



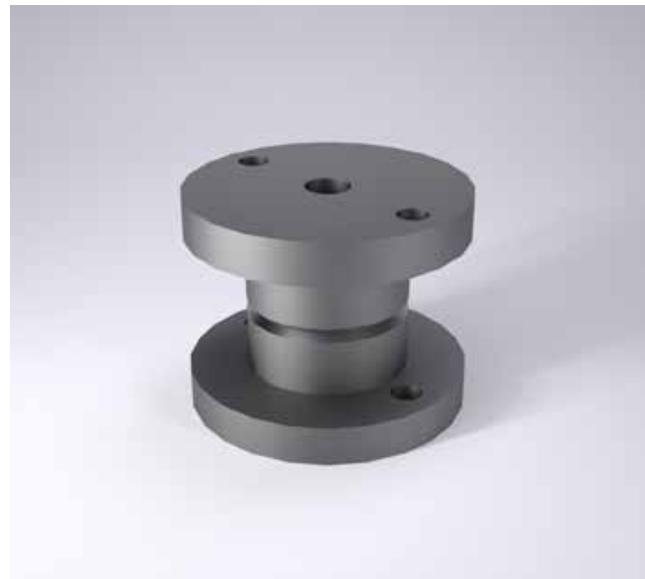
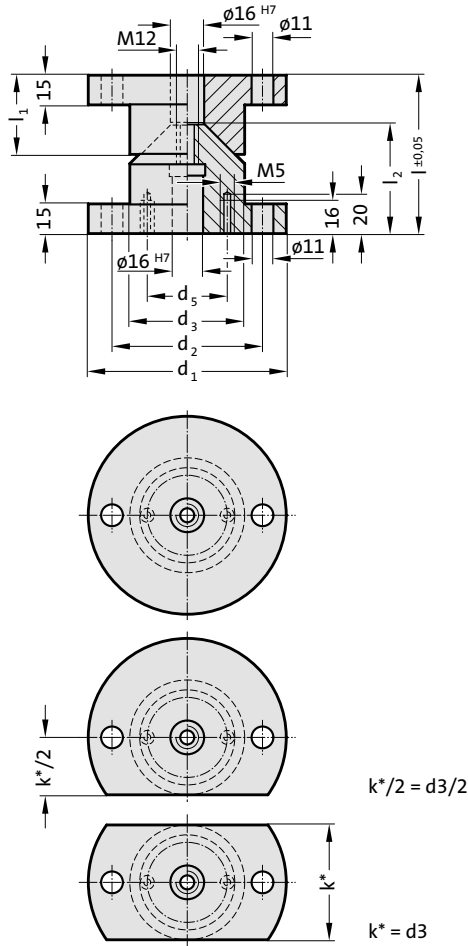
Guide Elements



Centering unit



2441.11.



Material:

16MnCr5, heat treated
Conical surfaces induction hardened
Surface hardness: 60 + 4 HRC, Eht: 1,0 + 0,5 mm

Note:

Adjusting washer 2441.11.3. to be ordered separately.
Screws are not included.

2441.11.□□□

Centring unit

2441.11.□□□.1

Centring unit with one flat side

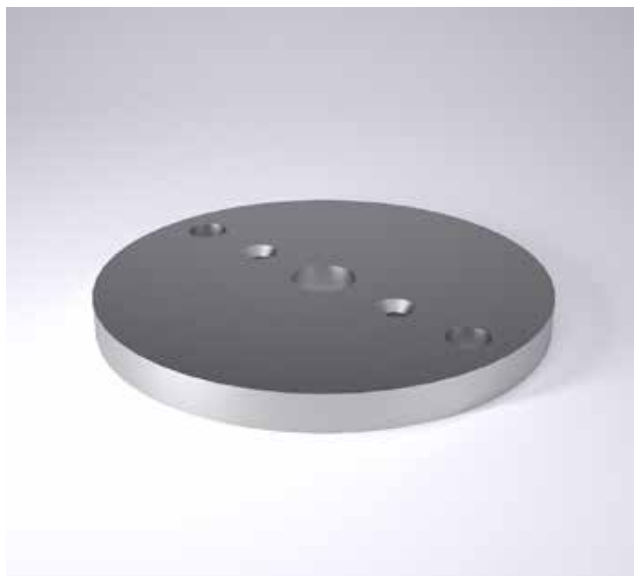
2441.11.□□□.2

Centring unit with two flat sides

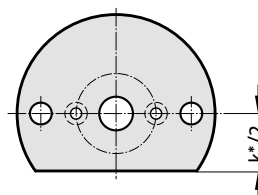
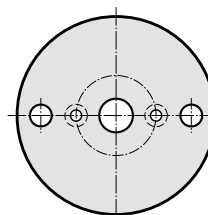
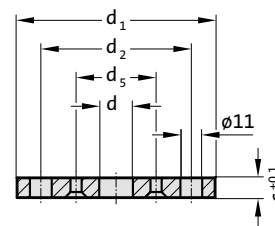
2441.11. Centering unit

Order No	d_1	d_2	d_3	l	l_1	l_2	d_5
2441.11.100	100	76	58	80	40	55	40.5
2441.11.100.1	100	76	58	80	40	55	40.5
2441.11.100.2	100	76	58	80	40	55	40.5
2441.11.120	120	96	78	90	50	65	50.5
2441.11.120.1	120	96	78	90	50	65	50.5
2441.11.120.2	120	96	78	90	50	65	50.5

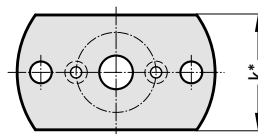
Adjusting washer



2441.11.3.



$$k^*/2 = d3/2$$



$$k^* = d3$$

Material:

C45 or similar

Note:

2441.11.3.□□□
Adjusting washer

2441.11.3.□□□.1
Adjusting washer with one flat side

2441.11.3.□□□.2
Adjusting washer with two flat sides

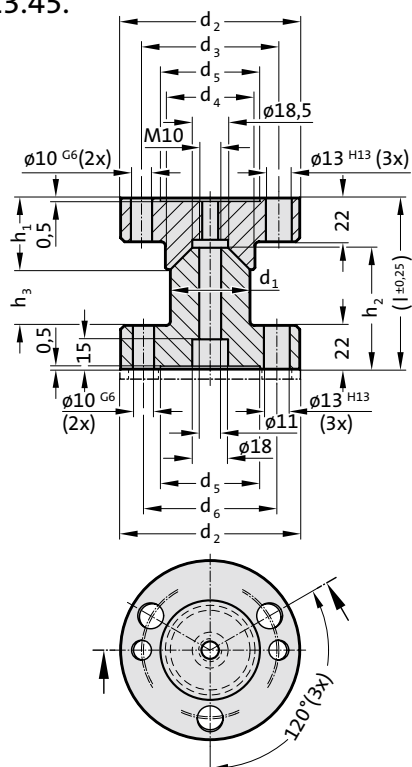
2441.11.3. Adjusting washer

Order No	d ₁	d ₂	d ₄	c	d ₅	k
2441.11.3.100	100	76	17	9.8	40.5	58
2441.11.3.100.1	100	76	17	9.8	40.5	58
2441.11.3.100.2	100	76	17	9.8	40.5	58
2441.11.3.105	105	76	18	5.5	40.5	58
2441.11.3.120	120	96	17	9.8	50.5	78
2441.11.3.120.1	120	96	17	9.8	50.5	78
2441.11.3.120.2	120	96	17	9.8	50.5	78
2441.11.3.125	125	96	18	5.5	50.5	78



Centring unit, CNOMO

2441.13.45.



Material:

X153CrMoV12 (1.2379), hardened 58 ± 2 HRC

Note:

Order No for centring unit to CNOMO with adjusting washer:
2441.13.0.45.

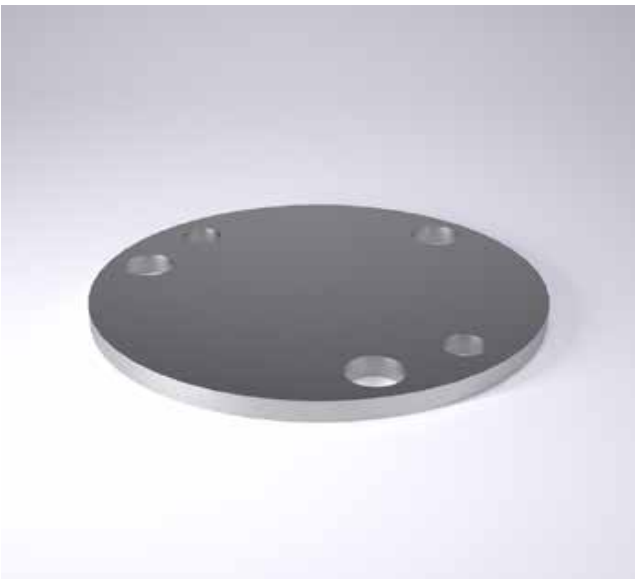
Screws and pins are not included.

2441.13.45. Centring unit, CNOMO

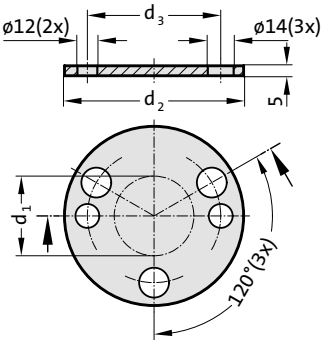
Order No	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆	h ₁	h ₂	h ₃	l
2441.13.45.040	40	90	69	45	50	67	36	61	61	(86)
2441.13.45.060	60	110	89	65	70	89	46	61	61	(86)



Adjusting washer, CNOMO



2441.13.3.45.



Material:
Cf 70 (1.1249)

Note:
Adjusting washer for centring unit 2441.13.45.

2441.13.3.45. Adjusting washer, CNOMO

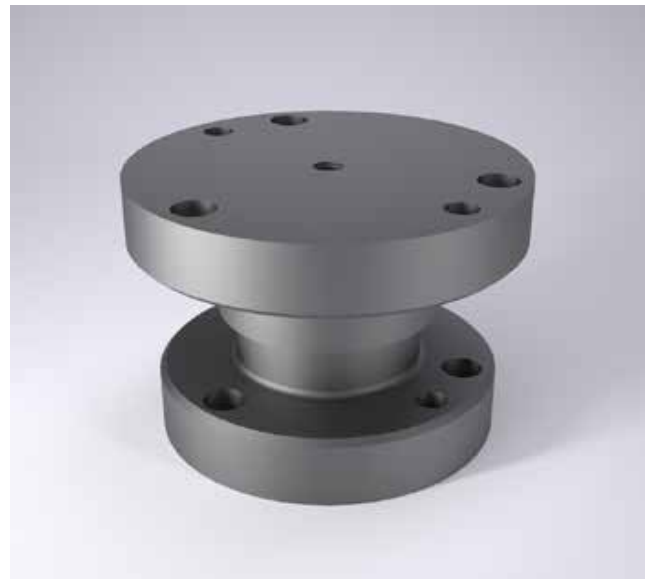
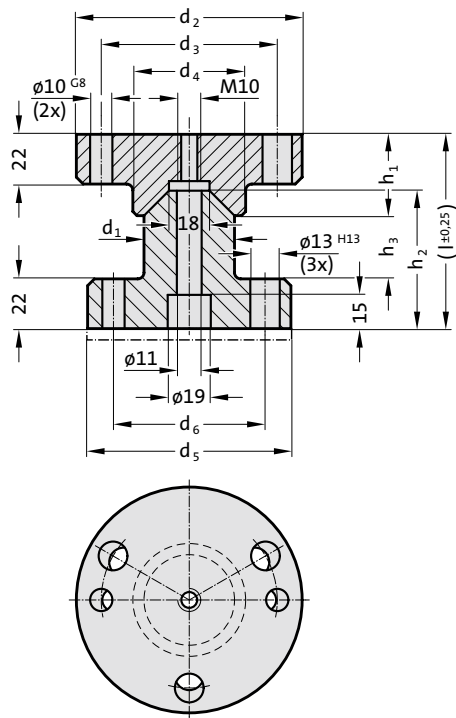
Order No	d ₁	d ₂	d ₃
2441.13.3.45.040	40	90	67
2441.13.3.45.060	60	110	89

Centring unit, CNOMO



FIBRO

2441.13.



Material:

16MnCr5, heat treated

Conical surfaces induction hardened

Surface hardness: 60 + 4 HRC, Hardness penetration 1,0 + 0,5 mm

Note:

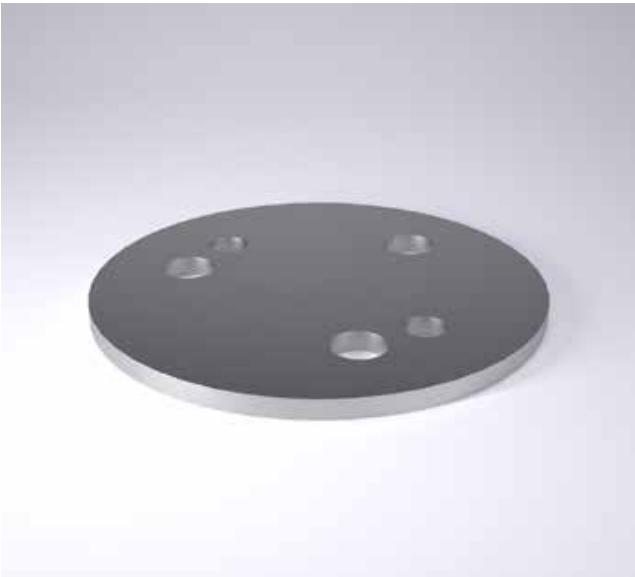
Order No for centring unit to CNOMO with adjusting washer: 2441.13.0.

Screws and pins are not included.

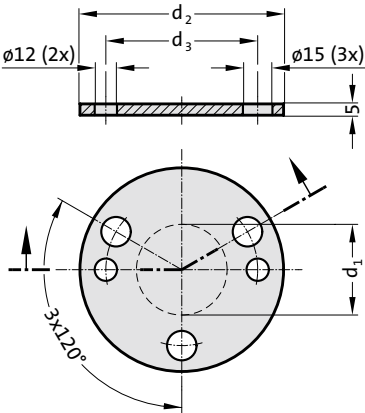
2441.13. Centring unit, CNOMO

Order No	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆	h ₁	h ₂	h ₃	(l)
2441.13.040	40	100	79	50	90	67	36	61	28	(86)
2441.13.060	60	125	104	70	110	89	46	61	18	(86)

Adjusting washer, CNOMO



2441.13.3.



Material:

100 Cr 6

Note:

Adjusting washer for centring unit 2441.13.

2441.13.3. Adjusting washer, CNOMO

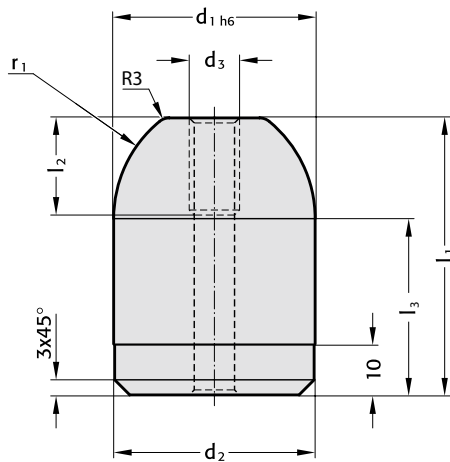
Order No	d_1	d_2	d_3
2441.13.3.040	40	90	67
2441.13.3.060	60	110	89

Centring pin



FIBRO

2445.10.



2445.10. Centring pin

Order No		d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	r ₁
2445.10.022.045	1), 2)	22	21.95	M8	45	16	35	15
2445.10.022.055	2)	22	21.95	M8	55	16	45	15
2445.10.032.050	1)	32	31.95	M10	50	20	35	20
2445.10.040.055	1), 2)	40	39.95	M10	55	20	35	25
2445.10.040.065	2)	40	39.95	M10	65	20	45	25
2445.10.050.055	1)	50	49.95	M10	55	20	35	25
2445.10.056.080	1)	56	55.95	M10	80	20	60	30

Description:

Using locating holes components, assemblies and tools can be repeatedly centred with high precision on processing machines, measuring equipment and tool components.

Material:

Steel, hardened

Note:

Screws are not included.

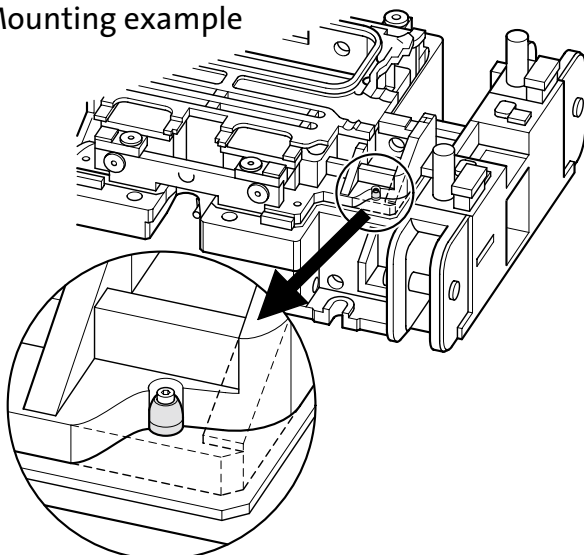
1) to BMW standard

2) to VW standard

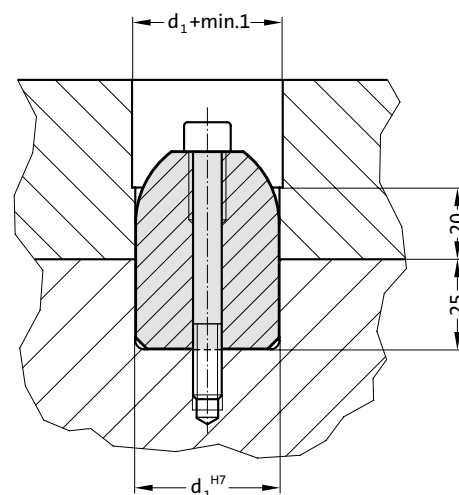
Fixing:

Use socket cap screws DIN EN ISO 4762 M6/M8.

Mounting example



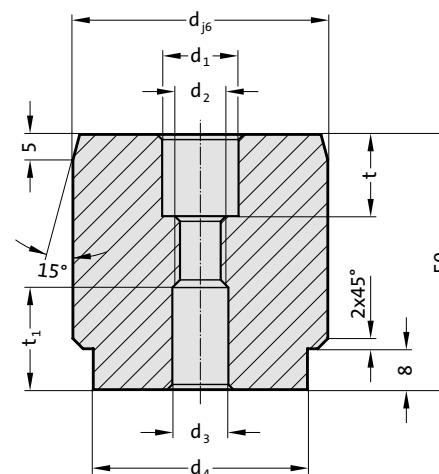
Mounting example



Centring pin to Mercedes-Benz standard



2445.11.



Description:

Using locating holes components, assemblies and tools can be repeatedly centred with high precision on processing machines, measuring equipment and tool components.

Material:

Steel, hardened

Note:

Screws are not included.

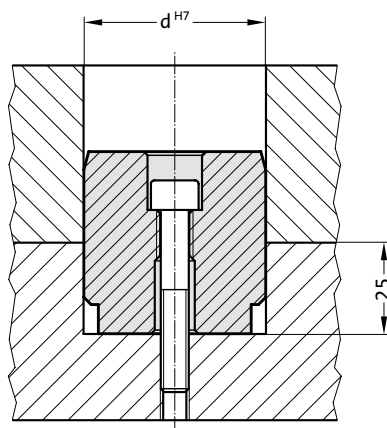
Fixing:

Use socket cap screws DIN EN ISO 4762 M6/M8.

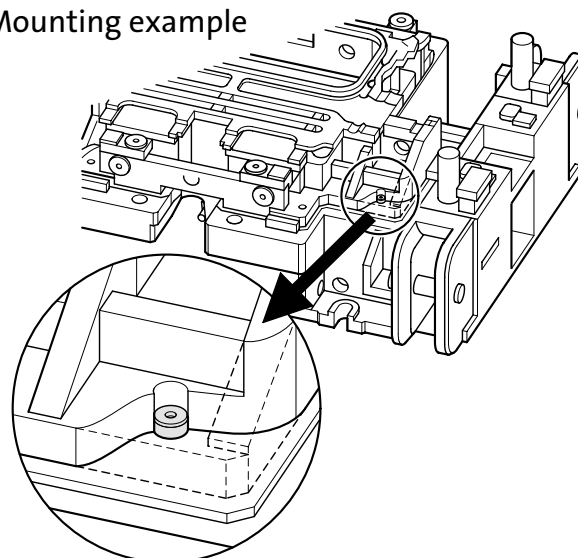
2445.11. Centring pin to Mercedes-Benz standard

Order No	d	d ₁	d ₂	d ₃	d ₄	t	t ₁
2445.11.022	22	11	M8	9	16	13	16
2445.11.025	25	11	M8	9	18	13	16
2445.11.032	32	11	M8	9	25	13	16
2445.11.040	40	15	M10	11	32	16	20
2445.11.050	50	15	M10	11	42	16	20

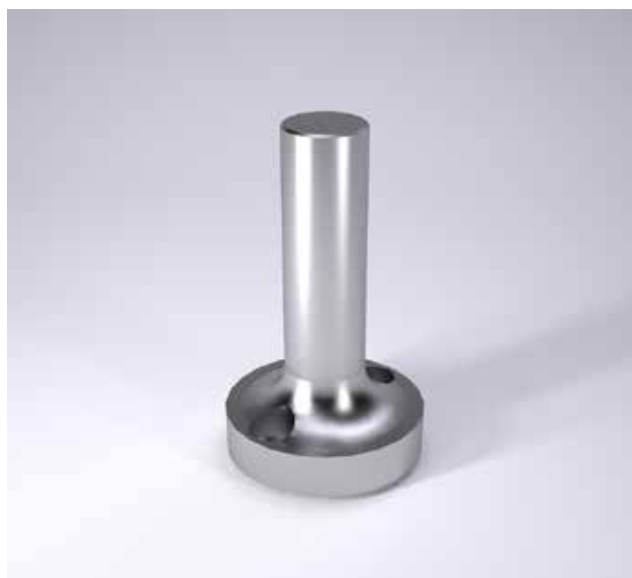
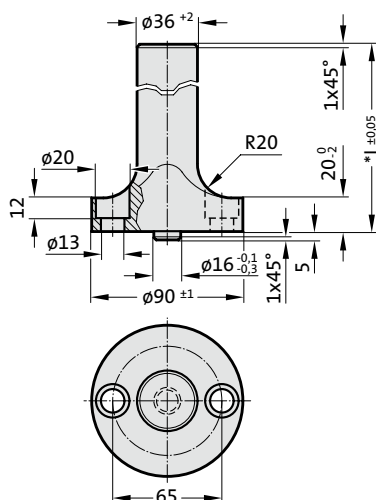
Mounting example



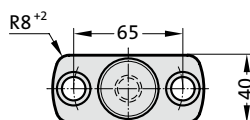
Mounting example



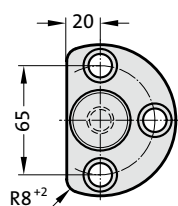
2446.10.55.03.



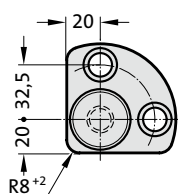
2446.10.55.02.



2446.10.55.04.



2446.10.55.05.



Description:
Pressure bolts with base are used to transfer force from the pressure cushion of the press to the tool.

C45 (1.0503), heat-treated 800 - 1000 N/mm²

drop-forged

NOTE:
Screws are not included.

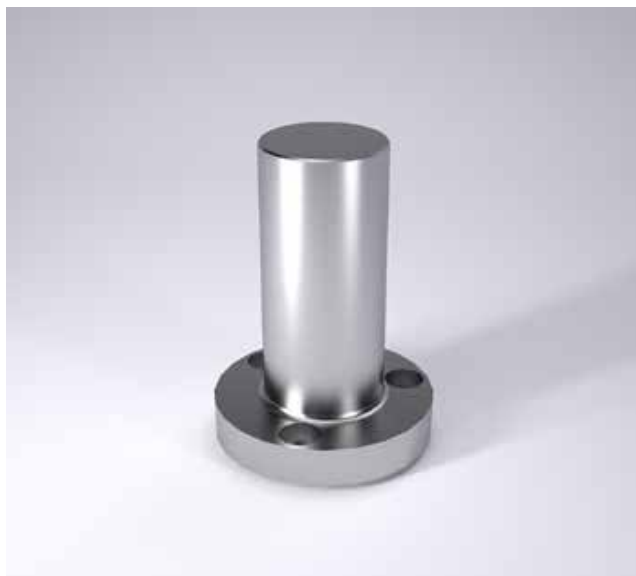
2446.10.55. Pressure bolt with base, according to VW

Order No	I*	Gradation
2446.10.55.02.	150 - 360	1
2446.10.55.03.	150 - 360	1
2446.10.55.04.	150 - 360	1
2446.10.55.05.	150 - 360	1

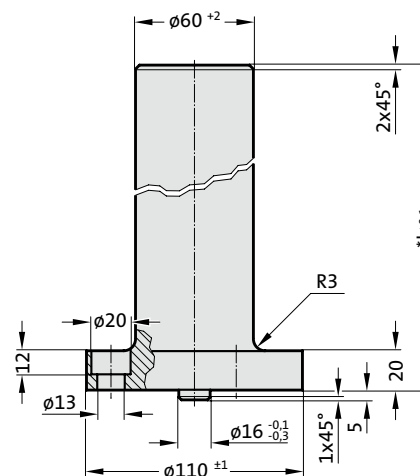
Ordering Code (example):

Pressure bolt with base, according to VW		=2446.10.55.
Execution Shape	4	= 04.
Length l	150 mm	= 150
Order No		=2446.10.55. 04. 150

Air pin, according to VW standard



2446.11.55.01.



Description:

Air pins are used to transfer force from the pressure cushion of the press to the tool.

Material:

C45 (1.0503), heat-treated 800 - 1000 N/mm²

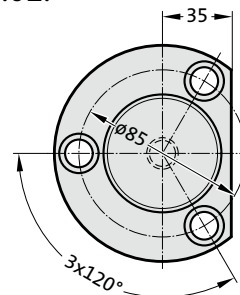
Execution:

drop-forged

Note:

Screws are not included.

2446.11.55.02.



2446.11.55. Air pin, according to VW standard

Order No	l*	Gradation
2446.11.55.01.	150 - 440	1
2446.11.55.02.	150 - 440	1

*to customer's specifications!

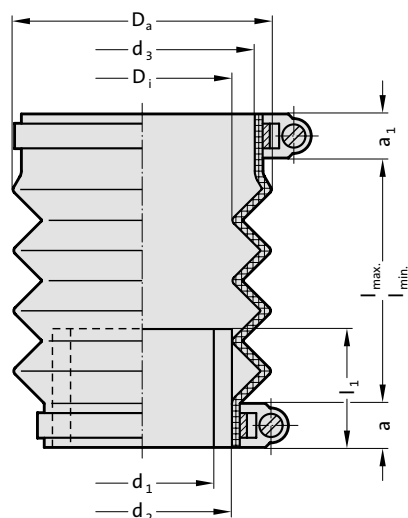
Ordering Code (example):

Air pin, according to VW standard	=2446.11.55.
Execution Shape	2 = 02.
Length l	150 mm = 150
Order No	=2446.11.55.02.150



Concertina shroud with spacer bush

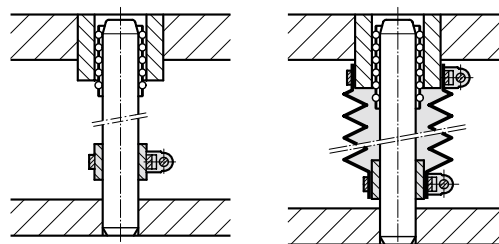
206.91.



Note:

Concertina Shrouds are supplied complete with spacer bush and two hose clamps.
Special sizes on request.

Mounting example



206.91. Concertina shroud with spacer bush

for guide bushes	2051./ 2061.	2051./ 2061.	2051./ 2061.	2051./ 2061.	2051./ 2061.	2051./ 2061.	2051./ 2061.	2081.	2081.	2081.	2081.	2081.	2081.	2081.
Pillar- $\varnothing d_1$	19 20	24 25	30 32	38 40	48 50	60	63	19 20	24 25	30 32	38 40	48 50	60	63
d^*	20	25	32	40	50	60	63	20	25	32	40	50	60	63
d_2	25	30	40	50	60	70	70	25	30	40	50	60	70	70
d_3	32	38	46	55	64	76	76	39	45	54	63	74	94	94
d_4^{**}	32	38	48	58	58	79	79	40	45	54	66	80	95	95
D_i	30	30	46	55	62	75	75	32	32	45	52	62	75	75
D_a	51	56	72	87	86	100	100	54	56	63	96	84	104	104
a	13	13	20	12	12	12	12	10	10	10	12	12	10	10
a_1	16	13	20	12	12	10	10	10	10	10	12	12	10	10
l_1	20	30	30	40	40	40	40	20	30	30	40	40	40	40
l_{min}	30	25	20	44	25	30	30	37	35	35	25	45	35	35
l_{max}	170	130	100	119	110	130	130	145	110	110	225	165	185	185

* d = Nominal diameter, ** d_4 = Nominal ordering diameter for flange diameter

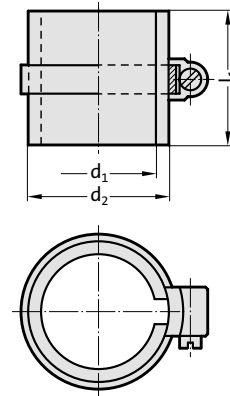
Ordering Code (example):

Concertina shroud with spacer bush	= 206.91.
Nominal diameter d	20 mm = 020.
Nominal ordering diameter for flange diameter d_4	40 mm = 040
Order No	= 206.91. 020.040

Spacer bush Spacer tube



206.93.



Material:

PMMA, PLEXIGLAS®



206.93. Spacer bush

Pillar- \varnothing d ₁	15 16	19 20	24 25	30 32	38 40	48 50	60	63
d*	16	20	25	32	40	50	60	63
d ₂	20	25	30	40	50	60	70	70
l ₁	20	20	30	30	40	40	40	40

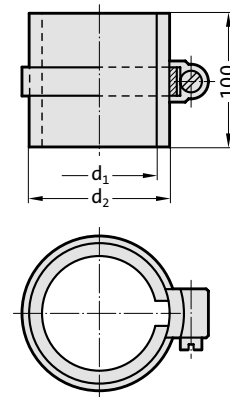
*d = Nominal diameter

Ordering Code (example):

Spacer bush	=206.93.
Nominal diameter d	40 mm = 040
Order No	=206.93. 040



206.94.



Material:

PMMA, PLEXIGLAS®



206.94. Spacer tube

Pillar- \varnothing d ₁	15/16	19/20	24/25	30/32	38/40	48/50	60	63
d*	16	20	25	32	40	50	60	63
d ₂	20	25	30	40	50	60	70	70
l ₁	100	100	100	100	100	100	100	100

*d = Nominal diameter

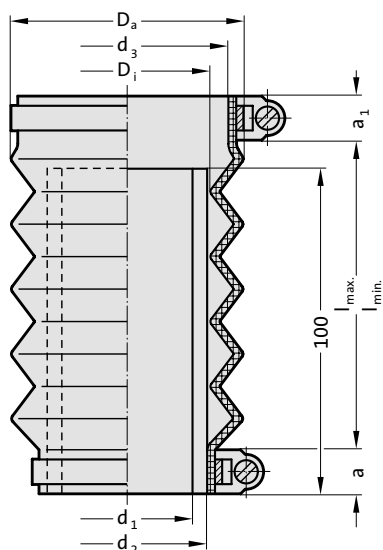
Ordering Code (example):

Spacer tube	=206.94.
Nominal diameter d	40 mm = 040
Order No	=206.94. 040



Concertina shroud with spacer tube

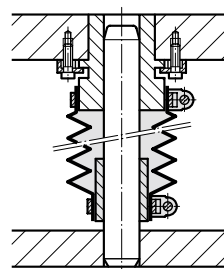
206.92.



Note:

Concertina Shrouds are supplied complete with spacer tube and two hose clamps.
Special sizes on request.

Mounting example



206.92. Concertina shroud with spacer tube

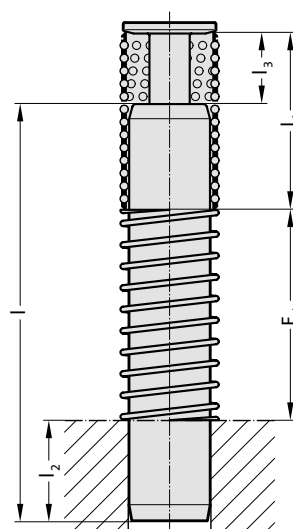
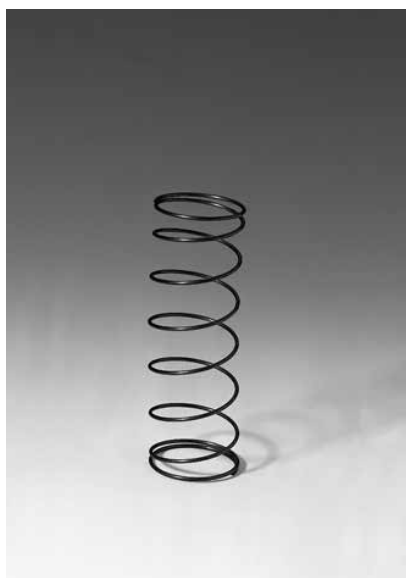
for guide bushes	2051./2061.	2051./2061.	2051./2061.	2051./2061.	2051./2061.	2051./2061.	2051./2061.	2081.	2081.	2081.	2081.	2081.	2081.	2081.
Pillar- $\varnothing d_1$	19 20	24 25	30 32	38 40	48 50	60	63	19 20	24 25	30 32	38 40	48 50	60	63
d^*	20	25	32	40	50	60	63	20	25	32	40	50	60	63
d_2	25	30	40	50	60	70	70	25	30	40	50	60	70	70
d_3	32	38	46	55	64	76	76	39	45	54	63	74	94	94
d_4^{**}	32	38	48	58	58	79	79	40	45	54	66	80	95	95
D_i	30	30	46	55	62	75	75	32	32	45	52	62	75	75
D_a	51	56	72	87	86	100	100	54	56	63	96	84	104	104
a	13	13	20	12	12	12	12	10	10	10	12	12	10	10
a_1	16	13	20	12	12	10	10	10	10	10	12	12	10	10
l_1	100	100	100	100	100	100	100	100	100	100	100	100	100	100
l_{min}	30	25	20	44	25	30	30	37	35	35	25	45	35	35
l_{max}	170	130	100	119	110	130	130	145	110	110	225	165	185	185

* d = Nominal diameter, ** d_4 = Nominal ordering diameter for flange diameter

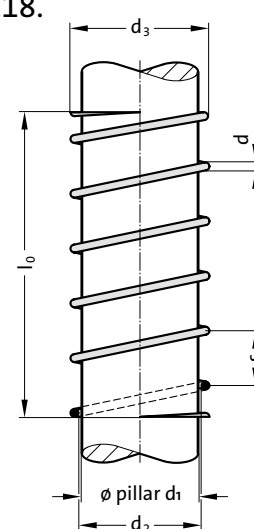
Ordering Code (example):

Concertina shroud with spacer tube = 206.92.
Nominal diameter d 20 mm = 020.
Nominal ordering diameter for flange diameter d_4 40 mm = 040
Order No = 206.92.020.040

Helical spring for ball cage retention



241.18.



Calculation:

Formula for selecting spring 241.18.:

$$F_L = [l - (l_2 + (l_1 - l_3))] \times 1,1$$

Formula for calculating the block length L_{BL} of the selected spring:

$$L_{BL} = (l_0 \times d : s) + 2 \times d$$

F_L = Length of compressed spring

l = Length of guide pillar (Customer specified)

l_1 = Cage length (Customer specified)

l_2 = Compression length of guide pillar (Customer specified)

l_3 = Ball cage retainer size (Customer specified)

1.1 = Safety factor

l_0 = Length of uncompressed spring

d = Spring wire diameter

s = Pitch

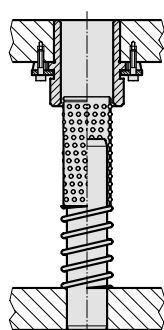
241.18. Helical spring for ball cage retention

d_1	d_2	d_3	s	d	l_0	Gradation l_0
19/20	20.5	22.5	14	1	40 - 140	10
24/25	25.5	27.9	14	1.2	40 - 160	10
30/32	32.5	35.7	16	1.6	50 - 230	10
38	38.5	42.5	18	2	60 - 230	10
40	40.5	45.1	20	2.3	60 - 230	10
48/50	50.5	55.7	20	2.6	70 - 280	10
60	60.5	66.9	20	3.2	80 - 250	10
63	63.5	69.9	20	3.2	80 - 250	10

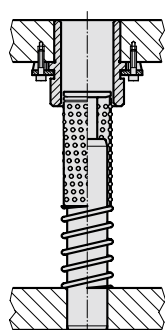
Ordering Code (example):

Helical spring for ball cage retention	=241.18.
Inside diameter d_2	40.5 mm = 405.
Length l_0	60 mm = 060
Order No	=241.18. 405.060

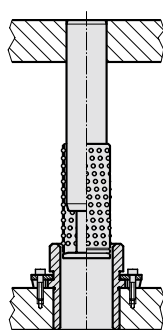
Mounting example



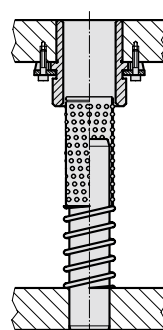
Without ball cage retainer



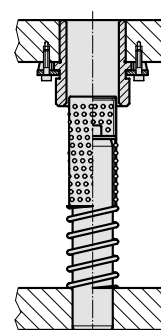
With ball cage retainer 202.91.



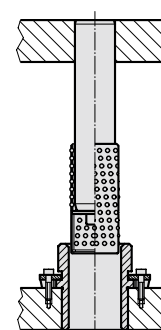
With ball cage retainer 202.91.



Without ball cage retainer



With ball cage retainer 202.92.1.



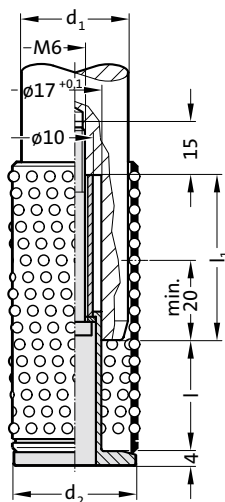
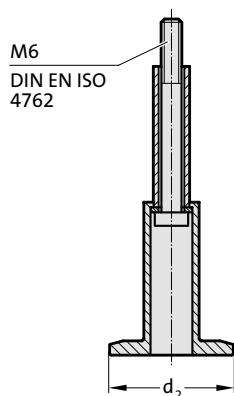
With ball cage retainer 202.92.1.



Cage retainer

202.91.

Mounting example



Note:

The following guide pillars can be equipped with this cage retainer.

Guide pillars without cage retainer -	become guide pillars with cage retainer:
202.19. -	202.17.
202.21. -	202.55.
2021.46. -	2021.44.
2021.50. -	2021.58.

202.91. Cage retainer

d ₁	38	40	48	50	60	63
d ₂	42	44	52	54	64	67
KG (l / l ₁)						
1 (31 / 46)	●	●	●	●	●	●
2 (41 / 56)	●	●	●	●	●	●
3 (51 / 66)	●	●	●	●	●	●
4 (61 / 76)	●	●	●	●	●	●
5 (73 / 89)	●	●	●	●	●	●

Ordering Code (example):

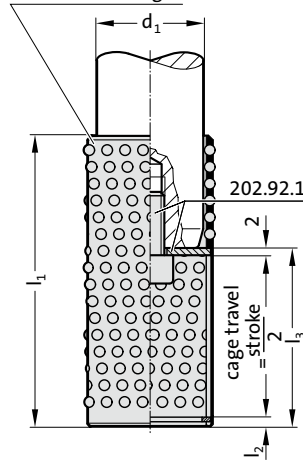
Cage retainers	=202.91.
Guide diameter d ₁	50 mm= 050.
Cage retainer size KG	1 = 1
Order No	=202.91. 050.1

Cage retainer

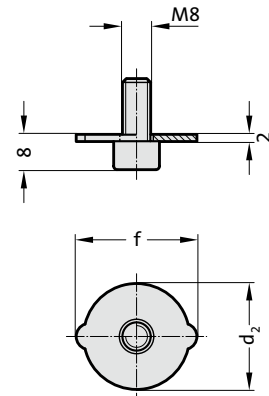


Mounting example

order separately:
206.75. Ball Cage
2060.65. Ball Cage



202.92.1.



Note:

The following guide pillars can be equipped with this cage retainer:

202.22.
202.24.
2021.46.
2021.50.

202.92.1. Cage retainer

d ₁	19	20	24	25	30	32	38	40	48	50	60	63
d ₂	18	19	23	24	29	31	37	39	47	49	59	62
f	22	23	27	28	34	36	42	44	52	54	64	67

Ordering Code (example):

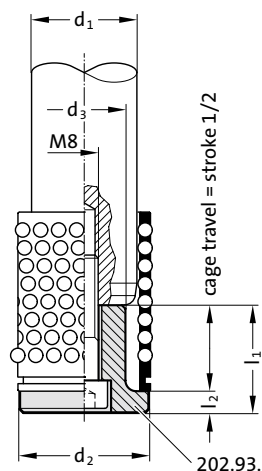
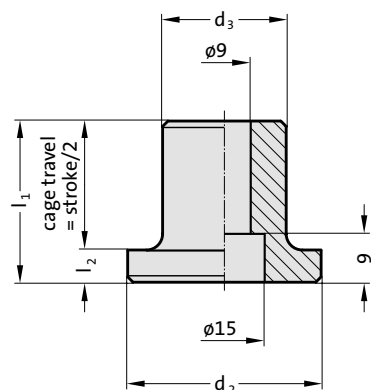
Cage retainer =202.92.1.
Guide diameter d₁ 38 mm = 038
Order No =202.92.1. 038



Cage retainer

202.93.

Mounting example



Note:

The following guide pillars can be equipped with this cage retainer:

202.22.

202.24.

2021.46.

2021.50.

Screws are not included.

Fixing:

Use socket cap screws DIN EN ISO 4762 for ordering size:

03. - 2192.12.08.035

04. - 2192.12.08.045

05. - 2192.12.08.055

06. - 2192.12.08.070

08. - 2192.12.08.090

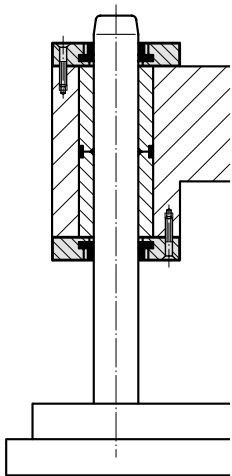
202.93. Cage retainer

Order No	d ₁	d ₂	d ₃	l ₁	l ₂
202.93.03.030	30 o. 32	36	23	30	6
202.93.04.040	38 o. 40	44	31	40	6
202.93.05.050	48 o. 50	54	39	50	8
202.93.06.060	60 o. 63	66	51	60	8
202.93.08.080	80	89	71	80	8

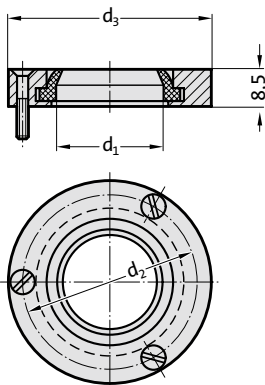
Pillar wiper



Mounting example



206.95.
2061.95.



Description:

FIBRO Pillar Wipers protect against premature wear caused by the ingress of dirt into the die set guides. Outside diameters match boss dias. on FIBRO Die Sets (Cast Iron). They can be fitted onto the bolster, or into a counterbore – flush with the bolster surface.

Note:

Pillar Wipers will be delivered with 3 screws M 4 × 16 DIN 963.

206.95./2061.95. Pillar wiper

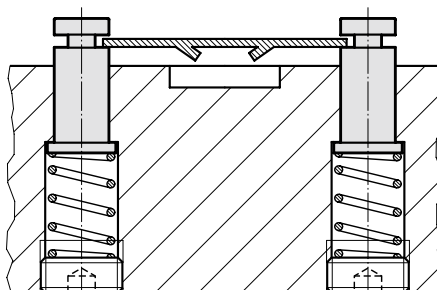
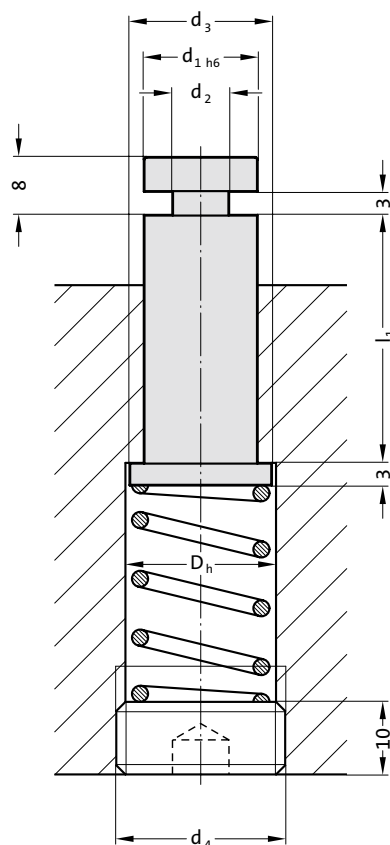
Order No	d ₁	d ₂	d ₃
206.95.024	24	45	55
206.95.025	25	45	55
206.95.030	30	55	65
206.95.032	32	55	65
206.95.038	38	65	75
206.95.040	40	65	75
206.95.042	42	65	75
206.95.048	48	78	94
206.95.050	50	78	94
206.95.052	52	78	94
206.95.060	60	92	110
206.95.063	63	92	110
2061.95.024	24	50	60
2061.95.025	25	50	60



Lifter pin for press tool strips

244.00.2.

Mounting example



Description:

Combination progression dies with certain forming stages can be equipped advantageously with springloaded lifter pins. FIBRO Lifter Pins 244.00.2., available in four sizes, can be used to assume the double function of lifting and guiding the strip. The amount of lift is a function of the counterbore-depth.

Material:

1.7131, case-hardened

Execution:

ground

Note:

For ordering code of screw plug 241.00.1. and helical spring see spring range on pages chapter F.

244.00.2. Lifter pin for press tool strips

d_1	8	10	13	16
d_2	5	6	7	8
d_3	10	12	16	20
D_h	10.5	12.5	16.5	20.5
d_4	M12x1.5	M14x1.5	M18x1.5	M22x1.5
l_1				
20	●			
25	●	●	●	
32	●	●	●	●
40	●	●	●	●
50		●	●	●

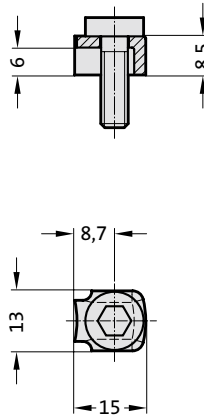
Ordering Code (example):

Lifter pin for press tool strips =244.00.2.
 Guide diameter d_1 13 mm = 13.
 Guide length l_1 25 mm = 025
 Order No =244.00.2.13. 025

Screw clamp with screw



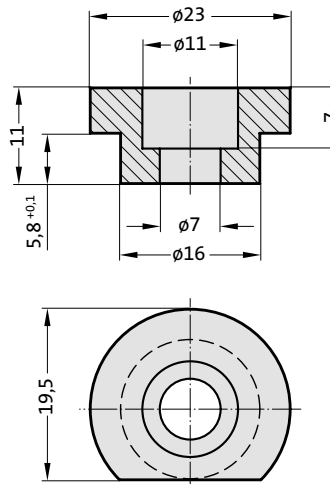
207.45



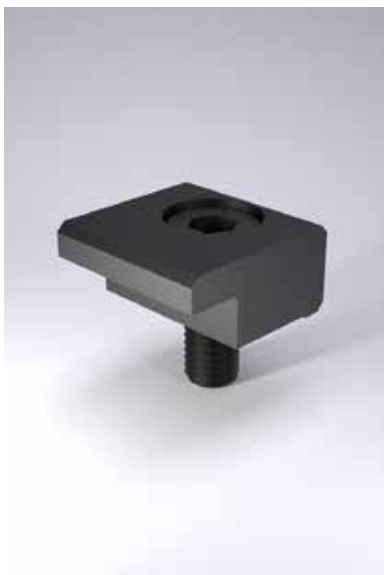
Screw clamp
incl. screw
- steel punched bent
component
- clamping height
6-6,3 mm
- M6 screw



2071.45

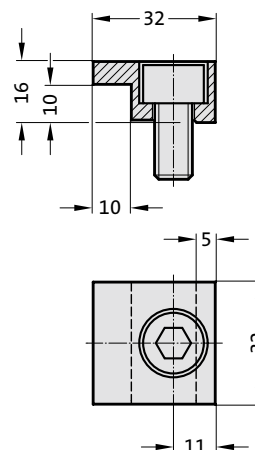
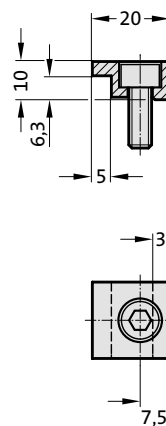


Screw clamp
incl. screw
- clamping height 6 mm
- M6 screw



2072.45.10.

2072.45.16.



Screw clamp
incl. screw
2072.45.10
- Steel, milled
- clamping height
6-6,3 mm
- M6 screw
2072.45.16
- Steel, milled
- clamping height 10 mm
- M10 screw



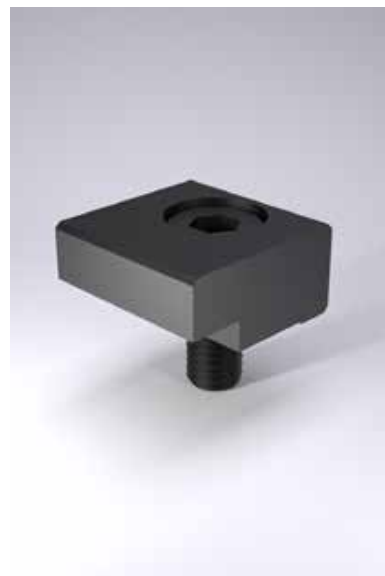
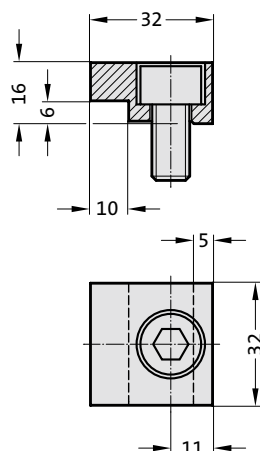
Screw clamp with screw

Screw clamp with screw, GM Standard

Screw clamp with screw, NAAMS

Screw clamp 2072.46

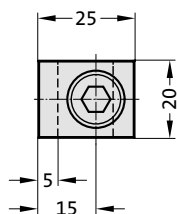
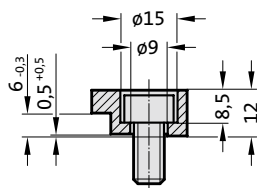
- incl. screw
- Steel, milled
- clamping height
6-6,3 mm
- M10 screw



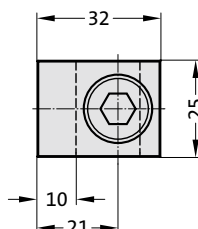
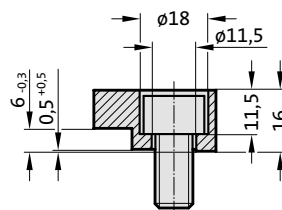
Screw clamp according to GM, incl. screw

- 2072.46.30.12
- Steel, milled
- clamping height 6 mm
- M8 screw
2072.46.30.16
- Steel, milled
- clamping height 6 mm
- M10 screw

2072.46.30.12

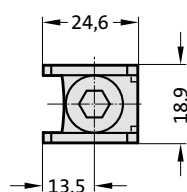
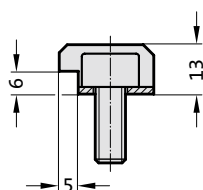


2072.46.30.16



Screw clamp 2072.47

- according to NAAMS, incl. screw
- steel punched bent component
- clamping height
6-6,3 mm
- M8 screw

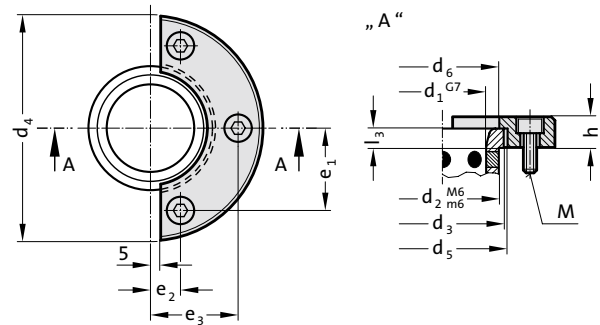


Securing flange with screws, CNOMO

Screw clamp with screw, CNOMO



2073.45.



Securing flange

according to CNOMO, incl. screws

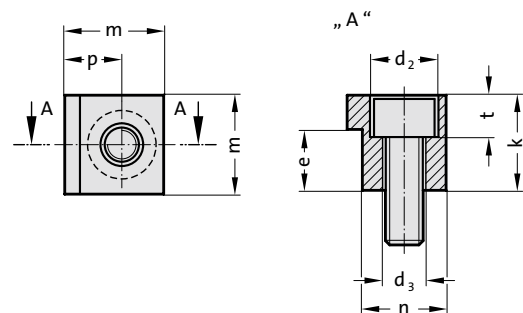
- steel, turned
- clamping height 4, 5, 6, 8, 10, 12, 16, 20 mm
- M6, M8, M10, M12 screws

2073.45. Securing flange with screws, CNOMO

Order No	d ₁	d ₂	d ₃	d ₄	d ₆	h	l ₃	e ₁	e ₂	e ₃	M
2073.45.020	20	28	32	63	25	10	4	16	18	-	6x16
2073.45.025	25	35	40	72	32	10	5	20	20	-	6x16
2073.45.032	32	44	50	80	40	12	6	25	21	-	6x16
2073.45.040	40	52	60	100	50	12	8	38.5	14	41	6x16
2073.45.050	50	63	71	125	63	16	10	46	17	49	8x20
2073.45.063	63	80	90	140	80	20	12	55	17	57.5	10x25
2073.45.080	80	100	112	180	100	25	16	70	20	72	12x30
2073.45.100	100	125	140	200	125	32	20	81	25	85	12x30



2072.48.45.



Screw clamp

according to CNOMO, incl. screw

- Steel, milled
- clamping height 8, 10, 12, 16, 20 mm
- M6, M8, M10 screw

2072.48.45. Screw clamp with screw, CNOMO

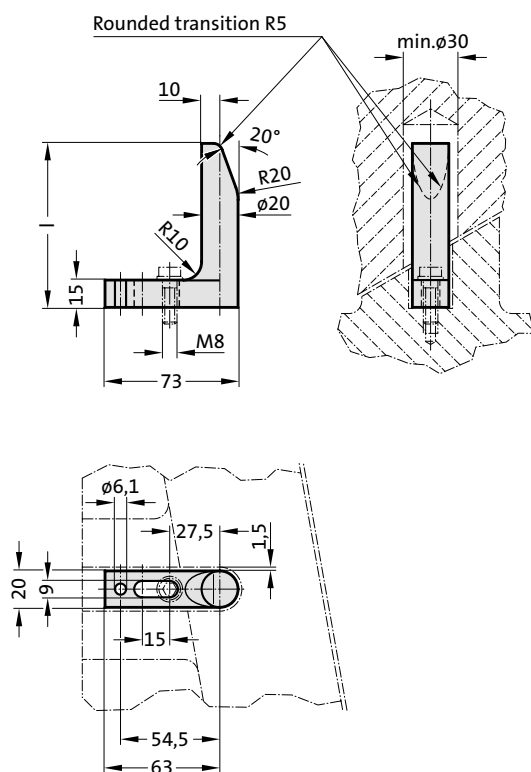
Order No	k	e	d ₂	d ₃	t	m	p	n	d ₁	M
2072.48.45.12	12	8	11	6.6	6.8	18	9.5	15.5	40	6x16
2072.48.45.16	16	10	15	9	9	22	12	19	50	8x20
2072.48.45.20	20	12	18	11	11	26	15	21	63	10x25
2072.48.45.25	25	16	18	11	11	26	15	21	80	10x30
2072.48.45.32	32	20	18	11	11	26	15	21	100	10x35





Guide to Mercedes-Benz Standard - hardened

2443.10.20. .1



Material:

Ck 60, hardened 58 + 2 HRC

Execution:

forged

Note:

Guides are preferably used in confined spaces in sequential compound dies.

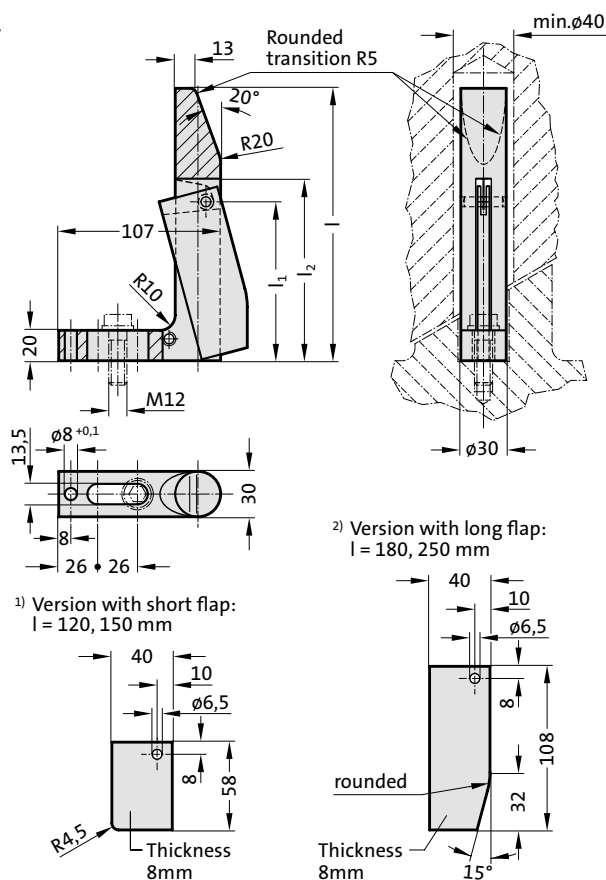
2443.10.20. .1 Guide to Mercedes-Benz Standard - hardened

Order No	l
2443.10.20.065.1	65
2443.10.20.090.1	90

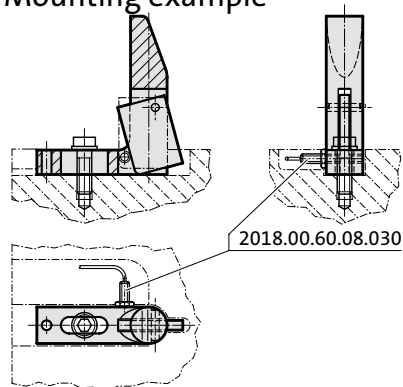
Guide with part position control and spring



2443.12.



Mounting example



Material:

Guide: Ck 60, hardened 50 + 5 HRC

Flap: St 37

Spring: Spring steel wire

Execution:

forged

Note:

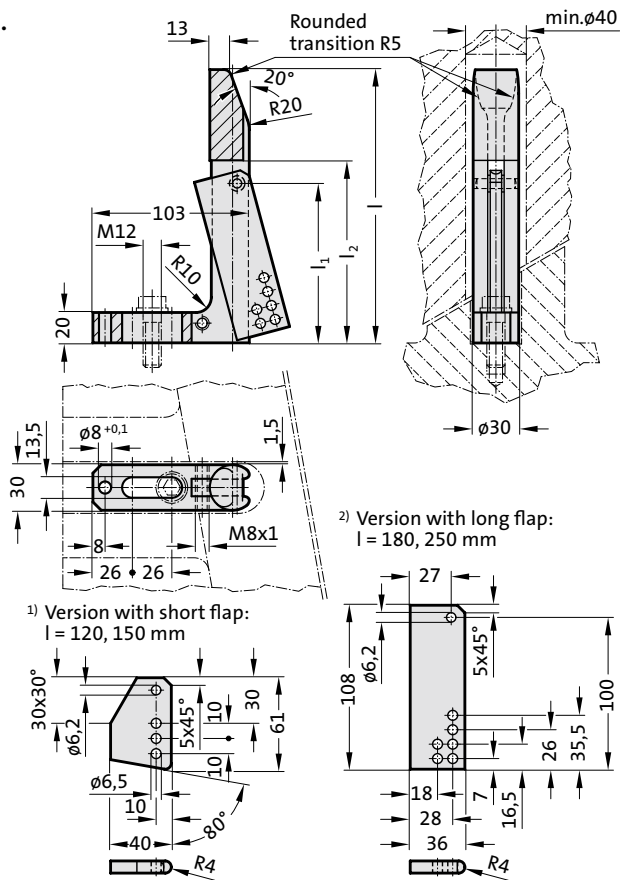
See following pages for accessories.

2443.12. Guide with part position control and spring

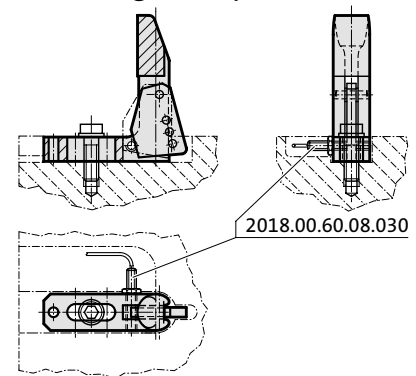
Order No	l	l ₁	l ₂
2443.12.120	120	55	70
2443.12.150	150	55	70
2443.12.180	180	105	120
2443.12.250	250	105	120

Guide with part position control, VDI

2443.13.



Mounting example



Material:

Guide: Ck 60, hardened 50 + 5 HRC
Flap: St 37, hardened 58 + 2 HRC

Execution:

forged

Note:

See following pages for accessories

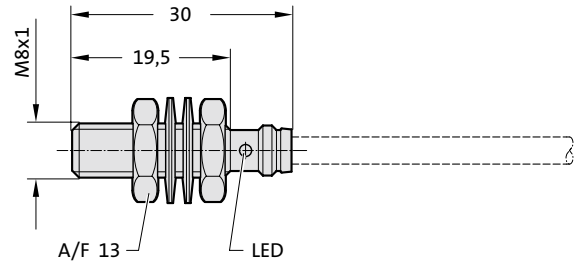
2443.13. Guide with part position control, VDI

Order No	l	l_1	l_2
2443.13.120	120	55	70
2443.13.150	150	55	70
2443.13.180	180	105	120
2443.13.240	240	105	120

Inductive proximity switch



2018.00.60.08.030



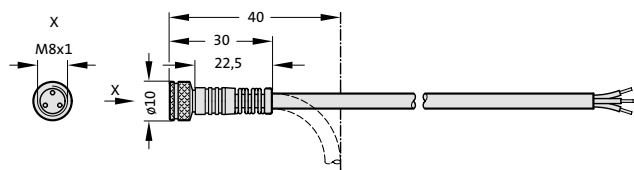
Technical data

Rated operating voltage U_e : 24 V DC
 Operating Voltage U_s : 10-30 V DC
 No load current I_0 damped/undamped: $\leq 8 \text{ mA}/\leq 1 \text{ mA}$
 Repeat accuracy R : $\leq 5\%$
 Ambient temperature T_a : -40 to +85 °C
 Switching frequency f : 3000 Hz
 Degree of protection to IEC 529: IP 67
 Casing material: Stainless steel
 Connection: plug connector
 Approvals: UL

2018.00.60.08.030 Inductive proximity switch

Cable - straight Cable , 90° connector

2018.00.60.23.01.5



2018.00.60.23.01.5 Cable - straight

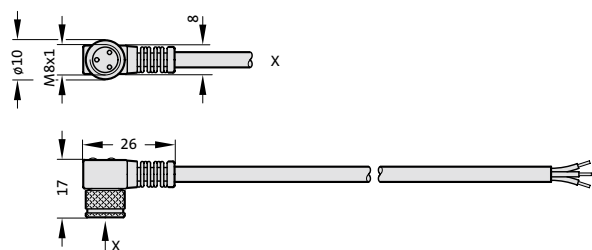
Technical data

Cable type: 3 pole, M8, oil resistant
Standard length: 5 m

Other lengths on request



2018.00.60.23.02.5



2018.00.60.23.02.5 Cable , 90° connector

Technical data

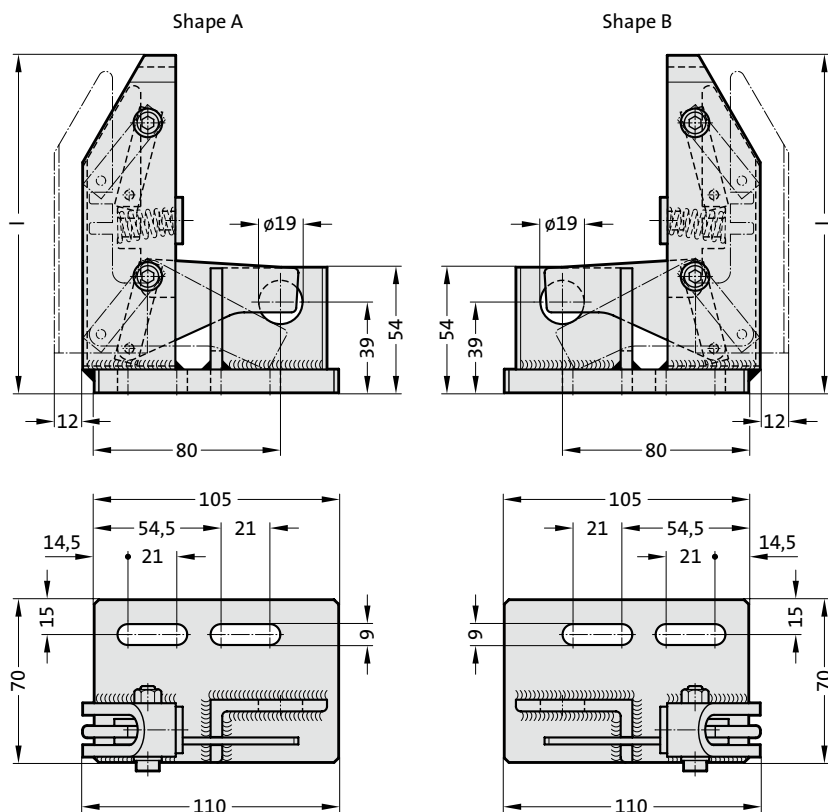
Cable type: 3 pole, M8, oil resistant
Standard length: 5 m

Other lengths on request

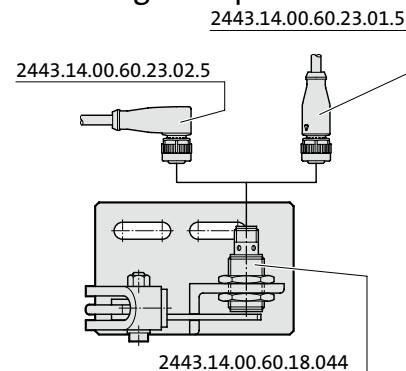


Position monitor for boards

2443.14.55.



Mounting example



Material:

Steel

Note:

See following pages for accessories.

Attention:

At least two position monitors must be installed crosswise. In case of large parts, such as the side part, a third position monitor should be

placed. The position monitors should be placed in such a way that a perfect querying of the sheet metal part is guaranteed. Position monitors should be arranged a minimum of 5 mm away from the pulling or locking bars and not within the range of strong sheet movement.

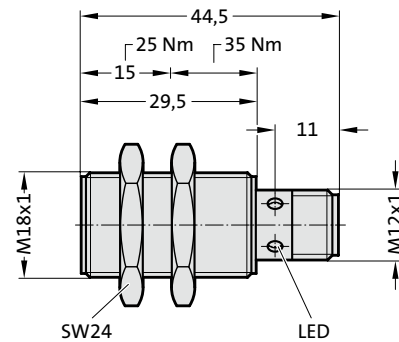
2443.14.55. Position monitor for boards

Order No	l	Shape
2443.14.55.01	145	A
2443.14.55.02	145	B
2443.14.55.03	185	A
2443.14.55.04	185	B
2443.14.55.25	225	A
2443.14.55.26	225	B

Inductive proximity switch



2443.14.00.60.18.044



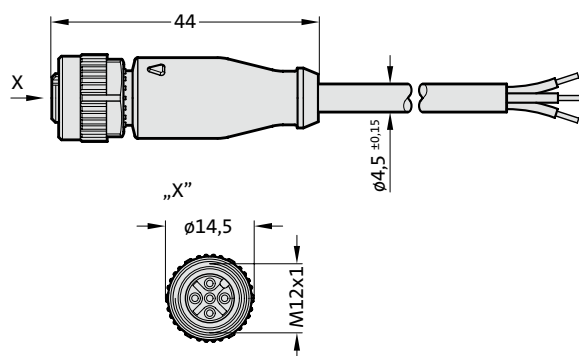
Technical data:

Rated operating voltage U_e : 24 V DC
 Operating Voltage U_s : 10-30 V DC
 No load current I_0 damped/undamped: ≤ 10 mA/ ≤ 3 mA
 Repeat accuracy R: max. (% v. Sr) 5%
 Ambient temperature T_a : -25 to +70°C
 Switching frequency f : max.1000 Hz
 Degree of protection to IEC 60529: IP 67
 Casing material: CuZn
 Connection: plug connector
 Approvals: UL

2443.14.00.60.18.044 Inductive proximity switch

Cable - straight Cable , 90° connector

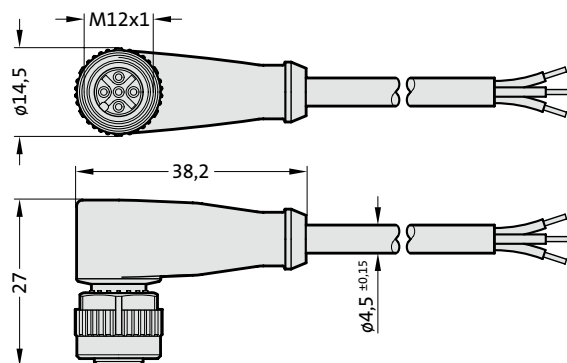
2443.14.00.60.23.01.5



2443.14.00.60.23.01.5 Cable - straight

Technical data:
Cable type: 3 pole, M12x1
Standard length: 5m
Other lengths on request

2443.14.00.60.23.02.5



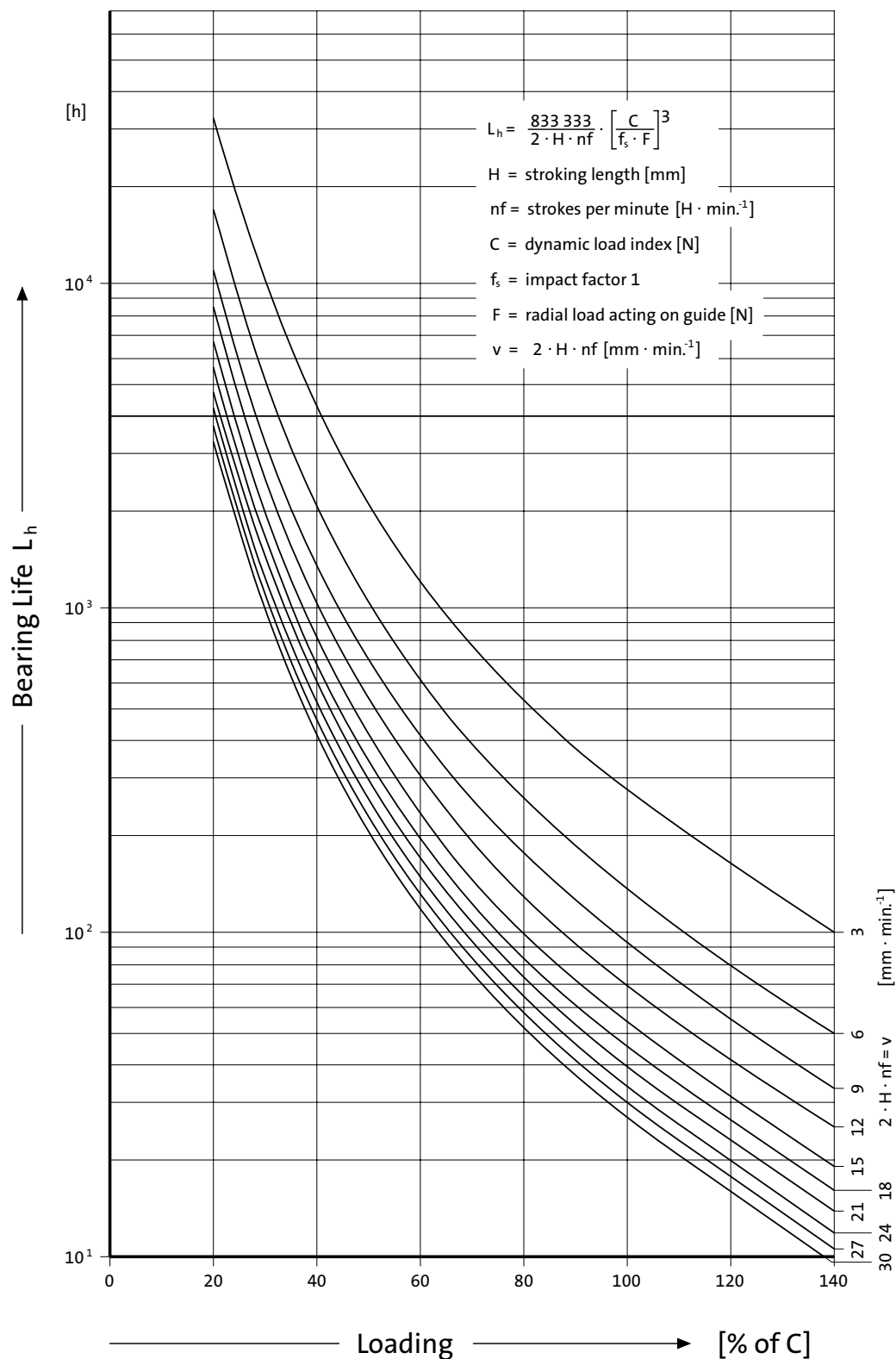
2443.14.00.60.23.02.5 Cable , 90°
connector

Technical data:
Cable type: 3 pole, M12x1
Standard length: 5m
Other lengths on request

Loading Diagram for Ball Bearing Guides

Bearing Life versus Loading:

Values shown are based on the Impact Factor of $f_s = 1$ which is applicable to normal conditions in respect of die set and press, with a maximum bearing temperature of 100 °C.



Safe Loads for FIBRO Ball Bearing Guides

Tables of Dynamic Load Indexes

Definition:

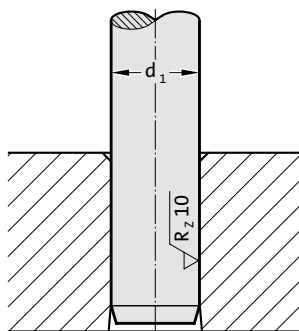
The dynamic load index C constitutes a constant loading that will allow the respective sizes of ball bearing guides to reach + 10⁵ m without any discernible bearing damage. The load index is shown in N and results from tests executed with batches of sufficient size, subjected to linear travel oscillations and radially imposed loads of constant magnitude and unchanging direction.

Pillar Ø d ₁	Cage length l ₁	Dynamic Load Index C for whole cage (N)	Pillar Ø d ₁	Cage length l ₁	Dynamic Load Index C for whole cage (N)
8	40	450	38	50	8200
10	40	1630	38	56	8900
10	56	2210	38	63	10300
11	40	1660	38	80	12100
11	56	2250	38	95	13900
12	40	1680	38	105	15000
12	56	2280	38	120	16700
15	45	3300	38	140	18700
15	56	4050	38	160	20700
15	63	4550	38	180	22600
15	71	4950	38	200	24400
16	24	1910	38	240	28000
16	28	2230	40	45	7500
16	45	3350	40	50	8200
16	56	4100	40	56	9000
16	63	4600	40	63	10300
16	71	5000	40	80	12200
19	31	3050	40	95	14000
19	45	4050	40	105	15100
19	56	4950	40	120	16700
19	71	6100	40	140	18800
19	80	6600	40	160	20800
19	95	7600	40	180	22700
20	24	2320	40	200	24600
20	28	2700	40	240	28000
20	31	3100	48	50	9400
20	45	4100	48	63	11700
20	56	5000	48	80	13800
20	71	6100	48	95	15900
20	80	6600	48	105	17100
20	95	7600	48	120	19000
24	31	3150	48	140	21400
24	40	3850	48	160	23600
24	45	4200	48	180	26000
24	56	5100	48	200	28000
24	71	6300	48	240	32000
24	80	6800	50	50	9400
24	95	7800	50	63	11700
24	120	9300	50	80	13900
25	31	3200	50	95	15900
25	40	3900	50	105	17200
25	45	4200	50	120	19100
25	56	5200	50	140	21400
25	71	6300	50	160	23700
25	80	6900	50	180	26000
25	95	7900	50	200	28000
25	120	9300	50	240	32000
30	40	5700	60	95	17700
30	45	6400	60	105	19200
30	50	7000	60	120	21300
30	56	7600	60	140	23900
30	71	9300	60	160	26500
30	75	9800	60	180	29000
30	80	10400	60	200	31000
30	95	11900	60	240	35500
30	105	12800	63	95	17800
30	120	14200	63	105	19300
30	140	16000	63	120	21300
30	160	17700	63	140	24000
32	40	5800	63	160	26500
32	45	6400	63	180	29000
32	50	7100	63	200	31500
32	56	7700	63	240	35500
32	71	9400	80	120	41000
32	75	9900	80	140	46500
32	80	10500	80	160	52000
32	95	12000	80	180	57000
32	105	12900	80	200	62000
32	120	14300	80	240	70000
32	140	16100			
32	160	17800			
38	45	7500			

Assembly of Guide Elements – Dimensional Requirements and Tolerances

202.17. / 202.19. /
202.22. / 202.23. /
202.24. / 202.29.

Guide pillar-
DIN 9825/ISO 9182-
2 ~DIN 9825/
~ISO 9182-2
(press fit)



202.17. / 202.19. / 202.22. / 202.23. / 202.24. /
202.29.

Pillar $\varnothing d_1^*$	Retaining bore d_1 (recommended values based on experiences)	
3-80	in grey cast iron: d_1	-0,025
		-0,035
	in steel: d_1	-0,015
		-0,025

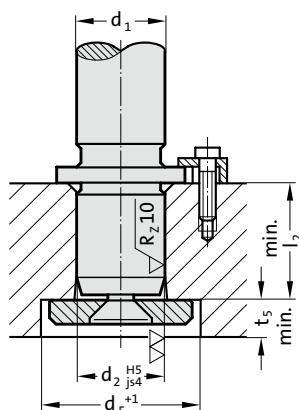
* Pillars of $d_1 = 50$ mm and over should be frozen in dry ice before fitting



2021.46. / 2021.44.

Demountable guide
pillar with collar
DIN 9825/
~ISO 9182-5

(transition fit)



2021.46. / 2021.44.

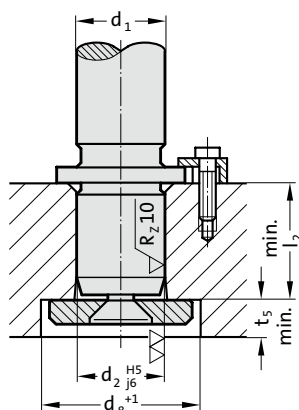
Pillar $\varnothing d_1$	Retaining bore d_3^{H5}	d_5^{+1}	l_2	t_5
15/16	15/16 ^{+0,008}	24	20,5	6,5
19/20	19/20 ^{+0,009}	27	23,5	6,5
24/25	24/25 ^{+0,009}	34	30,5	6,5
30/32	30/32 ^{+0,011}	42	37,5	6,5
38/40	38/40 ^{+0,011}	52	37,5	6,5
48/50	48/50 ^{+0,013}	62	47,5	6,5
60/63	60/63 ^{+0,013}	72	47,5	6,5
80	80 ^{+0,013}	95	60,5	12,5



2021.29.

Guide pillar with collar

(transition fit)



2021.29.

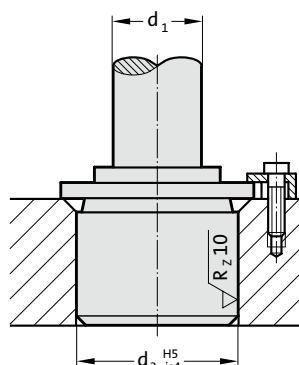
Pillar $\varnothing d_1$	Retaining bore d_2^{H5}	d_8^{+1}	l_2	t_5
15/16	15/16 ^{+0,008}	24	20,5	6,5
19/20	19/20 ^{+0,009}	27	23,5	6,5
24/25	24/25 ^{+0,009}	34	30,5	6,5
30/32	30/32 ^{+0,011}	42	37,5	6,5
38/40	38/40 ^{+0,011}	52	37,5	6,5
48/50	48/50 ^{+0,013}	62	47,5	6,5
60/63	60/63 ^{+0,013}	72	47,5	6,5
80	80 ^{+0,013}	95	60,5	12,5



2021.39.

Liner bush
DIN 9825/ISO 9182-4

(transition fit)



2021.39.

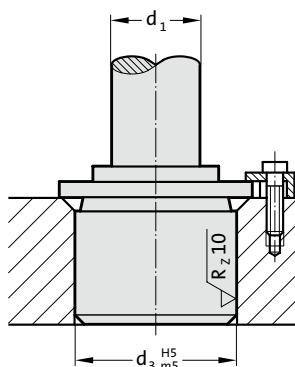
Pillar Ø	Retaining bore
d ₁	d ₃ ^{H5}
19/20	32 ^{+0,011}
24/25	40 ^{+0,011}
30/32	48 ^{+0,011}
38/40	58 ^{+0,013}
48/50	70 ^{+0,013}
60/63	85 ^{+0,015}



Assembly of Guide Elements – Dimensional Requirements and Tolerances

210.39.

Pillar $\varnothing d_1$	Retaining bore d_{1H5}
16	28 ^{+0,009}
20	32 ^{+0,011}
25	40 ^{+0,011}
32	50 ^{+0,011}
40	63 ^{+0,013}
50	80 ^{+0,013}
63	90 ^{+0,015}



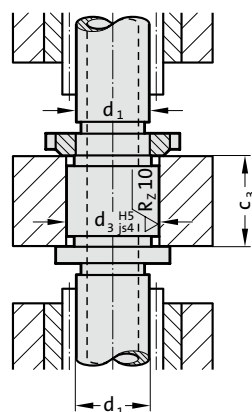
210.39.

Liner bushes,
similar AFNOR
(transition fit)



202.60.

Pillar $\varnothing d_1$	Retaining bore d_{3H5}	Plattendicke C_3^{-1}
19	25 ^{+0,009}	33
25	30 ^{+0,009}	33
32	36 ^{+0,011}	38
40	46 ^{+0,011}	38



202.60.

Demountable guide
pillars with centre
collar
(transition fit)



*Slip-Fit Bonding:

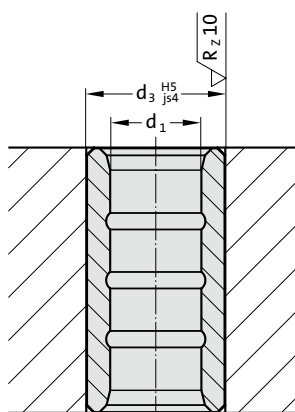
The glue-line gap must not be smaller than 0,005 mm, or the adhesive will be wiped off the contact surfaces upon fitment. This would result in an unreliable bond.

The available component tolerances do not always result in the minimum glue-line gap.

This fact has to be born in mind when machining receiving bores, or alternatively corrections can be made on the assembly bench.

2051.32.

Pillar $\varnothing d_1$	Retaining bore d_{1H5}
8	13,7 ^{+0,008}
11/12	22 ^{+0,009}
15/16	28 ^{+0,009}
19/20	32 ^{+0,011}
24/25	40 ^{+0,011}
30/32	48 ^{+0,011}
38/40	58 ^{+0,013}
48/50	70 ^{+0,013}
60/63	85 ^{+0,015}
80	95,7 ^{+0,015}



2051.32.

Sintered ferrite guide
bushes
DIN 9831 /
ISO 9448-2
slip-fit bonding*

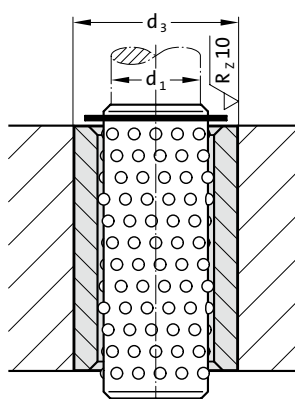


206.54.

Pillar $\varnothing d_1$	Retaining bore d_{3H6}
3	7 ^{+0,009}
4	8 ^{+0,009}
5	10 ^{+0,009}
6	11 ^{+0,011}
8	14 ^{+0,011}

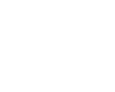
2061.44. / 2061.47

Pillar $\varnothing d_1$	Retaining bore d_{3H5}
8	18 ^{+0,008}
10	22 ^{+0,009}
11/12	22 ^{+0,009}
15/16	28 ^{+0,009}
19/20	32 ^{+0,011}
24/25	40 ^{+0,011}
30/32	48 ^{+0,011}
38/40	58 ^{+0,013}
48/50	70 ^{+0,013}
60/63	85 ^{+0,015}
80	105 ^{+0,015}



206.54.

2061.44./2061.47.
Ball bearing guide
bushes
DIN 9831 /
ISO 9448-3
slip-fit bonding*

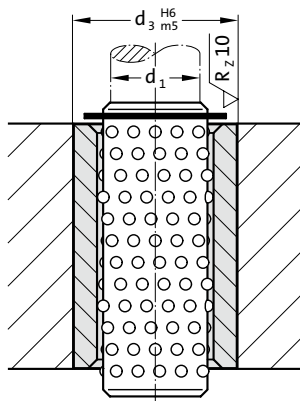


Assembly of Guide Elements – Dimensional Requirements and Tolerances

206.49.

Ball bearing guide
bushes similar AFNOR

slip-fit bonding*



206.49.

Pillar $\varnothing d_1$	Retaining bore d_3^{H6}
16	28 ^{+0,013}
20	32 ^{+0,016}
25	40 ^{+0,016}
32	50 ^{+0,016}
40	63 ^{+0,019}
50	80 ^{+0,019}

*Slip-Fit Bonding:

The glue-line gap must not be smaller than 0,005 mm, or the adhesive will be wiped off the contact surfaces upon fitment. This would result in an unreliable bond.

The available component tolerances do not always result in the minimum glue-line gap.

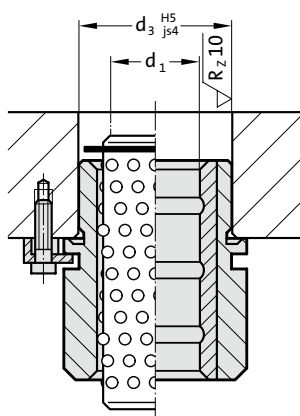
This fact has to be born in mind when machining receiving bores, or alternatively corrections can be made on the assembly bench.

2081.3x. / 2081.4x. /
2081.8x.

Headed guide bushes,
carbonitrided, bron-
ze-coated sintered
types or ball bearing
types

DIN 9831 / ISO 9448-6
DIN 9831 / ISO 9448-7
ISO 9448

(transition fit)



2081.3x. / 2081.4x. / 2081.8x.

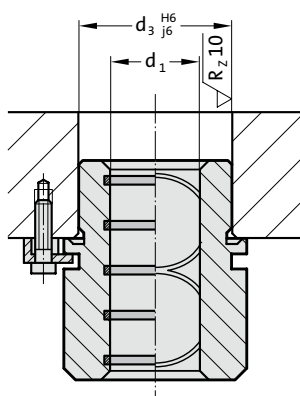
Pillar $\varnothing d_1$	Retaining bore d_3^{H5}
19/20	32 ^{+0,011}
24/25	40 ^{+0,011}
30/32	48 ^{+0,011}
38/40	58 ^{+0,013}
48/50	70 ^{+0,013}
60/63	85 ^{+0,015}
80	105 ^{+0,015}



2081.7x. / 2081.9x.

Headed guide bushes,
bronze, with solid lu-
bricant rings, bronze
plated

(transition fit)



2081.7x. / 2081.9x.

Pillar $\varnothing d_1$	Retaining bore d_3^{H6}
19/20	32 ^{+0,016}
24/25	40 ^{+0,016}
30/32	48 ^{+0,016}
38/40	58 ^{+0,019}
48/50	70 ^{+0,019}
60/63	85 ^{+0,022}
80	105 ^{+0,022}

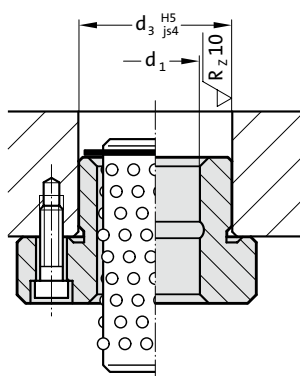


2091.3x. / 2091.4x.

Flanged guide
bushes, carbonitrided
sintered types or ball
bearing types

DIN 9831 / ISO 9448-4
DIN 9831 / ISO 9448-5

(transition fit)



2091.3x. / 2091.4x.

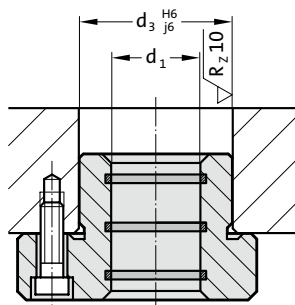
Pillar $\varnothing d_1$	Retaining bore d_3^{H5}
12	26 ^{+0,009}
15/16	28 ^{+0,009}
19/20	32 ^{+0,011}
24/25	40 ^{+0,011}
30/32	48 ^{+0,011}
38/40	58 ^{+0,013}
48/50	70 ^{+0,013}
60/63	85 ^{+0,015}
80	105 ^{+0,015}



Assembly of Guide Elements – Dimensional Requirements and Tolerances

2091.7x.

Pillar $\varnothing d_1$	Retaining bore d_3^{H6}
19/20	32 ^{+0,016}
24/25	40 ^{+0,016}
30/32	48 ^{+0,016}
38/40	58 ^{+0,019}
48/50	70 ^{+0,019}
60/63	85 ^{+0,022}
80	105 ^{+0,022}



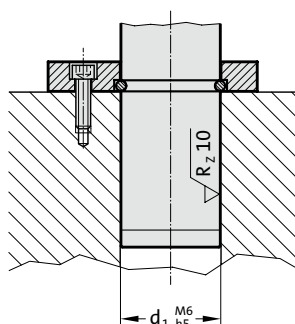
2091.7x.

Guide bush with
solid lubrication
rings DIN 9831 /
ISO 9448-4
(transition fit)



2022.25.

Pillar $\varnothing d_1$	Retaining bore d_1^{M6}
25	-0,004 -0,017
32	-0,004
40	-0,020
50	-0,005
63	-0,024
80	-0,006
100	-0,028



2022.25.

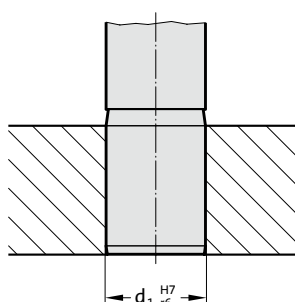
Guide pillar AFNOR
(transition fit)



2022.12. / 2022.15. / 2022.16. / 2022.17. / 2022.19. / 2022.29.

Pillar $\varnothing d_1$	Retaining bore d_1^{H7}
25	+0,021 0
32	+0,025
40	0
50	+0,030
63	0
80	+0,035
100	0
125	+0,040
160	0

Pillars of $d_1 = 50$ mm and over should be frozen in dry ice before fitting



2022.12. / 2022.15. / 2022.16. / 2022.17. / 2022.19. / 2022.29.

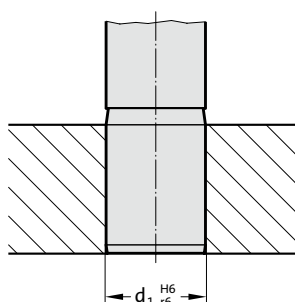
Guide pillar
DIN 9833/ISO 9182-3
Mercedes-Benz /
VDI / VW / WDX
(press fit)



2022.13.

Pillar $\varnothing d_1$	Bohrung d_1^{H6}
40	+0,016
50	0
63	+0,019
80	0

Pillars of $d_1 = 50$ mm and over should be frozen in dry ice before fitting



2022.13.

Guide pillar VW
(press fit)



Assembly of Guide Elements – Dimensional Requirements and Tolerances

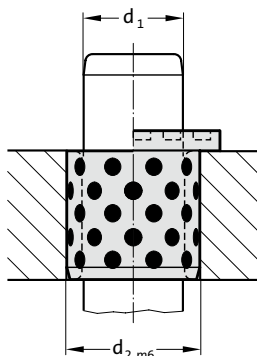
2052.70.¹⁾ / 2086.70. /
2085.72.

Guide Bushes/
Guide Bushes with
collar, Bronze with
non-liquid lubricant

slip-fit bonding*:
Retaining bore $d_2 = G7$

transition fit:
Retaining bore $d_2 = H7$

¹⁾ if required secure with set screw



*Slip-Fit Bonding:

The glue-line gap must not be smaller than 0,005 mm, or the adhesive will be wiped off the contact surfaces upon fitment. This would result in an unreliable bond.

The available component tolerances do not always result in the minimum glue-line gap.

This fact has to be born in mind when machining receiving bores, or alternatively corrections can be made on the assembly bench.

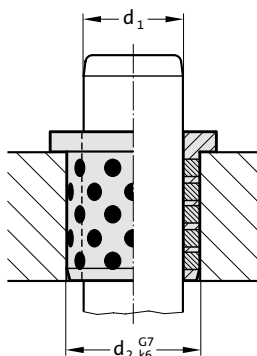


2052.70.¹⁾ / 2086.70. / 2085.72.

Pillar $\varnothing d_1$	Retaining bore d_2	bonding limits d_2^{G7}	Transition fit limits d_2^{H7}
8	12		
10	14/15	+0,024	+0,018
12	18	+0,006	0
13	19		
14	20		
15	21	+0,028	+0,021
16	22	+0,007	0
18/19	24/25		
20	26/28/30		
25	32/33/35		
28	38		
30	38/40/42		
31,5	40	+0,034	+0,025
32	42	+0,009	0
35	44/45		
38	48		
40	50		
40	55		
45	55/56/60		
50	60/62/65	+0,040	+0,030
55	70	+0,010	0
60	74/75		
63	75		
65	80		
70	85/90		
75	90/95		
80	96/100	+0,047	+0,035
85	100	+0,012	0
90	110		
100	120		
110	130		
120	140		
125	145		
130	150	+0,054	+0,040
140	160	+0,014	0
150	170		
160	180		

2085.70.

Guide Bushes with
collar, Bronze with
non-liquid lubricant
(transition fit)

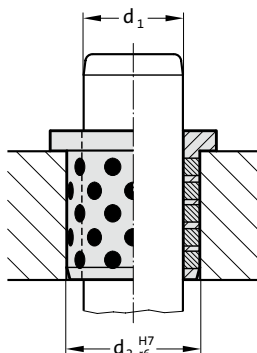


2085.70.

Pillar $\varnothing d_1$	Retaining bore d_2^{G7}	limits d_2^{G7}
12	16	+0,024 +0,006
16	20	
20	26	+0,028
24	30	+0,007

2085.71.

Guide Bushes with
collar, Bronze with
non-liquid lubricant
(press fit)



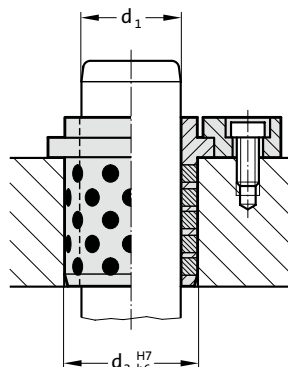
2085.71.

Pillar $\varnothing d_1$	Retaining bore d_2	limits d_2^{H7}	Pillar $\varnothing d_1$	Retaining bore d_2	limits d_2^{H7}
10	14	+0,018	45	55	
12	18	0	50	60	
13	19		55	65	+0,030
14	20		60	75	0
15	21	+0,021	63	75	
16	22	0	70	85	
20	30		75	90	
25	35		80	100	+0,035
30	40		90	110	0
31,5	40	+0,025	100	120	
35	45	0	120	140	+0,040
40	50				0

Assembly of Guide Elements – Dimensional Requirements and Tolerances

2082.70.

Pillar $\varnothing d_1$	Retaining bore d_2^{H7}	limits d_2^{H7}
24/25	32/35	+0,025 0
30/32	40/42	
38/40	50	
48/50	63	+0,030 0
60/63	80	
80	100	+0,035 0
100	125	+0,040 0
125	160	
160	200	+0,046 0



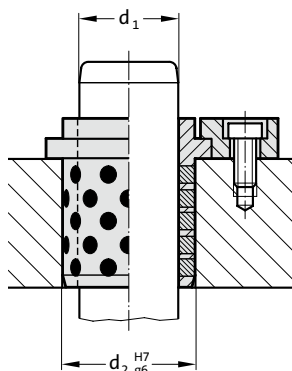
2082.70.

Guide Bushes with collar, bronze with non-liquid lubricant
DIN 9834/ISO 9448
(slip fit)



2082.71. / 2086.71.

Pillar $\varnothing d_1$	Retaining bore d_2^{H7}	limits d_2^{H7}
25/32/40	32/40/50	+0,025 0
50/63	63/80	+0,030 0
80	100	+0,035 0
100/125	125/160	+0,040 0



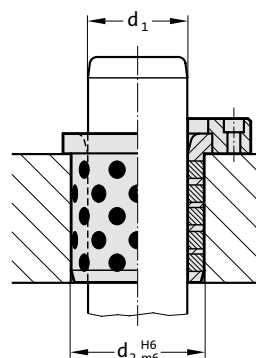
2082.71. / 2086.71.

Guide Bush with collar to NAAMS, bronze with non-liquid lubricant
(slip fit)



2102.70. / 2102.71.

Pillar $\varnothing d_1$	Retaining bore d_2^{H6}	limits d_2^{H6}
25	35	+0,016 0
32	44	
40	52	
50	63	+0,019 0
63	80	
80	100	+0,022 0
100	125	+0,025 0



2102.70. / 2102.71.

Guide Bushes with collar, bronze with non-liquid lubricant/
bronze, CNOMO
(transition fit)

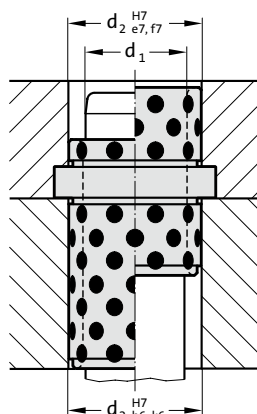


Assembly of Guide Elements – Dimensional Requirements and Tolerances

2087.70. / 2087.71. /
2087.73.

Guide Bushes with
centre collar/ with
collar, bronze with
non-liquid lubricant

e7 = slip fit
f7 = slip fit
h6 = slip fit
k6 = transition fit



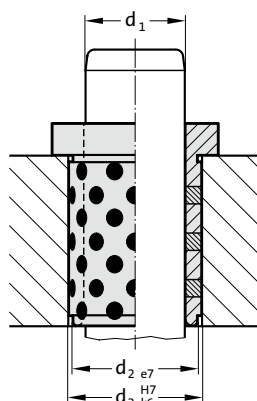
2087.70. / 2087.71. / 2087.73.

Pillar $\varnothing d_1$	Retaining bore d_2^{H7}	limits d_2^{H7}
9/10	14	+0,018 0
14/15	20	+0,021 0
18/20	26	
22/24	30	
25	35	+0,025 0
30/32	42	
40	50	
40/42	54	+0,030 0
50	63	
60	80	
63	80	

2087.72.

Guide Bushes with
collar, bronze with
non-liquid lubricant

e7 = slip fit
k6 = transition fit



2087.72.

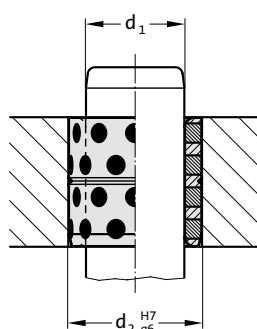
Pillar $\varnothing d_1$	Retaining bore d_2^{H7}	limits d_2^{H7}
9/10	14	+0,018 0
12	18	+0,021 0
14/15	20	
16	22	
18/20	26	+0,025 0
22/24	30	
25	32	
30/32	42	+0,030 0
40/42	54	
50	66	
60	80	

3120.70. / 3120.71.

Guide Bushes, bronze
with non-liquid
lubricant

slip fit

bond in or if required secure with
set screw or flat mushroom head
screw 2192.61.



3120.70. / 3120.71.

Pillar $\varnothing d_1$	Retaining bore d_2^{H7}	limits d_2^{H7}
8	12	+0,018 0
10	14/15	
12	18	
13	19	+0,021 0
14	20	
15	21	
16	22	+0,025 0
18/19	24/25	
20	26/28/30	
25	32/33/35	+0,030 0
28	38	
30	38/40/42	
31,5	40	+0,035 0
32	42	
35	44/45	
38	48	+0,040 0
40	50	
40	55	
45	55/56/60	+0,030 0
50	60/62/65	
55	70	
60	74/75	+0,035 0
63	75	
65	80	
70	85/90	+0,040 0
75	90/95	
80	96/100	
85	100	+0,040 0
90	110	
100	120	
110	130	+0,040 0
120	140	
125	145	
130	150	+0,040 0
140	160	
150	170	
160	180	