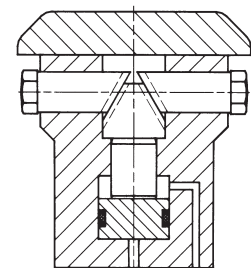
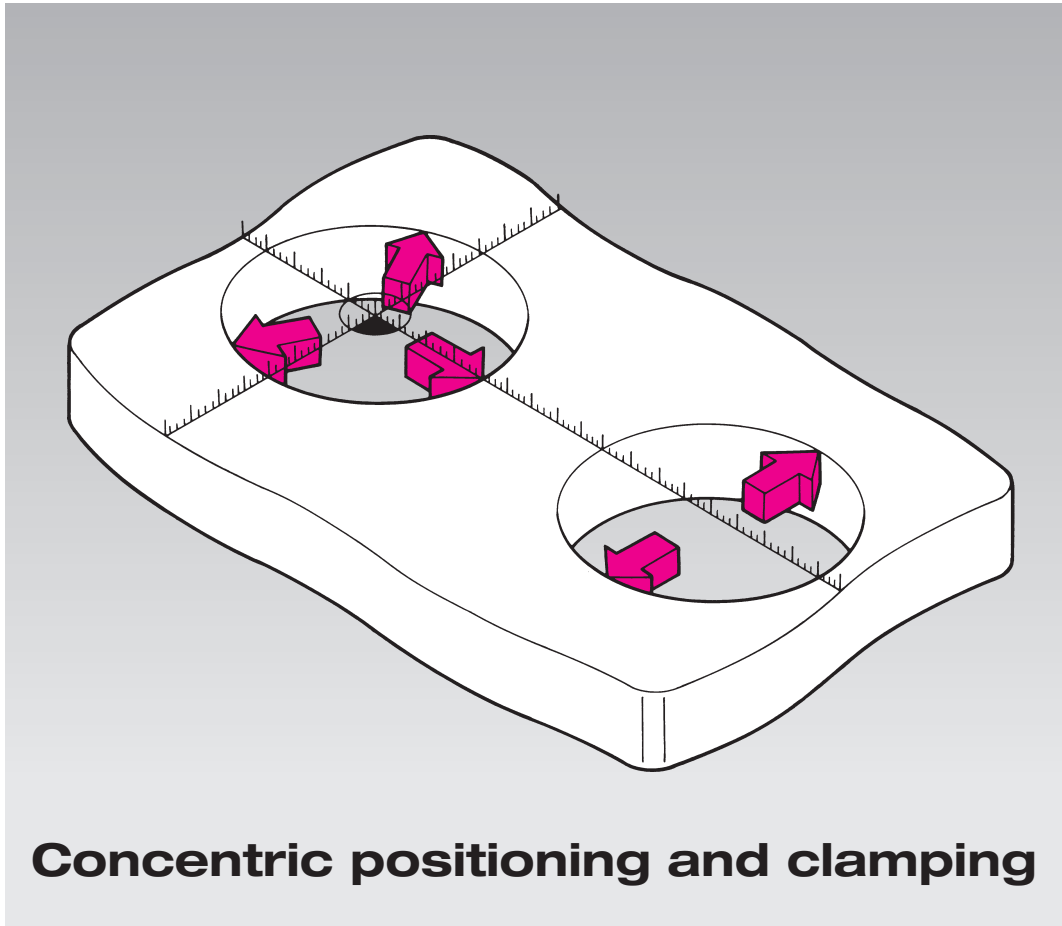


**Concentric Positioning and Clamping Elements**

2 and 3-point positioning, double acting, hydraulically operated  
max. operating pressure 250 bar

Diameters from 25 mm to 177 mm



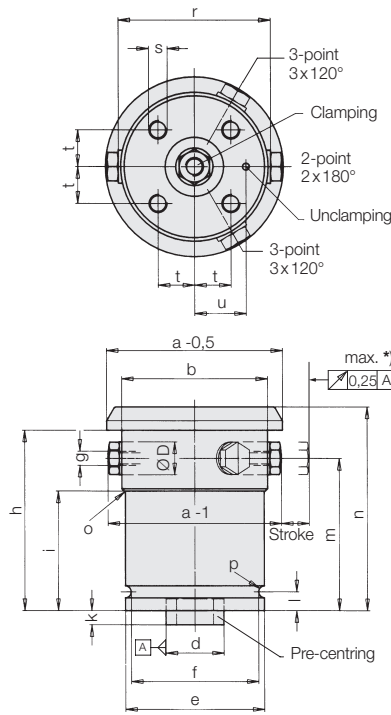
## 2 and 3-point concentric positioning and clamping elements



Version 431200X, -02X, -05X, -07X



Version 43121XX, -2XX, -3XX, -4XX



Clamping $\varnothing a$	Part no. 2-point elements	Part no. 3-point elements
25 – 29	<b>4312000</b>	<b>4312025</b>
28 – 32	<b>001</b>	<b>026</b>
32 – 36	<b>002</b>	<b>027</b>
36 – 40	<b>4312050</b>	<b>4312075</b>
39 – 43	<b>051</b>	<b>076</b>
42 – 46	<b>052</b>	<b>077</b>
45 – 49	<b>053</b>	<b>078</b>
48 – 52	<b>054</b>	<b>079</b>
51 – 55	<b>055</b>	<b>080</b>
54 – 59	<b>4312100</b>	<b>4312150</b>
58 – 63	<b>101</b>	<b>151</b>
62 – 67	<b>102</b>	<b>152</b>
67 – 72	<b>103</b>	<b>153</b>
71 – 76	<b>104</b>	<b>154</b>
76 – 84	<b>4312200</b>	<b>4312250</b>
83 – 91	<b>201</b>	<b>251</b>
90 – 98	<b>202</b>	<b>252</b>
98 – 109	<b>4312300</b>	<b>4312350</b>
109 – 120	<b>301</b>	<b>351</b>
119 – 130	<b>302</b>	<b>352</b>
130 – 145	<b>4312400</b>	<b>4312450</b>
141 – 156	<b>401</b>	<b>451</b>
152 – 167	<b>402</b>	<b>452</b>
163 – 177	<b>403</b>	<b>453</b>

### Description

Workpieces with cast or machined bores, reliefs or break-outs, can be easily loaded to the fixture with the concentric positioning and clamping elements and concentrically clamped or positioned for machining. Overtolerance conditions can be avoided and clamping tasks can be completely solved by an ingenious combination of 2 and 3-point elements. Various mounting and connecting possibilities extend the use for multiple applications. Different sizes and correspondingly adapted contact bolts allow exact adaptation to the required clamping diameter.

### Important notes

The pre-centring with the supplied bushing ( $\varnothing d$ ) allows a positioning precision of max. 0.125 mm. The values for positioning and repetitive accuracy specified in the chart can only be obtained by determining the virtual NOMINAL position (zero point). Both options are also shown visually on page 4. The prerequisites and the influence of the workpiece weight on the positioning accuracy are also described. These concentric clamping elements are not only suitable for the use on lathes.

Elements for clamping diameters bigger than  $\varnothing 177$  mm are available on request.

	<b>431200X</b> <b>431202X</b>	<b>431205X</b> <b>431207X</b>	<b>43121XX</b>	<b>43122XX</b>	<b>43123XX</b>	<b>43124XX</b>
Clamping range $\varnothing$	[mm] 25–36	36–55	54–76	76–98	98–130	130–177
Clamping force at 100 bar	[kN] 4	4	3	7	11	17
at 250 bar	[kN] 10	10	7	17	28	44
Adm. positioning force at a minimum pressure of 100 bar (see page 4)	[kN] 1.6	1.6	1.1	2.7	4.5	7.0
Positioning accuracy*	[mm] 0.02	0.02	0.02	0.025	0.025	0.03
Repetitive accuracy *	[mm] 0.04	0.04	0.04	0.05	0.05	0.06
Minimum operating pressure	[bar] 20	20	20	20	20	20
Max. operating pressure	[bar] 250	250	250	250	250	250
Oil volume / mm advance stroke	[cm <sup>3</sup> ] 0.35	0.35	0.35	0.85	1.39	2.17
/ mm return stroke	[cm <sup>3</sup> ] 0.15	0.15	0.15	0.50	0.84	1.33
Tightening torque - contact bolt	[Nm] –	15	10	10	15	20
Bolt $\varnothing D$	[mm] 14	14	12	14	18	22
Stroke	[mm] 2.5	2.5	3	4.5	6	8
$\varnothing b$	[mm] 24	35	45	65	85	115
$\varnothing d j 6$	[mm] 16	16	16	25	32	40
$\varnothing e -0.1$	[mm] 45	45	45	60	74	90
$\varnothing f -0.1$	[mm] 40	40	40	54	67	81
$g \times$ depth of thread	[mm] –	M 8 x 6	M 6 x 8	M 6 x 12	M 8 x 16	M 10 x 20
$h$	[mm] 64	64	57	68	80	91
$i$	[mm] 28	28	–	41	47	52
$k$	[mm] 6	6	6	6	6	7
$l$	[mm] 8	8	8	9	10	12
$m$	[mm] 51	51	45	56	64	72
$n$	[mm] 66.5	72	65	77	91	105
$o$	[mm] R 6	R 6	–	R 0,5	R 2,5	R 2,5
$p$	[mm] 2.6	2.6	2.6	3.1	3.6	4.6
$r$	[mm] –	29	45	65	85	115
$s \times$ depth of thread	[mm] M 6 x 12	M 6 x 12	M 6 x 12	M 8 x 16	M 10 x 20	M 12 x 24
$t$	[mm] 11.3	11.3	11.3	15.6	19.1	23.3
$u$	[mm] 16.8	16.8	16.8	22	27	33
Weight	[kg] 0.5	0.7	1.1	1.8	3.6	7.2

\* see "Important notes" and the explanation on page 4

# Mounting possibilities with accessory

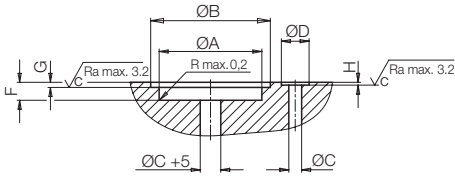
## Order information

The elements except (4312 000/-025) are supplied with short, dome-head and hardened contact bolts as standard. Please indicate on your order the corresponding workpiece diameter as well as the tolerances.

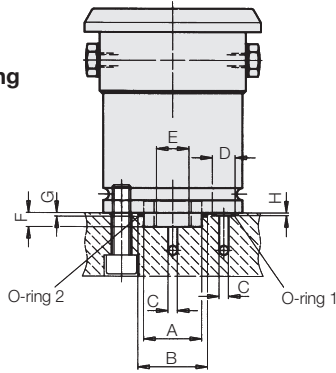
## Clamping examples

see page 4.

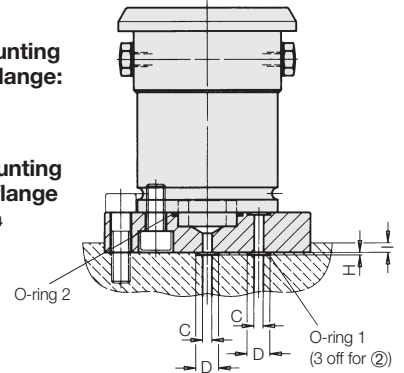
## Centring and sealing for direct mounting, mounting by segments and mounting by ball nut



### ① Direct mounting

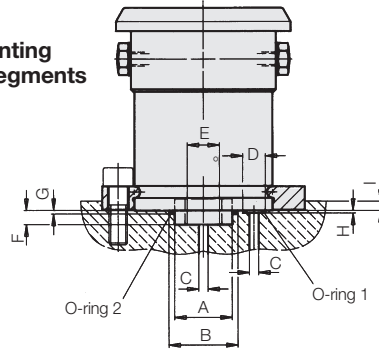


### ② Mounting by flange:

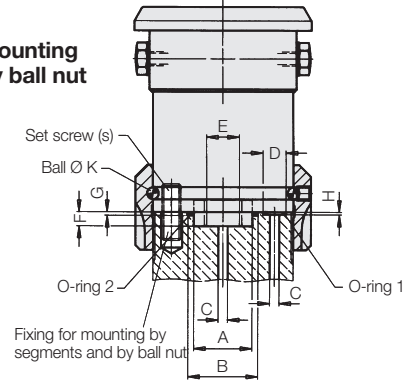


### ③ Mounting by flange G ¼

### ④ Mounting by segments

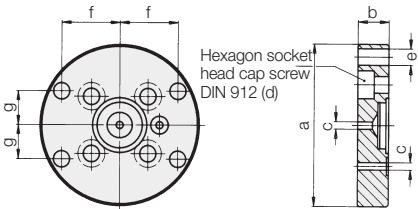


### ⑤ Mounting by ball nut



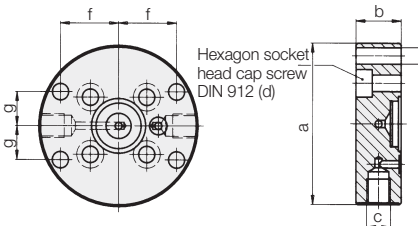
## O-rings for mounting variants ① ② ③ ④ ⑤ (not included in the delivery)

for elements	A H7	B +0,2	C	D +0,2	E	F -0,1	G ±0,05	H ±0,05	K	l	O-ring 1	Part no.	O-ring 2	Part no.
43120XX	16	20.6	3	7.8	8	6	1.3	1.1	5	4	5 x 1.5	<b>3000340</b>	17.17 x 1.78	<b>3000663</b>
43121XX	16	20.6	3	7.8	8	6	1.3	1.1	5	4	5 x 1.5	<b>3000340</b>	17.17 x 1.78	<b>3000663</b>
43122XX	25	30.0	4	9.8	14	6	1.5	1.1	6	4	7 x 1.5	<b>3000342</b>	26.00 x 2.00	<b>3000769</b>
43123XX	32	36.6	5	10.8	16	6	1.3	1.1	7	4	8 x 1.5	<b>3000343</b>	33.05 x 1.78	<b>3001238</b>
43124XX	40	46.6	5	10.8	18	7	2.0	1.1	9	4	8 x 1.5	<b>3000343</b>	40.95 x 2.62	<b>3000944</b>



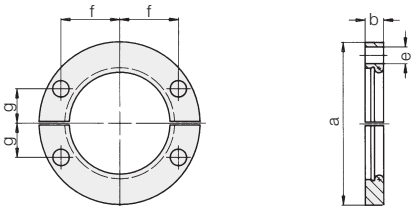
### Mounting by flange ②

for elements	a h7	b	c	d	e	f	g	Part no.
43120XX	68	15	3	M 6 x 16	Ø 6.6	24.2	14.0	<b>3456033</b>
43121XX	68	15	3	M 6 x 16	Ø 6.6	24.2	14.0	<b>3456033</b>
43122XX	88	17	4	M 8 x 20	Ø 9.0	32.0	18.5	<b>3456035</b>
43123XX	110	20	5	M 10 x 25	Ø 11.0	39.8	23.0	<b>3456037</b>
43124XX	130	22	5	M 12 x 25	Ø 13.5	47.6	27.5	<b>3456038</b>



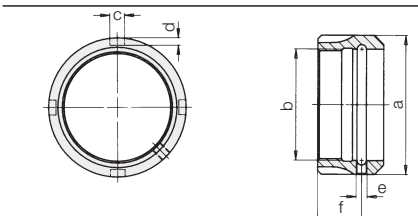
### Mounting by flange G ¼ ③

for elements	a h7	b	c	d	e	f	g	Part no.
43120XX	68	30	G ¼	M 6 x 35	Ø 6.6	24.2	14.0	<b>3456042</b>
43121XX	68	30	G ¼	M 6 x 35	Ø 6.6	24.2	14.0	<b>3456042</b>
43122XX	88	30	G ¼	M 8 x 35	Ø 9.0	32.0	18.5	<b>3456043</b>
43123XX	110	30	G ¼	M 10 x 35	Ø 11.0	39.8	23.0	<b>3456044</b>
43124XX	130	30	G ¼	M 12 x 35	Ø 13.5	47.6	27.5	<b>3456045</b>



### Mounting by segments ④

for elements	a	b	e	f	g	Part no.
43120XX	68	10.1	Ø 6.6	24.2	14.0	<b>3533240</b>
43121XX	68	10.1	Ø 6.6	24.2	14.0	<b>3533240</b>
43122XX	88	11.6	Ø 9.0	32.0	18.5	<b>3533241</b>
43123XX	110	13.1	Ø 11.0	39.8	23.0	<b>3533242</b>
43124XX	130	16.1	Ø 13.5	47.6	27.5	<b>3533243</b>



### Mounting by ball nut (with balls and set screws) ⑤

for elements	a	b	c	d	e	f	Part no.
43120XX	63	M 48 x 1.5	8	3.5	M 6	22	<b>0352762</b>
43121XX	63	M 48 x 1.5	8	3.5	M 6	22	<b>0352762</b>
43122XX	78	M 60 x 1.5	8	3.5	M 8	25	<b>0352763</b>
43123XX	94	M 75 x 2.0	10	4.0	M 10	27	<b>0352765</b>

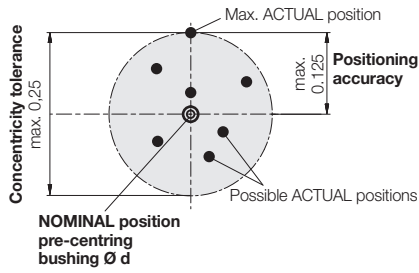
# Positioning accuracy Clamping examples

## Definition

The **positioning accuracy** is the deviation of the ACTUAL position from the NOMINAL position. The **repetitive accuracy** indicates the range of the reached position when a NOMINAL position is repeatedly approached from the same starting position.

### 1. Pre-centring with bushing $\varnothing d$

Due to component tolerances, the contact bolts have a concentricity tolerance of max. 0.25 mm (see dimensional drawing on page 2). If a workpiece is centred and clamped, the positioning accuracy is 0.125 mm (see sketch) in the worst case.



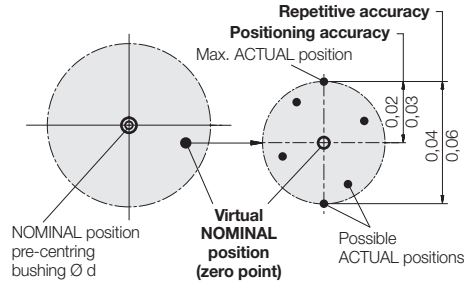
If further workpieces are inserted and clamped in the same way, the position accuracy will reach approximately the same value again.

### 2. Determine the virtual NOMINAL position

2.1 Centre and clamp a workpiece (sample part). This must be done in the same way as later in production.

2.2 Use the measuring probe to scan the clamped hole and determine the virtual zero point (hole centre).

2.3 Program the machine control accordingly. The advantage of this method is that a high positioning accuracy (0.02 - 0.03 mm) and repetitive accuracy (0.04 - 0.06 mm) can be expected (see chart on page 2).



### 3. Requirements

To ensure that all other similar workpieces in a series have the same virtual zero point, the following criteria must be met:

- The workpieces must always be moved from the same starting position and in the same way into the clamping position.

- The centring bore should be absolutely cylindrical.
- The centring bore should not have a concentricity error to the NOMINAL position.

### 4. Influence of the workpiece weight

High workpiece weights reduce the positioning accuracy and increase the wear of the centring bolts since

- in the case of vertical installation, the centring element has to apply the friction force that can be up to 25% of the workpiece weight.
- in the case of horizontal installation, the centring element must lift the workpiece a little.

### 5. Admissible positioning force

For the cases mentioned above, we have indicated an admissible positioning force in the chart on page 2. The corresponding workpiece weights are mechanically tolerable.

To enable the position accuracy according to the chart page 2, it is necessary to

- determine the virtual NOMINAL position according to point 2
- meet the requirements according to point 3.

### 6. Clamping examples

A number of examples where the weight of the workpieces is negligible can be found on this page.

