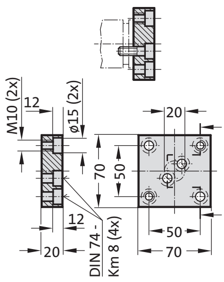
Pressure rise factor accounts for displacement but not external influences!

Gas spring Mould Line
Mounting variations

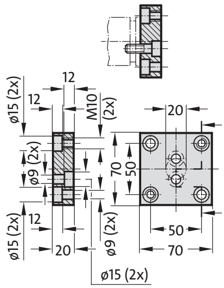
2480.011.00500



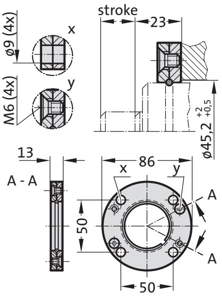
2480.011.00500.1



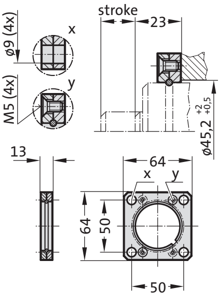
2480.011.00500.2



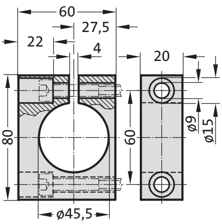
2480.055.00500



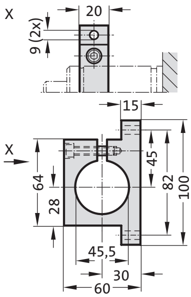
2480.057.00500



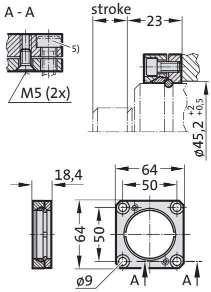
2480.044.03.00500 2)



2480.044.00500 2)



2480.064.00500 4)



Note:

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

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

5) Machine screws with hexagonal socket (compact head recommended)

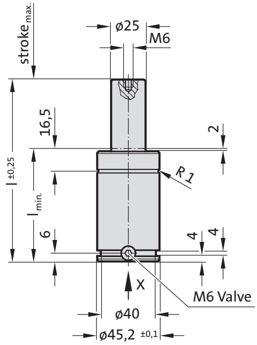
Gas spring MOULD LINE

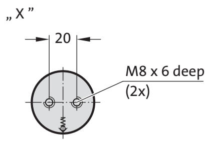
Note:
Initial spring force at 150 bar/20°C is 750 daN

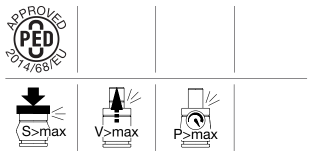
Order No. for spare parts kit: 3487.12.00750

Pressure medium: Nitrogen - N_2
Max. filling pressure depends on working temperature:
150 bar (20°C) at 0°C-80°C
125 bar (20°C) at 80°C-100°C
115 bar (20°C) at 100°C-120°C
Min. filling pressure: 25 bar (20°C)
Working temperature: 0°C to +120°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
20 (at 0°C-80°C)
15 (at 80°C-100°C)
10 (at 100°C-120°C)
Max. piston speed: 1.0 m/s

3487.12.00750.





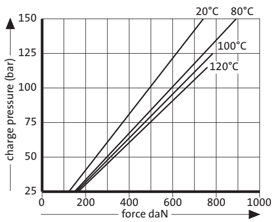


3487.12.00750.
Gas spring MOULD LINE

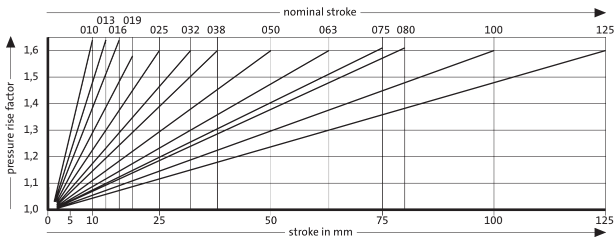
Order No*	Stroke$_{max.}$	l$_{min.}$	l
3487.12.00750.010	10	42	52
3487.12.00750.013	13	45	58
3487.12.00750.016	16	48	64
3487.12.00750.019	19	51	70
3487.12.00750.025	25	57	82
3487.12.00750.032	32	64	96
3487.12.00750.038	38	70	108
3487.12.00750.050	50	82	132
3487.12.00750.063	63	95	158
3487.12.00750.075	75	107	182
3487.12.00750.080	80	112	192
3487.12.00750.100	100	132	232
3487.12.00750.125	125	157	282

*Stroke lengths 100 and 125 only by request!

Initial spring force
versus charge pressure



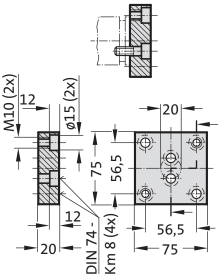
Spring force Diagram displacement versus stroke rise



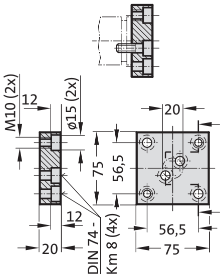
Pressure rise factor accounts for displacement but not external influences!

Gas spring Mould Line
Mounting variations

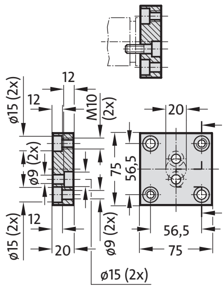
2480.011.00750



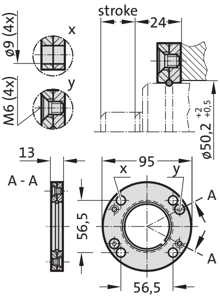
2480.011.00750.1



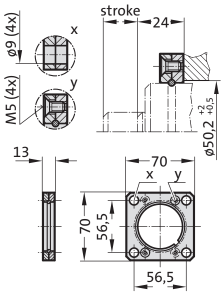
2480.011.00750.3



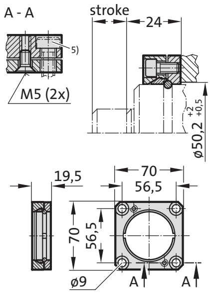
2480.055.00750



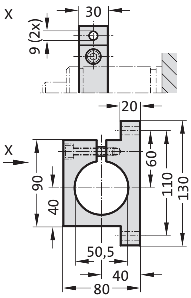
2480.057.00750



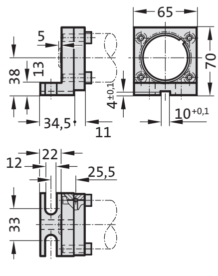
2480.064.00750 [4]



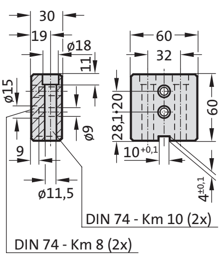
2480.044.00750 [2]



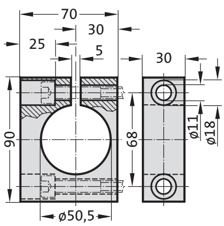
2480.045.00750 [2]



2480.047.00750 [2]



2480.044.03.00750 [2]



Note:

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

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

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring MOULD LINE

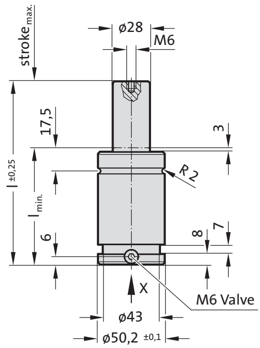
Note:

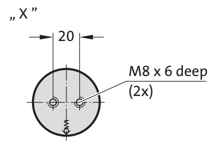
Initial spring force at 150 bar/20°C is 1000 daN

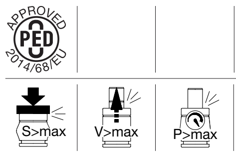
Order No. for spare parts kit: 3487.12.01000

Pressure medium: Nitrogen - N_2
Max. filling pressure depends on working temperature:
150 bar (20°C) at 0°C-80°C
125 bar (20°C) at 80°C-100°C
115 bar (20°C) at 100°C-120°C
Min. filling pressure: 25 bar (20°C)
Working temperature: 0°C to +120°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
20 (at 0°C-80°C)
15 (at 80°C-100°C)
10 (at 100°C-120°C)
Max. piston speed: 1.0 m/s

3487.12.01000.





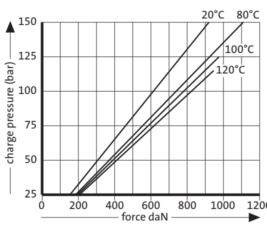


3487.12.01000.
Gas spring MOULD LINE

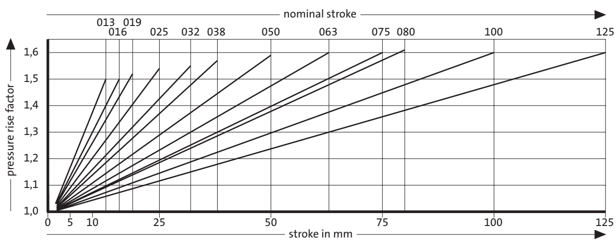
Order No*	Stroke$_{max.}$	l$_{min.}$	l
3487.12.01000.013	13	51	64
3487.12.01000.016	16	54	70
3487.12.01000.019	19	57	76
3487.12.01000.025	25	63	88
3487.12.01000.032	32	70	102
3487.12.01000.038	38	76	114
3487.12.01000.050	50	88	138
3487.12.01000.063	63	101	164
3487.12.01000.075	75	113	188
3487.12.01000.080	80	118	198
3487.12.01000.100	100	138	238
3487.12.01000.125	125	163	288

*Stroke lengths 100 and 125 only by request!

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise

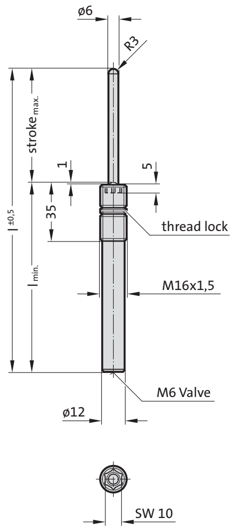


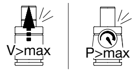
Pressure rise factor accounts for displacement but not external influences!

Gas Spring PLUNGERS

- Temperature upto 80°C

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





Description:

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

Note:

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

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

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

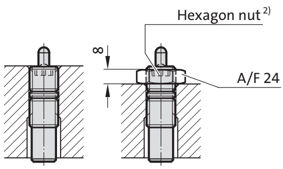
2) Hexagon nut order supplementary: 2480.004.00040.1 (M16 x 1,5)

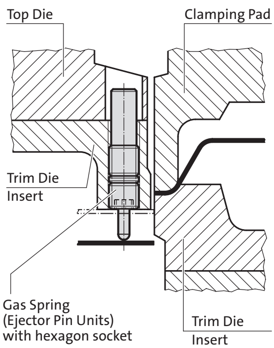
2479.030. Gas spring (Spring plunger), with hexagon socket, VDI 3004

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

*complete with spring type

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





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

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

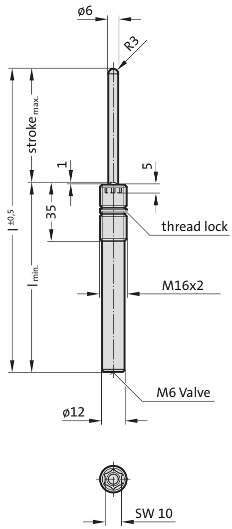
Note:
Worn gas springs cannot be repaired, they have to be replaced completely.

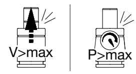
Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 6 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 100 (at 20°C)
Max. piston speed: 1.6 m/s

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

2) Hexagon nut order supplementary: 2480.004.00040.2 (M16 x 2)

2479.031.



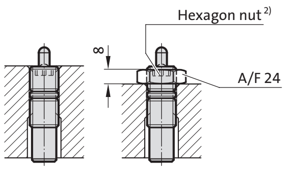


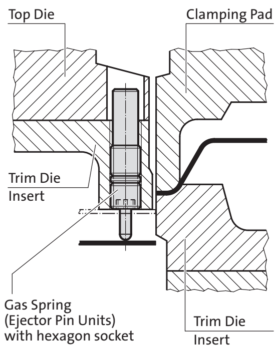
2479.031. Gas spring (Spring plunger), with hexagon socket, VDI 3004

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

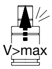
*complete with spring type

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

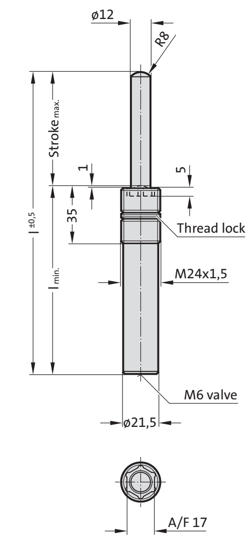




Gas spring (Spring plunger), with hexagon socket, VDI 3004



2479.032.



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

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

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

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

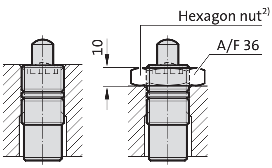
2) Hexagon nut order supplementary: 2480.004.00170

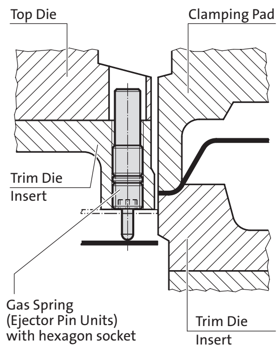
2479.032. Gas spring (Spring plunger), with hexagon socket, VDI 3004

Spring type:				.00020.		.00040.		.00080.		.00170.	
Order No*	$Stroke_{max.}$	l	$l_{min.}$	$F_{initial}$	F_{final}	$F_{initial}$	F_{final}	$F_{initial}$	F_{final}	$F_{initial}$	F_{final}
2479.032.□□□□□.010	10	65	55	23	33.1	45	64.8	85	122.4	170	244.8
2479.032.□□□□□.020	20	85	65	23	36.3	45	71.1	85	134.3	170	258.6
2479.032.□□□□□.030	30	105	75	23	38.2	45	74.7	85	141.1	170	282.2
2479.032.□□□□□.040	40	125	85	23	39.3	45	76.9	85	145.4	170	290.7
2479.032.□□□□□.050	50	145	95	23	42.5	45	83.2	85	157.3	170	314.5
2479.032.□□□□□.060	60	165	105	23	42.5	45	83.2	85	157.3	170	314.5
2479.032.□□□□□.070	70	185	115	23	42.8	45	83.7	85	158.1	170	316.2
2479.032.□□□□□.080	80	205	125	23	42.8	45	83.7	85	158.1	170	316.2
2479.032.□□□□□.100	100	245	145	23	43	45	84.1	85	159	170	318
2479.032.□□□□□.125	125	295	170	23	43	45	84.1	85	159	170	318

*complete with spring type

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





Gas spring (Spring plunger), to WDX

Description:

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

Note:

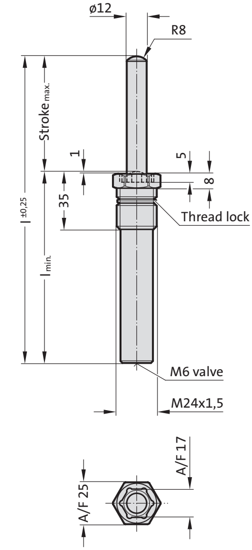
Worn gas springs cannot be repaired, they have to be replaced completely.

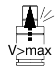
Pressure medium: Nitrogen - N_2
Max. filling pressure: 150 bar
Min. filling pressure: 20 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 30 to 80 (at 20°C)
Max. piston speed: 1.6 m/s

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

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

2479.034.

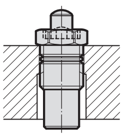


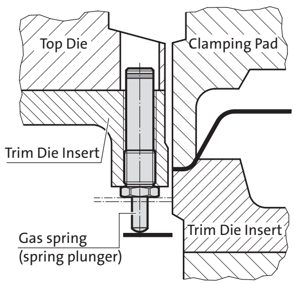


2479.034. Gas spring (Spring plunger), to WDX

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

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



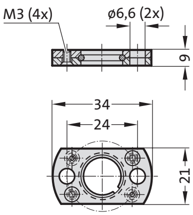


Gas Spring
SMALL DIMENSION

- Temperature upto 80°C

Gas spring, small dimension, low force
Mounting variations

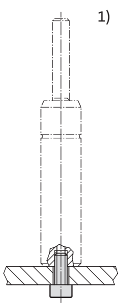
2480.051.00013

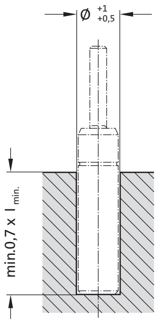


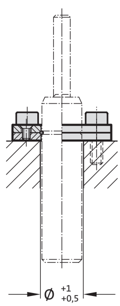
Note:

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

Mounting examples:







Gas spring, small dimension and low force

Description:

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

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

Note:

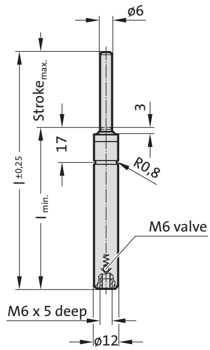
Worn gas springs cannot be repaired, they have to be replaced completely.

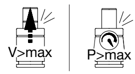
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 20 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

Spring forces as per spring diagram.

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

2482.72.



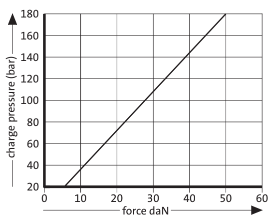


2482.72. Gas spring, small dimension and low force

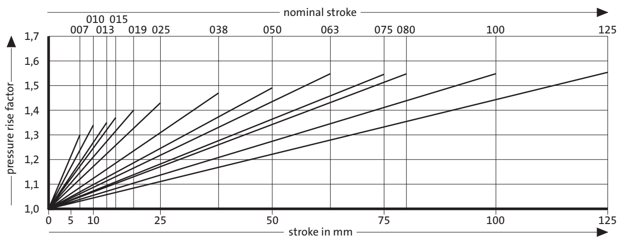
Order No*	$Stroke_{max.}$	l	$l_{min.}$
2482.72.□□□□□.007	7	56	49
2482.72.□□□□□.010	10	62	52
2482.72.□□□□□.013	12.7	67.4	54.7
2482.72.□□□□□.015	15	72	57
2482.72.□□□□□.019	19	80	61
2482.72.□□□□□.025	25	92	67
2482.72.□□□□□.038	38	118	80
2482.72.□□□□□.050	50	142	92
2482.72.□□□□□.063	63.5	172	108.5
2482.72.□□□□□.075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

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

Initial spring force
versus charge pressure



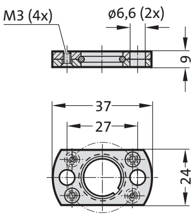
Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas spring, small dimension, low force
Mounting variations

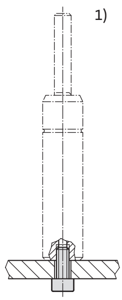
2480.051.00018

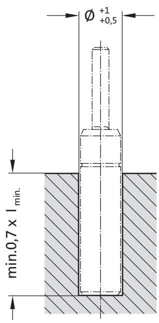


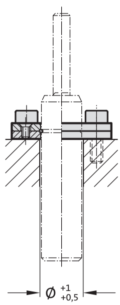
Note:

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

Mounting examples:







Gas spring, small dimension and low force

Description:

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

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

Note:

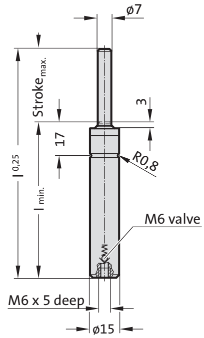
Worn gas springs cannot be repaired, they have to be replaced completely.

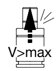
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 20 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

Spring forces as per spring diagram.

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

2482.73. .1



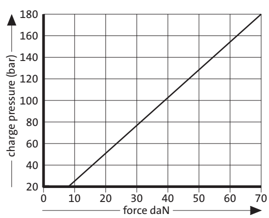


2482.73. .1 Gas spring, small dimension and low force

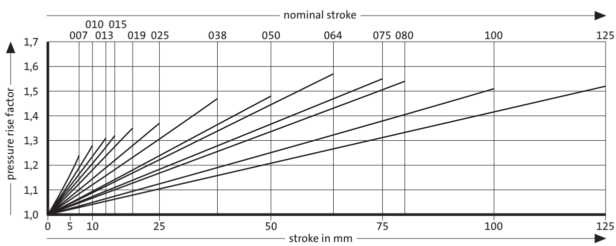
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2482.73.□□□□□.007.1	7	56	49
2482.73.□□□□□.010.1	10	62	52
2482.73.□□□□□.013.1	12.7	67.4	54.7
2482.73.□□□□□.015.1	15	72	57
2482.73.□□□□□.019.1	19	80	61
2482.73.□□□□□.025.1	25	92	67
2482.73.□□□□□.038.1	38	118	80
2482.73.□□□□□.050.1	50	142	92
2482.73.□□□□□.063.1	63.5	172	108.5
2482.73.□□□□□.075.1	75	195	120
2482.73.□□□□□.080.1	80	205	125
2482.73.□□□□□.100.1	100	245	145
2482.73.□□□□□.125.1	125	295	170

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

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



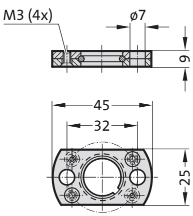
Pressure rise factor accounts for displacement but not external influences!

Gas spring, small dimension, low force
Mounting variations

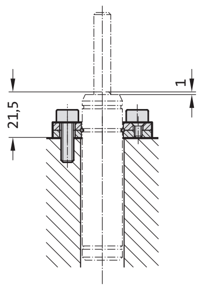
Note:

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

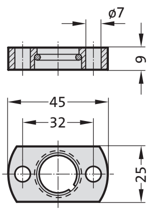
2480.051.03.00030



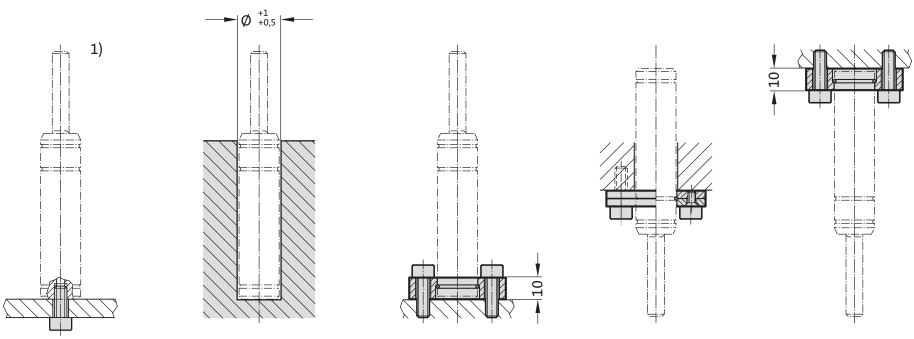
2480.051.03.00030



2480.052.00030



Mounting examples:



Gas spring, small dimension and low force

Description:

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

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

Note:

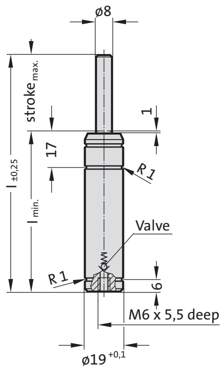
Worn gas springs cannot be repaired, they have to be replaced completely.

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

Spring forces as per spring diagram.

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

2482.74. .2

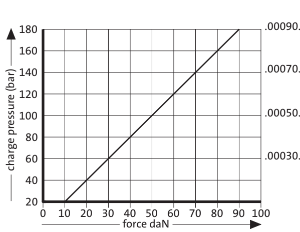


2482.74. .2 Gas spring, small dimension and low force

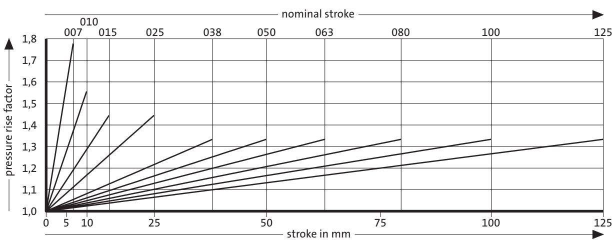
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2482.74.□□□□□.007.2	7	56	49
2482.74.□□□□□.010.2	10	62	52
2482.74.□□□□□.015.2	15	72	57
2482.74.□□□□□.025.2	25	92	67
2482.74.□□□□□.038.2	38.1	118.2	80.1
2482.74.□□□□□.050.2	50	142	92
2482.74.□□□□□.063.2	63.5	172	108.5
2482.74.□□□□□.080.2	80	205	125
2482.74.□□□□□.100.2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

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

Initial spring force versus charge pressure



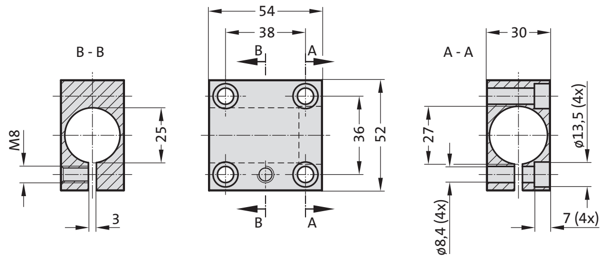
Spring force Diagram displacement versus stroke rise



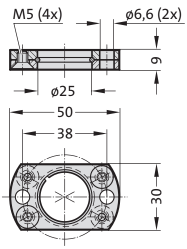
Pressure rise factor accounts for displacement but not external influences!

Gas spring, small dimension, low force
Mounting variations

2480.053.00150



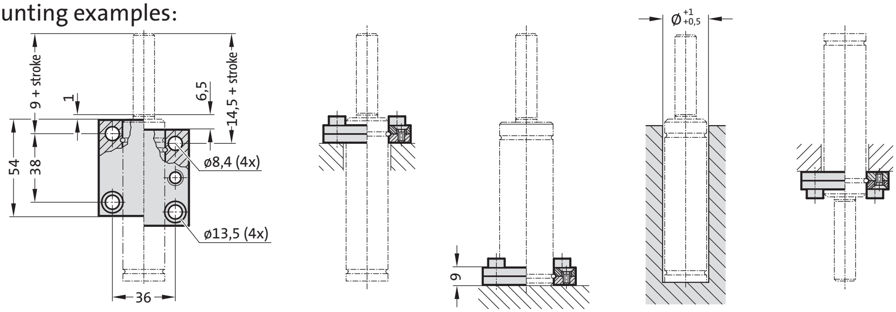
2480.051.00150



Note:

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

Mounting examples:



Gas spring, small dimension and low force

Description:

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

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

Note:

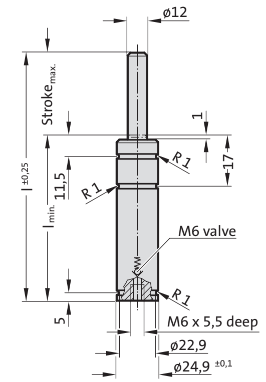
Order No for spare parts kit: 2480.21.00150

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

Spring forces as per spring diagram.

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

2480.21.

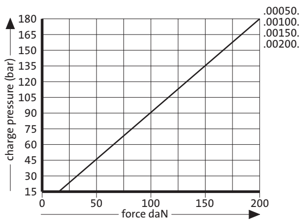


2480.21. Gas spring, small dimension and low force

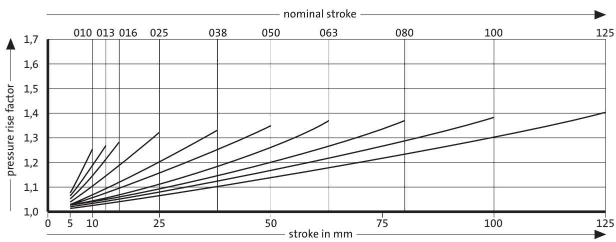
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2480.21.□□□□□.010	10	62	52
2480.21.□□□□□.013	12.7	67.4	54.7
2480.21.□□□□□.015	15	72	57
2480.21.□□□□□.016	16	74	58
2480.21.□□□□□.025	25	92	67
2480.21.□□□□□.038	38.1	118.2	80.1
2480.21.□□□□□.050	50	142	92
2480.21.□□□□□.063	63.5	172	108.5
2480.21.□□□□□.080	80	205	125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

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

Initial spring force
versus charge pressure



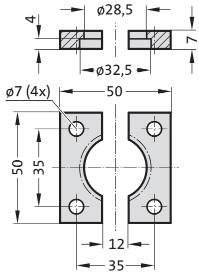
Spring force Diagram displacement versus stroke rise



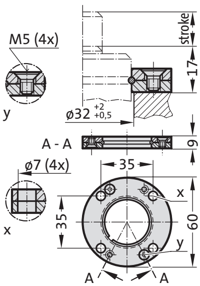
Pressure rise factor accounts for displacement but not external influences!

Gas spring, small dimension and low force
Mounting variations

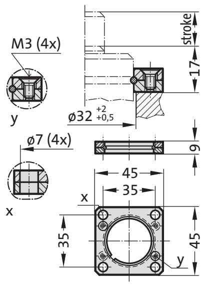
2480.022.00150



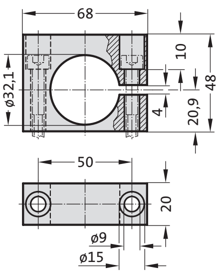
2480.055.00150



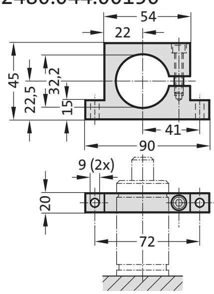
2480.057.00150



2480.044.03.00150 2)



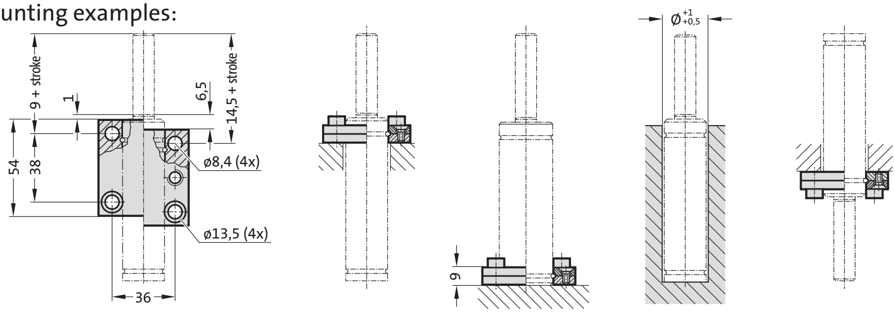
2480.044.00150 2)



Note:

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

Mounting examples:



Gas spring, small dimension and low force

Description:

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

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

Note:

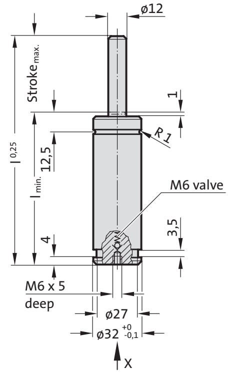
Order No for spare parts kit: 2480.21.00150

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

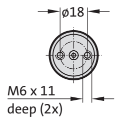
Spring forces as per spring diagram.

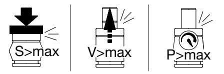
Upon customers request, also available unfilled, Order No 2480.22.00000...., Colour: black

2480.22. .1



View X - Gas spring



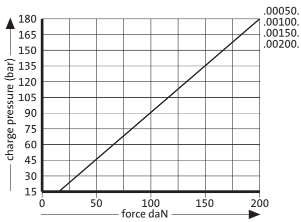


2480.22. .1 Gas spring, small dimension and low force

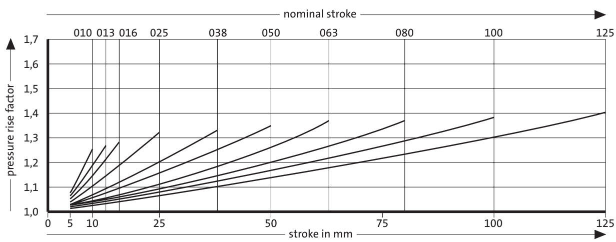
Order No*	Stroke$_{max.}$	l	l$_{min.}$
2480.22.□□□□□.010.1	10	70	60
2480.22.□□□□□.013.1	12.7	75.4	62.7
2480.22.□□□□□.016.1	16	82	66
2480.22.□□□□□.025.1	25	100	75
2480.22.□□□□□.038.1	38.1	126.2	88.1
2480.22.□□□□□.050.1	50	150	100
2480.22.□□□□□.063.1	63.5	177	113.5
2480.22.□□□□□.080.1	80	210	130
2480.22.□□□□□.100.1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

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

Initial spring force
versus charge pressure



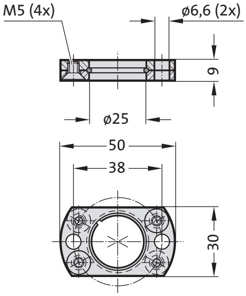
Spring force Diagram displacement versus stroke rise



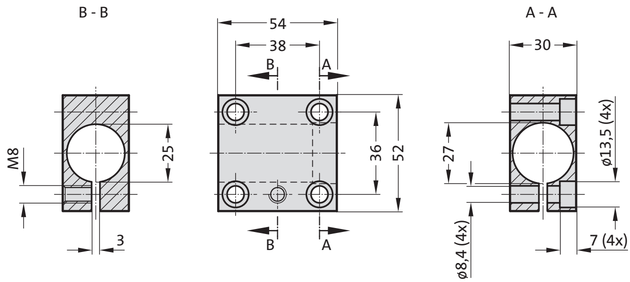
Pressure rise factor accounts for displacement but not external influences!

Gas spring, small dimension, low force
Mounting variations

2480.051.00150



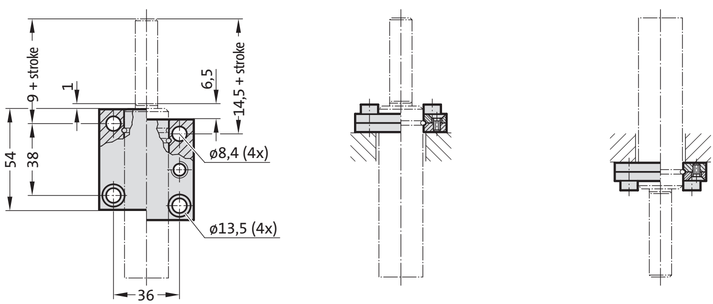
2480.053.00150



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 examples:



Gas spring, small dimension and low force

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

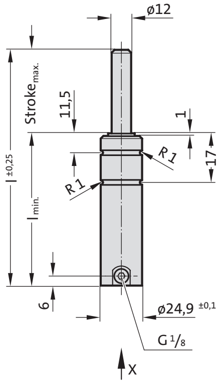
Note:
Initial spring force at 180 bar = 200 daN

Order No for spare parts kit: 2480.21.00150

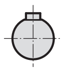
Pressure medium: Nitrogen - N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C bis +80°C
Temerature related force increase: ± 0,3%/°C
Max. recommended extensions per minute: ca. 80 to 100 (at 20°C)
Max. piston speed: 1,6 m/s

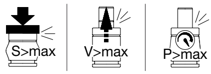
Spring forces as per spring diagram.

2480.23.



View X

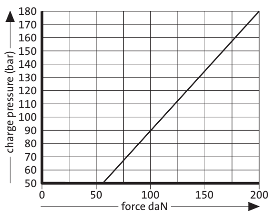




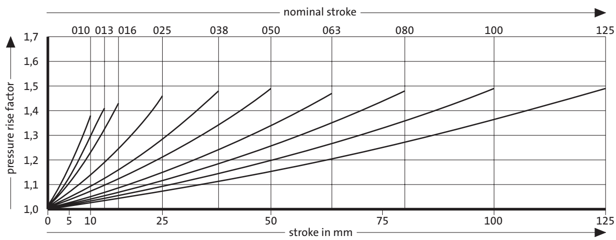
2480.23.
Gas spring, small dimension and low force

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

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



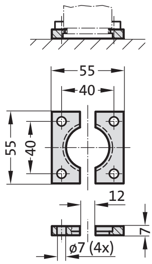
Pressure rise factor accounts for displacement but not external influences!

Gas Spring
STANDARD SERIES

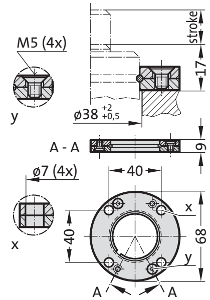
- Temperature upto 80°C

Gas Spring, Standard
Mounting variations

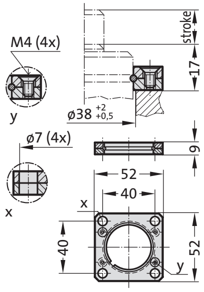
2480.022.00250



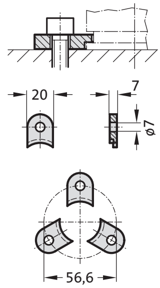
2480.055.00250



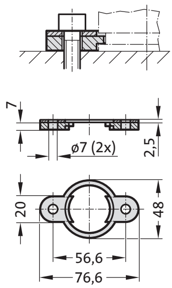
2480.057.00250



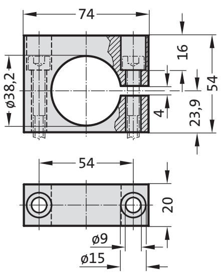
2480.007.00250



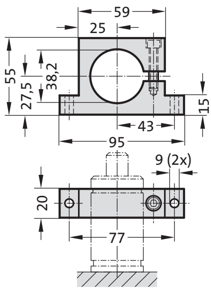
2480.008.00250 3)



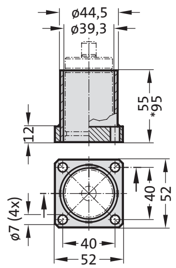
2480.044.03.00250 2)



2480.044.00250 2)



2480.010.00250.055 3)
2480.010.00250.095* 3)



Note:

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

3) Not for use with composite connection.

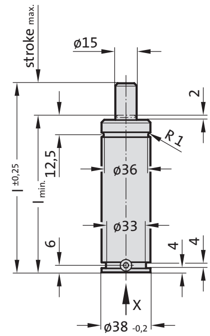
Gas spring, Standard

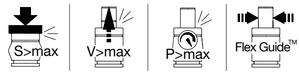
Note:
Initial spring force at 150 bar = 250 daN

Order No for spare parts kit: 2480.13.00250

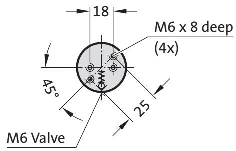
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2480.13.00250.





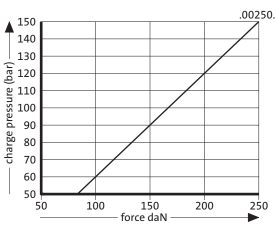
View X



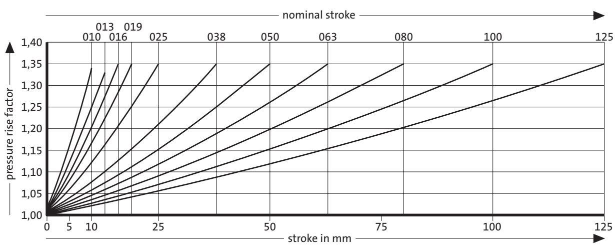
2480.13.00250.
Gas spring, Standard

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

Initial spring force versus charge pressure



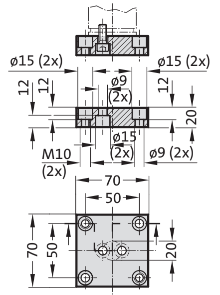
Spring force Diagram displacement versus stroke rise



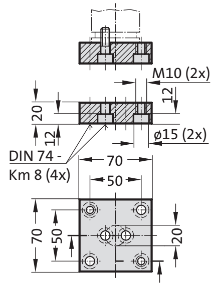
Pressure rise factor accounts for displacement but not external influences!

Gas Spring, Standard
Mounting variations

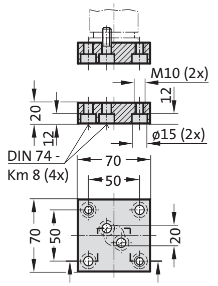
2480.011.00500.2



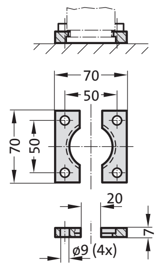
2480.011.00500



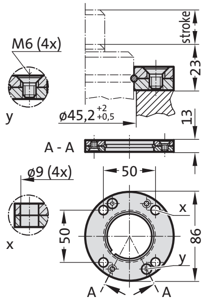
2480.011.00500.1



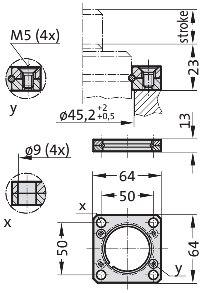
2480.022.00500



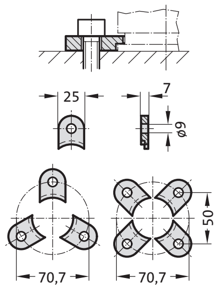
2480.055.00500



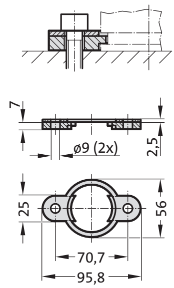
2480.057.00500



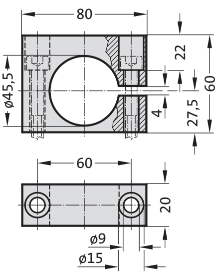
2480.007.00500



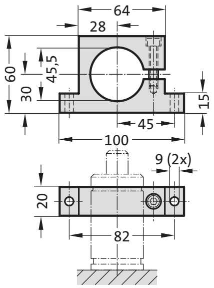
2480.008.00500 3)



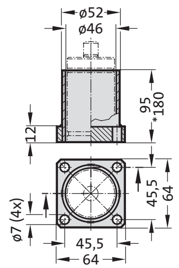
2480.044.03.00500 2)



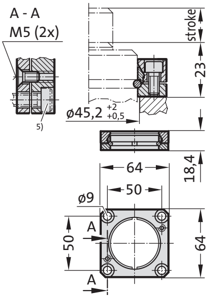
2480.044.00500 2)



2480.010.00500.095 3)
2480.010.00500.180* 3)



2480.064.00500 4)



Note:

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

3) Not for use with composite connection.

Gas spring, Standard

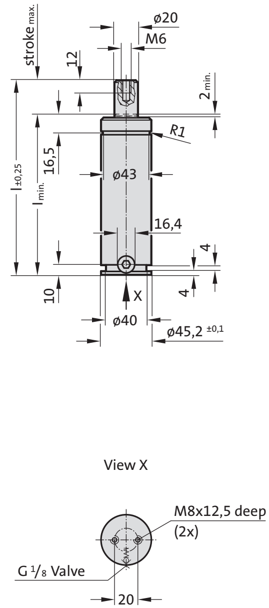
FIBRO

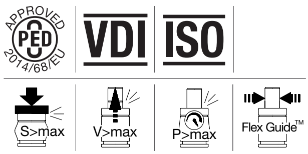
Note:
Initial spring force at 150 bar = 470 daN

Order No for spare parts kit: 2480.13.00500

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 40 to 80 (at 20°C)
Max. piston speed: 1.6 m/s

2480.13.00500.

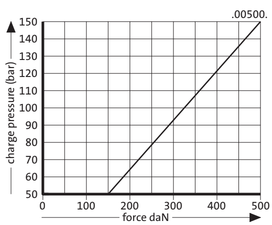




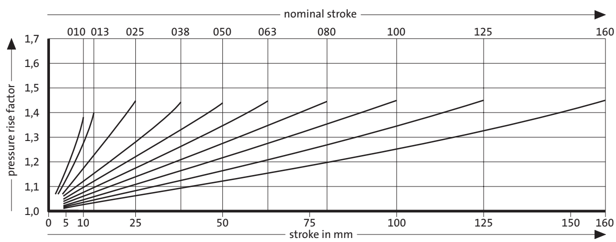
2480.13.00500.
Gas spring, Standard

Order No	Stroke$_{max.}$	$l_{min.}$	l
2480.13.00500.010	10	95	105
2480.13.00500.013	12.7	97.7	110.4
2480.13.00500.025	25	110	135
2480.13.00500.038	38.1	123.1	161.2
2480.13.00500.050	50	135	185
2480.13.00500.063	63.5	148.5	212
2480.13.00500.080	80	165	245
2480.13.00500.100	100	185	285
2480.13.00500.125	125	210	335
2480.13.00500.160	160	245	405

Initial spring force
versus charge pressure



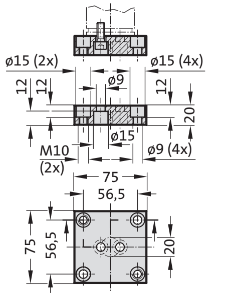
Spring force Diagram displacement versus stroke rise



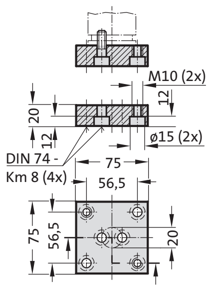
Pressure rise factor accounts for displacement but not external influences!

Gas Spring, Standard
Mounting variations

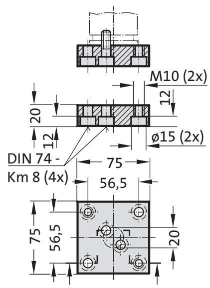
2480.011.00750.3



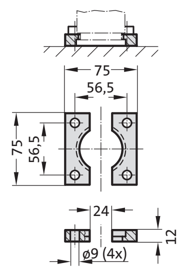
2480.011.00750



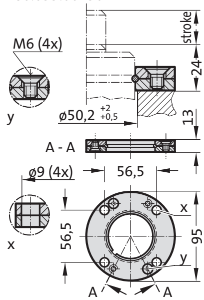
2480.011.00750.1



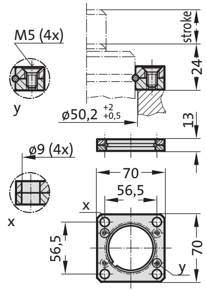
2480.022.00750



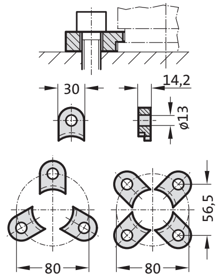
2480.055.00750



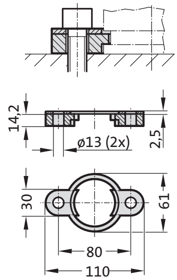
2480.057.00750



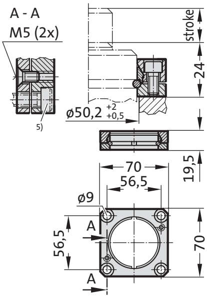
2480.007.00750



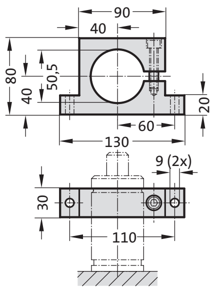
2480.008.00750 [3]



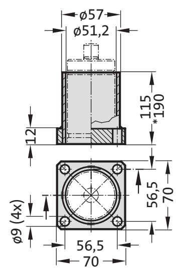
2480.064.00750 [4]



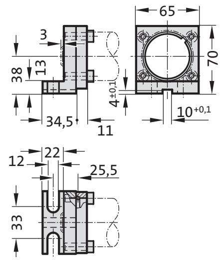
2480.044.00750 [2]



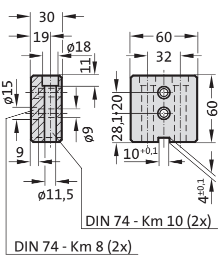
2480.010.00750.115 [3]
2480.010.00750.190* [3]



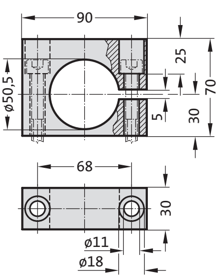
2480.045.00750 [2]



2480.047.00750 [2]



2480.044.03.00750 [2]



Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring, Standard

Note:

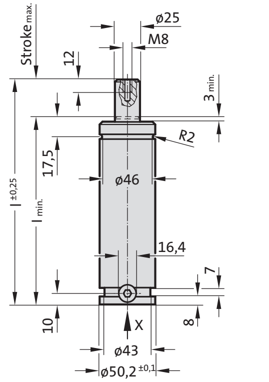
Initial spring force at 150 bar = 750 daN

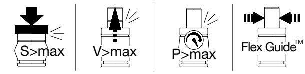
Order No for spare parts kit: 2480.13.00750
Order No for spare parts kit: to Renault standard EM24.54.700 2480.13.00750.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.13.00750. .R

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

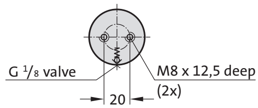
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.13.00750.





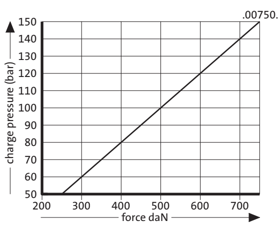
View X - Gas spring



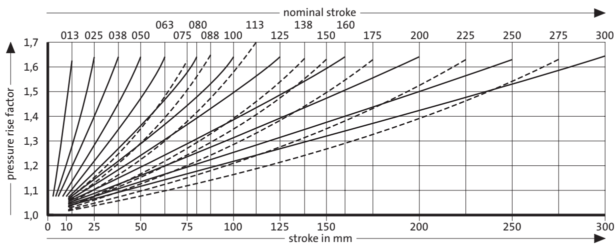
2480.13.00750.
Gas spring, Standard

Order No		Stroke max.	l min.	l
2480.13.00750.013		12.7	107.7	120.4
2480.13.00750.025		25	120	145
2480.13.00750.038		38.1	133.1	171.2
2480.13.00750.050		50	145	195
2480.13.00750.063		63.5	158.5	222
2480.13.00750.075	1)	75	170	245
2480.13.00750.080		80	175	255
2480.13.00750.088	1)	87.5	182.5	270
2480.13.00750.100		100	195	295
2480.13.00750.113	1)	112.5	207.5	320
2480.13.00750.125		125	220	345
2480.13.00750.138	1)	137.5	232.5	370
2480.13.00750.150	1)	150	245	395
2480.13.00750.160		160	255	415
2480.13.00750.175	1)	175	270	445
2480.13.00750.200		200	295	495
2480.13.00750.225	1)	225	320	545
2480.13.00750.250		250	345	595
2480.13.00750.275		275	370	645
2480.13.00750.300		300	395	695

Initial spring force
versus charge pressure



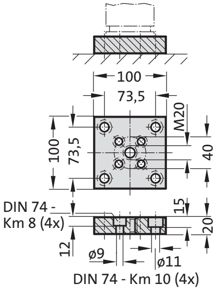
Spring force Diagram displacement versus stroke rise



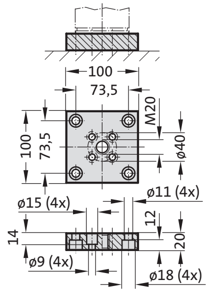
Pressure rise factor accounts for displacement but not external influences!

Gas Spring, Standard
Mounting variations

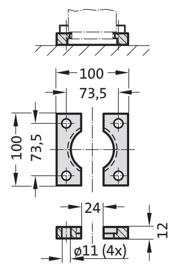
2480.011.01500



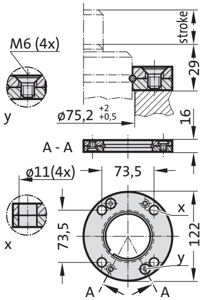
2480.011.01500.2



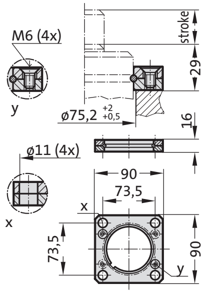
2480.022.01500



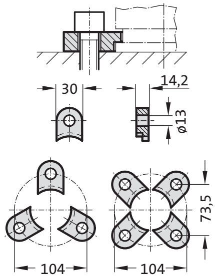
2480.055.01500



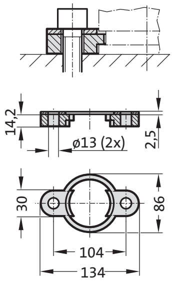
2480.057.01500



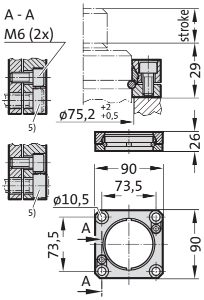
2480.007.01500



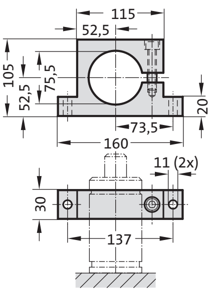
2480.008.01500 3)



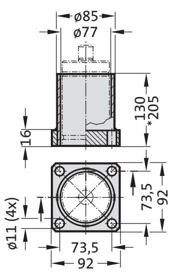
2480.064.01500 4)



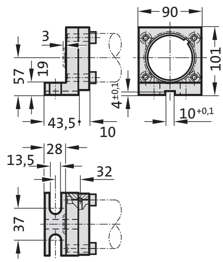
2480.044.01500 2)



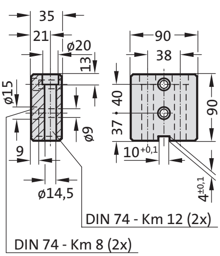
2480.010.01500.130 3)
2480.010.01500.205* 3)



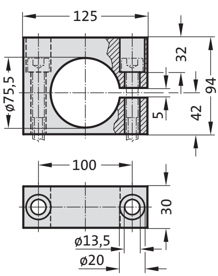
2480.045.01500 2)



2480.047.01500 2)



2480.044.03.01500 2)



Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

 Subject to alteration

Gas spring, Standard

Note:

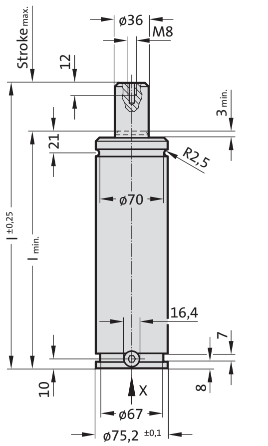
Initial spring force at 150 bar = 1500 daN

Order No for spare parts kit: 2480.12.01500
Order No for spare parts kit: to Renault standard EM24.54.700 2480.12.01500.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.12.01500. .R

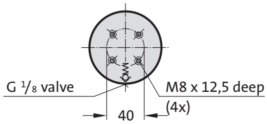
1) Special stroke lengths
Not for gas springs to Renault Standard EM24.54.700.

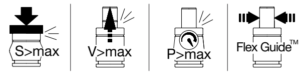
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.12.01500.



View X - Gas spring

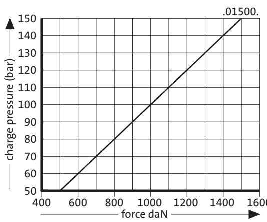




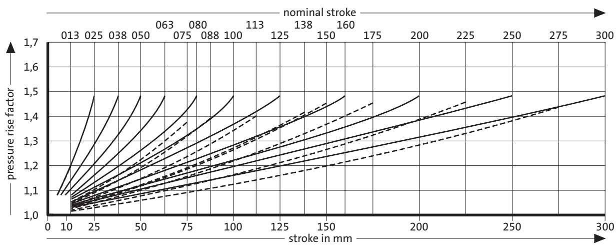
2480.12.01500.
Gas spring, Standard

Order No		Stroke$_{max.}$	l$_{min.}$	l
2480.12.01500.013	1)	12.7	122.3	135
2480.12.01500.025		25	135	160
2480.12.01500.038		38.1	148.1	186.2
2480.12.01500.050		50	160	210
2480.12.01500.063		63.5	173.5	237
2480.12.01500.075	1)	75	185	260
2480.12.01500.080		80	190	270
2480.12.01500.088	1)	87.5	197.5	285
2480.12.01500.100		100	210	310
2480.12.01500.113	1)	112.5	222.5	335
2480.12.01500.125		125	235	360
2480.12.01500.138	1)	137.5	247.5	385
2480.12.01500.150	1)	150	260	410
2480.12.01500.160		160	270	430
2480.12.01500.175	1)	175	285	460
2480.12.01500.200		200	310	510
2480.12.01500.225	1)	225	335	560
2480.12.01500.250		250	360	610
2480.12.01500.275		275	385	660
2480.12.01500.300		300	410	710

Initial spring force versus charge pressure



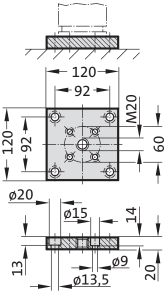
Spring force Diagram displacement versus stroke rise



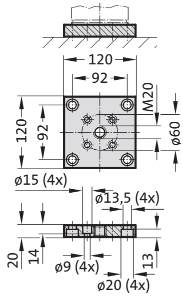
Pressure rise factor accounts for displacement but not external influences!

Gas Spring, Standard
Mounting variations

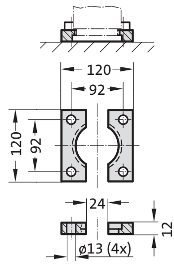
2480.011.03000



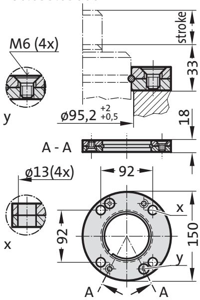
2480.011.03000.2



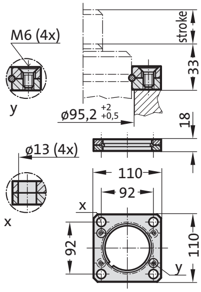
2480.022.03000



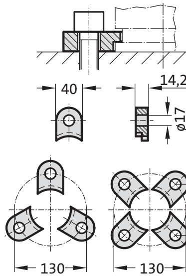
2480.055.03000



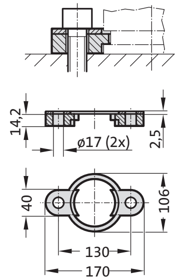
2480.057.03000



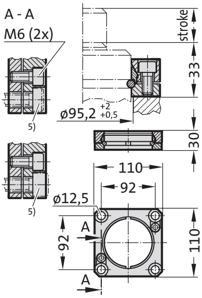
2480.007.03000



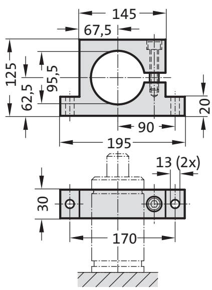
2480.008.03000 3)



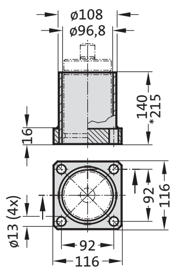
2480.064.03000 4)



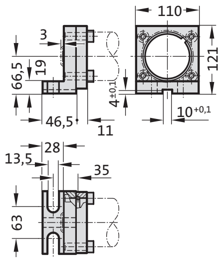
2480.044.03000 2)



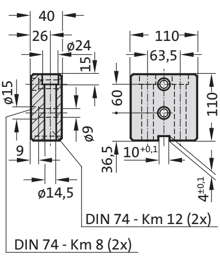
2480.010.03000.140 3)
2480.010.03000.215* 3)



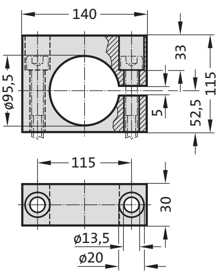
2480.045.03000 2)



2480.047.03000 2)



2480.044.03.03000 2)



Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring, Standard

Note:

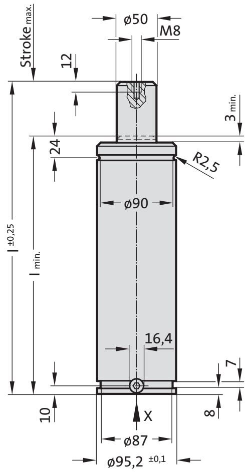
Initial spring force at 150 bar = 3000 daN

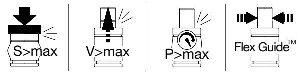
Order No for spare parts kit: 2480.13.03000
Order No for spare parts kit: to Renault standard EM24.54.700 2480.13.03000.R
Gas spring to Renault standard EM24.54.700
Order No (example): 2480.13.03000. .R

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

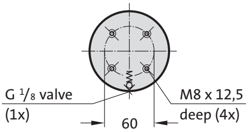
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 1.6 m/s
for 2480. ... .R: 2.0 m/s

2480.13.03000.





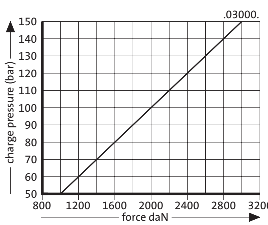
View X - Gas spring



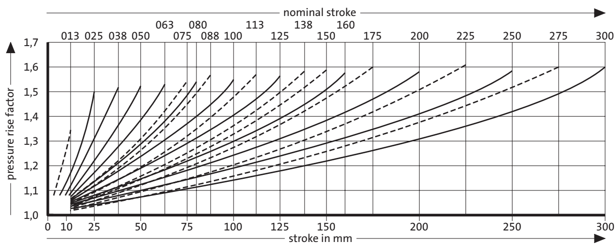
2480.13.03000.
Gas spring, Standard

Order No		Stroke max.	l min.	l
2480.13.03000.013	1)	12.7	132.3	145
2480.13.03000.025		25	145	170
2480.13.03000.038		38.1	158.1	196.2
2480.13.03000.050		50	170	220
2480.13.03000.063		63.5	183.5	247
2480.13.03000.075	1)	75	195	270
2480.13.03000.080		80	200	280
2480.13.03000.088.1	1)	87.5	207.5	295
2480.13.03000.100		100	220	320
2480.13.03000.113	1)	112.5	232.5	345
2480.13.03000.125		125	245	370
2480.13.03000.138	1)	137.5	257.5	395
2480.13.03000.150	1)	150	270	420
2480.13.03000.160		160	280	440
2480.13.03000.175	1)	175	295	470
2480.13.03000.200		200	320	520
2480.13.03000.225	1)	225	345	570
2480.13.03000.250		250	370	620
2480.13.03000.275	1)	275	395	670
2480.13.03000.300		300	420	720

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



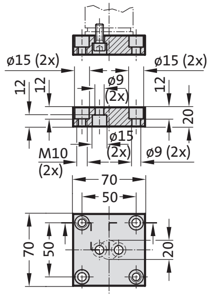
Pressure rise factor accounts for displacement but not external influences!

Gas Spring
HEAVY DUTY

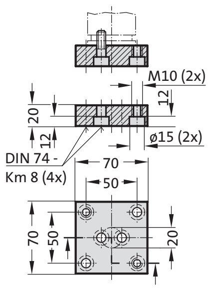
- Temperature upto 80°C

Gas Spring, HEAVY DUTY
Mounting variations

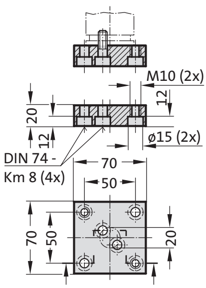
2480.011.00500.2



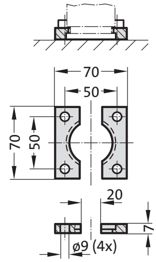
2480.011.00500



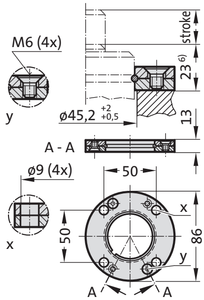
2480.011.00500.1



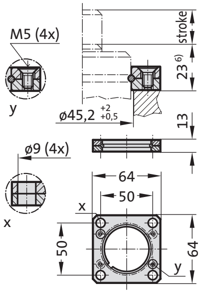
2480.022.00500



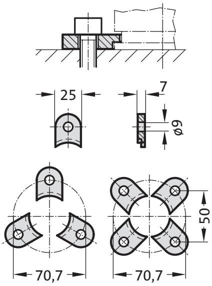
2480.055.00500



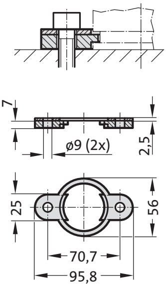
2480.057.00500



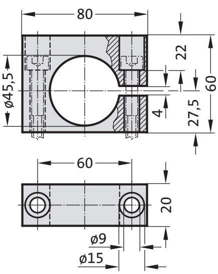
2480.007.00500



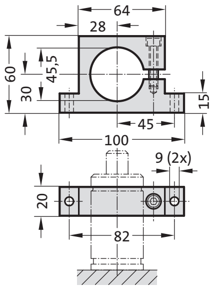
2480.008.00500 3)



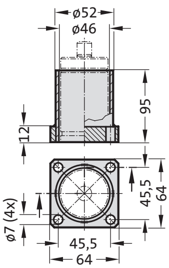
2480.044.03.00500 2)



2480.044.00500 2)



2480.010.00500.095 3)



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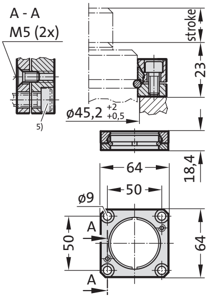


Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

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

Gas spring HEAVY DUTY

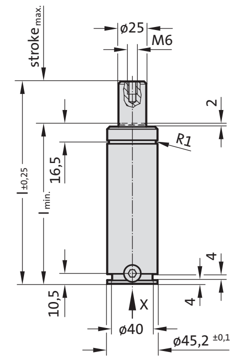
Note:

Initial spring force at 150 bar = 740 daN

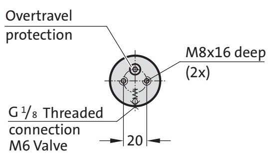
Order No for spare parts kit: 2488.13.00750

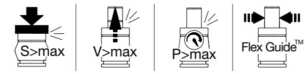
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.00750.



View X

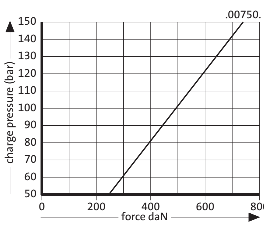




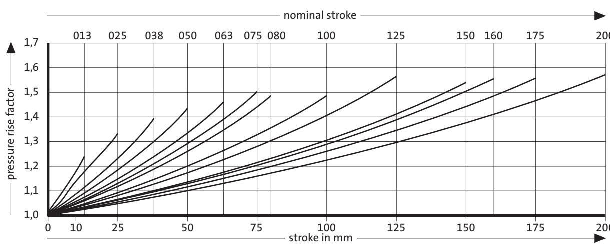
2488.13.00750.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$	l$_{min.}$	l
2488.13.00750.013	13	98	111
2488.13.00750.025	25	110	135
2488.13.00750.038	38	123	161
2488.13.00750.050	50	135	185
2488.13.00750.063	63	148	211
2488.13.00750.075	75	160	235
2488.13.00750.080	80	165	245
2488.13.00750.100	100	185	285
2488.13.00750.125	125	210	335
2488.13.00750.150	150	235	385
2488.13.00750.160	160	245	405
2488.13.00750.175	175	260	435
2488.13.00750.200	200	285	485

Initial spring force
versus charge pressure



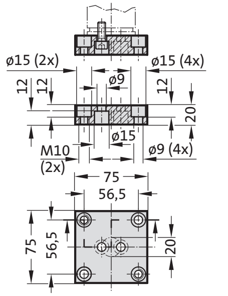
Spring force Diagram displacement versus stroke rise



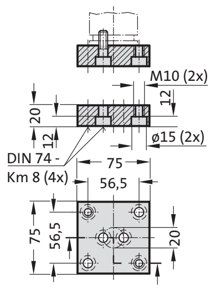
Pressure rise factor accounts for displacement but not external influences!

Gas spring HEAVY DUTY
Mounting variations

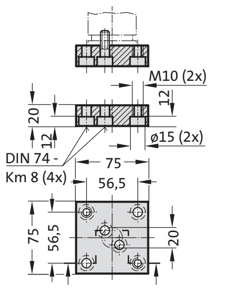
2480.011.00750.3



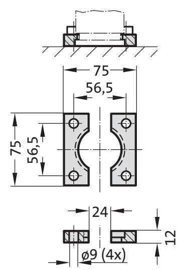
2480.011.00750



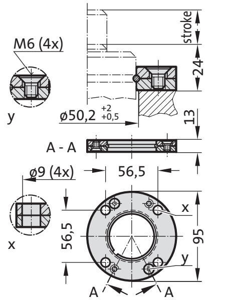
2480.011.00750.1



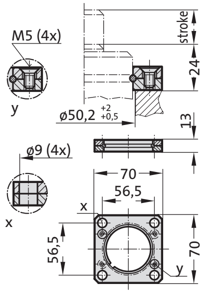
2480.022.00750



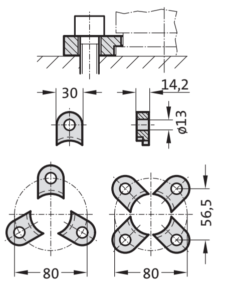
2480.055.00750



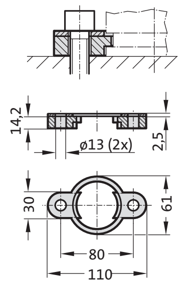
2480.057.00750



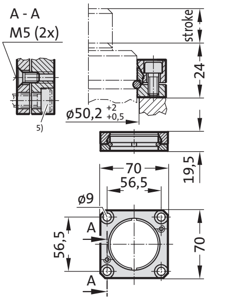
2480.007.00750



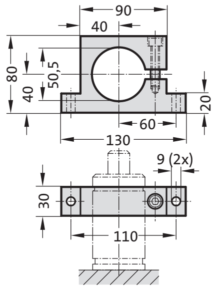
2480.008.00750 3)



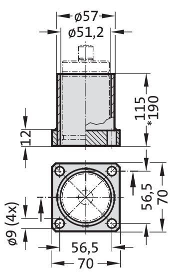
2480.064.00750 4)



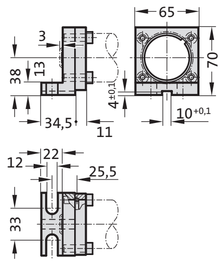
2480.044.00750 2)



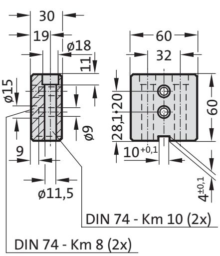
2480.010.00750.115 3)
2480.010.00750.190* 3)



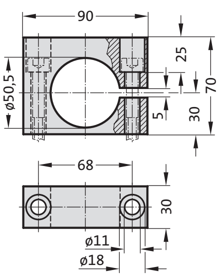
2480.045.00750 2)



2480.047.00750 2)



2480.044.03.00750 2)



Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

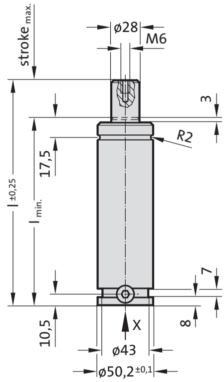
Gas spring HEAVY DUTY

Note:
Initial spring force at 150 bar = 920 daN

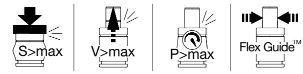
Order No for spare parts kit: 2488.13.01000

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

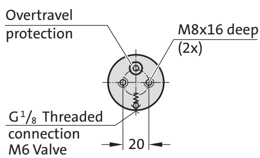
2488.13.01000.



PED APPROVED 2014/68/EU
VDI
ISO



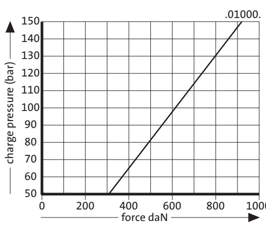
View X



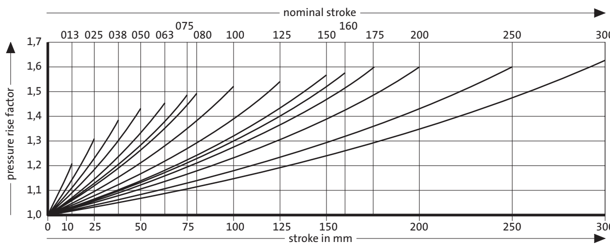
2488.13.01000.
Gas spring HEAVY DUTY

Order No	Stroke$_{max.}$	l$_{min.}$	l
2488.13.01000.013	13	108	121
2488.13.01000.025	25	120	145
2488.13.01000.038	38	133	171
2488.13.01000.050	50	145	195
2488.13.01000.063	63	158	221
2488.13.01000.075	75	170	245
2488.13.01000.080	80	175	255
2488.13.01000.100	100	195	295
2488.13.01000.125	125	220	345
2488.13.01000.150	150	245	395
2488.13.01000.160	160	255	415
2488.13.01000.175	175	270	445
2488.13.01000.200	200	295	495
2488.13.01000.250	250	345	595
2488.13.01000.300	300	395	695

Initial spring force
versus charge pressure



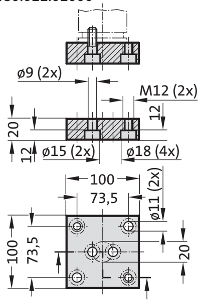
Spring force Diagram displacement versus stroke rise



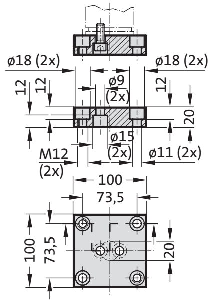
Pressure rise factor accounts for displacement but not external influences!

Gas spring HEAVY DUTY
Mounting variations

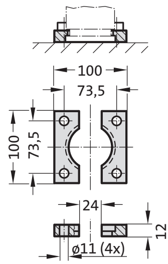
2480.011.01000



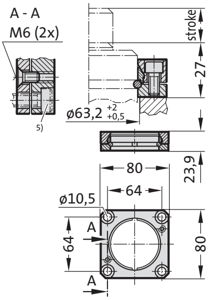
2480.011.01000.2



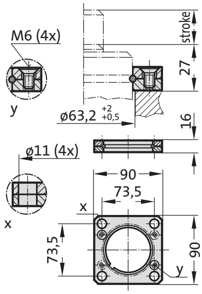
2480.022.01000



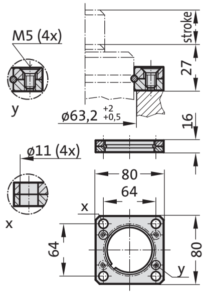
2480.064.01000 4)



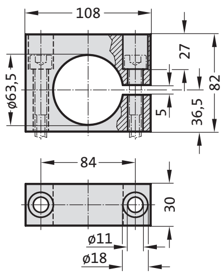
2480.057.01000



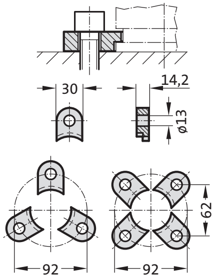
2480.057.03.01000



2480.044.03.01000 2)



2480.007.01000



Note:

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

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

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring HEAVY DUTY

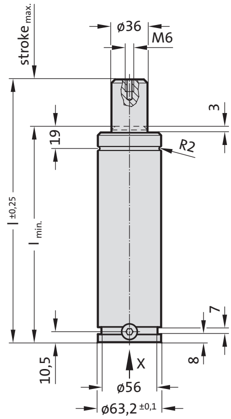
Note:

Initial spring force at 150 bar = 1500 daN

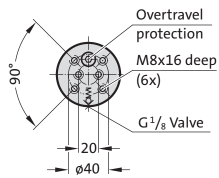
Order No for spare parts kit: 2488.13.01500

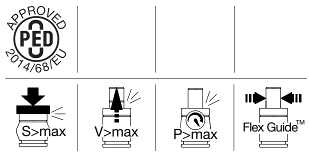
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2488.13.01500.



View X

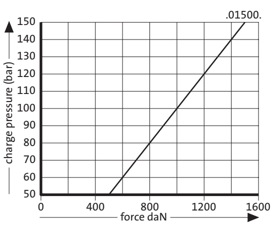




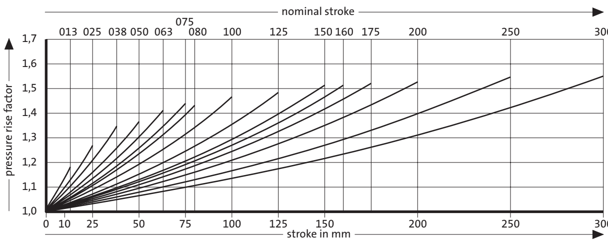
2488.13.01500.
Gas spring HEAVY DUTY

Order No	$Stroke_{max.}$	$l_{min.}$	l
2488.13.01500.013	13	108	121
2488.13.01500.025	25	120	145
2488.13.01500.038	38	133	171
2488.13.01500.050	50	145	195
2488.13.01500.063	63	158	221
2488.13.01500.075	75	170	245
2488.13.01500.080	80	175	255
2488.13.01500.100	100	195	295
2488.13.01500.125	125	220	345
2488.13.01500.150	150	245	395
2488.13.01500.160	160	255	415
2488.13.01500.175	175	270	445
2488.13.01500.200	200	295	495
2488.13.01500.250	250	345	595
2488.13.01500.300	300	395	695

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



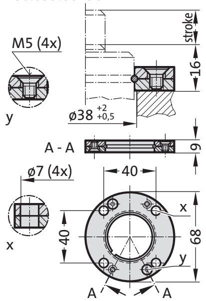
Pressure rise factor accounts for displacement but not external influences!

Gas Springs WITH THROUGH BORE PASSAGE

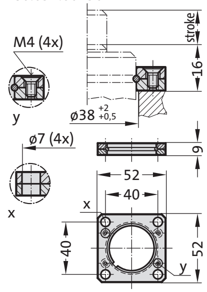
- Temperature upto 80°C

Gas Spring with through bore passage
Mounting variations

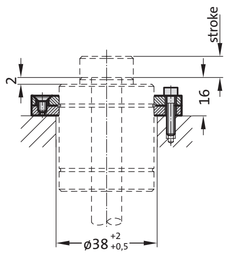
2480.055.00250

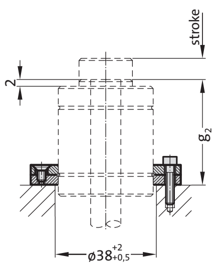


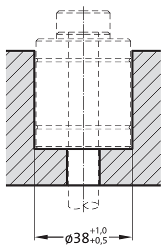
2480.057.00250



Mounting examples:







Gas spring with through bore passage

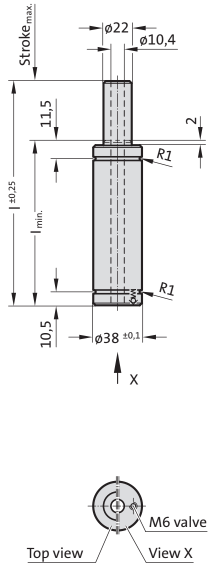
Note:

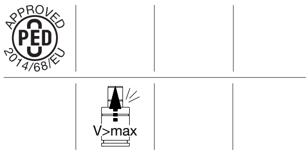
Initial spring force at 150 bar = 270 daN

Order No for spare parts kit: 2496.12.00270

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 15 to 40 (at 20°C)
Max. piston speed: 0.5 m/s

2496.12.00270.



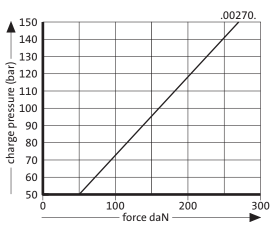


2496.12.00270.
Gas spring with through bore passage

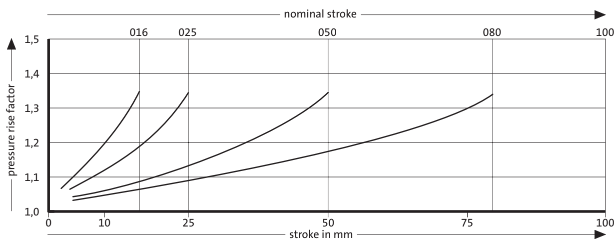
Order No	Stroke$_{max.}$	l$_{min.}$	l	g$_2$*
2496.12.00270.016	16	92	108	86
2496.12.00270.025	25	101	126	95
2496.12.00270.050	50	126	176	120
2496.12.00270.080	80	156	236	150

*see mounting example

Initial spring force versus charge pressure



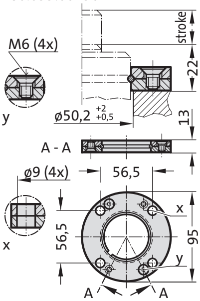
Spring force Diagram displacement versus stroke rise



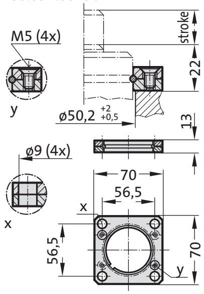
Pressure rise factor accounts for displacement but not external influences!

Gas spring with through bore passage
Mounting variations

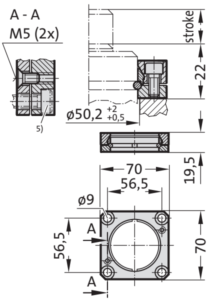
2480.055.00750



2480.057.00750



2480.064.00750[4)]

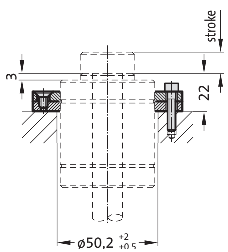


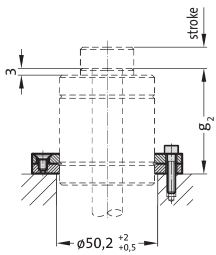
Note:

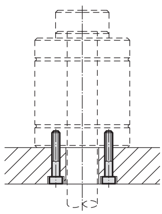
4) Square collar flange, non-rotating, fixing for composite connection.

5) Machine screws with hexagonal socket (compact head recommended)

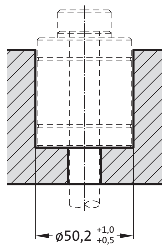
Mounting examples:







see Note!



Gas spring with through bore passage

Note:

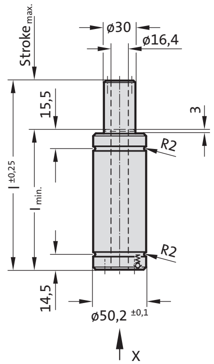
Initial spring force at 150 bar = 490 daN

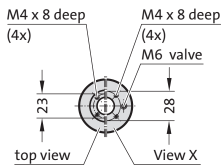
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

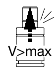
Order No for spare parts kit: 2496.12.00490

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 0.5 m/s

2496.12.00490.





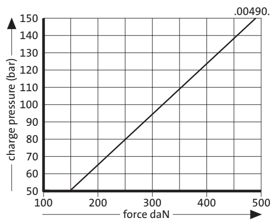


2496.12.00490.
Gas spring with through bore passage

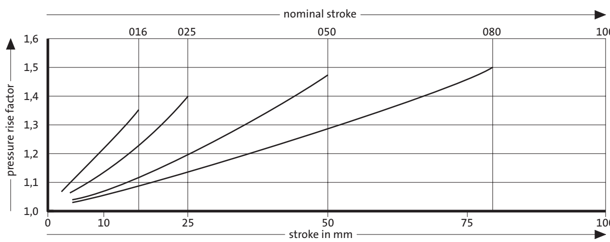
Order No	$Stroke_{max.}$	$l_{min.}$	l	g_2*
2496.12.00490.016	16	96	112	88
2496.12.00490.025	25	105	130	97
2496.12.00490.050	50	130	180	122
2496.12.00490.080	80	160	240	152

*see mounting example

Initial spring force versus charge pressure



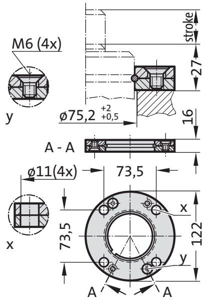
Spring force Diagram displacement versus stroke rise



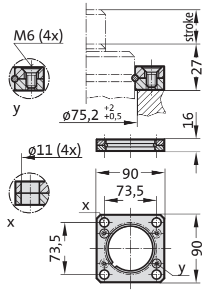
Pressure rise factor accounts for displacement but not external influences!

Gas Spring with through bore passage
Mounting variations

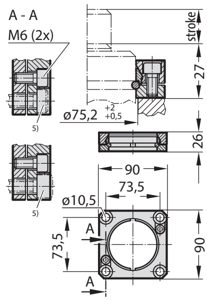
2480.055.01500



2480.057.01500



2480.064.01500[4)]

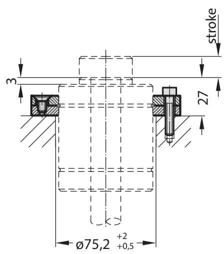


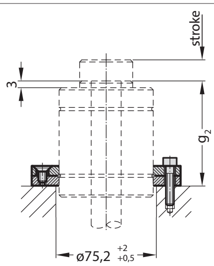
Notes:

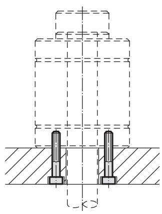
4) Square collar flange, non-rotating, fixing for composite connection.

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

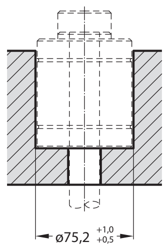
Mounting examples:







see Note!



Gas spring with through bore passage

Note:

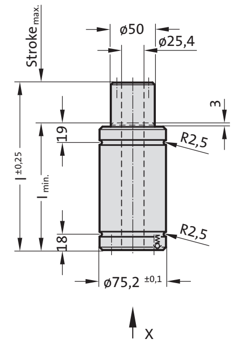
Initial spring force at 150 bar = 1060 daN

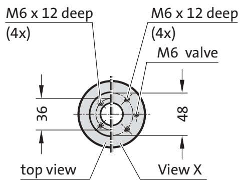
When mounting to floor, contact over the entire floor of the cylinder tube must be ensured!

Order No for spare parts kit: 2496.12.01060

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 15 to 40 (at 20°C)
Max. piston speed: 0.5 m/s

2496.12.01060.





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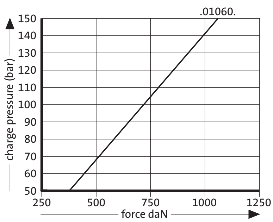
V>max

2496.12.01060.
Gas spring with through bore passage

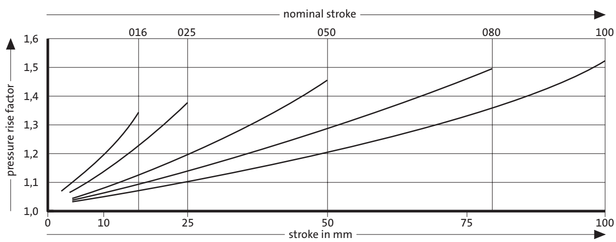
Order No	$Stroke_{max.}$	$l_{min.}$	l	g_2*
2496.12.01060.016	16	106	122	96
2496.12.01060.025	25	115	140	105
2496.12.01060.050	50	140	190	130
2496.12.01060.080	80	170	250	160
2496.12.01060.100	100	190	290	180

*see mounting example

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



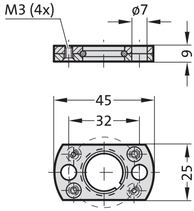
Pressure rise factor accounts for displacement but not external influences!

Gas Spring
POWER LINE

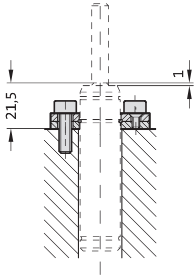
- Temperature upto 80°C

Gas Spring POWERLINE
Mounting variations

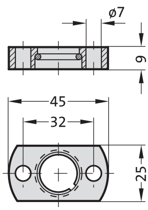
2480.051.03.00030



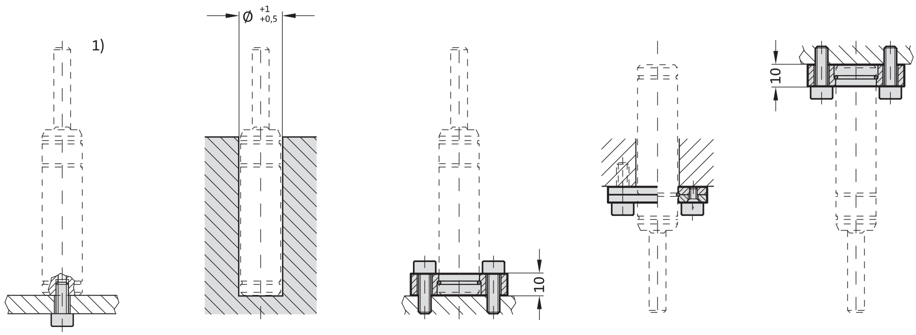
2480.051.03.00030



2480.052.00030



Mounting examples:



Gas spring POWERLINE

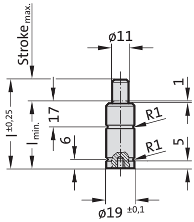
Note:
Initial spring force at 180 bar = 170 daN

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

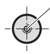
1) Fixing at bottom thread only recommanded for stroke length up to 50 mm.

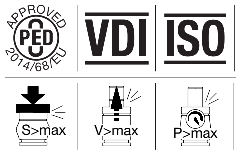
Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.00170.



View X

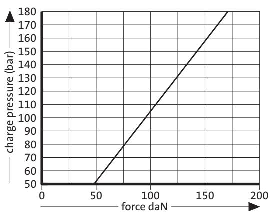




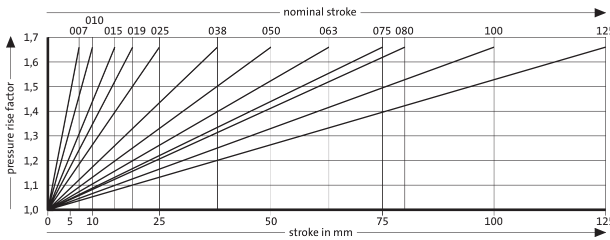
2487.12.00170.
Gas spring POWERLINE

Order No	Stroke max.	l min.	l
2487.12.00170.007	7	37	44
2487.12.00170.010	10	40	50
2487.12.00170.015	15	45	60
2487.12.00170.019	19	49	68
2487.12.00170.025	25	55	80
2487.12.00170.038	38	68	106
2487.12.00170.050	50	80	130
2487.12.00170.063	63	93	156
2487.12.00170.075	75	110	185
2487.12.00170.080	80	115	195
2487.12.00170.100	100	135	235
2487.12.00170.125	125	160	285

Initial spring force versus charge pressure



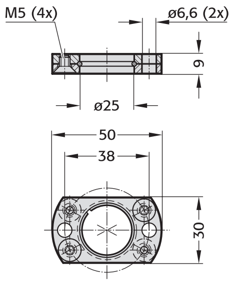
Spring force Diagram displacement versus stroke rise



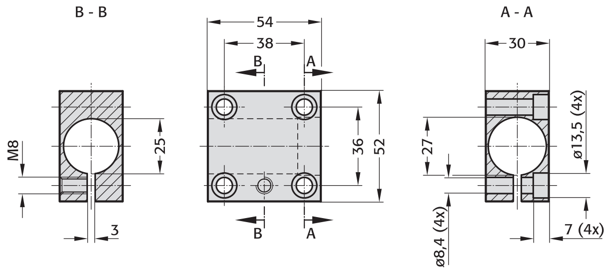
Pressure rise factor accounts for displacement but not external influences!

Gas spring POWERLINE
Mounting variations

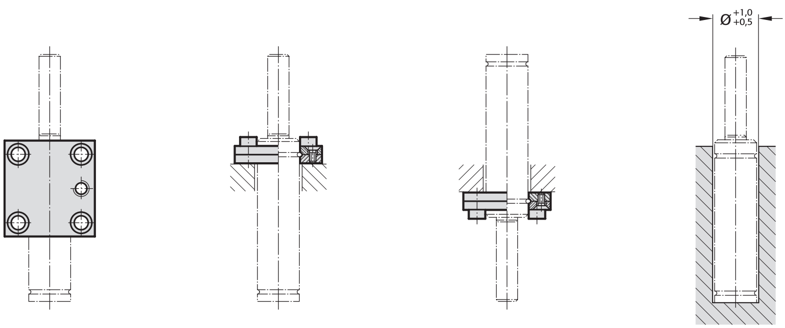
2480.051.00150



2480.053.00150



Mounting examples:



Subject to alteration

Gas spring POWERLINE

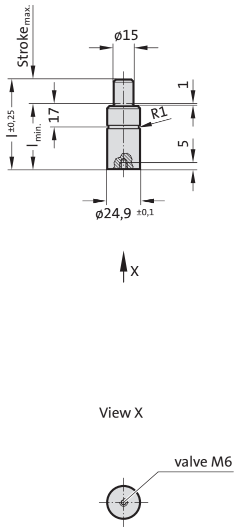
Note:

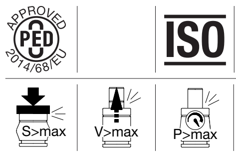
Initial spring force at 180 bar = 320 daN

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

Pressure medium: Nitrogen N_2
Max. filling pressure: 180 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 40 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.00320.

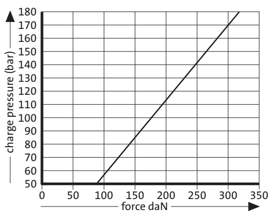




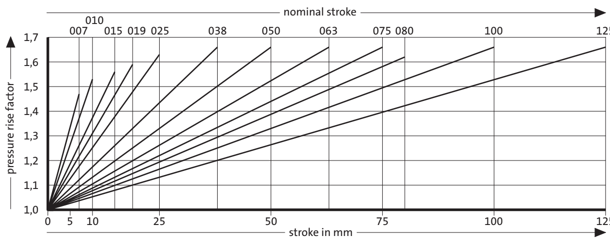
2487.12.00320.
Gas spring POWERLINE

Order No	Stroke max.	l min.	l
2487.12.00320.007	7	37	44
2487.12.00320.010	10	40	50
2487.12.00320.015	15	45	60
2487.12.00320.019	19	49	68
2487.12.00320.025	25	55	80
2487.12.00320.038	38	68	106
2487.12.00320.050	50	80	130
2487.12.00320.063	63	93	156
2487.12.00320.075	75	110	185
2487.12.00320.080	80	115	195
2487.12.00320.100	100	135	235
2487.12.00320.125	125	160	285

Initial spring force versus charge pressure



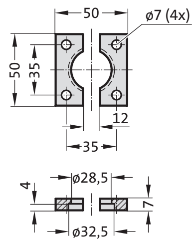
Spring force Diagram displacement versus stroke rise



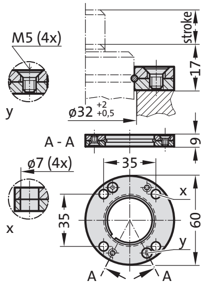
Pressure rise factor accounts for displacement but not external influences!

Gas Spring POWERLINE
Mounting variations

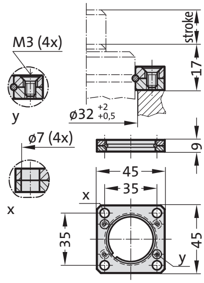
2480.022.00150



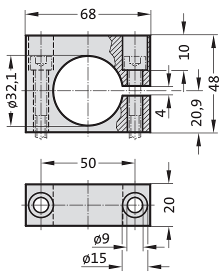
2480.055.00150



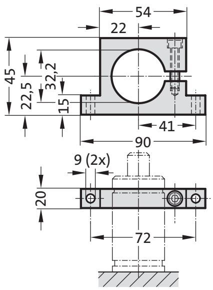
2480.057.00150



2480.044.03.00150 2)



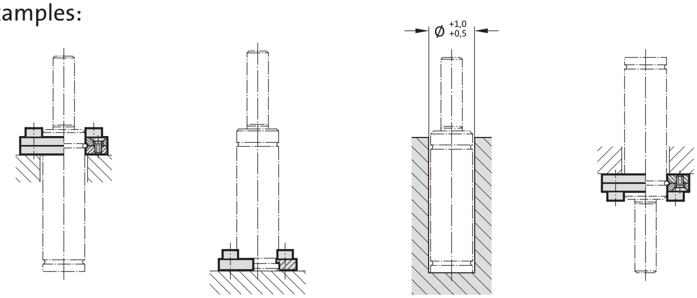
2480.044.00150 2)



Notes:

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

Mounting examples:



Gas spring POWERLINE

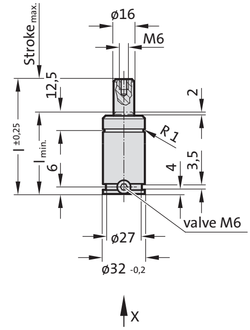
Note:

Initial spring force at 180 bar = 350 daN

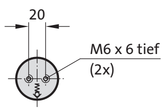
Order No for spare parts kit: 2487.12.00350

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

2487.12.00350.



View X



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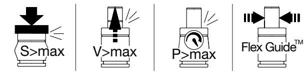
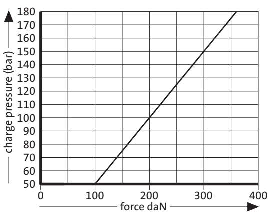


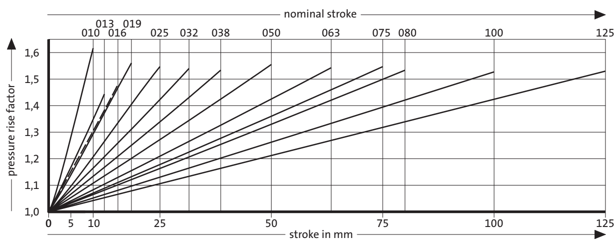
2487.12.00350.
Gas spring POWERLINE

Order No	Stroke max.	l min.	l
2487.12.00350.010	10	40	50
2487.12.00350.013	13	43	56
2487.12.00350.016	16	46	62
2487.12.00350.019	19	49	68
2487.12.00350.025	25	55	80
2487.12.00350.032	32	62	94
2487.12.00350.038	38	68	106
2487.12.00350.050	50	80	130
2487.12.00350.063	63	93	156
2487.12.00350.075	75	105	180
2487.12.00350.080	80	110	190
2487.12.00350.100	100	130	230
2487.12.00350.125	125	155	280

Initial spring force
versus charge pressure



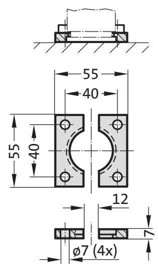
Spring force Diagram displacement versus stroke rise



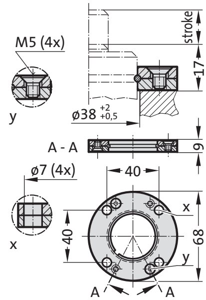
Pressure rise factor accounts for displacement but not external influences!

Gas Spring POWERLINE
Mounting variations

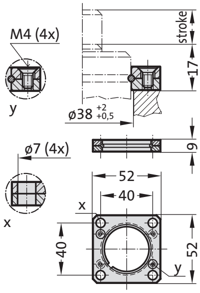
2480.022.00250



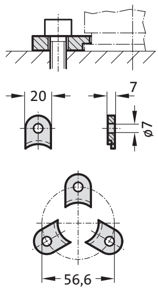
2480.055.00250



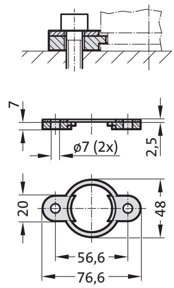
2480.057.00250



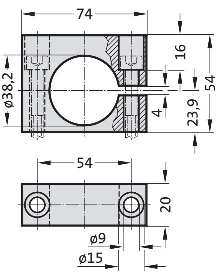
2480.007.00250



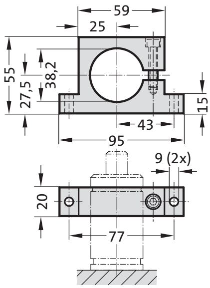
2480.008.00250 3)



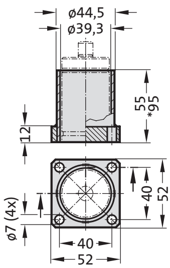
2480.044.03.00250 2)



2480.044.00250 2)



2480.010.00250.055 3)
2480.010.00250.095* 3)



Note:

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

3) Not for use with composite connection.

Gas spring POWERLINE

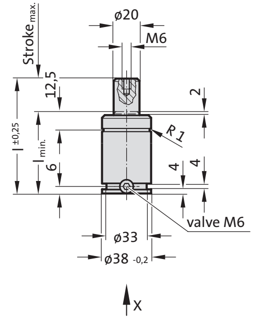
Note:

Initial spring force at 150 bar = 470 daN

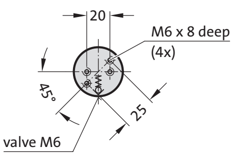
Order No for spare parts kit: 2487.12.00500

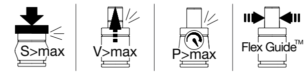
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute:
approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.00500.



View X

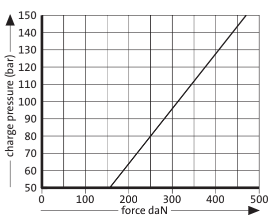




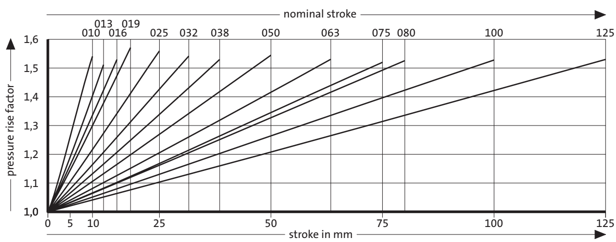
2487.12.00500.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.00500.010	10	40	50
2487.12.00500.013	13	43	56
2487.12.00500.016	16	46	62
2487.12.00500.019	19	49	68
2487.12.00500.025	25	55	80
2487.12.00500.032	32	62	94
2487.12.00500.038	38	68	106
2487.12.00500.050	50	80	130
2487.12.00500.063	63	93	156
2487.12.00500.075	75	105	180
2487.12.00500.080	80	110	190
2487.12.00500.100	100	130	230
2487.12.00500.125	125	155	280

Initial spring force
versus charge pressure



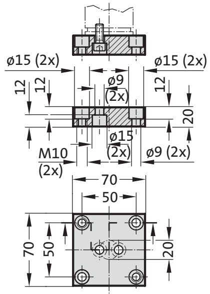
Spring force Diagram displacement versus stroke rise



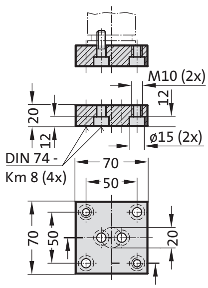
Pressure rise factor accounts for displacement but not external influences!

Gas spring POWERLINE
Mounting variations

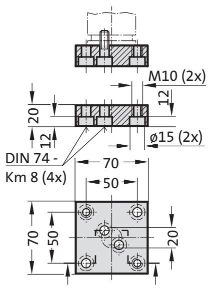
2480.011.00500.2



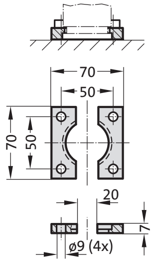
2480.011.00500



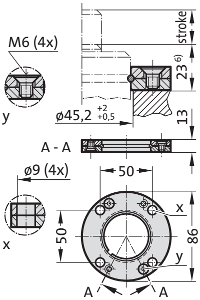
2480.011.00500.1



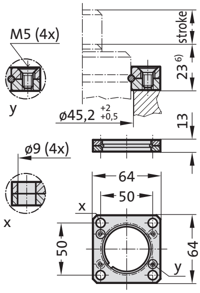
2480.022.00500



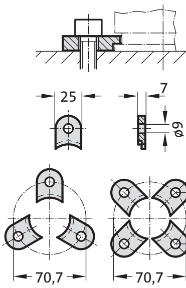
2480.055.00500



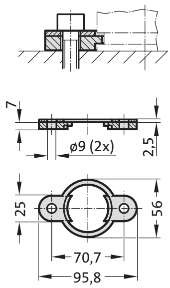
2480.057.00500



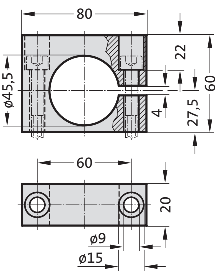
2480.007.00500



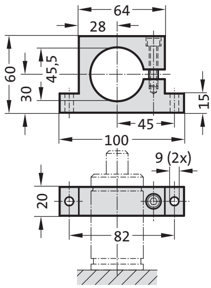
2480.008.00500 3)



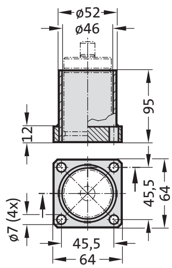
2480.044.03.00500 2)



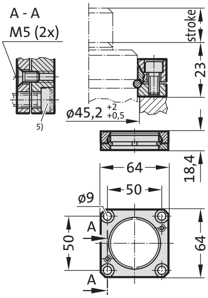
2480.044.00500 2)



2480.010.00500.095 3)



2480.064.00500 4)



Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

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

Gas spring POWERLINE

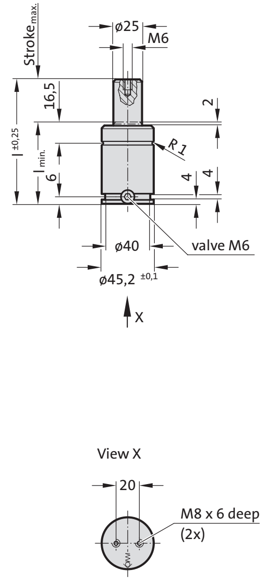
Note:

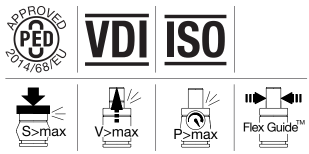
Initial spring force at 150 bar = 750 daN

Order No for spare parts kit: 2487.12.00750

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

2487.12.00750. .1

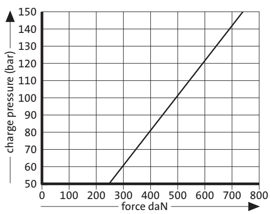




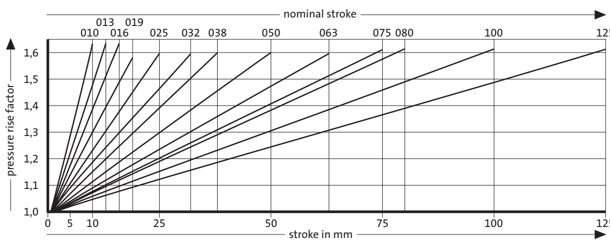
2487.12.00750. .1
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.00750.010.1	10	42	52
2487.12.00750.013.1	13	45	58
2487.12.00750.016.1	16	48	64
2487.12.00750.019.1	19	51	70
2487.12.00750.025.1	25	57	82
2487.12.00750.032.1	32	64	96
2487.12.00750.038.1	38	70	108
2487.12.00750.050.1	50	82	132
2487.12.00750.063.1	63	95	158
2487.12.00750.075.1	75	107	182
2487.12.00750.080.1	80	112	192
2487.12.00750.100.1	100	132	232
2487.12.00750.125.1	125	157	282

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise

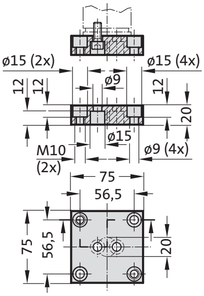


Pressure rise factor accounts for displacement but not external influences!

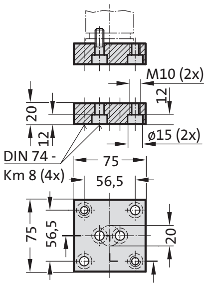
FIBRO

Gas Spring POWERLINE
Mounting variations

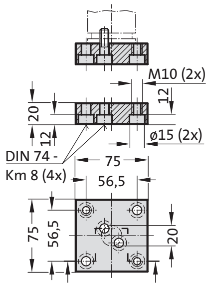
2480.011.00750.3



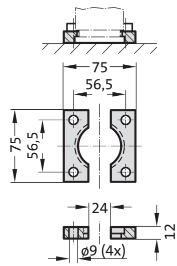
2480.011.00750



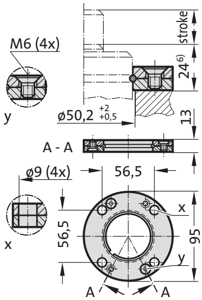
2480.011.00750.1



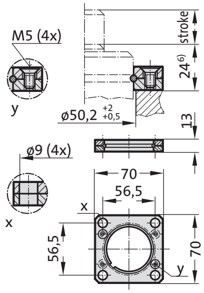
2480.022.00750



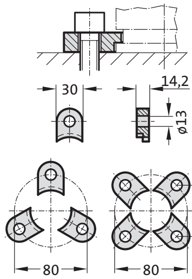
2480.055.00750



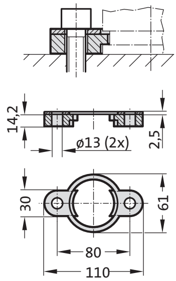
2480.057.00750



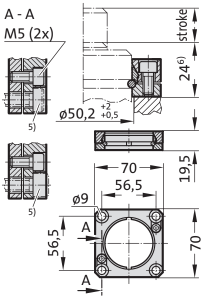
2480.007.00750



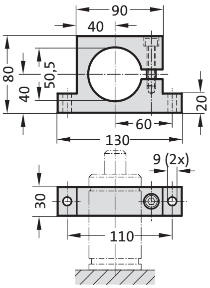
2480.008.00750 3)



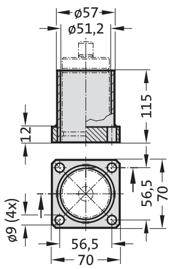
2480.064.00750 4)



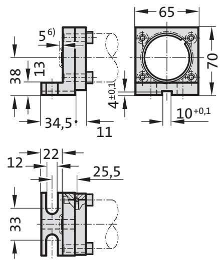
2480.044.00750 2)



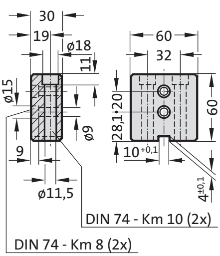
2480.010.00750.115 3)



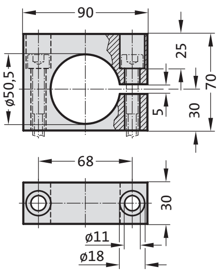
2480.045.00750 2)



2480.047.00750 2)



2480.044.03.00750 2)



Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

6) Installation height increased from 22 mm to 24 mm, installation position from 3 mm to 5 mm according to VDI 3003.

Gas spring POWERLINE

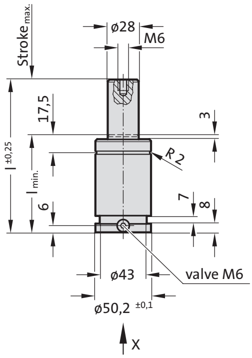
Note:

Initial spring force at 150 bar = 920 daN

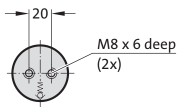
Order No for spare parts kit: 2487.12.01000

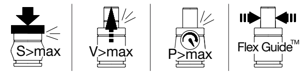
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.01000. .1



View X

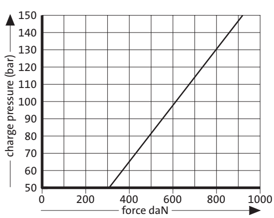




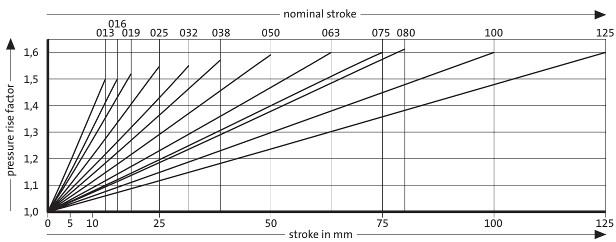
2487.12.01000. .1
Gas spring POWERLINE

Order No	Stroke max.	l min.	l
2487.12.01000.013.1	13	51	64
2487.12.01000.016.1	16	54	70
2487.12.01000.019.1	19	57	76
2487.12.01000.025.1	25	63	88
2487.12.01000.032.1	32	70	102
2487.12.01000.038.1	38	76	114
2487.12.01000.050.1	50	88	138
2487.12.01000.063.1	63	101	164
2487.12.01000.075.1	75	113	188
2487.12.01000.080.1	80	118	198
2487.12.01000.100.1	100	138	238
2487.12.01000.125.1	125	163	288

Initial spring force versus charge pressure



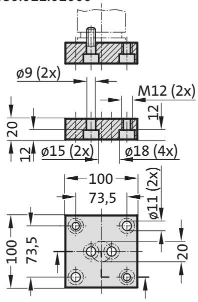
Spring force Diagram displacement versus stroke rise



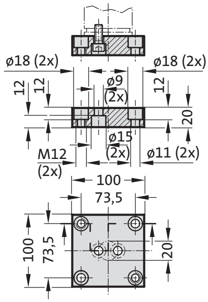
Pressure rise factor accounts for displacement but not external influences!

Gas spring POWERLINE
Mounting variations

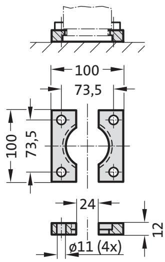
2480.011.01000



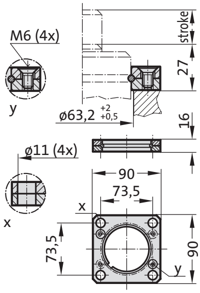
2480.011.01000.2



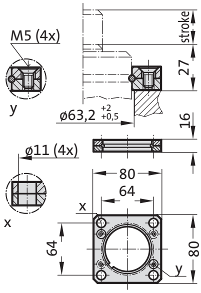
2480.022.01000



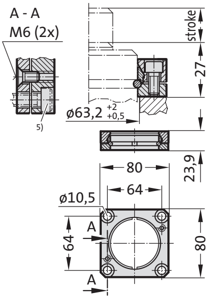
2480.057.01000



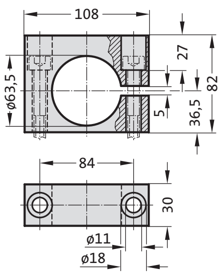
2480.057.03.01000



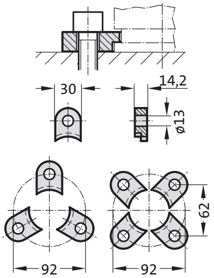
2480.064.01000 [4]



2480.044.03.01000 [2]



2480.007.01000



Note:

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

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

5) Machine screws with hexagonal socket (compact head recommended)

Gas spring POWERLINE

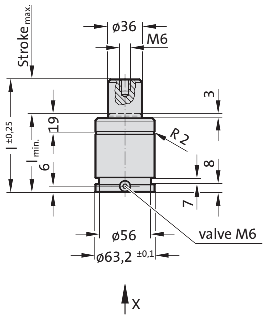
Note:

Initial spring force at 150 bar = 1500 daN

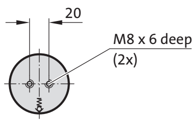
Order No for spare parts kit: 2487.12.01500

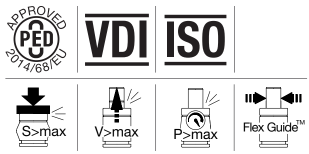
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 50 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.01500.



View X

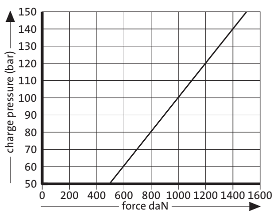




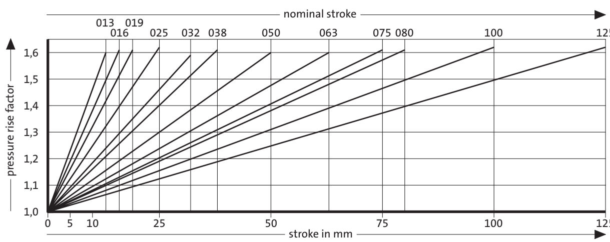
2487.12.01500.
Gas spring POWERLINE

Order No	$Stroke_{max.}$	$l_{min.}$	l
2487.12.01500.013	13	57	70
2487.12.01500.016	16	60	76
2487.12.01500.019	19	63	82
2487.12.01500.025	25	69	94
2487.12.01500.032	32	76	108
2487.12.01500.038	38	82	120
2487.12.01500.050	50	94	144
2487.12.01500.063	63	107	170
2487.12.01500.075	75	119	194
2487.12.01500.080	80	124	204
2487.12.01500.100	100	144	244
2487.12.01500.125	125	169	294

Initial spring force versus charge pressure



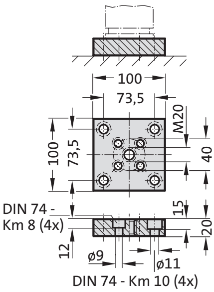
Spring force Diagram displacement versus stroke rise



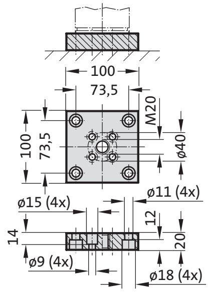
Pressure rise factor accounts for displacement but not external influences!

Gas Spring POWERLINE
Mounting variations

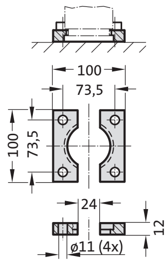
2480.011.01500



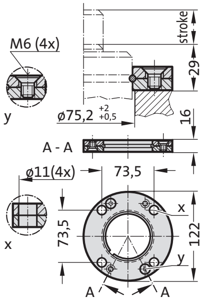
2480.011.01500.2



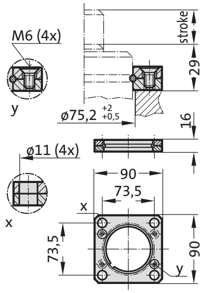
2480.022.01500



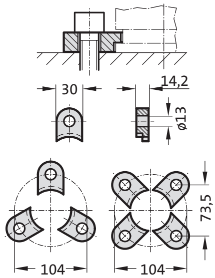
2480.055.01500



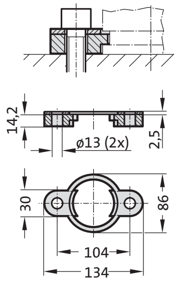
2480.057.01500



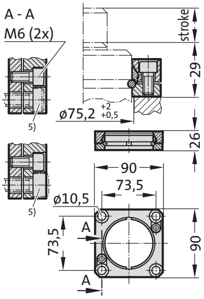
2480.007.01500



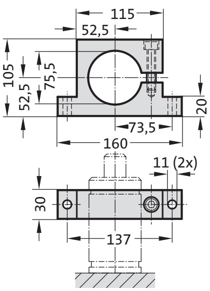
2480.008.01500 3)



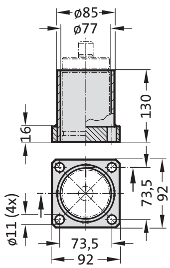
2480.064.01500 4)



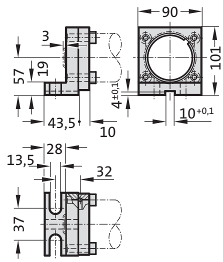
2480.044.01500 2)



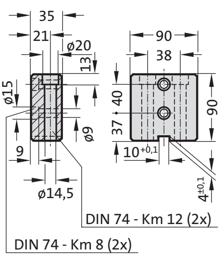
2480.010.01500.130 3)



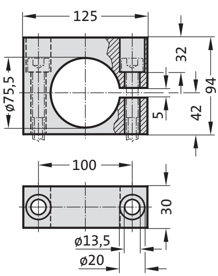
2480.045.01500 2)



2480.047.01500 2)



2480.044.03.01500 2)



Note:

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

3) Not for use with composite connection.

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

5) Machine screws with hexagonal socket (compact head recommended)

 Subject to alteration

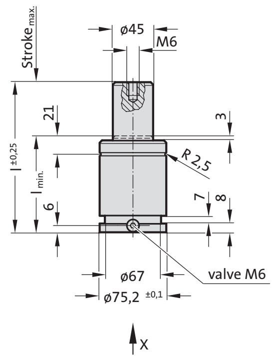
Gas spring POWERLINE

Note:
Initial spring force at 150 bar = 2400 daN

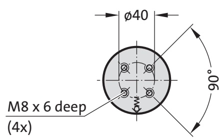
Order No for spare parts kit: 2487.12.02400

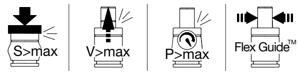
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 20 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.12.02400.



View X

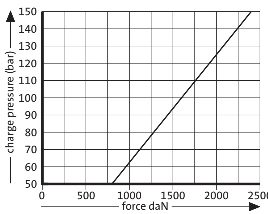




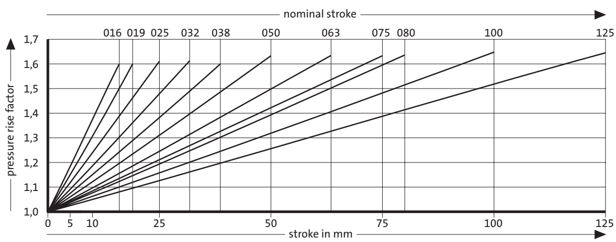
2487.12.02400.
Gas spring POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.12.02400.016	16	61	77
2487.12.02400.019	19	64	83
2487.12.02400.025	25	70	95
2487.12.02400.032	32	77	109
2487.12.02400.038	38	83	121
2487.12.02400.050	50	95	145
2487.12.02400.063	63	108	171
2487.12.02400.075	75	120	195
2487.12.02400.080	80	125	205
2487.12.02400.100	100	145	245
2487.12.02400.125	125	170	295

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

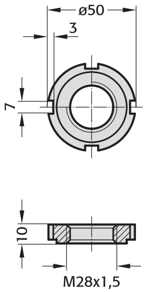
Gas Spring with THREAD

- Temperature upto 80°C

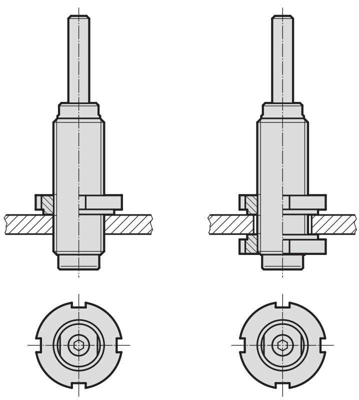
Gas spring with external thread
Mounting variations

2480.005.00200.

Slotted nut



Mounting examples:



Gas spring with external thread

Description:

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

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

Note:

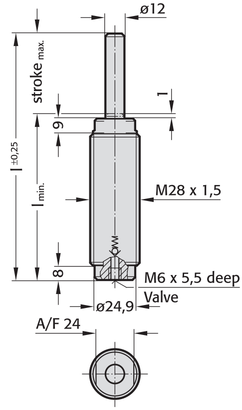
Order No for spare parts kit: 2480.21.00150

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

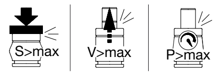
Spring forces as per spring diagram.

Upon customers request, also available unfilled, Order No 2482.32.00000...., Colour: black

2480.32.



APPROVED PED 2014/68/EU

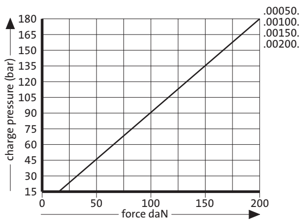


2480.32. Gas spring with external thread

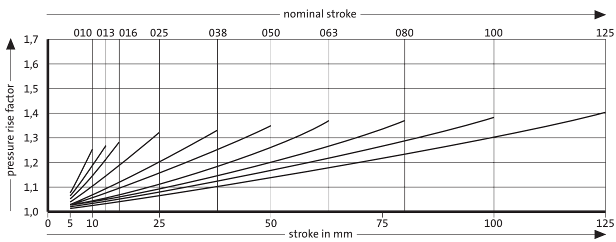
Order No*	$Stroke_{max.}$	l	$l_{min.}$
2480.32.□□□□□.010	10	62	52
2480.32.□□□□□.013	12.7	67.4	54.7
2480.32.□□□□□.016	16	74	58
2480.32.□□□□□.025	25	92	67
2480.32.□□□□□.038	38.1	118.2	80.1
2480.32.□□□□□.050	50	142	92
2480.32.□□□□□.063	63.5	169	105.5
2480.32.□□□□□.080	80	202	122
2480.32.□□□□□.100	100	242	142
2480.32.□□□□□.125	125	292	167

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

Initial spring force versus charge pressure



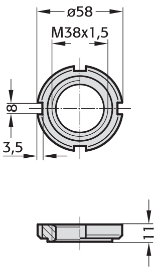
Spring force Diagram displacement versus stroke rise



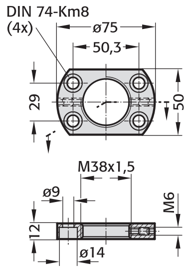
Pressure rise factor accounts for displacement but not external influences!

Gas spring with external thread
Mounting variations

2480.005.00250.
Slotted nut

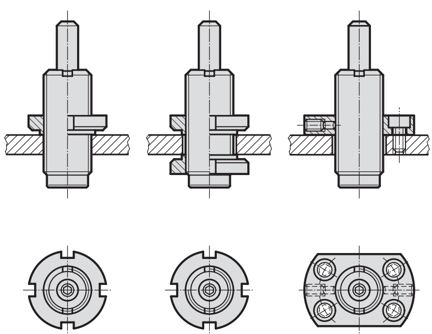


2480.006.00250.
Clamped flange



2480.00.51.01
Box spanner for assembling/disassembling of gas springs

Mounting examples:



 Subject to alteration

Gas spring with external thread

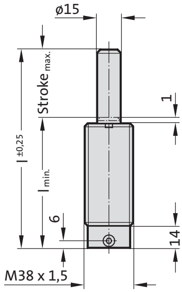
Note:
Initial spring force at 150 bar = 250 daN

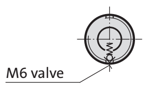
Order No for spare parts kit: 2480.12.00250

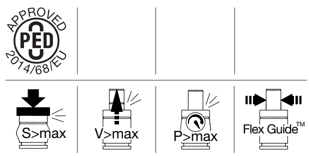
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

Fixing:
Installation with ring nut(s) 2480.005.00250 can be done with one or two ring nuts. If the hole in the bolster plate is not threaded, two ring nuts are needed. Holes threaded M 38 × 1,5 require one only ring nut for mounting of the gas springs.
Mounting with a threaded flange plate has the advantage of a degree of adjustability as far as the flange screws permit, moreover it is often found easier to make do with a clearance hole in the tool plate. Locking is by way of two lock screws with thrust plugs, provided in the threaded flange.
Diameter of through-hole in tool plate = 38 mm – plus four tapped holes M 8.

2480.32.00250.



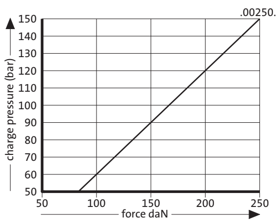




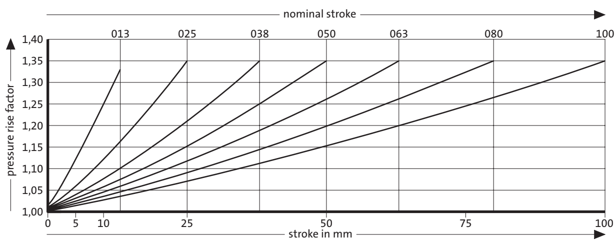
2480.32.00250.
Gas spring with external thread

Order No	Stroke$_{max.}$	l$_{min.}$	l
2480.32.00250.013	12.7	62.7	75.4
2480.32.00250.025	25	75	100
2480.32.00250.038	38.1	88.1	126.2
2480.32.00250.050	50	100	150
2480.32.00250.063	63.5	113.5	177
2480.32.00250.080	80	130	210
2480.32.00250.100	100	150	250

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



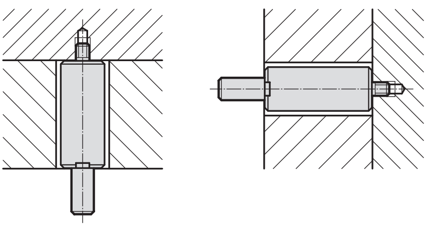
Pressure rise factor accounts for displacement but not external influences!

Gas spring with male fixing thread, small mounting height
Mounting variations

2480.00.51.01

Box spanner for assembling/disassembling of gas springs

Mounting examples:



Gas spring with male fixing thread, small mounting height

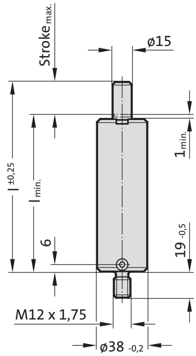
Note:

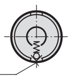
Initial spring force at 150 bar = 250 daN

Order No for spare parts kit: 2480.12.00250

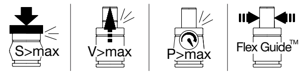
Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 50 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 80 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2480.82.00250.





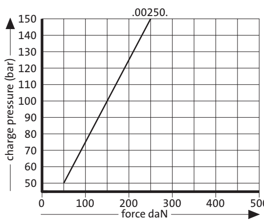
M6 valve



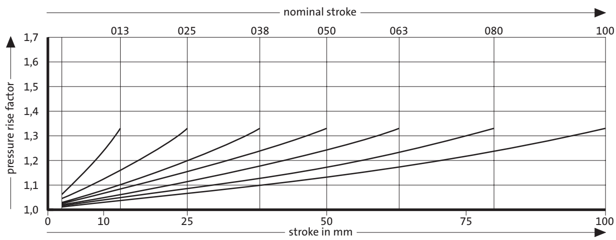
2480.82.00250.
Gas spring with male fixing thread, small mounting height

Order No	Stroke$_{max.}$	l$_{min.}$	l
2480.82.00250.013	12.7	62.7	75.4
2480.82.00250.025	25	75	100
2480.82.00250.038	38.1	88.1	126.2
2480.82.00250.050	50	100	150
2480.82.00250.063	63.5	113.5	177
2480.82.00250.080	80	130	210
2480.82.00250.100	100	150	250

Initial spring force versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

FIBRO

Gas spring with male fixing thread, POWERLINE

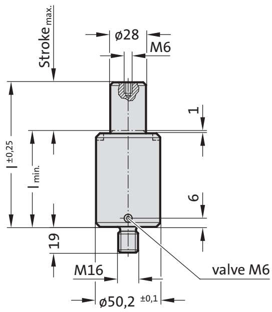
Note:

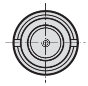
Initial spring force at 150 bar = 920 daN

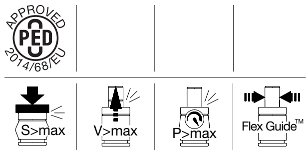
Order No for spare parts kit: 2487.12.01000

Pressure medium: Nitrogen N_2
Max. filling pressure: 150 bar
Min. filling pressure: 25 bar
Working temperature: 0°C to +80°C
Temperature related force increase: ± 0.3%/°C
Max. recommended extensions per minute: approx. 50 to 100 (at 20°C)
Max. piston speed: 1.6 m/s

2487.82.01000.



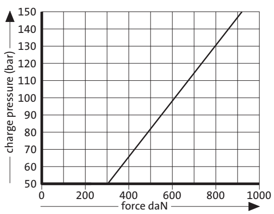




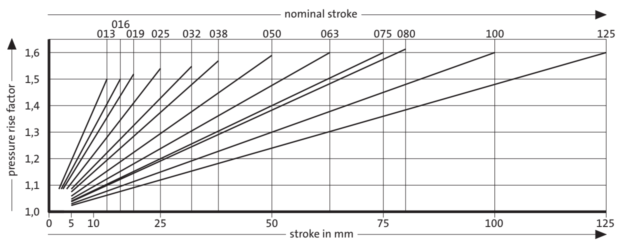
2487.82.01000.
Gas spring with male fixing thread, POWERLINE

Order No	Stroke$_{max.}$	l$_{min.}$	l
2487.82.01000.013	13	51	64
2487.82.01000.016	16	54	70
2487.82.01000.019	19	57	76
2487.82.01000.025	25	63	88
2487.82.01000.032	32	70	102
2487.82.01000.038	38	76	114
2487.82.01000.050	50	88	138
2487.82.01000.063	63	101	164
2487.82.01000.075	75	113	188
2487.82.01000.080	80	118	198
2487.82.01000.100	100	138	238
2487.82.01000.125	125	163	288

Initial spring force
versus charge pressure



Spring force Diagram displacement versus stroke rise



Pressure rise factor accounts for displacement but not external influences!

Gas Spring ACCESSORIES

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.

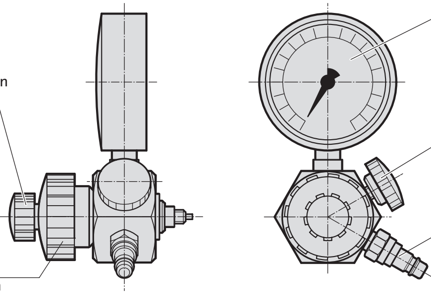
The fitting is equipped with an additional adapter 2480.00.32.11 for connecting to gas springs with G 1/8 valve connection as standard.

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.

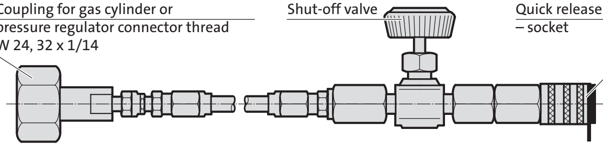
2480.00.32.21 Filling and control fitting



Connecting adapter for cylinder connector

Order No.	Country	For cylinder connector
2480.00.31.02.00.10	France	AFNOR C, W21,8x1/14
2480.00.31.02.00.11	China	G 5/8-ISO228
2480.00.31.02.00.12	Great Britain	G 5/8

2480.00.31.02 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.

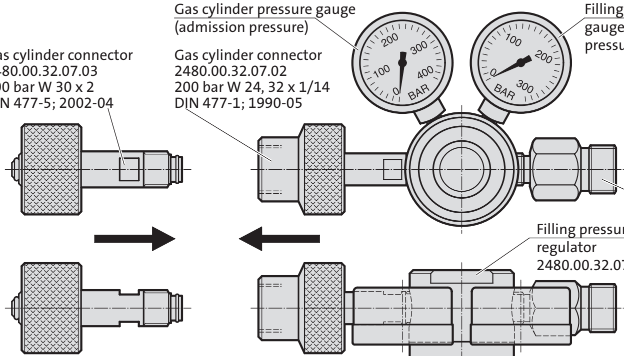
Depending on the type of gas cylinder, the gas cylinder connector used can either be the 2480.00.32.07.02 for 200 bar cylinders or the 2480.00.32.07.03 for 300 bar cylinders.

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.

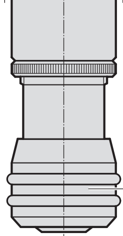
2480.00.32.07. Gas cylinder pressure regulator



Order No	for gas cylinder pressure 200/300 bar
2480.00.32.07.01	Pressure regulator
2480.00.32.07.02	Gas cylinder connector 200 bar
2480.00.32.07.03	Gas cylinder connector 300 bar
2480.00.32.07.04	Connector adaptor

Order No	for gas cylinder pressure 200 bar
2480.00.32.07.01	Pressure regulator
2480.00.32.07.02	Gas cylinder connector 200 bar
2480.00.32.07.04	Connector adaptor

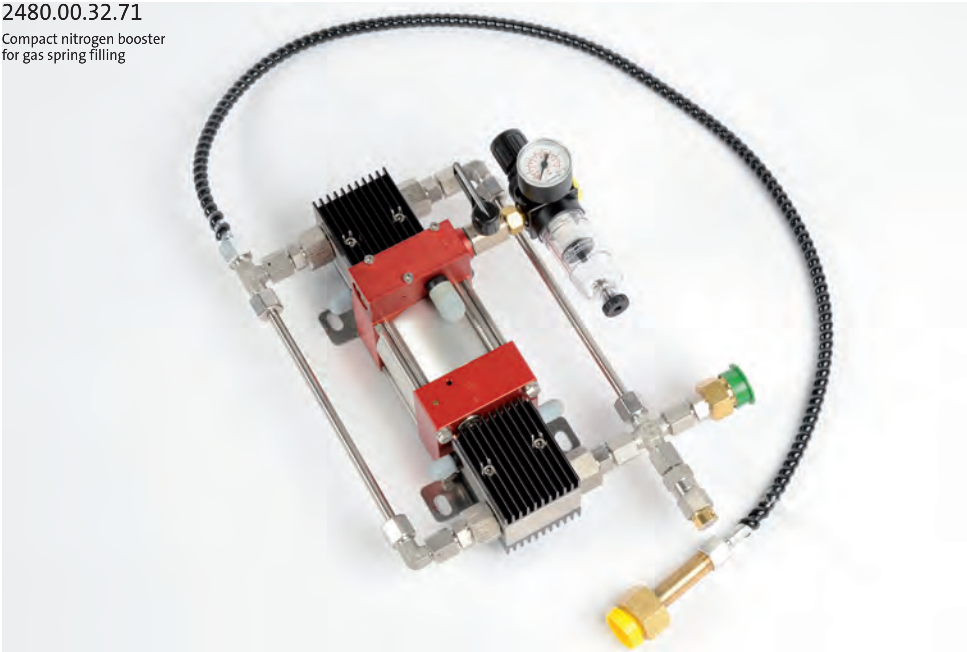
Order No	for gas cylinder pressure 300 bar
2480.00.32.07.01	Pressure regulator
2480.00.32.07.03	Gas cylinder connector 300 bar
2480.00.32.07.04	Connector adaptor



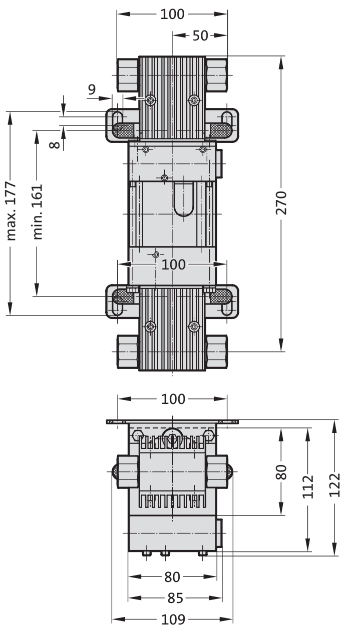
Compact nitrogen booster for gas spring filling

2480.00.32.71

Compact nitrogen booster
for gas spring filling



2480.00.32.71



Description:

The FIBRO compact nitrogen booster 2480.00.32.71 was developed to compress nitrogen gas. It increases the output pressure of the nitrogen cylinders considerably.

For example, when filling gas springs, the N_2 cylinders can be used up to a residual pressure of 30 bar.

Advantages:

- ▶ Increase in utilisation capacity
- ▶ Reduction in cylinder replacement time
- ▶ Minimisation of the number of cylinders
- ▶ Light weight (7.2 kg)
- ▶ Compact design
- ▶ Suitable for simple installation directly on all standard nitrogen cylinders (200 bar)

Function:

The FIBRO compact nitrogen booster works according to the principle of a pressure relay valve. Low pressure is applied to a large surface, which in turns applies high pressure to a small surface. Continuous delivery is achieved by means of an internally actuated 4/2-way valve.

Compressed air is used as the drive mechanism.

A holding plate is included to secure the compact nitrogen booster to the nitrogen cylinder. The compact nitrogen booster is simply hung over the nitrogen cylinder connection.

Compact nitrogen booster for gas spring filling
Holding plate

Connection diagram

Compact nitrogen booster

2480.00.32.71.02 Holding plate

for re-order

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 G$^1/_4$ 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 N_2 cylinder connection 200 bar

Nitrogen outlet:
N_2 cylinder connection 200 bar W24, 32 x 1/14

Max. operating temperature: 60°C

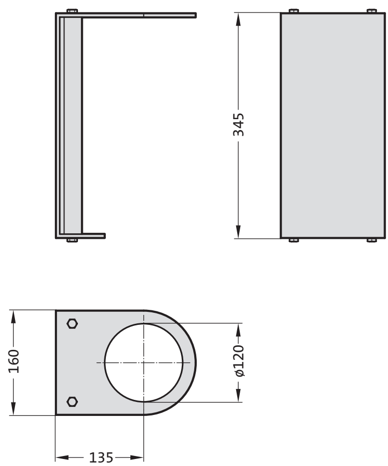
Weight: approx. 7.2 kg

Inlet pressure: 30-300 bar

Average supply rate*: 280 NL/min

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

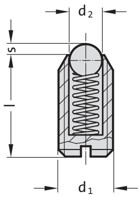
2480.00.32.71.02



SPRING PLUNGER

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

2471.01.



Material:

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

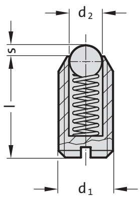
Note:

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

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

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

2471.31.



Material:

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

Note:

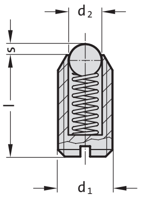
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C

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

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

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

2471.02.



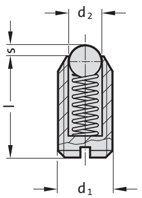
2471.02. Spring plunger, with spring loaded ball, with slot, increased spring force

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

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

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

2471.32.



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

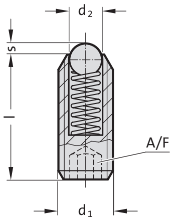
Order No	d_1	l	s	d_2	Spring force [N] initial	Spring force [N] final
2471.32.005	M5	12	0.9	3	15	22
2471.32.006	M6	14	1	3.5	19	28
2471.32.008	M8	16	1.5	4.5	36	62
2471.32.010	M10	19	2	6	57	104
2471.32.012	M12	22	2.5	8	61	110
2471.32.016	M16	24	3.5	10	68	142
2471.32.020	M20	30	4.5	12	84	166
2471.32.024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

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

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

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

2471.03.



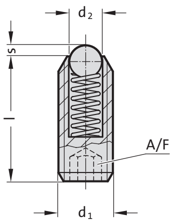
Material:
Sleeve: Free machining steel, burnished
Ball: Hardened ball bearing steel
Spring: Nirosta

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

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

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

2471.33.



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

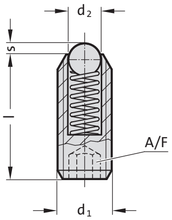
Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: max. 250°C

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

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

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

2471.04.



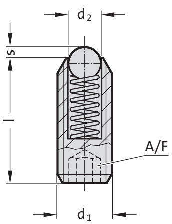
2471.04. Spring plunger, with spring loaded ball, with hexagon socket, increased spring force

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

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

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

2471.34.



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

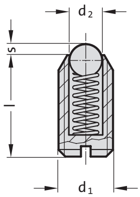
Order No	d_1	d_2	A/F	l	s	Spring force [N] initial	Spring force [N] final
2471.34.005	M5	3	2.5	14	0.9	15	22
2471.34.006	M6	3.5	3	15	1	19	28
2471.34.008	M8	4.5	4	18	1.5	36	62
2471.34.010	M10	6	5	23	2	57	104
2471.34.012	M12	8	6	26	2.5	61	110
2471.34.016	M16	10	8	33	3.5	68	142
2471.34.020	M20	12	10	43	4.5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

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

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

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

2471.05.



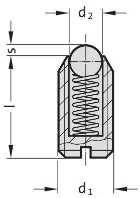
Material:
Sleeve: Delrin blue (POM)
Ball: Delrin white (POM)
Spring: Nirosta

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

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

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

2471.35.



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

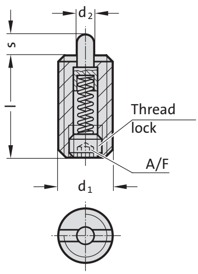
Note:
For locking and for pressing upwards or downwards.
Admissible temperature range: -30°C to +50°C

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

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

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

2472.01.



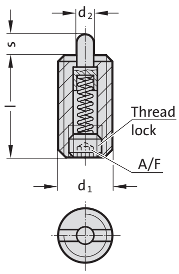
2472.01. Spring plunger, with spring loaded pin, with slot, standard spring force

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

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

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

2472.31.



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

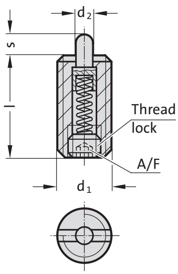
Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.31.004	M4	1.5	15	1.5	1.3	4.5	16
2472.31.005	M5	2.4	18	2.3	1.5	6	19
2472.31.006	M6	2.7	20	2.5	2	6	19
2472.31.008	M8	3.5	22	3	2.5	10	39
2472.31.010	M10	4	22	3	3	10	39
2472.31.012	M12	6	28	4	4	12	53
2472.31.016	M16	7.5	32	5	5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

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

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

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

2472.21.



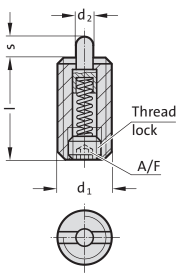
Material:
Sleeve: Free machining steel, burnished
Pin: Delrin white (POM)
Spring: Nirosta

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

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

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

2472.22.



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

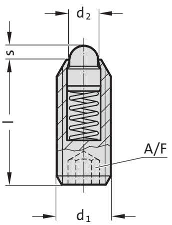
Note:
For locking and for pressing upwards or downwards. Removable with hexagon socket screw key or slotted screwdriver.

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

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

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

2472.03.



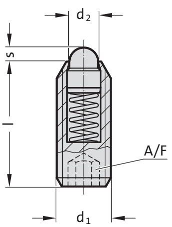
2472.03. Spring plunger, with spring loaded pin, with hexagon socket, standard spring force

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

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

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

2472.33.



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

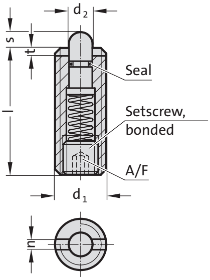
Order No	d_1	d_2	l	s	A/F	Spring force [N] initial	Spring force [N] final
2472.33.004	M4	1.8	12	1.5	2	4.5	12.5
2472.33.005	M5	2.4	14	2	2.5	5	13
2472.33.006	M6	2.7	15	2	3	6	17
2472.33.008	M8	3.8	18	2	4	16	33
2472.33.010	M10	4.5	23	2.5	5	19	42
2472.33.012	M12	6	26	3.5	6	22	57
2472.33.016	M16	8.5	33	4.5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

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

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

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

2472.07.



Material:

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

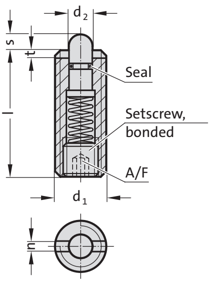
Note:

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

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

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

2472.37.



Material:

Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

Note:

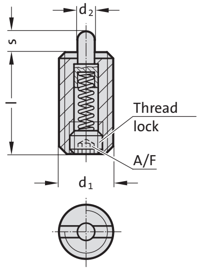
For locking and for pressing upwards or downwards. The seal prevents the ingress of liquids into the forcing pin. Assembly and dismantling using hexagon socket key and slotted screwdriver.
Temperature operating range: –30°C up to 80°C

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

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

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

2472.02.



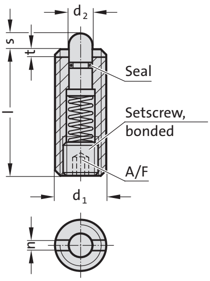
2472.02. Spring plunger, with spring loaded pin, with slot, increased spring force

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

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

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

2472.08.



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

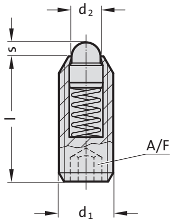
Order No	d_1	d_2	l	n	s	t	A/F	Spring force [N] initial	Spring force [N] final
2472.08.008	M8	3.8	26	1.5	3	1.4	2.5	17	39
2472.08.010	M10	4	28	1.5	3.5	1.4	3	22	43
2472.08.012	M12	6	35	2.7	4	2	4	40	80
2472.08.016	M16	7.5	40	3.2	5	2.5	5	44	113

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

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

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

2472.04.



Material:

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

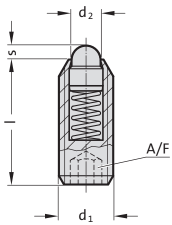
Note:

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

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

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

2472.34.



Material:

Sleeve: Nirosta 1.4305
Pin: Nirosta 1.4305
Spring: Nirosta

Note:

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

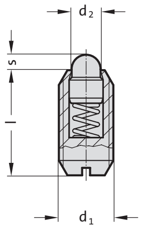
2472.34. Spring plunger, with spring loaded pin, with hexagon socket, increased spring force

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

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

FIBRO

2472.05.



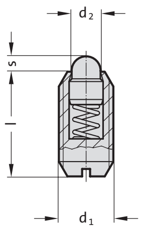
2472.05. Spring plunger, with spring loaded pin, with slot, standard spring force

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

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

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

2472.35.



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

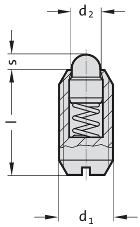
Order No	d_1	d_2	l	s	Spring force [N] initial	Spring force [N] final
2472.35.004	4	1.8	9	1.5	4.5	12.5
2472.35.005	5	2.4	12	2	5	13
2472.35.006	6	2.7	14	2	6	17
2472.35.008	8	3.8	16	2	16	33
2472.35.010	10	4.5	19	2.5	19	42
2472.35.012	12	6.2	22	3.5	22	57
2472.35.016	16	8.5	24	4.5	38	78
2472.35.020	20	10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

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

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

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

2472.06.



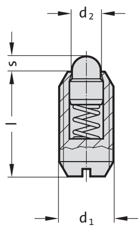
Material:
Sleeve: Free machining steel, burnished
Pin: Free machining steel hardened, burnished
Spring: Nirosta

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

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

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

2472.36.



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

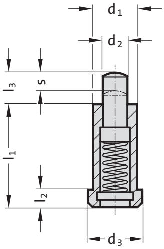
Note:
For locking and for pressing upwards or downwards.
Temperature operating range: max. 250°C
Identification of increased spring force by two longitudinal marks on the sleeve.

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

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

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

2473.01.



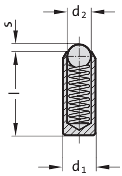
2473.01. Spring plunger, with spring loaded pin, straight version, with collar

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

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

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

2473.02.



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

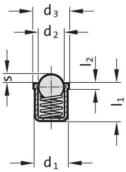
Order No	d_1	d_2	l	s	Spring force [N] initial	Spring force [N] final
2473.02.030	3	2	7	0.65	4.5	7.5
2473.02.035	3.5	2.5	9	0.8	6	14.5
2473.02.040	4	3	11	0.9	8	14
2473.02.045	4.5	3.2	12	0.95	9.5	16.5
2473.02.050	5	3.5	13	1	11	18
2473.02.055	5.5	4	14	1.2	15.5	25
2473.02.060	6	4.5	15	1.5	18	31

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

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

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

2475.01.



Material:

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

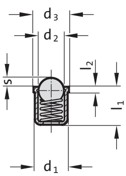
Note:

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

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

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

2475.02.



Material:

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

Note:

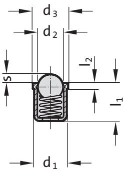
For locking and for pressing upwards or downwards.
Temperature operating range: –30°C to +50°C

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

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

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

2475.03.



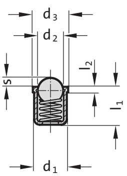
2475.03. Spring plunger, with spring loaded ball, straight version, with collar

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

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

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

2475.04.



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

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

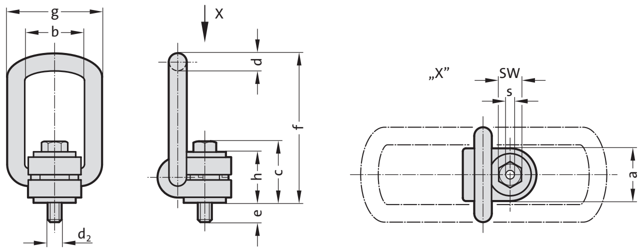
Material:
Sleeve: Nirosta 1.4303
Ball: Nirosta hardened
Spring: Nirosta

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

LIFTING AND CLAMPING DEVICES

Hoisting snap link, omnidirectional

2131.33.



Description:

The hinged unit is free to rotate through 360°, self-align with the direction of pull and folding. The hoisting Snap Link must be installed in the stress direction before loading, must be able to move freely and may not be supported at an angle.
Do not rotate under load.
Full load bearing capacity in any direction.
Complete with a 100% crack-checked outer and inner hexagonal bolt for universal tool use.

Material:

Alloyed tool steel

Note:

Ensure even screw-in surface, threads must be screwed in completely.

2131.33. Hoisting snap link, omnidirectional

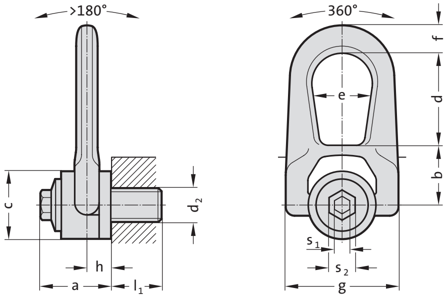
Order No	Rated carrying capacity [t]	d_2	e	g	a	b	c	d	f	h	s	SW	Tightening torque [Nm]
2131.33.008.055	0.3	M8	12	55	30	35	35	11	84	28	6	13	30
2131.33.010.055	0.63	M10	16	55	30	35	36	11	86	29	6	17	60
2131.33.012.057	1	M12	18	57	33	37	44	14	98	36	8	19	100
2131.33.014.057	1.2	M14	21	57	33	37	45	14	98	36	10	22	120
2131.33.016.057	1.5	M16	24	57	33	37	46	14	98	36	10	24	150
2131.33.018.082	2	M18	26	82	50	54	57	17	142	44	12	30	200
2131.33.020.082	2.5	M20	30	82	50	54	57	17	142	44	12	30	250
2131.33.024.082	4	M24	36	82	50	54	59	17	142	44	14	36	400
2131.33.027.099	4	M27	38	99	60	65	79	23	170	62	17	41	400
2131.33.030.099	5	M30	48	99	60	65	81	23	170	62	17	46	500
2131.33.036.099	7	M36	54	99	60	65	86	23	177	63	22	55	700
2131.33.036.124	8	M36	62	124	77	85	101	27	225	78	22	55	800
2131.33.042.124	10	M42	72	124	77	85	104	27	225	78.5	24	65	1000
2131.33.042.158	15	M42	63	158	95	104	115	36	256	89	24	65	1500
2131.33.048.158	20	M48	72	158	95	104	119	36	258	89	27	75	2000

Max. carrying capacity "G" in tonnes for various types of attachment

Type of attachment, Arrangement of the suspension points	G	G	G	G	G		G		G	G
Number of lines	1	1	2	2	2 symmetrical		3 and 4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymmetrical	asymmetrical
Order No	carrying capacity in tonnes									
2131.33.008.055	0.3	0.3	0.6	0.6	0.42	0.3	0.63	0.45	0.3	0.3
2131.33.010.055	0.63	0.63	1.26	1.26	0.88	0.63	1.32	0.95	0.63	0.63
2131.33.012.057	1	1	2	2	1.4	1	2.1	1.5	1	1
2131.33.014.057	1.2	1.2	2.4	2.4	1.7	1.2	2.5	1.8	1.2	1.2
2131.33.016.057	1.5	1.5	3	3	2.1	1.5	3.1	2.2	1.5	1.5
2131.33.018.082	2	2	4	4	2.8	2	4.2	3	2	2
2131.33.020.082	2.5	2.5	5	5	3.5	2.5	5.2	3.7	2.5	2.5
2131.33.024.082	4	4	8	8	5.6	4	8.4	6	4	4
2131.33.027.099	4	4	8	8	5.6	4	8.4	6	4	4
2131.33.030.099	5	5	10	10	7	5	10.5	7.5	5	5
2131.33.036.099	7	7	14	14	9.8	7	14.7	10.5	7	7
2131.33.036.124	8	8	16	16	11.2	8	16.8	12	8	8
2131.33.042.124	10	10	20	20	14	10	21	15	10	10
2131.33.042.158	15	15	30	30	21	15	31.5	22.5	15	15
2131.33.048.158	20	20	40	40	28	20	42	30	20	20

Double vortice ring

2131.37.



Description:

The double vortex ring was especially designed to guarantee lifting under rotation.
Its double joint permits a perfect alignment for load suspension.

Material:

High-strength chrome-nickle alloyed Q & T steel,
Screws: high-strength screws, min. strength category 10.9, 100 % crack inspected

Note:

Ensure even screw-in surface, threads must be screwed in completely.
The threaded connection on the transport belt must be suitable for the force transmission.
Each attachment point is provided with an individual serial number
Information about installation and removal, see operating instructions.
Load capacity according to operating instructions or load capacity table in the specified directions of pull.

When selecting the arrangement, make sure that unequal loading does not occur, e.g. if:
- no free adjustment is possible in the direction of pull
- direction of pull does not lie in the specified range
Safety factor 5

2131.37. Double vortice ring

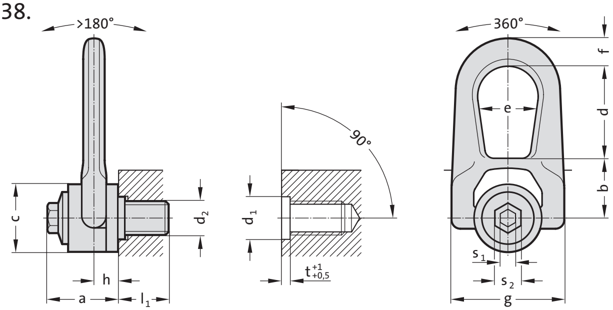
Order No	Rated carrying capacity [t]	d_2	l_1	s_1	s_2	a	b	c	d	e	f	g	h	Tightening torque [Nm]
2131.37.004	0.05	M4	15	3	16	33	30	30	38	27	14	53	9.5	2
2131.37.005	0.075	M5	15	4	16	33	30	30	38	27	14	53	9.5	3
2131.37.006	0.1	M6	15	5	16	33	30	30	38	27	14	53	9.5	4
2131.37.008	0.3	M8	14	8	16	33	30	30	38	27	14	53	9.5	6
2131.37.010	0.6	M10	17	8	16	33	30	30	38	27	14	53	9.5	10
2131.37.012	1	M12	21	8	16	33	30	30	38	27	14	53	9.5	15
2131.37.014	1.3	M14	23	8	20	45	42	45	54	38	17	76	13	30
2131.37.016	1.6	M16	27	8	20	45	42	45	54	38	17	76	13	50
2131.37.018	2	M18	27	8	20	45	42	45	54	38	17	76	13	70
2131.37.020	2.5	M20	30	8	20	45	42	45	54	38	17	76	13	100
2131.37.022	3	M22	33	14	24	62	55	60	83	55	25	117	19	120
2131.37.024	4	M24	36	14	24	62	55	60	83	55	25	117	19	160
2131.37.027	5	M27	40	14	24	62	55	60	83	55	25	117	19	160
2131.37.030	6.3	M30	45	14	24	62	55	60	83	55	25	117	19	250

Max. carrying capacity "G" in tonnes for various types of attachment

Type of attachment, Arrangement of the suspension points	G	G	G	G	G		G		G	G
Number of lines	1	1	2	2	2 symmetrical		3+4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymmetrical	asymmetrical
Order No	carrying capacity in tonnes									
2131.37.004	0.05	0.05	0.1	0.1	0.07	0.05	0.1	0.05	0.05	0.05
2131.37.005	0.075	0.075	0.15	0.15	0.1	0.6	0.15	0.075	0.075	0.05
2131.37.006	0.1	0.1	0.2	0.2	1.4	0.1	0.2	0.1	0.1	0.1
2131.37.008	0.3	0.3	0.6	0.6	0.4	0.3	0.6	0.3	0.3	0.3
2131.37.010	0.6	0.6	1.2	1.2	0.8	0.6	1.3	0.6	0.6	0.6
2131.37.012	1	1	2	2	1.4	1	2.1	1	1	1
2131.37.014	1.3	1.3	2.6	2.6	1.8	1.3	2.7	1.3	1.3	1.3
2131.37.016	1.6	1.6	3.2	3.2	2.2	1.6	3.4	1.6	1.6	1.6
2131.37.018	2	2	4	4	2.8	2	4.2	2	2	2
2131.37.020	2.5	2.5	5	5	3.5	2.5	5.3	2.5	2.5	2.5
2131.37.022	3	3	6	6	4.2	3	6.3	3	3	3
2131.37.024	4	4	8	8	5.6	4	8.4	4	4	4
2131.37.027	5	5	10	10	7	5	10.5	5	5	5
2131.37.030	6.3	6.3	12.6	12.6	8.8	6.3	13.2	6.3	6.3	6.3

Double vortice ring with central device

2131.38.



Description:

The double vortex ring with centring device was especially designed to guarantee lifting under rotation.
The centring device increases the resistance of the axis in case of lateral mounting.

Material:

High-strength chrome-nickle alloyed Q & T steel,
Screws: high-strength screws, min. strength category 10.9, 100 % crack inspected

Note:

Ensure even screw-in surface, threads must be screwed in completely.
The threaded connection on the transport belt must be suitable for the force transmission.
Each attachment point is provided with an individual serial number
Information about installation and removal, see operating instructions.
Load capacity according to operating instructions or load capacity table in the specified directions of pull.

When selecting the arrangement, make sure that unequal loading does not occur, e.g. if:
- no free adjustment is possible in the direction of pull
- direction of pull does not lie in the specified range
Safety factor 5

2131.38. Double vortice ring with central device

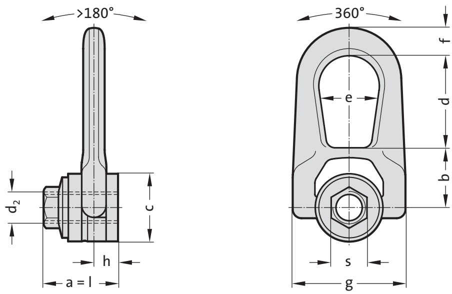
Order No	Rated carrying capacity [t]	d_2	l_1	s_1	s_2	a	b	c	d	e	f	g	h	d_1	Tolerance d_1	t	Tightening torque [Nm]
2131.38.004	0.05	M4	15	3	16	33	30	30	38	27	14	53	9.5	16	+0,25/0	3	2
2131.38.005	0.075	M5	15	4	16	33	30	30	38	27	14	53	9.5	16	+0,25/0	3	3
2131.38.006	0.1	M6	15	5	16	33	30	30	38	27	14	53	9.5	16	+0,25/0	3	4
2131.38.008	0.5	M8	14	8	16	33	30	30	38	27	14	53	9.5	16	+0,25/0	3	6
2131.38.010	0.8	M10	17	8	16	33	30	30	38	27	14	53	9.5	20	+0,25/0	3	10
2131.38.012	1.2	M12	21	8	16	33	30	30	38	27	14	53	9.5	20	+0,25/0	3	15
2131.38.014	1.3	M14	23	8	20	45	42	45	54	38	17	76	13	20	+0,30/0	3	30
2131.38.016	2	M16	27	8	20	45	42	45	54	38	17	76	13	20	+0,30/0	3	50
2131.38.018	2	M18	27	8	20	45	42	45	54	38	17	76	13	30	+0,30/0	3	70
2131.38.020	2.7	M20	30	8	20	45	42	45	54	38	17	76	13	30	+0,30/0	3	100
2131.38.022	3	M22	33	14	24	62	55	60	83	55	25	117	19	30	+0,30/0	4	120
2131.38.024	5	M24	36	14	24	62	55	60	83	55	25	117	19	30	+0,30/0	4	160
2131.38.027	5	M27	40	14	24	62	55	60	83	55	25	117	19	36	+0,30/0	4	200
2131.38.030	6.3	M30	45	14	24	62	55	60	83	55	25	117	19	36	+0,30/0	4	250

Max. carrying capacity "G" in tonnes for various types of attachment

Type of attachment, Arrangement of the suspension points	G	G	G	G	G		G		G	G
Number of lines	1	1	2	2	2 symmetrical		3+4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymmetrical	asymmetrical
Order No	carrying capacity in tonnes									
2131.38.004	0.05	0.05	0.1	0.1	0.07	0.05	0.1	0.05	0.05	0.05
2131.38.005	0.075	0.075	0.15	0.15	0.1	0.075	0.15	0.075	0.075	0.075
2131.38.006	0.1	0.1	0.2	0.2	0.14	0.1	0.21	0.1	0.1	0.1
2131.38.008	0.5	0.5	1	1	0.7	0.5	1.05	0.5	0.5	0.5
2131.38.010	0.8	0.8	1.6	1.6	1.12	0.8	1.68	0.8	0.8	0.8
2131.38.012	1.2	1.2	2.4	1.68	1.2	1.2	2.52	1.2	1.2	1.2
2131.38.014	1.3	1.3	2.6	2.6	1.82	1.3	2.73	1.3	1.3	1.3
2131.38.016	2	2	4	4	2.8	2	4.2	2	2	2
2131.38.018	2	2	4	4	2.8	2	4.2	2	2	2
2131.38.020	2.7	2.7	5.4	5.4	3.78	2.7	5.67	2.7	2.7	2.7
2131.38.022	3	3	6	6	4.2	3	6.3	3	3	3
2131.38.024	5	5	10	10	7	5	10.5	5	5	5
2131.38.027	5	5	10	10	7	5	10.5	5	5	5
2131.38.030	6.3	6.3	12.6	12.6	8.82	6.3	13.23	6.3	6.3	6.3

Double vortice ring with internal thread

2131.39.



Description:

The double vortex ring with internal thread was especially designed to guarantee lifting under rotation.
Its double joint permits a perfect alignment for load suspension.

Material:

High-strength chrome-nickle alloyed Q & T steel

Note:

Ensure even screw-in surface, threads must be screwed in completely. The threaded connection on the transport belt must be suitable for the force transmission.

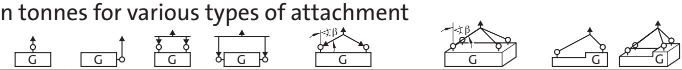
Each attachment point is provided with an individual serial number
Information about installation and removal, see operating instructions.
Load capacity according to operating instructions or load capacity table in the specified directions of pull.

When selecting the arrangement, make sure that unequal loading does not occur, e.g. if:
- no free adjustment is possible in the direction of pull
- direction of pull does not lie in the specified range
Safety factor 5

2131.39. Double vortice ring with internal thread

Order No	Rated carrying capacity [t]	d_2	l	s	a	b	c	d	e	f	g	h	Tightening torque [Nm]
2131.39.008	0.3	M8	45	20	45	42	45	54	38	17	76	13	6
2131.39.010	0.6	M10	45	20	45	42	45	54	38	17	76	13	10
2131.39.012	1	M12	45	20	45	42	45	54	38	17	76	13	15
2131.39.014	1	M14	45	20	45	42	45	54	38	17	76	13	30
2131.39.016	1.6	M16	45	20	45	42	45	54	38	17	76	19	50
2131.39.018	2	M18	62	24	62	55	60	83	55	25	117	19	70
2131.39.020	2.5	M20	62	24	62	55	60	83	55	25	117	19	100
2131.39.022	3	M22	62	24	62	55	60	83	55	25	117	19	120

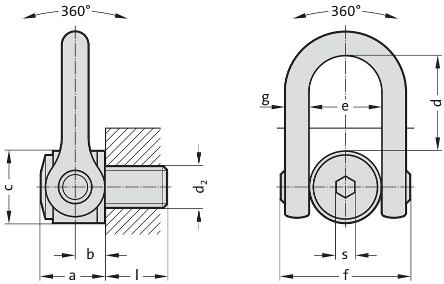
Max. carrying capacity “G” in tonnes for various types of attachment



Type of attachment, Arrangement of the suspension points										
Number of lines	1	1	2	2	2 symmetrical		3+4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymme-trical	asymme-trical
Order No	carrying capacity in tonnes									
2131.39.008	0.3	0.3	0.6	0.6	0.4	0.3	0.6	0.3	0.3	0.3
2131.39.010	0.6	0.6	1.2	1.2	0.8	0.6	1.3	0.6	0.6	0.6
2131.39.012	1	1	2	2	1.4	1	2.1	1	1	1
2131.39.014	1.3	1.3	2.6	2.6	1.8	1.3	2.7	1.3	1.3	1.3
2131.39.016	1.6	1.6	3.2	3.2	2.2	1.6	3.4	1.6	1.6	1.6
2131.39.018	2	2	4	4	2.8	2	4.2	2	2	2
2131.39.020	2.5	2.5	5	5	3.5	2.5	5.3	2.5	2.5	2.5
2131.39.022	3	3	6	6	4.2	3	6.3	3	3	3

Double vortex ring screw

2131.40.



Description:
The double vortex ring screw was especially designed for the lifting and rotating of heavy loads.
Load bearing capacity in all directions and perfect alignment for load suspension.

Material:
High-strength chrome-nickle alloyed Q & T steel,
Screws: high-strength screws, min. strength category 10.9, 100 % crack inspected

Note:
Ensure even screw-in surface, threads must be screwed in completely.

The threaded connection on the transport belt must be suitable for the force transmission.
Each attachment point is provided with an individual serial number
Information about installation and removal, see operating instructions.
Load capacity according to operating instructions or load capacity table in the specified directions of pull.

When selecting the arrangement, make sure that unequal loading does not occur, e.g. if:
- no free adjustment is possible in the direction of pull
- direction of pull does not lie in the specified range
Safety factor 5 - 2131.40.024 through 2131.40.042
Safety factor 4 - 2131.40.045 through 2131.40.100

2431.40. Double vortex ring screw

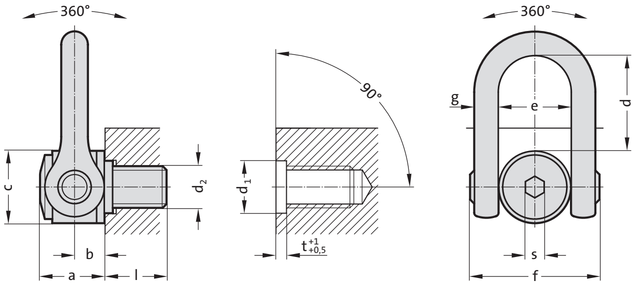
Order No	Rated carrying capacity [t]	d_2	l	s	a	b	c	d	e	f	g	Tightening torque [Nm]
2131.40.024	4.5	M24	36	19	61	31	70	104	73	145	29	160
2131.40.030	7.3	M30	45	19	61	31	70	104	73	145	29	250
2131.40.033	8	M33	50	19	61	31	70	104	73	145	29	250
2131.40.036	10	M36	54	19	61	31	70	104	73	145	29	320
2131.40.039	10	M39	58	19	61	31	70	104	73	145	29	320
2131.40.042	12.5	M42	63	19	61	31	70	104	73	145	29	400
2131.40.045	15	M45	63	19	61	31	70	104	73	145	29	400
2131.40.048	20	M48	68	19	79	38	90	125	91	184	36	600
2131.40.052	20	M52	68	19	79	38	90	125	91	184	36	600
2131.40.056	25	M56	78	19	79	38	90	125	91	184	36	600
2131.40.064	32.1	M64	90	19	79	38	95	125	91	184	36	600
2131.40.072	25	M72	90	19	79	38	95	125	91	184	36	600
2131.40.080	32.1	M80	90	19	79	38	95	125	91	184	36	600
2131.40.090	32.1	M90	90	19	79	38	95	125	91	184	36	600
2131.40.100	32.1	M100	90	19	79	38	95	125	91	184	36	600

Max. carrying capacity "G" in tonnes for various types of attachment

Type of attachment, Arrangement of the suspension points	G	G	G	G	G		G		G	G
Number of lines	1	1	2	2	2 symmetrical		3+4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymme-trical	asymme-trical
Order No	carrying capacity in tonnes									
2131.40.024	4.5	4.5	9	9	6.3	4.5	9.5	4.5	4.5	4.5
2131.40.030	7.3	7.3	14.6	14.6	10.2	7.3	15.3	7.3	7.3	4.5
2131.40.033	8	8	16	16	11.2	8	16.8	8	8	8
2131.40.036	10	10	20	20	14	10	21	10	10	10
2131.40.039	10	10	20	20	14	10	21	10	10	10
2131.40.042	12.5	12.5	25	25	17.5	12.5	26.3	12.5	12.5	12.5
2131.40.045	15	15	30	30	21	15	31.5	15	15	15
2131.40.048	20	20	40	40	28	20	42	20	20	20
2131.40.052	20	20	40	40	28	20	42	20	20	20
2131.40.056	25	25	50	50	35	25	52.5	25	25	25
2131.40.064	32.1	32.1	64.2	64.2	44.9	32.1	67.4	32.1	32.1	32.1
2131.40.072	25	25	50	50	35	25	52.5	25	25	32.1
2131.40.080	32.1	32.1	64.2	64.2	44.9	32.1	67.4	32.1	32.1	32.1
2131.40.090	32.1	32.1	64.2	64.2	44.9	32.1	67.4	32.1	32.1	32.1
2131.40.100	32.1	32.1	64.2	64.2	44.9	32.1	67.4	32.1	32.1	32.1

Double vortex ring screw with centring

2131.41.



Description:

The double vortex ring screw with centring device was especially designed for the lifting and rotating of heavy loads. The centring device increases the resistance of the axis in case of lateral mounting.
Load bearing capacity in all directions and perfect alignment for load suspension.

Material:

High-strength chrome-nickle alloyed Q & T steel,
Screws: high-strength screws, min. strength category 10.9, 100 % crack inspected

Note:

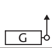
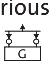
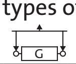
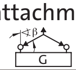
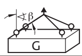
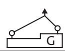
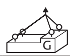
Ensure even screw-in surface, threads must be screwed in completely.
The threaded connection on the transport belt must be suitable for the force transmission.
Each attachment point is provided with an individual serial number
Information about installation and removal, see operating instructions.
Load capacity according to operating instructions or load capacity table in the specified directions of pull.

When selecting the arrangement, make sure that unequal loading does not occur, e.g. if:
- no free adjustment is possible in the direction of pull
- direction of pull does not lie in the specified range
Safety factor 5 - 2131.41.024 through 2131.41.042
Safety factor 4 - 2131.41.045 through 2131.41.064

2134.41. Double vortex ring screw with centring

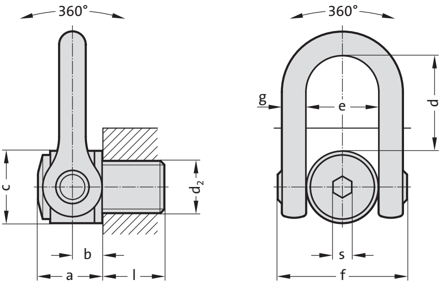
Order No	Rated carrying capacity [t]	d_2	l	s	a	b	c	d	e	f	g	d_1	Tolerance d_1	t	Tightening torque [Nm]
2131.41.024	5	M24	36	19	61	31	70	104	73	145	29	30	+0,3/0	4	160
2131.41.030	8	M30	45	19	61	31	70	104	73	145	29	36	+0,3/0	4	250
2131.41.033	8	M33	50	19	61	31	70	104	73	145	29	48	+0,3/+0,1	6	250
2131.41.036	11	M36	54	19	61	31	70	104	73	145	29	48	+0,5/+0,1	6	320
2131.41.042	13	M42	63	19	61	31	70	104	73	145	29	48	+0,5/+0,1	6	400
2131.41.045	15	M45	63	19	61	31	70	104	73	145	29	48	+0,5/+0,1	8	400
2131.41.048	22	M48	68	19	79	38	90	125	91	184	36	64	+0,6/+0,1	8	600
2131.41.056	26	M56	78	19	79	38	90	125	91	184	36	64	+0,6/+0,1	8	600
2131.41.064	32.1	M64	90	19	79	38	95	125	91	184	36	74	+0,6/+0,1	10	600

Max. carrying capacity “G” in tonnes for various types of attachment

Type of attachment, Arrangement of the suspension points										
Number of lines	1	1	2	2	2 symmetrical		3+4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymmetrical	asymmetrical
Order No	carrying capacity in tonnes									
2131.41.024	5	5	10	10	7	5	10.5	5	5	5
2131.41.030	8	8	16	16	11.2	8	16.8	8	8	8
2131.41.033	8	8	16	16	11.2	8	16.8	8	8	8
2131.41.036	11	11	22	22	15.4	11	23.1	11	11	11
2131.41.042	13	13	26	26	18.2	13	27.3	13	13	13
2131.41.045	15	15	30	30	21	15	31.5	15	15	15
2131.41.048	22	22	44	44	30.8	22	46.2	22	22	22
2131.41.056	26	26	52	52	36.4	26	54.6	26	26	26
2131.41.064	32.1	32.1	64.2	64.2	44.9	32.1	67.4	32.1	32.1	32.1

Double vortex ring screw Mega DSS

2131.42.



Description:
The Mega double vortex ring screw was specially designed to lift and rotate under a load of up to 50 tons. It can be used directly with the lifting equipment (hook of the travelling crane).
Load bearing capacity in all directions and perfect alignment for load suspension.

Material:
High-strength chrome-nickle alloyed Q & T steel,
Screws: high-strength screws, min. strength category 10.9, 100 % crack inspected

Note:
Ensure even screw-in surface, threads must be screwed in completely.
The threaded connection on the transport belt must be suitable for the force transmission.
Each attachment point is provided with an individual serial number
Information about installation and removal, see operating instructions.
Load capacity according to operating instructions or load capacity table in the specified directions of pull.

When selecting the arrangement, make sure that unequal loading does not occur, e.g. if:
- no free adjustment is possible in the direction of pull
- direction of pull does not lie in the specified range
Safety factor 4

2131.42. Double vortex ring screw Mega DSS

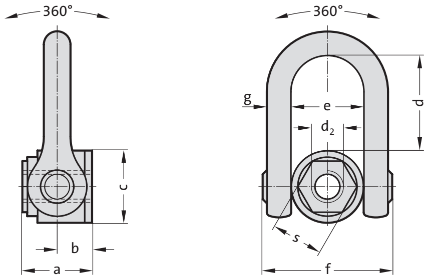
Order No	Rated carrying capacity [t]	d_2	l	s	a	b	c	d	e	f	g	Tightening torque [Nm]
2131.42.064	33	M64	100	36	127.5	64.5	158	186	143	278	57.5	600
2131.42.072	35	M72	110	36	127.5	64.5	158	186	143	278	57.5	700
2131.42.080	40	M80	120	36	127.5	64.5	158	186	143	278	57.5	800
2131.42.090	45	M90	135	36	127.5	64.5	158	186	143	278	57.5	900
2131.42.100	50	M100	150	36	127.5	64.5	158	186	143	278	57.5	1000

Max. carrying capacity "G" in tonnes for various types of attachment

Type of attachment, Arrangement of the suspension points	G	G	G	G	G		G		G	G
Number of lines	1	1	2	2	2 symmetrical		3+4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymmetrical	asymmetrical
Order No	carrying capacity in tonnes									
2131.42.064	33	33	66	66	46	33	69	33	33	33
2131.42.072	35	35	70	70	49	35	74	35	35	35
2131.42.080	40	40	80	80	56	40	84	40	40	40
2131.42.090	45	45	90	90	63	45	95	45	45	45
2131.42.100	50	50	100	100	70	50	105	50	50	50

Double vortice ring with internal thread

2131.43.



Description:
The double vortex ring with internal thread was especially designed for the lifting and rotating of heavy loads.
Its double joint permits a perfect alignment for load suspension.

Material:
High-strength chrome-nickle alloyed Q & T steel

Note:
Ensure even screw-in surface, threads must be screwed in completely.
The threaded connection on the transport belt must be suitable for the force transmission.

Each attachment point is provided with an individual serial number
Information about installation and removal, see operating instructions.
Load capacity according to operating instructions or load capacity table in the specified directions of pull.

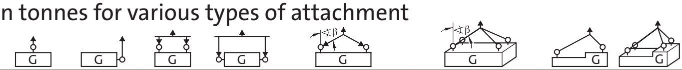
When selecting the arrangement, make sure that unequal loading does not occur, e.g. if:
- no free adjustment is possible in the direction of pull
- direction of pull does not lie in the specified range

Safety factor 5 - 2131.43.024 through 2131.43.042
Safety factor 4 - 2131.43.045 through 2131.43.052

2131.43. Double vortice ring with internal thread

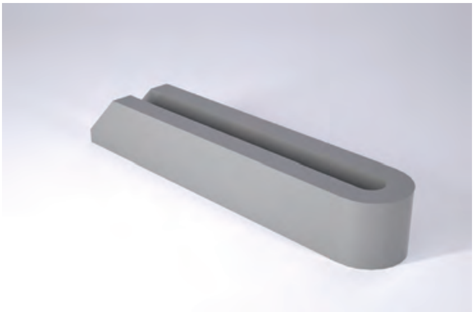
Order No	Rated carrying capacity [t]	d_2	l	s	a	b	c	d	e	f	g	Tightening torque [Nm]
2131.43.024	4.5	M24	66	50	66	31	70	104	73	145	29	160
2131.43.027	5	M27	66	50	66	31	70	104	73	145	29	200
2131.43.030	7.3	M30	66	50	66	31	70	104	73	145	29	250
2131.43.033	8	M33	66	50	66	31	70	104	73	145	29	250
2131.43.036	10	M36	66	50	66	31	70	104	73	145	29	320
2131.43.039	10	M39	89	60	89	38	95	125	91	184	36	320
2131.43.042	12.5	M42	89	60	89	38	95	125	91	184	36	400
2131.43.045	15	M45	89	60	89	38	95	125	91	184	36	400
2131.43.048	20	M48	89	60	89	38	95	125	91	184	36	600
2131.43.052	20	M52	89	60	89	38	95	125	91	184	36	600

Max. carrying capacity “G” in tonnes for various types of attachment

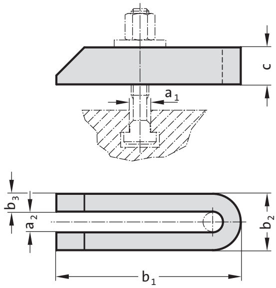


Type of attachment, Arrangement of the suspension points										
Number of lines	1	1	2	2	2 symmetrical		3+4 symmetrical		2	3 and 4
Angle of inclination/ load direction	0°	90°	0°	90°	0–45°	45–60°	0–45°	45–60°	asymme-trical	asymme-trical
Order No	carrying capacity in tonnes									
2131.43.024	4.5	4.5	9	9	6.3	4.5	9.5	4.5	4.5	4.5
2131.43.027	5	5	10	10	7	5	10.5	5	5	5
2131.43.030	7.3	7.3	14.6	14.6	10.2	7.3	15.3	7.3	7.3	7.3
2131.43.033	8	8	16	16	11.2	8	16.8	8	8	8
2131.43.036	10	10	20	20	14	10	21	10	10	10
2131.43.039	10	10	20	20	14	10	21	10	10	10
2131.43.042	12.5	12.5	25	25	17.5	12.5	26.3	12.5	12.5	12.5
2131.43.045	15	15	30	30	21	15	31.5	15	15	15
2131.43.048	20	20	40	40	28	20	42	20	20	20
2131.43.052	20	20	40	40	28	20	42	20	20	20

Clamp, forked shape, DIN 6315-B
Clamping claw, goose-neck shape



2140.17.



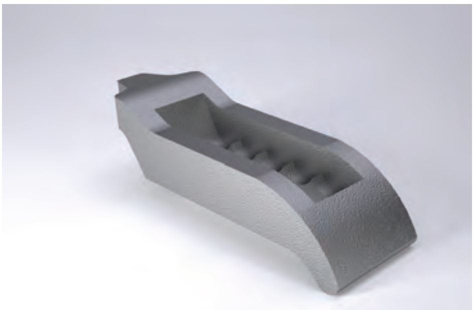
Material:
Heat-treated steel, painted

Note:
Holding and contact surfaces are plane-parallel. High clamping forces can be achieved by using high-strength screws conforming to DIN 787. The dimensions of the holding strap should be matched to the strength of the bolts.

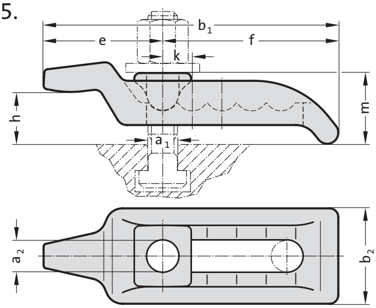
Supplied without clamping bolt,
suitable clamping bolts: 2140.30.

2140.17. Clamp, forked shape, DIN 6315-B

Order No	a_1	a_2	b_1	b_2	b_3	c
2140.17.09.080	8	9	80	25	8	15
2140.17.11.100	10	11	100	31	10	20
2140.17.14.125	12 o. 14	14	125	38	12	25
2140.17.14.160	12 o. 14	14	160	38	12	25
2140.17.14.200	12 o. 14	14	200	38	12	25
2140.17.18.160	16 o. 18	18	160	48	15	30
2140.17.18.200	16 o. 18	18	200	48	15	30
2140.17.18.250	16 o. 18	18	250	48	15	40
2140.17.22.200	20 o. 22	22	200	52	15	40
2140.17.22.250	20 o. 22	22	250	62	20	40
2140.17.22.315	20 o. 22	22	315	62	20	40
2140.17.26.200	24	26	200	66	20	40
2140.17.26.250	24	26	250	66	20	40
2140.17.26.315	24	26	315	66	20	40



2140.15.



Material:
Steel, forged and heat-treated ,
galvanised and yellow passivated

Note:
Clamping claws quickly span very different clamping heigths without the need for additional supports and take up very little space on the machine table. They are designed for maximum loads and are particularly suitable for clamping cutting and punching tools.

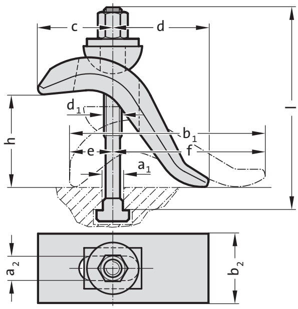
Supplied without clamping bolt,
suitable clamping bolts: 2140.30.

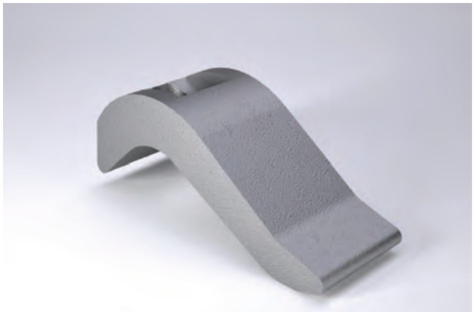
2140.15. Clamping claw, goose-neck shape

Order No	a_1	a_2	b_1	b_2	e	f	k	m	Clamping height h
2140.15.22	20 o. 22	22	200	66	88	112	20	60	25 - 50
2140.15.26	24 o. 26	26	232	76	97	135	24	70	30 - 70
2140.15.32	36	32	263	90	107	156	28	80	40 - 75

Clamping claw, infinitely variable

2140.13.





2140.13. Clamping claw, infinitely variable

Order No	a_1	a_2	b_1	b_2	c	d	e	f	h*	Clamping bolt d_1 x a_1 x l
2140.13.12.17	12	17	140	50	55	60	30	110	0-50	M12x12x125
2140.13.14.17	14	17	140	50	55	60	30	110	0-50	M12x14x125
2140.13.16.17	16	17	140	50	55	60	30	110	0-75	M16x16x160
2140.13.18.17	18	17	140	50	55	60	30	110	0-75	M16x18x160
2140.13.16.21	16	21	175	60	70	80	40	135	0-65	M16x16x160
2140.13.18.21	18	21	175	60	70	80	40	135	0-65	M16x18x160
2140.13.22.21	22	21	175	60	70	80	40	135	0-85	M20x22x200

*Clamping height

Material:

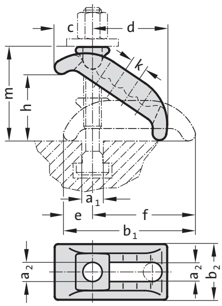
Steel, forged and head-treated, tempered in burnishing clay.

Note:

Clamping claws quickly span very different clamping heigths without the need for additional supports and take up very little space on the machine table. They are designed for maximum loads and are particularly suitable for clamping cutting and punching tools.

Supplied with clamping bolt,
suitable clamping bolts: 2140.30.

2140.14.



2140.14. Clamping claw, infinitely variable

Order No	a_1	a_2	b_1	b_2	c	d	e	f	k	m	h_{max}
2140.14.13	12 o. 14	13	88	38	28	48	23	68	14	52	35
2140.14.18	16 o. 18	18	130	56	38	74	29	101	18	80	55
2140.14.22	20 o. 22	22	140	66	46	80	32	112	20	98	65
2140.14.26	24 o. 28	26	174	76	52	100	39	135	24	110	75
2140.14.32	36	32	200	90	61	110	44	156	28	118	80

Material:

Steel, forged and heat-treated ,
galvanised and yellow passivated

Note:

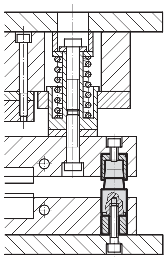
Clamping claws quickly span very different clamping heigths without the need for additional supports and take up very little space on the machine table. They are designed for maximum loads and are particularly suitable for clamping cutting and punching tools.

Supplied without clamping bolt,
suitable clamping bolts: 2140.30.

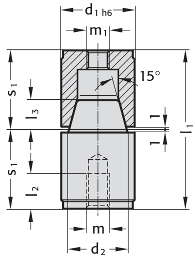
EXCLUSIVE COMPONENTS

Centering unit
Centring unit, flat

Mounting example



2442.12.

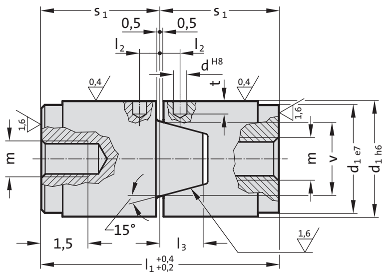


Description:
Conical centring units are used to increase repeat accuracy in mould, die and machine-making.

2442.12. Centering unit

Order No	d_1	d_2	l_1	l_2	l_3	m, m_1	s_1
2442.12.012.034	12	8	34	6	4	M4	17
2442.12.014.034	14	10	34	7.5	6	M5	17
2442.12.016.034	16	10	34	7.5	6	M5	17
2442.12.020.054	20	15	54	12	9	M8	27
2442.12.025.054	25	20	54	12	10	M8	27
2442.12.026.054	26	20	54	12	10	M8	27
2442.12.030.072	30	25	72	15	14	M10	36
2442.12.032.072	32	25	72	15	14	M10	36
2442.12.042.092	42	35	92	15	18	M10	46

2442.13.

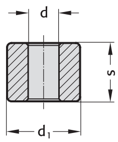


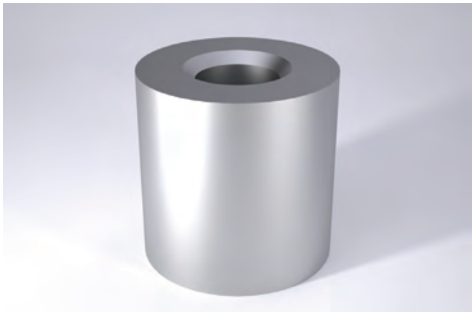
2442.13. Centring unit, flat

Order No	d_1	d	l_1	l_2	l_3	v	s_1	t	m
2442.13.030.072	30	4	72	5	10	18	36	5	M10
2442.13.042.092	42	5	92	6	14	23	46	7	M10
2442.13.054.112	54	6	112	8	17	30	56	8	M12
2442.13.080.152	80	8	152	8	27	42	76	11	M16

Adjusting washer
Retaining washer

2442.12.3.

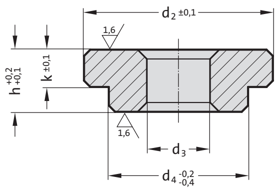


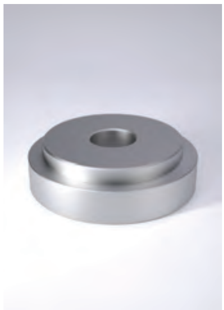


2442.12.3. Adjusting washer

Order No	d_1	d	s
2442.12.3.012.010	12	4.5	10
2442.12.3.014.005	14	5.5	5
2442.12.3.014.010	14	5.5	10
2442.12.3.014.014	14	5.5	14
2442.12.3.014.019	14	5.5	19
2442.12.3.016.005	16	6.5	5
2442.12.3.016.010	16	6.5	10
2442.12.3.016.015	16	6.5	15
2442.12.3.016.019	16	6.5	19
2442.12.3.016.020	16	6.5	20
2442.12.3.016.025	16	6.5	25
2442.12.3.020.009	20	8.5	9
2442.12.3.020.010	20	8.5	10
2442.12.3.020.015	20	8.5	15
2442.12.3.020.020	20	8.5	20
2442.12.3.020.030	20	8.5	30
2442.12.3.020.040	20	8.5	40
2442.12.3.025.009	25	10.5	9
2442.12.3.025.010	25	10.5	10
2442.12.3.025.015	25	10.5	15
2442.12.3.025.020	25	10.5	20
2442.12.3.025.025	25	10.5	25
2442.12.3.025.035	25	10.5	35
2442.12.3.025.045	25	10.5	45
2442.12.3.025.055	25	10.5	55
2442.12.3.026.009	26	8.5	9
2442.12.3.026.010	26	8.5	10
2442.12.3.026.020	26	8.5	20
2442.12.3.026.030	26	8.5	30
2442.12.3.030.010	30	12.5	10
2442.12.3.030.020	30	12.5	20
2442.12.3.030.030	30	12.5	30
2442.12.3.030.040	30	12.5	40
2442.12.3.030.050	30	12.5	50
2442.12.3.032.010	32	12.5	10
2442.12.3.032.020	32	12.5	20
2442.12.3.032.030	32	12.5	30
2442.12.3.032.040	32	12.5	40
2442.12.3.032.050	32	12.5	50
2442.12.3.042.010	42	10.5	10
2442.12.3.042.020	42	10.5	20
2442.12.3.042.030	42	10.5	30

2442.12.4.



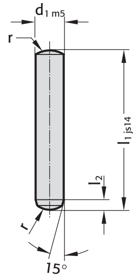


2442.12.4. Retaining washer

Order No	d_4	d_3	d_2	h	k
2442.12.4.014	14	5.5	16	5	3.2
2442.12.4.020	20	8.5	25.5	9	6.3
2442.12.4.026	26	8.5	31.5	9	6.3
2442.12.4.030	30	11	35.5	10	6.3
2442.12.4.042	42	11	47.5	10	6.3

Dowel pin similar to DIN EN ISO 8734

235.1.



Material:

Steel
Hardness 60 ± 2 HRC

Execution:

hardened and ground to finest finish
FIBRO Dowel Pins are manufactured with the exacting requirements of high class diemaking in mind. Whereas DIN EN ISO 8734 stipulates ISO Class 6 for dowels, we produce our pins to m5.

235.1. Dowel pin similar to DIN EN ISO 8734

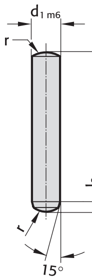
d_1	l_2	r	l_1	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50	55	60	70	80	90	100	120	130	140
1	0.48	1			●	●	●																				
1.5	0.62	1.6		●	●	●	●	●	●																		
2	0.78	2		●	●	●	●	●	●	●	●	●	●	●	●												
2.5	0.95	2.5		●	●	●	●	●	●	●	●	●	●	●	●												
3	1.1	3		●	●	●	●	●	●	●	●	●	●	●	●	●	●										
4	1.4	4		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
5	1.7	5			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
6	2.1	6				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
8	2.6	8				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
10	3	10							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
12	3.8	12									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
14	3.8	16													●	●	●	●	●	●	●	●	●	●	●		
16	4.7	16														●	●	●	●	●	●	●	●	●	●		●
20	6	20																	●	●	●	●	●	●	●		●

Ordering Code (example):

Dowel pin similar to DIN EN ISO 8734		=235.1.	
Diameter d_1	1 mm =	0100.	
Length l_1	8 mm =		008
Order No		=235.1.0100.	008

Dowel pin according to DIN EN ISO 8734

2351.1.



Material:

Steel
Hardness 60 ± 2 HRC

Execution:

hardened and ground to finest finish

2351.1. Dowel pin according to DIN EN ISO 8734

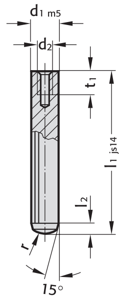
d_1	l_2	r	l_1	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	45	50	55	60	70	80	90	100	120
1	0.4	1		●	●	●	●	●	●																					
1.5	0.5	1.6		●	●	●	●	●	●	●	●		●	●	●															
2	0.6	2		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●									
2.5	0.7	2.5			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●											
3	0.8	3			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●					
4	1	4				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●			
5	1.2	5					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
6	1.5	6					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
8	1.8	8								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
10	2	10									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
12	2.5	12											●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
14	2.5	16													●		●	●	●	●	●	●	●	●	●	●	●	●	●	●
16	3	16													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
20	4	20																		●	●	●	●	●	●	●	●	●	●	●

Ordering Code (example):

Dowel pin according to DIN EN ISO 8734		=2351.1.
Diameter d_1	1 mm =	0100.
Length l_1	4 mm =	004
Order No		=2351.1.0100. 004

Dowel pin with internal extracting thread, similar to DIN EN ISO 8735

236.1.



Material:

Steel
Hardness 60 ± 2 HRC

Execution:

hardened and ground to finest finish
FIBRO Dowel Pins are manufactured with the exacting requirements of high class diemaking in mind. Whereas DIN EN ISO 8735 stipulates ISO Class 6 for dowels, we produce our pins to m5.

236.1. Dowel pin with internal extracting thread, similar to DIN EN ISO 8735

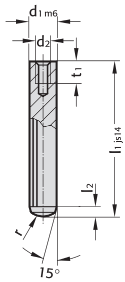
d_1	d_2	t_1	l_2	r	l_1	16	18	20	24	28	32	36	40	45	50	55	60	70	80	90	100	120
6	4	6	2.1	6		●	●	●	●	●	●	●	●	●	●	●	●					
8	5	8	2.6	8				●	●	●		●	●	●	●	●	●	●	●	●	●	
10	6	10	3	10					●	●	●	●	●	●	●	●	●	●	●	●	●	
12	6	12	3.8	12						●	●	●	●	●	●	●	●	●	●	●	●	●
14	8	12	4	16							●	●	●	●	●	●	●	●	●	●	●	●
16	8	16	4.7	16							●	●	●	●	●	●	●	●	●	●	●	●
20	10	20	6	20								●	●	●	●	●	●	●	●	●	●	●
25	16	24	6	25										●	●	●	●	●	●	●	●	●

Ordering Code (example):

Dowel pin with internal extracting thread, similar to DIN EN ISO 8735		=236.1.	
Diameter d_1	6 mm	=	0600.
Length l_1	16 mm	=	016
Order No		=236.1. 0600. 016	

Dowel pin with internal extracting thread, according to DIN EN ISO 8735

2361.1.



Material:
Steel
Hardness 60 ± 2 HRC

Execution:
hardened and ground to finest finish

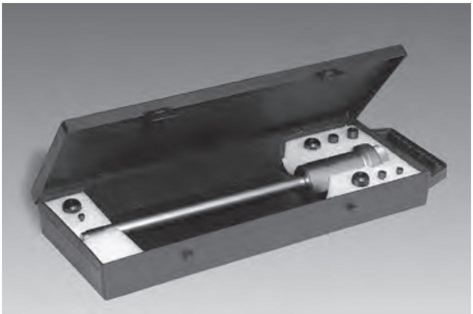
2361.1. Dowel pin with internal extracting thread, according to DIN EN ISO 8735

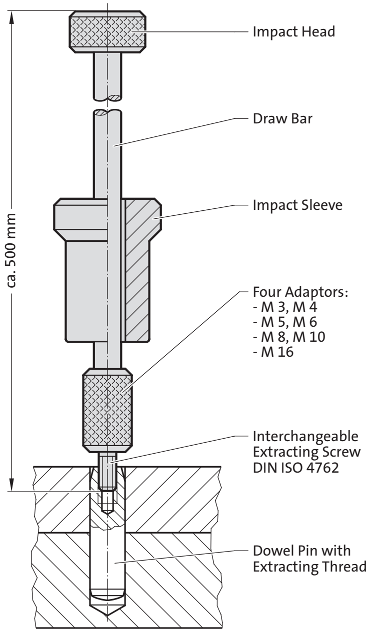
d_1	d_2	t_1	l_2	r	l_1	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	45	50	55	60	70	80	90	100	120
4	3	4.5	1.3	4			●	●	●	●	●	●		●		●	●	●	●	●		●							
5	3	5	1.7	5		●	●	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●					
6	4	6	2.1	6				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
8	5	8	2.6	8						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
10	6	10	3	10						●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●
12	6	10	3.8	12								●		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●
14	8	12	4	14												●		●	●	●	●	●	●	●	●	●	●	●	●
16	8	12	4.7	16														●	●	●	●	●	●	●	●	●	●	●	●
20	10	16	6	20															●	●	●	●	●	●	●	●	●	●	●

Ordering Code (example):

Dowel pin with internal extracting thread, according to DIN EN ISO 8735		=2361.1.		
Diameter d_1	4 mm	=	0400.	
Length l_1	10 mm	=		010
Order No		=2361.1.0400.		010

FIBROZIPP



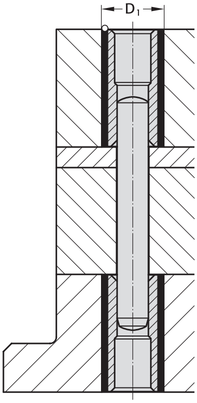


236.001 Dowel Pin Extractor FIBROZIPP

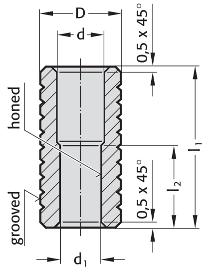
Extraction tool for the fast and convenient removal of dowels with internal extracting thread – also for shafts, plugs and other machine components.

The tool comes with interchangeable adaptors and screws, to fit all threads from M3 to M16.

Liner bush for dowel pin, for bonding



265.1.



Description:
Dowel liner bushes are used where precisely positioned, unhardened parts are often changed or must be replaced, e.g. in precision tool construction.

Material:
WS
Hardness 54 ± 2 HRC

Epoxy-Bonding:
The jig-ground pin holes of the hardened matrix are joined with the dowel liner bush by means of a dowel pin 235.1. Retainer holes for dowel liner bushes should be approximately 2 mm larger in diameter than the bush O.D. – a coarse finish is desirable. Following exact positioning/aligning, FIBROLIT® ZWO or FIBROFIX® SECHS is used for bonding.

265.1. Liner bush for dowel pin, for bonding

d_1	d	D	D_1	l_1	l_2
6	7	10	12	25	12
8	9	12	14	30	16
10	11	16	18	36	20

Ordering Code (example):

One Dowel Liner Bush – only –

Dowel Liner Bush	= 265.
Material: Tool Steel	= 1.
$d_1 = \varnothing$ 8,0 mm	= 0800.
Quantity: one	= 1
Order No	= 265.1.0800.1

Ordering Code (example):

One Dowel Liner Bush + Matching Dowel

Dowel Liner Bush	= 265.
Material: Tool Steel	= 1.
$d_1 = \varnothing$ 8,0 mm	= 0800.
Quantity: one	= 1.
Dowel: length = 40 mm	= 040
Order No	= 265.1.0800.1.040

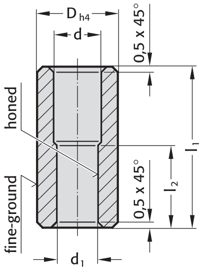
Ordering Code (example):

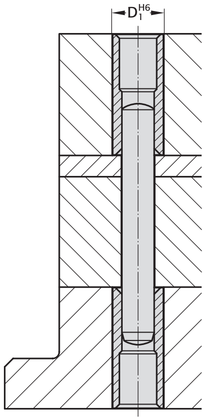
Two Dowel Liner Bushes + one Dowel

Dowel Liner Bush	= 265.
Material: Tool Steel	= 1.
$d_1 = \varnothing$ 8,0 mm	= 0800.
Quantity: two	= 2.
Dowel: length = 50 mm	= 050
Order No	= 265.1.0800.2.050

Liner bush for dowel pin, for push fit

2650.1.





Description:
Dowel liner bushes are used where precisely positioned, unhardened parts are often changed or must be replaced, e.g. in precision tool construction.

Material:
WS
Hardness 54 ± 2 HRC

Slip-Fit Bonding:
The position of the bush is given by push fit hole tolerance H6. The adhesive (order no. 281.648) provides optimum push retention whilst offering the following
advantages:
- high accuracy and stiffness
- no problems to find position when changing bushings

We do not recommend to press fit bushings.

2650.1. Liner bush for dowel pin, for push fit

d_1	d	D	l_1	l_2
6	7	10	25	12
8	9	12	30	16
10	11	16	36	20

Ordering Code (example):

One Dowel Liner Bush – only –

Dowel Liner Bush	= 2650.
Material: Tool Steel	= 1.
d_1 = ∅ 8,0 mm	= 0800.
Quantity: one	= 1
Order No	= 2650.1.0800.1

Ordering Code (example):

One Dowel Liner Bush + Matching Dowel

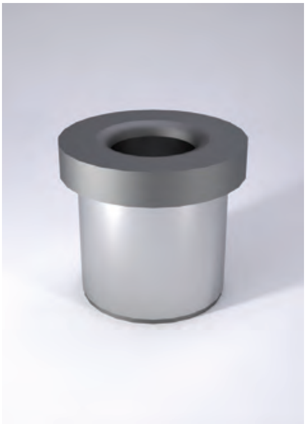
Dowel Liner Bush	= 2650.
Material: Tool Steel	= 1.
d_1 = ∅ 8,0 mm	= 0800.
Quantity: one	= 1.
Dowel: length = 40 mm	= 040
Order No	= 2650.1.0800.1.040

Ordering Code (example):

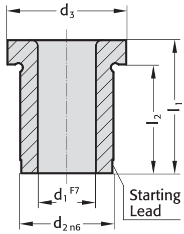
Two Dowel Liner Bushes + one Dowel

Dowel Liner Bush	= 2650.
Material: Tool Steel	= 1.
d_1 = ∅ 8,0 mm	= 0800.
Quantity: two	= 2.
Dowel: length = 50 mm	= 050
Order No	= 2650.1.0800.2.050

Drill bush with collar, DIN 172, Shape A



276.



Material:
Case hardened steel
Hardness 740 ± 40 HV 10

Execution:
Diameters d_1, d_2 and shoulder precision ground.

276. Drill bush with collar, DIN 172, Shape A

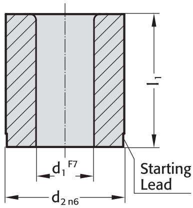
d_1	d_2	d_3	l_1	6	8	9	10	12	16	20	25	28	30	35	36	45	56	67	78
0.4 - 1	3	6	l_2	4		7													
1.1 - 1.8	4	7		4		7													
1.9 - 2.6	5	8		4		7													
2.7 - 3.3	6	9			5.5			9.5	13.5										
3.4 - 4	7	10			5.5			9.5	13.5										
4.1 - 5	8	11			5.5			9.5	13.5										
5.1 - 6	10	13					7		13	17									
6.1 - 8	12	15					7		13	17									
8.1 - 10	15	18						9		17	22								
10.1 - 12	18	22						8		16	21								
12.1 - 15	22	26							12			24			32				
15.1 - 18	26	30							12			24			32				
18.1 - 22	30	34								15					31	40			
22.1 - 26	35	39								15					31	40			
26.1 - 30	42	46									20					40	51		
30.1 - 35	48	52									20					40	51		
35.1 - 42	55	59											25				51	62	
42.1 - 48	62	66											24				50	61	
48.1 - 55	70	74											24				50	61	
55.1 - 63	78	82												29				61	72

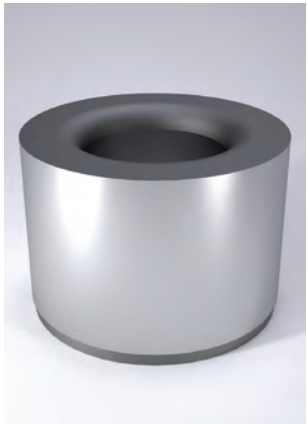
Ordering Code (example):

Drill bush with collar, DIN 172, Shape A		=	276.1.
Guide diameter d_1	0.4 mm	=	0040.
Length l_1	6 mm	=	006
Order No		=	276.1. 0040. 006

Drill bush without collar, DIN 179, Shape A

277.





Material:

Case hardened steel
Hardness 740 ± 40 HV 10

Execution:

Diameters d_1 and d_2 precision ground.

277. Drill bush without collar, DIN 179, Shape A

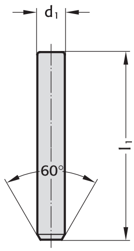
d_1	d_2	l_1	6	8	9	10	12	16	20	25	28	30	35	36	45	56	67	78
0.4 - 1	3		●		●													
1.1 - 1.8	4		●		●													
1.9 - 2.6	5		●		●													
2.7 - 3.3	6			●			●	●										
3.4 - 4	7			●			●	●										
4.1 - 5	8			●			●	●										
5.1 - 6	10					●		●	●									
6.1 - 8	12					●		●	●									
8.1 - 10	15						●		●	●								
10.1 - 12	18						●		●	●								
12.1 - 15	22							●			●			●				
15.1 - 18	26							●			●			●				
18.1 - 22	30								●					●	●			
22.1 - 26	35								●					●	●			
26.1 - 30	42									●					●	●		
30.1 - 35	48									●					●	●		
35.1 - 42	55											●				●	●	
42.1 - 48	62											●				●	●	
48.1 - 55	70											●				●	●	
55.1 - 63	78												●				●	●

Ordering Code (example):

Drill bush without collar, DIN 179, Shape A		=277.1.
Guide diameter d_1	0.4 mm	= 0040.
Length l_1	6 mm	= 006
Order No		=277.1.0040. 006

Gauge pin DIN 2269

240.1./2.



Material:

Alloy tool steel, hardened and tempered.
Age-treated repeatedly.
Hardness 60 ± 2 HRC

Execution:

precision ground
Quality class I: diameter tolerance ±0,001
Quality class II: diameter tolerance ±0,002

Single pins:
Quality class I 240.1.
Quality class II 240.2.

Small set:
91 gauge pins from ∅ 1-10 mm in steps of 0,1 mm, complete in wooden box.
Quality class I 240.51.
Quality class II 240.52.

Large set:
273 gauge pins from ∅ 1-10 mm in steps of 0,1 mm, plus one each. 0,01 mm-oversize/ undersize pin – complete in wooden box
Quality class I 240.41.
Quality class II 240.42.

Special sets:
Supplied to customer's requirements in respect of assortment and quality class. All gauge pins from ∅ 3 mm upward are marked with their actual size.

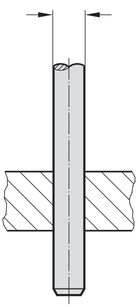
Ordering Code (example):

Gauge pin DIN 2269		=240.
Quality class KL	1	= 1.
Diameter d_1	0.29 mm	= 0029
Order No		=240. 1. 0029

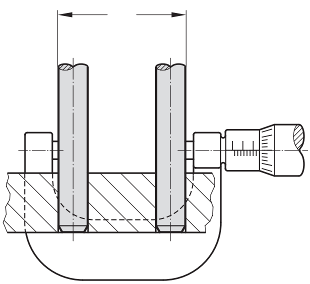
240.1./2. Gauge pin DIN 2269

d_1	l_1
0.29 - 6	50
6.01 - 20	70

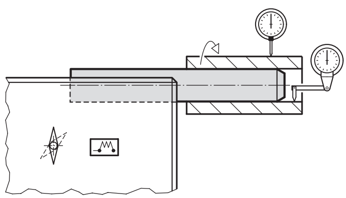
Direct gauging of bore diameters



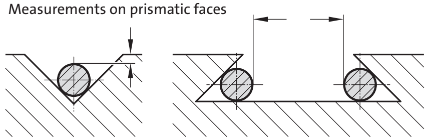
Measurement of centre-distance between two bores



Concentricity check on a bush

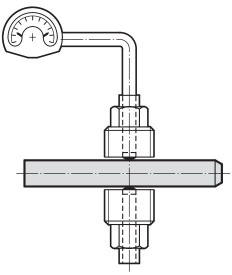


Measurements on prismatic faces

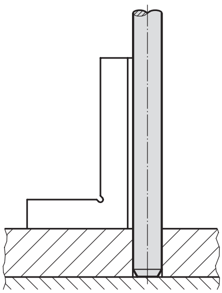


Gauge Pin Holders
Wooden Boxes

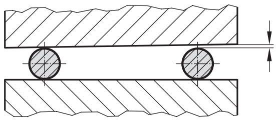
Calibration of a
comparator



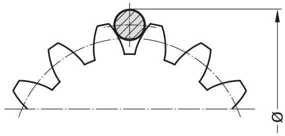
Inspection for squareness
of a bore



Check on parallelism



Measuring of gear teeth,
threads etc.



240.45. Gauge Pin Holders

(without pins)	for diameters	Order No
	from 1–2	240.45.1
	from 2–4	240.45.2
	from 4–6	240.45.3
	from 6–8	240.45.4
	from 8–10	240.45.5

Gauge Pin Holders are double-ended, to carry two pins e.g. for go – no go measurements etc.

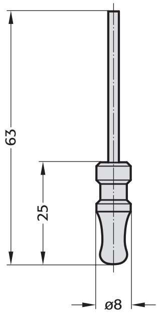
Wooden boxes: (without pins)	with drilled holes, for the safe and orderly storage of gauge pins – each hole marked with the requisite pin size.	Order No
	Large Set of approx. 270 Pins size: 250×90×390	240.91
	Small Set of approx. 90 Pins size: 155×90×285	240.92
	Boxes complete with carrier board inset	
	Class I-Accuracy	240.9x.1
	Class II-Accuracy	240.9x.2

Ordering code (example):

Gauge pin box – approx. 270 pins	= 240.91.
Class I-Accuracy	= 1
Order No	= 240.91.1

High Precision Gauge Pin with Handle
High Precision Gauge Pins – Boxed Sets

240.11./22.



240.11./22. High-Precision Gauge Pin with Handle

The Gauge Pins are firmly fixed to the handle. Each Pin is marked with its true diameter.

Single Gauge Pins:	∅ 0,3 – 3,0 mm, In dia. steps of 0.01 mm	Order No
	Class I-Accuracy	240.11.
	Class II-Accuracy	240.22.
Assortment:	84 Gauge Pins from 0.3 – 3.0 mm, in dia. steps of 0.1 mm plus one each pin with undersize 0.01 and oversize 0.01 mm (for example 0.29 – 0.30 – 0.31 etc.)	
	Class I-Accuracy	240.31
	Class II-Accuracy	240.32
Special Assortments:	to customer's specifications in respect of class of accuracy	

Material:

Alloy tool steel, hardened and tempered.
Repeatedly age-treated.
Hardness 60 ± 2 HRC.
fine-ground
Class II-Accuracy ±0.001
Class II-Accuracy ±0.002
to DIN 2269

Ordering Code (example):

Gauge Pin	= 240.
Class I-Accuracy, with handle	= 11.
d_1 = 1,5 mm	= 0150
Order No	= 240.11.0150

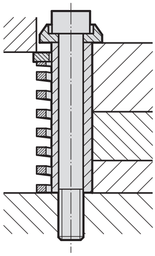
Wooden box:

Wooden boxes for Gauge Pins – with drilled holes in wooden tray insert. Each hole marked with true size of pin.

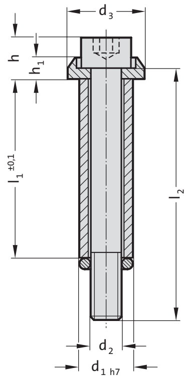
External dimensions: 155x90x285 mm

Spring and spacer unit

Mounting example



244.16.



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

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

Execution:
Outside diameter ground
Tolerance: h_7

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

244.16. Spring and spacer unit

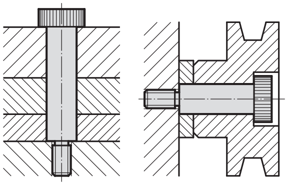
d_1	10	12.5	15	17.5	23	25
d_2	M6	M8	M10	M12	M16	M16
Tightening torque [Nm]	13	32	65	120	290	290
d_3	15	19	23	27	34	40
h	10	13	15	18	24	24
h_1	5.5	6.5	7.5	9	11	11
l_1	l_2					
20	35	35				
25	40					
30	45	45	50	50		
35	50	50	55			
40	55	55	60	60		
45	60	60	65	65		
50	65	65	70	70	80	
55	70	70 80	75	80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

Ordering Code (example):

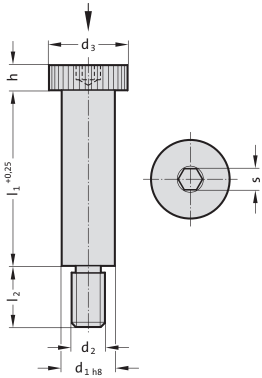
Spring and spacer unit		=	244.16.
Nominal diameter d_1	10 mm	=	100.
Length l_1	20 mm	=	020.
Screw length l_2	35 mm	=	035
Order No		=	244.16. 100. 020. 035

Shoulder screw

Mounting example



244.17.



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

Execution:
d_1 ground,
heads knurled.

244.17. Shoulder screw

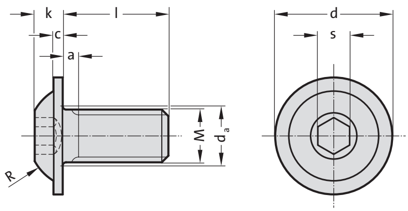
d_1	6	8	10	12	16	20	24
d_2	M5	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	7	13	32	65	120	290	500
d_3	10	13	16	18	24	30	36
h	4.5	5.5	7	9	11	14	16
s	3	4	5	6	8	10	12
l_2	9.5	11	13	16	18	22	27
l_1							
10	●	●					
12	●	●					
16	●	●	●	●			
20	●	●	●	●			
25	●	●	●	●	●		
30	●	●	●	●	●		
35	●	●	●	●	●		
40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

Ordering Code (example):

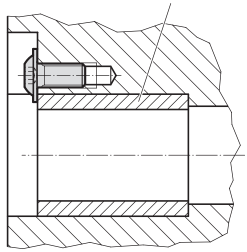
Shoulder screw		=244.17.
Nominal diameter d_1	6 mm	= 060.
Guide length l_1	10 mm	= 010
Order No		=244.17. 060. 010

Flat mushroom head screw with hexagon socket

2192.61.



Mounting example



Material:

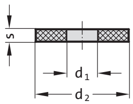
Strength class 10.9 = Code No 1.

2192.61. Flat mushroom head screw with hexagon socket

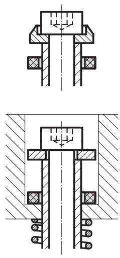
Order No	M	l	k	s	c	a	d_a	d	R
2192.61.06.012	M6	12	3.2	4	1.2	2	7	13.27	5.6
2192.61.06.016	M6	16	3.2	4	1.2	2	7	13.27	5.6
2192.61.06.020	M6	20	3.2	4	1.2	2	7	13.27	5.6
2192.61.08.016	M8	16	4.3	5	1.5	2.5	9.2	17.77	7.5
2192.61.08.020	M8	20	4.3	5	1.5	2.5	9.2	17.77	7.5
2192.61.08.025	M8	25	4.3	5	1.5	2.5	9.2	17.77	7.5
2192.61.10.020	M10	20	5.3	6	1.75	3	11.2	22.18	10

Shock absorbing washer

2450.



Mounting example



Material:

Polyurethan (FIBROFLEX®)

Execution:

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

2450. Shock absorbing washer

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

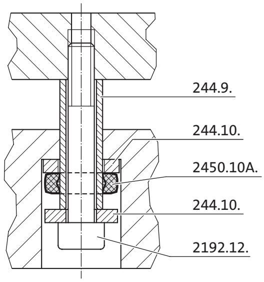
Ordering Code (example):

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

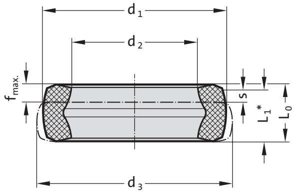
FIBRO

Damper, light-duty

Mounting example



2450.10A.



Description:

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

Benefits:

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

Material:

Co-Polyester-Elastomer

Technical data:

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

Note:

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

2450.10A. Damper, light-duty

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

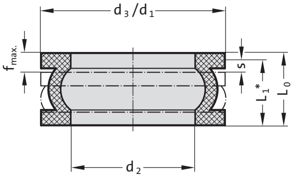
*Dimension L_1 is the slump which must be taken into account for the design.

**W = Total energy per stroke

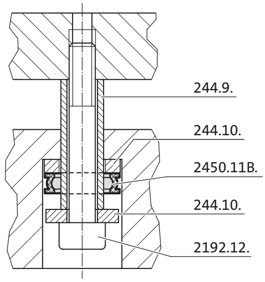
***W_h = Total energy per hour

Damper, light-duty

2450.11B.



Mounting example



Description:

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

Benefits:

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

Material:

Co-Polyester-Elastomer

Technical data:

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

Note:

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

2450.11B. Damper, light-duty

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

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

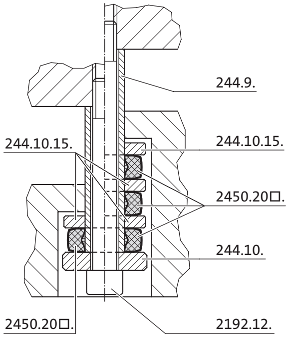
**W = Total energy per stroke

***W_h = Total energy per hour

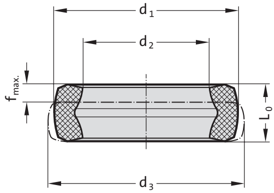
FIBRO

Damper, heavy-duty

Mounting example



2450.20□.



Description:

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

Benefits:

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

Material:

Co-Polyester-Elastomer

Technical data:

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

Note:

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

2450.20□. Damper, heavy-duty

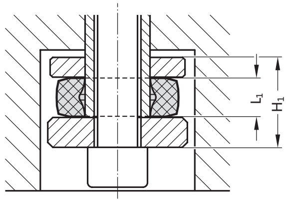
Order No	d_1	d_2	d_3	L_0	$F_{max.}$ [N] (static < 0,1)	$f_{max.}$	W [Nm/stroke (s)]*	Socket cap screw
2450.20A.0264.0163.078	26.4	16.3	28.4	7.8	5500	2	5	M10
2450.20B.0321.0203.108	32.1	20.3	35.1	10.8	9000	4.4	14.2	M12
2450.20B.0458.0253.170	45.8	25.3	49.8	17	20000	4.9	44.6	M16
2450.20A.0546.0303.213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

*Total energy per stroke

Damper, heavy-duty
Selection table multiple layering

Simple layering

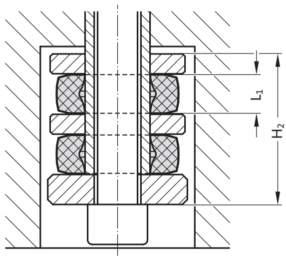
Order No.	L_1*	$F_{1\,max}$ [N] (dynamic>0,1)	W_1 [Nm/stroke (s)]**	W_{h1} [Nm/h]***	H_1 total height	socket cap screw
2450.20A.0264.0163.078	7.1	4100	3.5	9000	17.1	M10
2450.20B.0321.0203.108	9.8	6600	12	30000	23.8	M12
2450.20B.0458.0253.170	15.3	14500	19	45000	31.3	M16
2450.20A.0546.0303.213	19	22500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



* Dimension „L_1“ is the slump which must be taken into account for the design.
** Total energy per stroke
*** Total energy per hour

Double layering

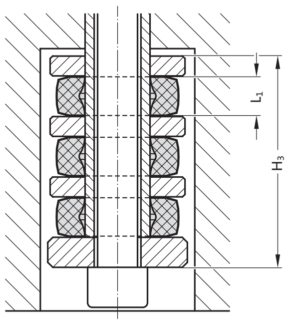
Order No.	L_1*	$F_{2\,max}$ [N] (dynamic>0,1)	W_2 [Nm/stroke (s)]**	W_{h2} [Nm/h]***	H_2 total height	socket cap screw
2450.20A.0546.0303.213	19	18000	78	107000	66	M20
2450.20A.0618.0363.215	19.5	35000	148	174000	67	M24
2450.20A.0785.0423.294	27	39000	233	272000	85	M30



* Dimension „L_1“ is the slump which must be taken into account for the design.
** Total energy per stroke
*** Total energy per hour

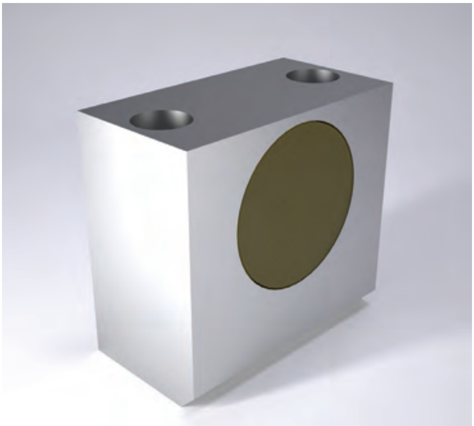
Threefold layering

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

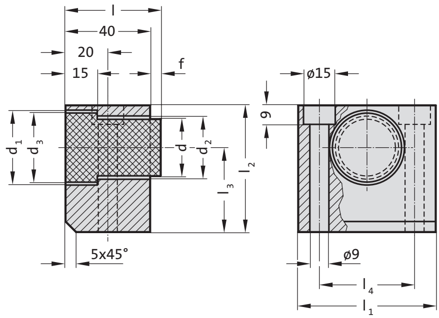


* Dimension „L_1“ is the slump which must be taken into account for the design.
** Total energy per stroke
*** Total energy per hour

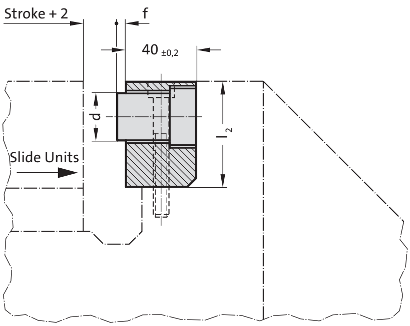
Slide stop



2451.6.



Mounting example



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

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

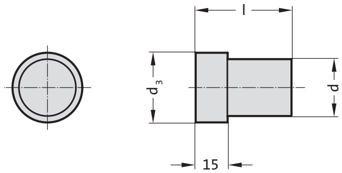
Fixing:
Use socket cap screws DIN EN ISO 4762 M8.

2451.6. Slide stop

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

Stop buffer

2451.6. .2



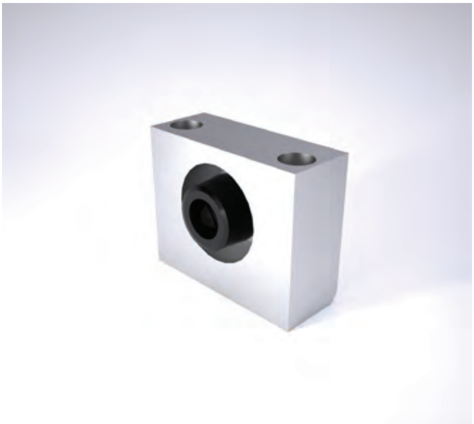
2451.6. .2 Stop buffer

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

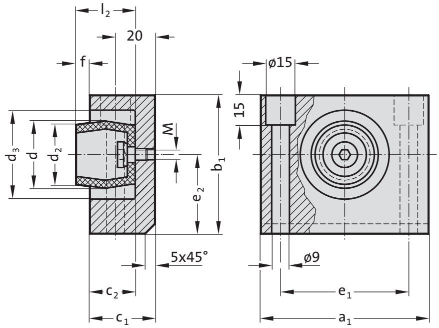
Material:

FIBROFLEX®, 90 Shore A

Slide stop



2452.10.



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

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

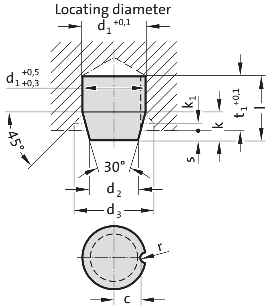
Fixing:
Use socket cap screws DIN EN ISO 4762 M8.

2452.10. Slide stop

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

Compression Pad
Shedder insert

2471.6.

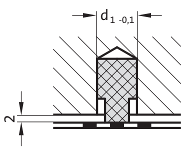


Material:
FIBROFLEX®
Hardness 90 Shore A

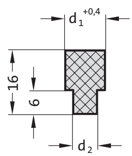
2471.6. Compression Pad

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

Mounting example



247.6.



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

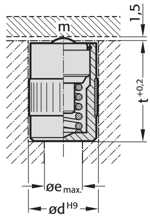
Material:
FIBROFLEX®
Hardness 90 Shore A

247.6. Shedder insert

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

Ball bearing insert without collar
Ball bearing insert with collar

2198.32.

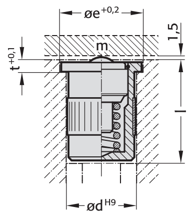


Note:
The supporting ball bearings raise the object to be moved (tool) away from the table surface and replace the surface friction with rolling friction. This significantly reduces the force required to move the tool.

2198.32. Ball bearing insert without collar

Order No	d	Load capacity m [daN]	Ball diameter	e	t
2198.32.020	20	25	10	10	30
2198.32.024	24	40	12	14	38
2198.32.030	30	63	15	20	44
2198.32.040	40	100	20	30	53

2198.33.



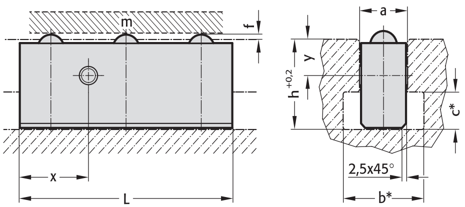
Note:
The supporting ball bearings raise the object to be moved (tool) away from the table surface and replace the surface friction with rolling friction. This significantly reduces the force required to move the tool.

2198.33. Ball bearing insert with collar

Order No	d	Load capacity m [daN]	Ball diameter	e	t	l
2198.33.020	20	25	10	25	3.5	31
2198.33.024	24	40	12	30	4	39
2198.33.030	30	63	15	35	5	45
2198.33.040	40	100	20	50	6	54

Ball bearing rail

2198.42.



Note:

The ball bearing rails are pushed into the DIN 650 T-shaped grooves in the press table and are fixed in place by the clamping piece. The size and number of the ball bearing rails is determined by the size of the T-shaped groove and the load-bearing capacity required. Once the tool is clamped in place, it lies on the press table and the clamping pressure presses the ball bearings into the holes.

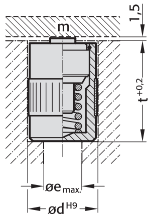
* T-shaped grooves are not absolutely necessary.

2198.42. Ball bearing rail

Order No	a	Load capacity m [daN]	L	Number of balls	Ball diameter	f	b*	c*	h	x	y
2198.42.18.105	18	75	105	3	10	1.5	30	12	30	35	14.5
2198.42.18.140	18	100	140	4	10	1.5	30	12	30	35	14.5
2198.42.18.175	18	125	175	5	10	1.5	30	12	30	35	14.5
2198.42.18.210	18	150	210	6	10	1.5	30	12	30	35	14.5
2198.42.18.280	18	200	280	8	10	1.5	30	12	30	35	14.5
2198.42.18.350	18	250	350	10	10	1.5	30	12	30	35	14.5
2198.42.22.120	22	120	120	3	12	1.5	37	16	38	40	14.5
2198.42.22.160	22	160	160	4	12	1.5	37	16	38	40	14.5
2198.42.22.200	22	200	200	5	12	1.5	37	16	38	40	14.5
2198.42.22.240	22	240	240	6	12	1.5	37	16	38	40	14.5
2198.42.22.320	22	320	320	8	12	1.5	37	16	38	40	14.5
2198.42.22.400	22	400	400	10	12	1.5	37	16	38	40	14.5
2198.42.28.135	28	190	135	3	15	1.5	46	20	48	45	19
2198.42.28.180	28	250	180	4	15	1.5	46	20	48	45	19
2198.42.28.225	28	320	225	5	15	1.5	46	20	48	45	19
2198.42.28.270	28	380	270	6	15	1.5	46	20	48	45	19
2198.42.28.360	28	500	360	8	15	1.5	46	20	48	45	19
2198.42.28.450	28	630	450	10	15	1.5	46	20	48	45	19
2198.42.36.150	36	300	150	3	20	1.5	56	25	61	50	24.5
2198.42.36.200	36	400	200	4	20	1.5	56	25	61	50	24.5
2198.42.36.250	36	500	250	5	20	1.5	56	25	61	50	24.5
2198.42.36.300	36	600	300	6	20	1.5	56	25	61	50	24.5
2198.42.36.400	36	800	400	8	20	1.5	56	25	61	50	24.5
2198.42.36.500	36	1000	500	10	20	1.5	56	25	61	50	24.5

Roller insert without collar
Roller insert with collar

2198.34.



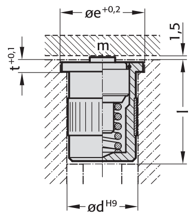
Note:
Roller inserts provide double the capacity of ball bearing inserts.

Torsion protection is provided by the customer.

2198.34. Roller insert without collar

Order No	d	Load capacity m [daN]	Roller diameter	e	t
2198.34.020	20	50	10	10	30
2198.34.024	24	80	13	14	38
2198.34.030	30	125	16	20	44
2198.34.040	40	200	19	30	53

2198.35.



Note:
Roller inserts provide double the capacity of ball bearing inserts.

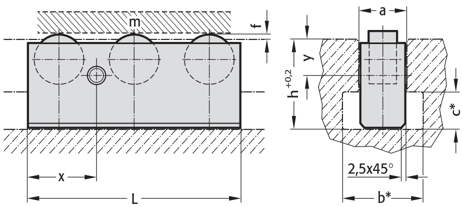
Torsion protection is provided by the customer.

2198.35. Roller insert with collar

Order No	d	Load capacity m [daN]	Roller diameter	e	t	l
2198.35.020	20	50	10	25	3.5	31
2198.35.024	24	80	13	30	4	39
2198.35.030	30	125	16	35	5	45
2198.35.040	40	200	19	50	6	54

Roller rail

2198.44.



Note:

Roller rails provide double the capacity of ball bearing rails. They ensure precise linear movement of the tool.
Unlike ball bearing rails, roller rails can be used in tool base plates, i.e. installed upside down.

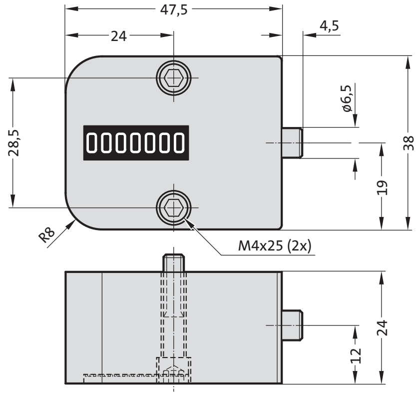
* T-shaped grooves are not absolutely necessary.

2198.44. Roller rail

Order No	a	Load capacity m [daN]	L	Number of rollers	Roller diameter	f	b*	c*	h	x	y
2198.44.18.105	18	150	105	3	10	1.5	30	12	30	35	14.5
2198.44.18.140	18	200	140	4	10	1.5	30	12	30	35	14.5
2198.44.18.175	18	250	175	5	10	1.5	30	12	30	35	14.5
2198.44.18.210	18	300	210	6	10	1.5	30	12	30	35	14.5
2198.44.18.280	18	400	280	8	10	1.5	30	12	30	35	14.5
2198.44.18.350	18	500	350	10	10	1.5	30	12	30	35	14.5
2198.44.22.120	22	240	120	3	13	1.5	37	16	38	40	14.5
2198.44.22.160	22	320	160	4	13	1.5	37	16	38	40	14.5
2198.44.22.200	22	400	200	5	13	1.5	37	16	38	40	14.5
2198.44.22.240	22	480	240	6	13	1.5	37	16	38	40	14.5
2198.44.22.320	22	640	320	8	13	1.5	37	16	38	40	14.5
2198.44.22.400	22	800	400	10	13	1.5	37	16	38	40	14.5
2198.44.28.135	28	380	135	3	16	1.5	46	20	48	45	19
2198.44.28.180	28	500	180	4	16	1.5	46	20	48	45	19
2198.44.28.225	28	630	225	5	16	1.5	46	20	48	45	19
2198.44.28.270	28	750	270	6	16	1.5	46	20	48	45	19
2198.44.28.360	28	1000	360	8	16	1.5	46	20	48	45	19
2198.44.28.450	28	1250	450	10	16	1.5	46	20	48	45	19
2198.44.36.150	36	600	150	3	19	1.5	56	25	61	50	24.5
2198.44.36.200	36	800	200	4	19	1.5	56	25	61	50	24.5
2198.44.36.250	36	1000	250	5	19	1.5	56	25	61	50	24.5
2198.44.36.300	36	1200	300	6	19	1.5	56	25	61	50	24.5
2198.44.36.400	36	1600	400	8	19	1.5	56	25	61	50	24.5
2198.44.36.500	36	2000	500	10	19	1.5	56	25	61	50	24.5

Counter view, mechanical

3710.12.01



Description:
- monitors the productivity of a moulding tool

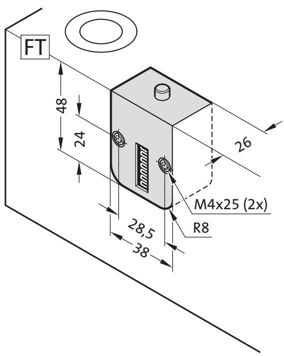
Note:
- max. operational temperature 120 °C
- seven digit display, non-resettable, allows recording up to 10 million cycles
- splash resistant, corrosion resistant
- incl. mounting screws M4x25

Installation into mould parting surface with 2 cylinder screws M4 x 25 DIN EN ISO 4762.
- An installation in the mould parting surface provides a good reading of the counted values.

Patent

3710.12.01 Counter view, mechanical

Mounting example



Precision feeler gauge
Foil shim

Typical Applications:

- ☐ Tolerance measurement of internal and external dimensions.
- ☐ Adjustment of tooling devices and machine parts.
- ☐ Testing valve and cylinder clearances.

Material:

C-Steel, Material-No.: 1.1274
Stainless steel, Material-No.: 1.4310

2925. Precision feeler gauge, Foil shim

	Precision feeler gauge Contents per can/spool						Foil shims Contents: foil shims per pack			Technical specifications tensile strength N/mm²		
	5 m	10 m	5 m	5 m	5 m	5 m	10	5	5			
Width mm ▶	12,7	12,7	6	25	50	100	Format 50×300 mm	Format 100×500 mm	Format 150×500 mm	Tolerance ± mm	for carbon steel	for stainless steel
Thickness mm ▼												
0,005	▲	▲	–	–	–	▲	–	▲	–	0,001	– –	>1500
0,01	▲	▲	–	▲	▲	▲	▲	▲	–	0,002	– –	>1500
0,02	◆	◆	–	▲	▲	▲	▲	▲	–	0,002	2000–2200	>1500
0,03	◆	◆	–	◆	◆	▲	◆	▲	–	0,002	2000–2200	1500–1700
0,04	◆	◆	–	◆	◆	▲	◆	▲	–	0,003	2000–2200	1500–1700
0,05	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,003	2000–2200	1500–1700
0,06	◆	◆	–	◆	◆	▲	◆	▲	–	0,003	2000–2200	1500–1700
0,07	◆	◆	–	◆	◆	▲	◆	▲	–	0,004	2000–2200	1500–1700
0,08	◆	◆	◆	◆	◆	▲	◆	▲	–	0,004	2000–2200	1500–1700
0,09	◆	◆	–	◆	◆	▲	◆	▲	–	0,004	2000–2200	1500–1700
0,10	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,004	2000–2200	1500–1700
0,12	◆	◆	–	–	◆	▲	◆	▲	–	0,004	2000–2200	1500–1700
0,15	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,005	2000–2200	1500–1700
0,20	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,006	1800–2100	1500–1700
0,25	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,007	1800–2100	1500–1700
0,30	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,007	1800–2100	1500–1700
0,35	◆	◆	–	–	◆	▲	◆	▲	–	0,008	1800–2000	1500–1700
0,40	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,009	1600–1900	1500–1700
0,45	◆	◆	–	–	◆	▲	◆	▲	–	0,009	1600–1900	1500–1700
0,50	◆	◆	◆	◆	◆	▲	◆	▲	▲	0,010	1600–1900	1500–1700
0,55	◆	◆	–	–	–	▲	–	▲	–	0,010	1600–1900	1500–1700
0,60	◆	◆	–	◆	◆	▲	◆	▲	–	0,010	1600–1900	1500–1700
0,70	◆	◆	–	◆	◆	▲	◆	▲	–	0,012	1600–1900	1500–1700
0,80	◆	◆	–	◆	◆	▲	◆	▲	–	0,013	1600–1800	1500–1700
0,90	◆	◆	–	◆	◆	▲	◆	▲	–	0,013	1600–1800	1500–1700
1,00	◆	◆	–	◆	◆	▲	◆	▲	–	0,013	1600–1800	1500–1700

Order No. Part II = Material

◆ C-Steel, Material-No.: 1.1274 is 1

▲ Stainless steel, Material-No.: 1.4310 is 2

Ordering code (example):

Precision feeler gauge	= 2925.
Material-No.: 1.1274	= 1.
Thickness 0,07 mm	= 0070.
Width 12,7 mm	= 0012.
Length 10 m	= 10000
Order No	= 2925.1.0070.0012.10000

Ordering code (example):

Foil shim	= 2925.
Material-No.: 1.4310	= 2.
Thickness 0,02 mm	= 0020.
Width 50 mm	= 050.
Length 300 mm	= 300
Order No	= 2925.2.0020.050.300

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