



OPTIMIZED CAM SERIES

O-KS | O-BS | O-ES

The optimized cam series for highest precision and performance





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voestalpine CAMTEC

Your innovative and reliable partner

voestalpine Camtec is a worldwide leading company and specialist for standard parts, maintenance-free sliding elements and cam units. We convince especially in the automotive, toolmaking, injection moulding and specialized industries with the highest product quality, reliability and fast delivery times.

Our broad product portfolio offers suitable solutions for every requirement:

- » Cam units
- » Sliding elements & standard parts
- » ALZEN®

Industries:

- » Automotive
- » Toolmaking
- » Injection moulding
- » Specialized industries

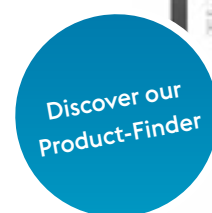
With our broad product portfolio and individual customized products, we are able to offer personalized solutions for every requirement. Thanks to global locations, subsidiaries and holdings, we can react flexibly and quickly to your concerns and ensure the highest quality of service on site. Our dedicated team of specialists takes care of your individual needs globally.

SIMPLE, FAST AND TARGETED TO THE OPTIMUM SOLUTION!

In our Product-Finder you will find detailed information on products, 3D downloads and on orders. Find out now:

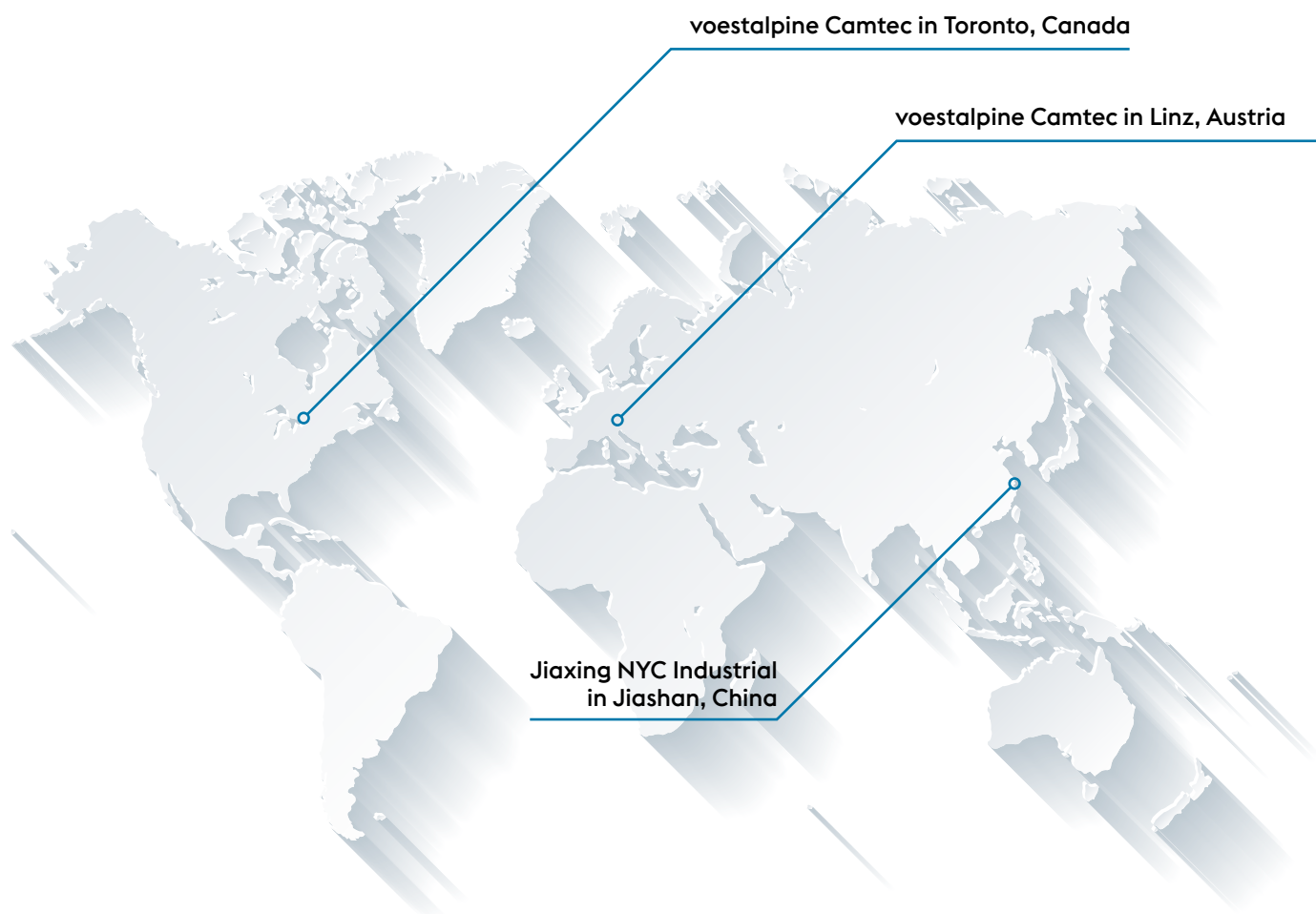
www.voestalpine.com/camtec/en/Product-Finder

Click here to go directly
to the Product-Finder



WORLDWIDE PRODUCT AVAILABILITY AND CUSTOMER SERVICE

Due to our global locations, subsidiaries and holdings, we can react flexibly and quickly to your concerns and ensure the highest quality of service on a very local level.



Our highly dedicated team of specialists will take care of your individual needs globally. Find your contact person online at www.voestalpine.com/camtec or contact us at sales.camtec@voestalpine.com



OPTIMIZED CAM SERIES

For highest precision and performance

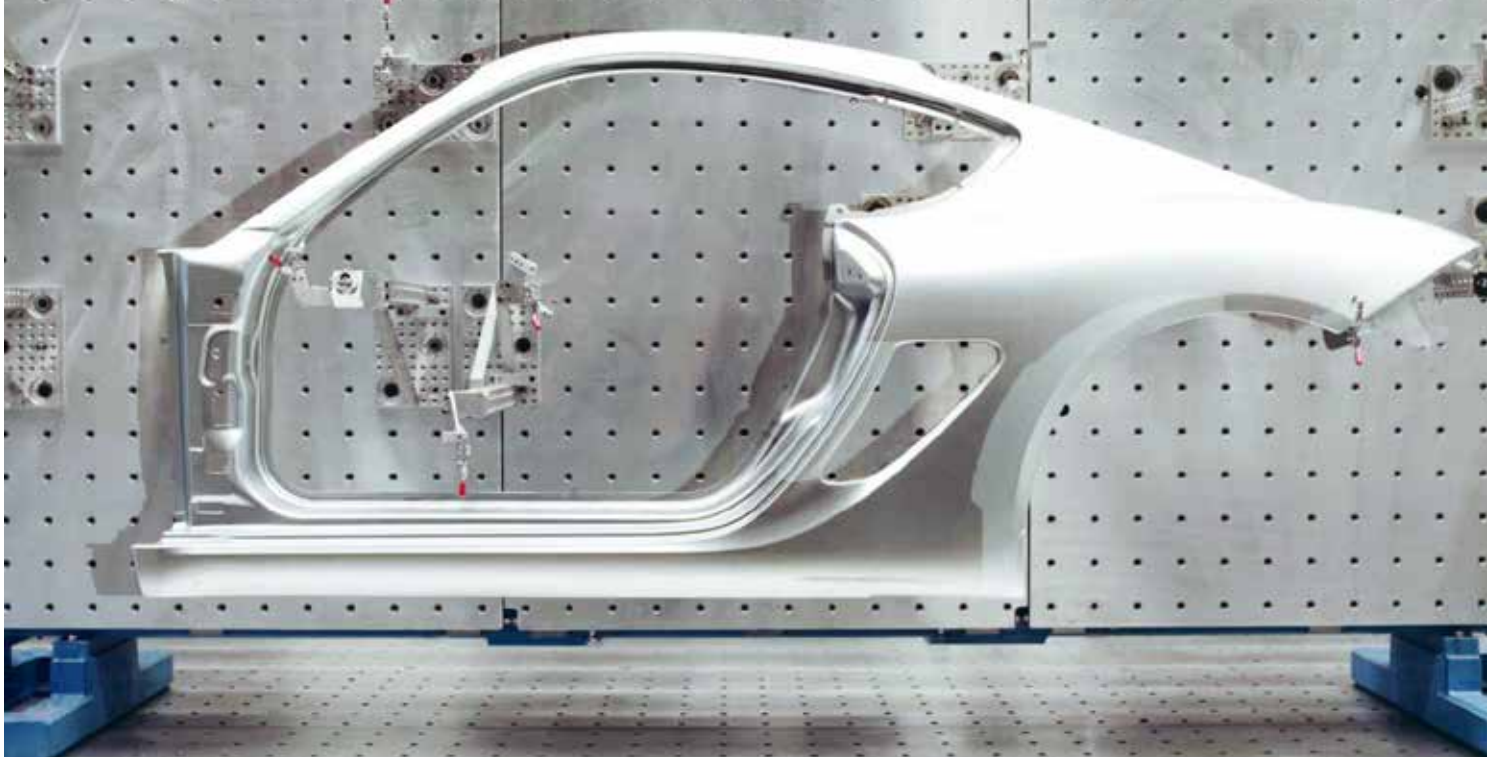
The optimized cam series (O-Series) was specially developed for the most complex industries and the most technical challenges and is convincing with maximum precision, durability, quality and innovative advantages.

The models consist of the optimized elementary, basic and compact cam units and combine effective product design and optimized application options. The outcome is a line of well thought-out cam units with optimum value added.

Advantages:

- » Long service life
 - due to robust design & high (material) quality
 - due to high precision
- » Consistent power transmission & precise centering
 - due to double prism guidance
- » High retraction forces
 - due to reinforced gas springs
- » Uncomplicated maintenance
 - in installed condition
- » 24 h emergency storage in Austria, Canada and China
- » Special cam units - individual solutions & dimensions

Switch now to the
optimized cam unit
series and to more power
in the tool.
**Inform now to
find out more!**



	O-KS optimized compact cam unit	O-BS optimized basic cam unit	O-ES optimized elementary cam unit
Average service life	2,000,000 strokes*	1,500,000 strokes*	1,000,000 strokes*
Guaranteed service life	1,000,000 strokes	500,000 / 750,000 strokes*	300,000 strokes
Sliding surfaces	at least Rz 6.3, hardened	at least Rz 6.3, unhardened	at least Rz 6.3, unhardened
Field of application	shaping, bending, punching, cutting	shaping, bending, punching, cutting	shaping, bending, punching, cutting
Angle range	0° – 75°	0° – 75°	0° – 75°
Tensile strength of driver, sliding element and cam base materials	700 N/mm ² minimum	600 N/mm ² minimum	400 N/mm ² minimum
Available widths (mm)	60, 65/85, 90/110, 125/160, 175/220, 260/330, 400/500	60, 65/85, 90/110, 125/160, 175/220, 260/330, 400/500	50, 65/85, 90/110, 125/160, 175/220, 260/330, 400/500
Lock Out System	yes	yes	yes
Sliding element removable to the rear	yes	yes	yes
Guide clamps	1.7225 / Sinter	1.7225 / Sinter	1.7225 + Graphite
Positive return	both sides	both sides	both sides
Measuring holes	yes	yes	yes
Gas spring	yes	yes	yes
Special cam unit options	yes	yes	no
Compliant with VDI	yes	yes	yes
NAAMs insert point	yes	yes	yes
Pre-machining	yes	yes	yes

*depending on load

O-SERIES – OPTIMIZED CAM UNITS

For more performance in the tool

HIGHLY COMPACT DESIGN AND REDUCED COMPLEXITY

resulting from reduced number of components

STRONG RETRACTION FORCES

for the processing of medium to high-strength steels

PATENTED 1° ANGLE

of side plates

IMPRESSIVE PRODUCTION QUALITY

by using proven materials and
optimum surface finishes

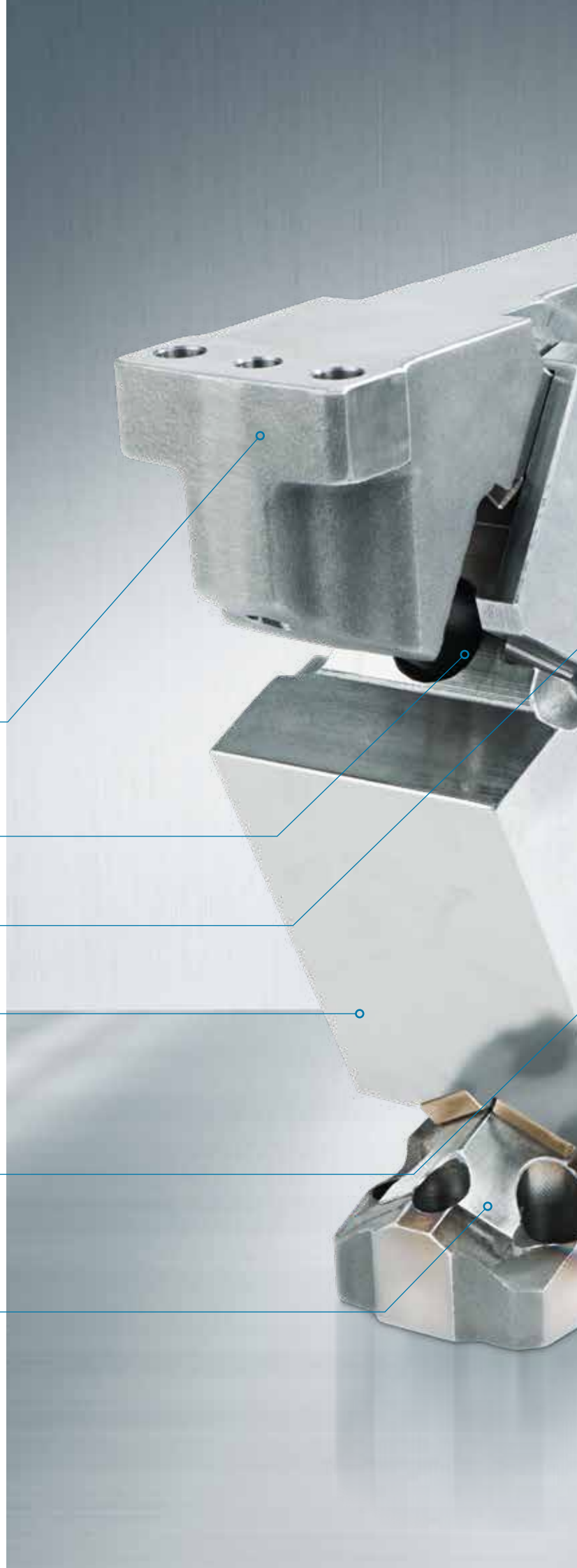
FLEXIBLY EXCHANGEABLE

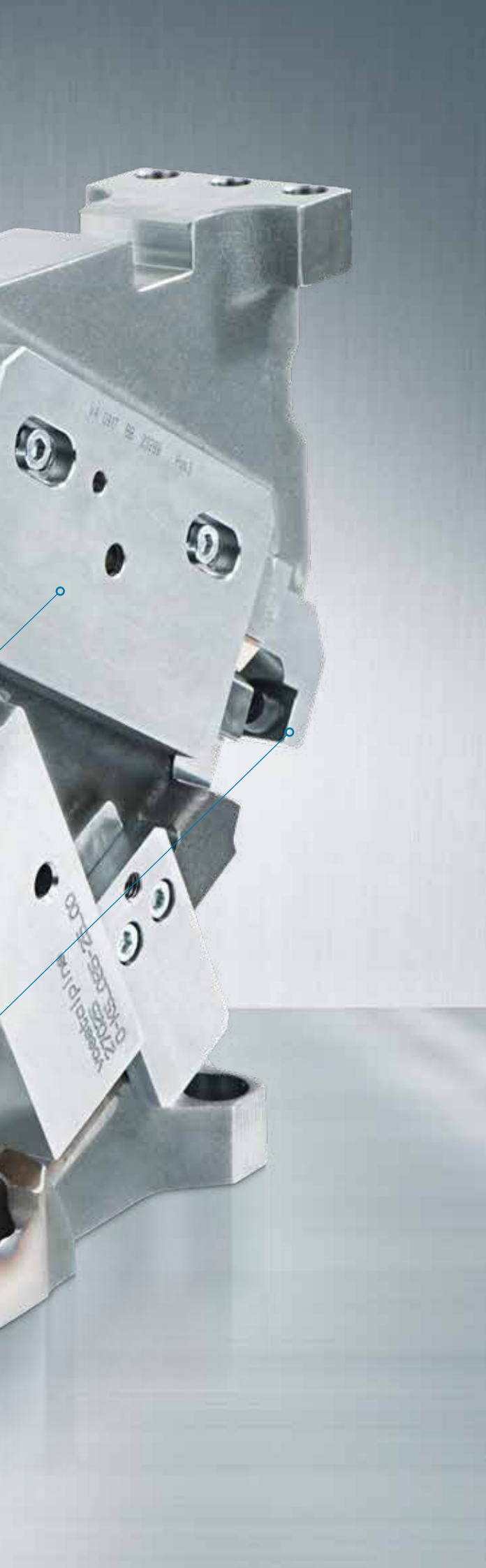
from the back or the side – for improved
handling and more efficient tool usage

PROVEN DESIGN

for easy maintenance

Discover all current series in our Product-Finder:
www.voestalpine.com/camtec/en/Product-Finder





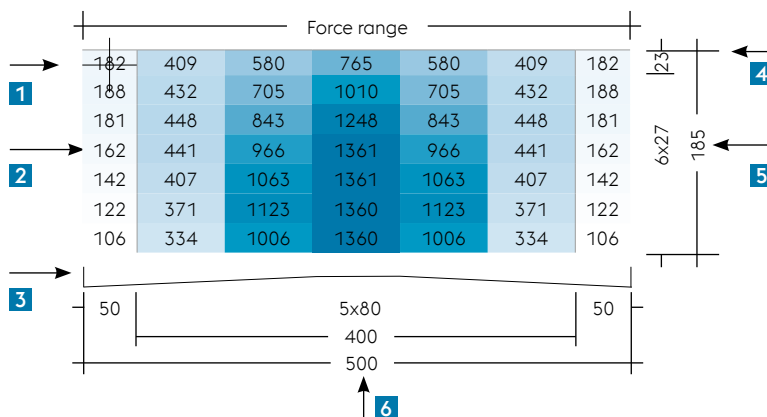
CAM FORCES

- 1 Force in the midpoint of each field
- 2 Force value in kN
- 3 lower cam part
- 4 Work surface top
- 5 Height of the work surface
- 6 Width of the work surface

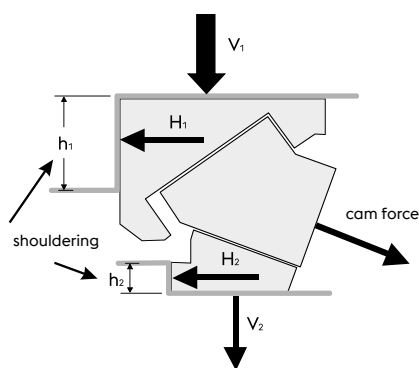


The coloring in the force diagrams reflects tendencies in the range of values from the smallest force to the maximum cam force for each method of support.

O-KS 400/500-0°



The cam unit force is distributed as shown in the sketch:



Shouldering:
 h_1 (top)
 h_2 (bottom)

Press:
 V_1 (vertical)

Cam base:
 H_1 (horizontal)

Driver:
 H_2 (horizontal)
 V_2 (vertical)

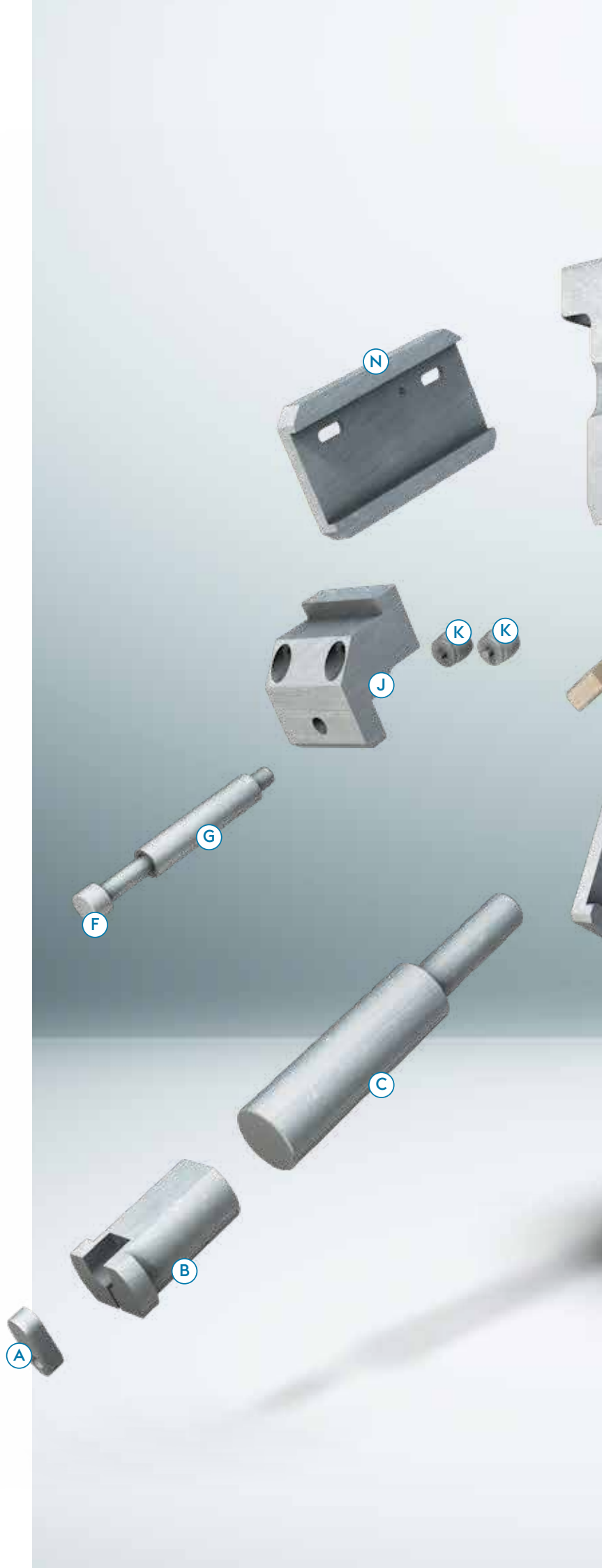


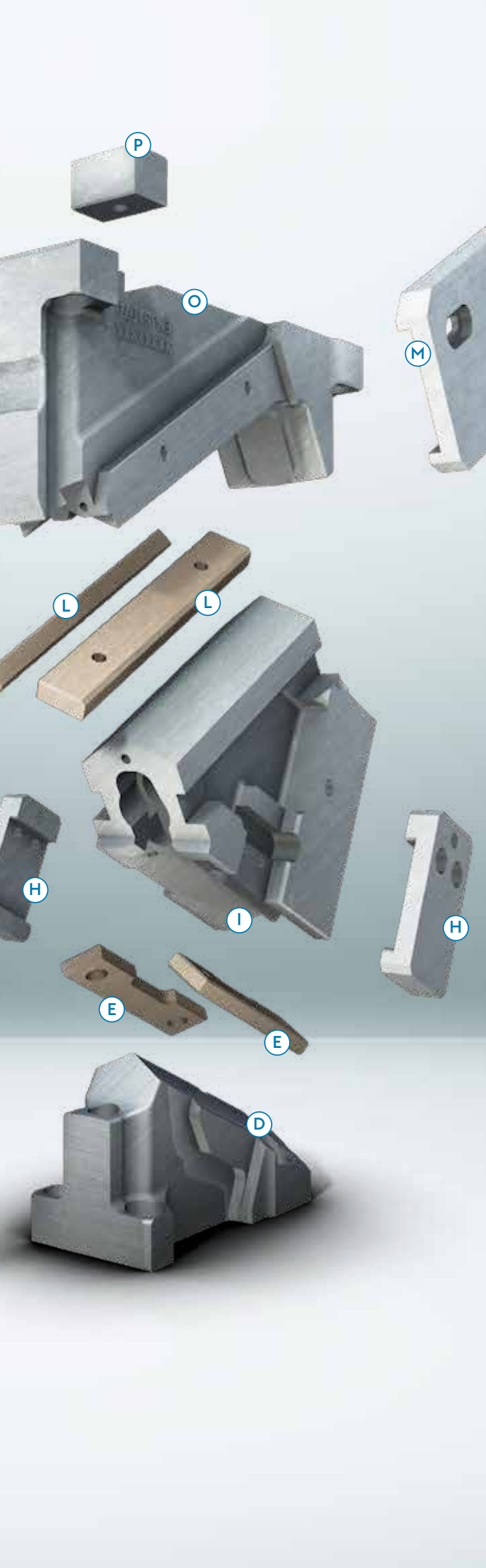
Technical details and additional information:
<https://www.voestalpine.com/camtec/en/Cam-units/O-Serie>

HIGH- PRECISION DESIGN

The O-Series consists of very few components, which guarantees high-quality initial installation and maintenance.

- Ⓐ Lock plate
- Ⓑ Lock screw
- Ⓒ Gas spring
- Ⓓ Driver
- Ⓔ Wear plates
- Ⓕ Lock-out screw
- Ⓖ Lock-out tube
- Ⓗ Positive return
- Ⓘ Cam slider
- ⓵ Stop block
- Ⓚ Tubus damper
- Ⓛ Wear plates
- Ⓜ Side plate (left)
- Ⓝ Side plate (right)
- Ⓞ Cam base
- Ⓟ Fitting key





PERFORMANCE LEVELS

For uninterrupted operation, voestalpine Camtec guarantees two different service lives in the O-Series:

- 1** A shorter service life with increased maximum cam unit forces
- 2** A longer service life with reduced maximum cam unit force

SIMPLE, FAST AND TARGETED TO THE OPTIMUM SOLUTION!



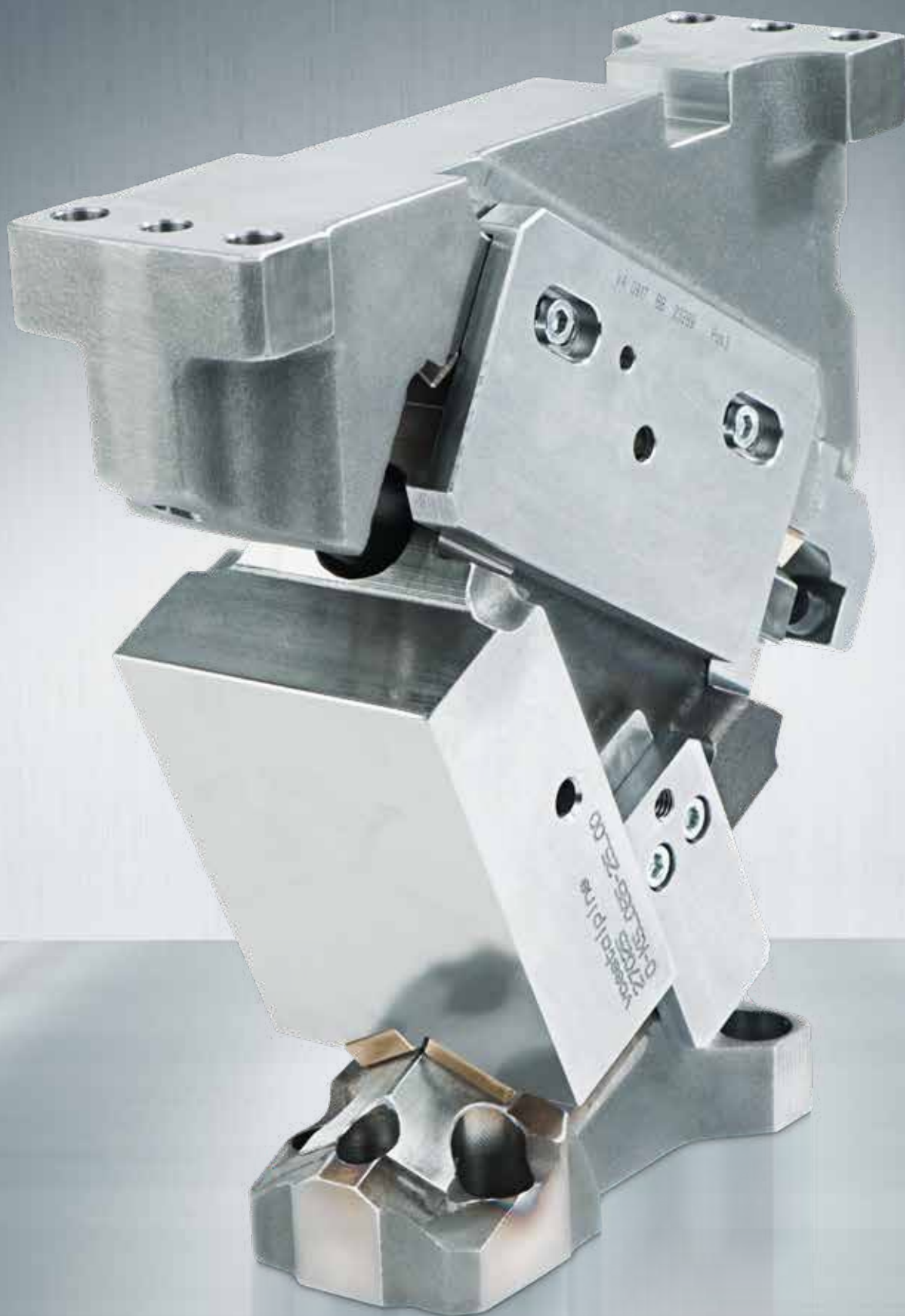
Our Product-Finder:
www.voestalpine.com/camtec/en/Product-Finder

In our Product-Finder you will find all product information and data for design, ordering and spare parts management quickly and easily.



O-KS
OPTIMIZED
COMPACT CAM UNIT





TECHNICAL DETAILS

O-KS

Important information at a glance

Here you will find important technical data for the optimized compact cam unit. Should you have any further questions about O-KS, our experienced team of specialists will be happy to assist you at any time. Please contact us at sales.camtec@voestalpine.com

	O-KS
Average service life	2,000,000 strokes*
Guaranteed service life	1,000,000 strokes*
Sliding surfaces	at least Rz 6.3, unhardened
Field of application	shaping, beveling, punching, cutting
Angle range	0° – 75°
Tensile strength of driver, sliding element and cam base materials	700 N/mm ² minimum
Available widths (mm)	60, 65/85, 90/110, 125/160, 175/220, 260/330, 400/500
Lock Out System	yes
Sliding element removable to the rear	yes
Guide clamps	1.7225 / Sinter
Positive return	both sides
Measuring holes	yes
Gas spring	yes
Special cam unit options	yes
Compliant with VDI	yes
NAAMs insert point	yes
Pre-machining	yes

*depending on load



The QR code leads you directly to the force diagrams

Discover all current O-KS models including force diagrams on our website: <https://www.voestalpine.com/camtec/en/Product-Finder>

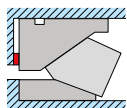
O-KS SIZE 0

FORCE DISTRIBUTION

Cam unit specifications O-KS 60

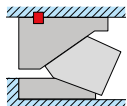
ident. no.	designation	angle [degree]	weight [kg]	stroke [mm]	height cam unit [mm]	length cam unit [mm]
27080	O-KS 60-0°	0°	11	21,85	205	195
27081	O-KS 60-5°	5°	11	21,94	205	195
27082	O-KS 60-10°	10°	11	26,45	205	195
27083	O-KS 60-15°	15°	11	26,96	205	195
27084	O-KS 60-20°	20°	11	25,81	205	195
27085	O-KS 60-25°	25°	11	26,76	205	195
27086	O-KS 60-30°	30°	11	21,23	205	195
27087	O-KS 60-35°	35°	11	22,44	205	199
27088	O-KS 60-40°	40°	11	23,74	205	197
27089	O-KS 60-45°	45°	12	25,72	205	201
27090	O-KS 60-50°	50°	12	28,29	205	196
27091	O-KS 60-55°	55°	12	31,71	205	198
27092	O-KS 60-60°	60°	11	35,45	205	195
27093	O-KS 60-65°	65°	11	41,95	205	195
27094	O-KS 60-70°	70°	11	51,83	205	195
27095	O-KS 60-75°	75°	11	68,49	205	195

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

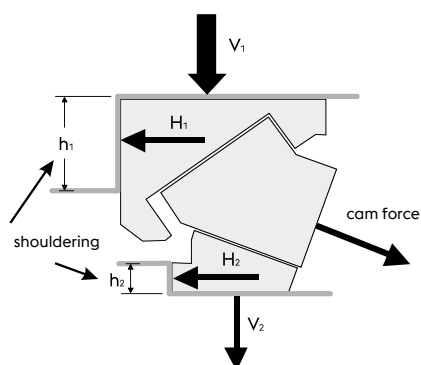
O-KS SIZE 0

PERMISSIBLE CAM FORCES

Cam unit force distribution O-KS 60, 1,000,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	124	72	86	72	0	145	26	3,7
5°	131	72	86	64	6	145	26	4,1
10°	119	84	70	69	12	120	26	3,7
15°	126	84	71	61	16	120	26	4,1
20°	119	96	55	67	24	106	48	3,4
25°	126	95	55	57	27	106	48	3,8
30°	152	89	75	34	20	120	48	6,1
35°	157	89	75	25	17	120	48	8,1
40°	153	100	58	30	26	106	48	6,1
45°	157	100	58	21	21	106	48	8,1
50°	160	99	57	13	15	106	48	12,0
55°	162	100	58	6	8	106	48	18,0
60°	154	114	20	20	34	50	90	5,8
65°	162	117	21	13	28	50	90	7,6
70°	161	114	20	7	19	50	90	11,4
75°	162	116	20	3	10	50	90	18,0

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-KS SIZE 0

O-KS 60 | support via cast shoulder

0°	20°	40°	60°	75 mm height
45 101 45	43 102 43	16 83 16	17 85 17	
67 120 67	63 119 63	32 142 32	32 143 32	
86 124 86	85 118 85	61 153 61	61 154 61	
72 119 72	75 118 75	73 139 73	89 153 89	
58 108 58	59 115 59	58 131 58	63 142 63	
60 mm width				60 mm
5°	25°	45°	65°	75 mm height
47 113 47	42 113 42	8 57 8	12 74 12	
73 130 73	69 126 69	18 124 18	25 142 25	
83 131 83	86 126 86	41 157 41	47 161 47	
66 128 66	69 126 69	71 147 71	79 162 79	
49 114 49	54 116 54	62 113 62	67 151 67	
60 mm width				60 mm width
10°	30°	50°	70°	75 mm height
41 98 41	18 89 18	7 69 7	11 82 11	
61 117 61	35 143 35	15 147 15	24 148 24	
87 119 87	65 152 65	43 160 43	47 161 47	
77 118 77	70 143 70	62 129 62	71 158 71	
60 118 60	57 119 57	47 112 47	53 126 53	
60 mm width				60 mm width
15°	35°	55°	75°	75 mm height
42 109 42	11 67 11	5 50 5	15 55 15	
67 126 67	24 129 24	6 127 6	14 131 14	
85 126 85	45 157 45	19 162 19	32 161 32	
68 126 68	72 149 72	55 130 55	61 162 61	
53 120 53	61 113 61	50 115 50	54 126 54	
60 mm width				60 mm width

rounded values

O-KS SIZE 0

O-KS-60 | support via fitting key

0° <table><tr><td>37</td><td>37</td><td>37</td></tr><tr><td>38</td><td>38</td><td>38</td></tr><tr><td>38</td><td>38</td><td>38</td></tr><tr><td>38</td><td>38</td><td>38</td></tr><tr><td>38</td><td>38</td><td>38</td></tr></table> 60 mm width	37	37	37	38	38	38	38	38	38	38	38	38	38	38	38	20° <table><tr><td>43</td><td>59</td><td>43</td></tr><tr><td>57</td><td>60</td><td>57</td></tr><tr><td>59</td><td>59</td><td>59</td></tr><tr><td>60</td><td>61</td><td>60</td></tr><tr><td>57</td><td>60</td><td>57</td></tr></table> 60 mm width	43	59	43	57	60	57	59	59	59	60	61	60	57	60	57	40° <table><tr><td>16</td><td>65</td><td>16</td></tr><tr><td>32</td><td>73</td><td>32</td></tr><tr><td>61</td><td>73</td><td>61</td></tr><tr><td>72</td><td>74</td><td>72</td></tr><tr><td>59</td><td>74</td><td>59</td></tr></table> 60 mm width	16	65	16	32	73	32	61	73	61	72	74	72	59	74	59	60° <table><tr><td>13</td><td>61</td><td>13</td></tr><tr><td>23</td><td>101</td><td>23</td></tr><tr><td>45</td><td>109</td><td>45</td></tr><tr><td>64</td><td>109</td><td>64</td></tr><tr><td>47</td><td>102</td><td>47</td></tr></table> 60 mm width	13	61	13	23	101	23	45	109	45	64	109	64	47	102	47	75 mm height
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52	112	52																																																														
39	91	39																																																														
15° <table><tr><td>41</td><td>48</td><td>41</td></tr><tr><td>49</td><td>49</td><td>49</td></tr><tr><td>49</td><td>50</td><td>49</td></tr><tr><td>50</td><td>50</td><td>50</td></tr><tr><td>48</td><td>50</td><td>48</td></tr></table> 60 mm width	41	48	41	49	49	49	49	50	49	50	50	50	48	50	48	35° <table><tr><td>12</td><td>50</td><td>12</td></tr><tr><td>24</td><td>59</td><td>24</td></tr><tr><td>46</td><td>59</td><td>46</td></tr><tr><td>59</td><td>60</td><td>59</td></tr><tr><td>58</td><td>59</td><td>58</td></tr></table> 60 mm width	12	50	12	24	59	24	46	59	46	59	60	59	58	59	58	55° <table><tr><td>4</td><td>47</td><td>4</td></tr><tr><td>5</td><td>76</td><td>5</td></tr><tr><td>9</td><td>78</td><td>9</td></tr><tr><td>56</td><td>79</td><td>56</td></tr><tr><td>53</td><td>82</td><td>53</td></tr></table> 60 mm width	4	47	4	5	76	5	9	78	9	56	79	56	53	82	53	75° <table><tr><td>6</td><td>40</td><td>6</td></tr><tr><td>11</td><td>93</td><td>11</td></tr><tr><td>24</td><td>115</td><td>24</td></tr><tr><td>45</td><td>117</td><td>45</td></tr><tr><td>41</td><td>93</td><td>41</td></tr></table> 60 mm width	6	40	6	11	93	11	24	115	24	45	117	45	41	93	41	75 mm height
41	48	41																																																														
49	49	49																																																														
49	50	49																																																														
50	50	50																																																														
48	50	48																																																														
12	50	12																																																														
24	59	24																																																														
46	59	46																																																														
59	60	59																																																														
58	59	58																																																														
4	47	4																																																														
5	76	5																																																														
9	78	9																																																														
56	79	56																																																														
53	82	53																																																														
6	40	6																																																														
11	93	11																																																														
24	115	24																																																														
45	117	45																																																														
41	93	41																																																														

rounded values

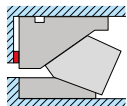
O-KS SIZE 1

FORCE DISTRIBUTION

Cam unit specifications O-KS 65-85

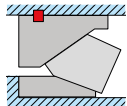
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-KS 65	O-KS 85	size	size		O-KS 65	O-KS 85			
27000	27020	O-KS 65-0°	O-KS 85-0°	0°	16	17	28,93	225	227
27001	27021	O-KS 65-5°	O-KS 85-5°	5°	16	17	29,04	225	227
27002	27022	O-KS 65-10°	O-KS 85-10°	10°	16	17	35,00	225	229
27003	27023	O-KS 65-15°	O-KS 85-15°	15°	16	17	35,69	225	232
27004	27024	O-KS 65-20°	O-KS 85-20°	20°	16	17	36,86	225	247
27005	27025	O-KS 65-25°	O-KS 85-25°	25°	16	17	38,22	225	247
27006	27026	O-KS 65-30°	O-KS 85-30°	30°	16	16	35,38	225	236
27007	27027	O-KS 65-35°	O-KS 85-35°	35°	16	17	37,41	225	239
27008	27028	O-KS 65-40°	O-KS 85-40°	40°	16	17	39,57	225	247
27009	27029	O-KS 65-45°	O-KS 85-45°	45°	16	17	42,87	225	247
27010	27030	O-KS 65-50°	O-KS 85-50°	50°	16	17	47,16	225	247
27011	27031	O-KS 65-55°	O-KS 85-55°	55°	16	17	52,85	225	247
27012	27032	O-KS 65-60°	O-KS 85-60°	60°	16	17	49,24	225	247
27013	27033	O-KS 65-65°	O-KS 85-65°	65°	16	17	46,61	225	252
27014	27034	O-KS 65-70°	O-KS 85-70°	70°	16	17	57,59	225	252
27015	27035	O-KS 65-75°	O-KS 85-75°	75°	16	17	76,10	225	252

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

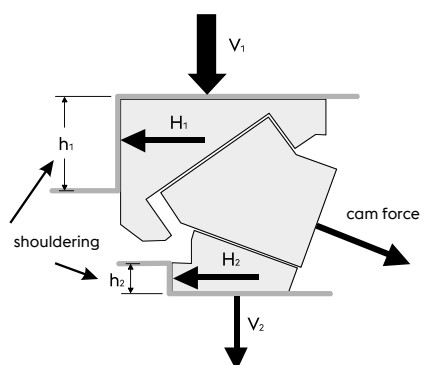
O-KS SIZE 1

PERMISSIBLE CAM FORCES

Cam unit force distribution size 1 O-KS, 1,000,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	184	154	184	154	0	155	20	6,8
5°	209	164	195	146	13	155	20	7,6
10°	186	186	156	154	27	125	30	6,8
15°	202	189	159	137	37	125	30	7,6
20°	187	211	122	147	54	100	60	6,5
25°	203	215	124	129	60	100	60	7,3
30°	200	163	137	63	36	105	60	12,2
35°	205	163	136	45	32	105	60	16,1
40°	208	192	111	58	49	100	80	11,6
45°	213	191	110	40	40	100	80	15,3
50°	217	191	110	25	29	100	80	22,9
55°	220	191	110	11	16	100	80	20,5
60°	212	222	39	39	67	40	110	11,6
65°	218	222	39	25	53	40	110	13,8
70°	222	222	39	13	37	40	110	20,5
75°	225	222	39	5	19	40	110	20,5

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-KS SIZE 1

O-KS 65-85 | support via cast shoulder

0°								20°								40°								60°							
38	58	91	120	91	58	38		37	56	93	132	93	56	37		18	29	57	113	57	29	18		18	30	63	117	63	30	18	
49	76	117	142	117	76	49		48	75	120	158	120	75	48		24	41	88	161	88	41	24		23	43	98	166	98	43	23	
61	97	150	170	150	97	61		61	97	149	187	149	97	61		32	62	143	208	143	62	32		31	66	158	211	158	66	31	
66	92	135	184	135	92	66		74	108	160	187	160	108	74		44	85	167	208	167	85	44		44	88	171	212	171	88	44	
65	87	118	174	118	87	65		73	100	145	186	145	100	73		53	88	149	207	149	88	53		49	87	154	212	154	87	49	
60	80	106	153	106	80	60		68	91	129	181	129	91	68		55	83	129	204	129	83	55		49	78	134	211	134	78	49	
56	74	97	133	97	74	56		62	84	114	167	114	84	62		52	74	111	180	111	74	52		46	68	111	180	111	68	46	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
5°								25°								45°								65°							
31	47	81	118	81	47	31		30	47	81	127	81	47	30		15	23	44	92	44	23	15		16	24	49	106	49	24	16	
40	65	112	142	112	65	40		38	64	113	158	113	64	38		19	32	71	149	71	32	19		19	34	79	165	79	34	19	
53	90	150	174	150	90	53		50	87	150	192	150	87	50		25	49	124	205	124	49	25		25	53	135	218	135	53	25	
62	97	146	209	146	97	62		67	109	174	203	174	109	67		34	70	163	211	163	70	34		34	73	172	216	172	73	34	
62	91	131	205	131	91	62		68	103	156	202	156	103	68		46	83	152	213	152	83	46		43	80	159	217	159	80	43	
59	83	117	192	117	83	59		66	94	137	203	137	94	66		50	82	137	211	137	82	50		47	77	141	218	141	77	47	
54	76	105	160	105	76	54		61	85	121	187	121	85	61		48	74	119	184	119	74	48		44	68	118	183	118	68	44	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
10°								30°								50°								70°							
37	57	93	128	93	57	37		17	26	49	99	49	26	17		11	16	29	62	29	16	11		11	16	33	74	33	16	11	
48	76	120	154	120	76	48		22	37	77	147	77	37	22		14	22	50	119	50	22	14		14	23	58	135	58	23	14	
61	97	151	182	151	97	61		29	56	127	190	127	56	29		18	34	90	192	90	34	18		18	37	102	205	102	37	18	
70	100	152	186	152	100	70		41	82	167	200	167	82	41		25	56	152	215	152	56	25		25	59	162	222	162	59	25	
69	94	136	186	136	94	69		47	81	151	199	151	81	47		35	72	155	217	155	72	35		34	71	165	222	165	71	34	
64	87	119	172	119	87	64		48	74	128	198	128	74	48		41	74	143	215	143	74	41		39	73	146	222	146	73	39	
59	79	105	152	105	79	59		45	64	104	177	104	64	45		42	68	123	185	123	68	42		38	66	122	188	122	66	38	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
15°								35°								55°								75°							
30	47	83	125	83	47	30		14	21	39	78	39	21	14		10	13	22	45	22	13	10		10	14	25	55	25	14	10	
38	64	114	156	114	64	38		18	30	64	132	64	30	18		11	17	38	96	38	17	11		12	19	43	112	43	19	12	
51	89	151	187	151	89	51		23	45	110	191	110	45	23		14	26	71	176	71	26	14		15	29	79	183	79	29	15	
65	103	163	201	163	103	65		32	68	166	205	166	68	32		20	44	124	217	124	44	20		20	47	138	221	138	47	20	
67	97	146	202	146	97	67		41	77	155	205	155	77	41		28	61	150	220	150	61	28		27	60	156	225	156	60	27	
63	89	128	195	128	89	63		44	73	132	205	132	73	44		32	63	146	214	146	63	32		30	61	151	223	151	61	30	
58	81	114	173	114	81	58		43	65	109	179	109	65	43		34	60	124	182	124	60	34		31	57	129	188	129	57	31	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							

rounded values

O-KS SIZE 1

O-KS 65-85 | support via fitting key

0°								20°								40°								60°							
32	37	37	37	37	37	37	32	36	49	58	58	58	49	36	18	29	54	74	54	29	18	18	30	63	117	63	30	18	95 mm height		
36	37	37	37	37	37	37	36	44	58	58	58	58	44	24	40	73	74	73	40	24	23	43	98	166	98	43	23				
36	37	37	37	37	37	37	36	51	58	59	59	59	58	51	32	52	74	74	74	52	32	31	66	158	206	158	66	31			
37	37	37	37	37	37	37	37	58	58	59	59	59	58	58	44	71	75	75	75	71	44	44	88	171	208	171	88	44			
37	37	37	37	37	37	37	37	59	59	59	59	59	59	59	52	75	75	75	75	75	52	49	87	154	210	154	87	49			
37	37	37	37	37	37	37	37	58	59	59	59	59	59	58	55	74	75	75	75	74	55	49	78	134	210	134	78	49			
37	37	37	37	37	37	37	37	56	59	59	59	59	59	56	52	70	76	75	76	70	52	46	68	111	180	111	68	46			
65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width							
5°								25°								45°								65°							
29	36	39	39	39	39	36	29	30	44	62	63	62	44	30	15	23	42	70	42	23	15	16	24	49	106	49	24	16	95 mm height		
33	39	39	39	39	39	39	33	37	55	63	63	63	55	37	19	31	60	77	60	31	19	19	34	79	165	79	34	19			
39	39	40	40	40	40	39	39	45	63	63	63	63	45	25	43	77	77	77	43	25	25	53	135	218	135	53	25				
39	39	40	40	40	40	39	39	55	63	63	63	63	55	34	57	77	77	77	57	34	34	73	172	216	172	73	34				
40	40	40	40	40	40	40	40	58	63	63	63	63	58	46	72	77	77	77	72	46	43	80	159	217	159	80	43				
40	40	40	40	40	40	40	40	58	63	63	63	63	58	50	73	78	78	78	73	50	47	77	141	218	141	77	47				
40	40	40	40	40	40	40	40	55	63	63	63	63	55	48	68	77	78	77	68	48	44	68	118	183	118	68	44				
65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width							
10°								30°								50°								70°							
35	44	45	45	45	44	35		17	26	44	57	44	26	17	11	16	28	52	28	16	11	11	16	33	74	33	16	11	95 mm height		
39	44	45	45	45	44	39		22	35	57	57	57	35	22	14	22	47	78	47	22	14	14	23	58	135	58	23	14			
44	45	45	45	45	45	44		29	45	57	57	57	45	29	18	33	78	79	78	33	18	18	37	102	205	102	37	18			
44	45	45	45	45	45	44		38	56	57	57	57	56	38	25	45	78	79	78	45	25	25	59	161	218	161	59	25			
45	45	45	45	45	45	45		44	57	57	57	57	57	44	35	60	79	79	79	60	35	34	71	165	221	165	71	34			
45	45	45	44	45	45	45		46	58	58	57	58	58	46	41	64	79	79	79	64	41	39	73	146	221	146	73	39			
45	45	45	45	45	45	45		44	56	58	58	58	56	44	42	61	80	80	80	61	42	38	66	122	188	122	66	38			
65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width							
15°								35°								55°								75°							
30	41	48	48	48	41	30		14	21	37	56	37	21	14	10	13	22	44	22	13	10	10	14	25	55	25	14	10	95 mm height		
36	47	48	48	48	47	36		18	29	52	59	52	29	18	11	17	37	80	37	17	11	12	19	43	112	43	19	12			
41	48	48	48	48	48	41		23	38	59	59	59	38	23	14	26	62	80	62	26	14	15	29	79	183	79	29	15			
47	48	48	48	48	48	47		32	51	59	59	59	51	32	20	37	78	80	78	37	20	20	47	138	218	138	47	20			
48	48	48	48	48	48	48		39	58	60	59	60	58	39	28	51	80	80	80	51	28	27	60	156	224	156	60	27			
49	49	48	48	48	49	49		43	60	60	59	60	60	43	32	53	81	81	81	53	32	30	61	151	223	151	61	30			
48	49	49	49	49	49	48		43	57	60	60	60	57	43	34	54	82	82	82	54	34	31	57	129	188	129	57	31			
65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width								65 mm width 85 mm width							

rounded values

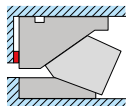
O-KS SIZE 2

FORCE DISTRIBUTION

Cam unit specifications O-KS 90-100

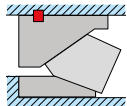
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-KS 90	O-KS 110	size	size		O-KS 90	O-KS 110			
27040	27060	O-KS 90-0°	O-KS 110-0°	0°	35	36	28,93	275	277
27041	27061	O-KS 90-5°	O-KS 110-5°	5°	35	36	29,04	275	277
27042	27062	O-KS 90-10°	O-KS 110-10°	10°	35	36	35,00	275	302
27043	27063	O-KS 90-15°	O-KS 110-15°	15°	35	36	35,69	275	302
27044	27064	O-KS 90-20°	O-KS 110-20°	20°	34	35	36,86	275	302
27045	27065	O-KS 90-25°	O-KS 110-25°	25°	34	35	38,22	275	302
27046	27066	O-KS 90-30°	O-KS 110-30°	30°	34	36	35,38	275	302
27047	27067	O-KS 90-35°	O-KS 110-35°	35°	35	36	37,41	275	302
27048	27068	O-KS 90-40°	O-KS 110-40°	40°	34	35	39,57	275	302
27049	27069	O-KS 90-45°	O-KS 110-45°	45°	34	35	42,89	275	302
27050	27070	O-KS 90-50°	O-KS 110-50°	50°	34	35	47,16	275	302
27051	27071	O-KS 90-55°	O-KS 110-55°	55°	34	36	52,85	275	303
27052	27072	O-KS 90-60°	O-KS 110-60°	60°	33	34	49,24	275	300
27053	27073	O-KS 90-65°	O-KS 110-65°	65°	33	34	46,61	275	300
27054	27074	O-KS 90-70°	O-KS 110-70°	70°	34	35	57,59	275	300
27055	27075	O-KS 90-75°	O-KS 110-75°	75°	34	35	76,10	275	300

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

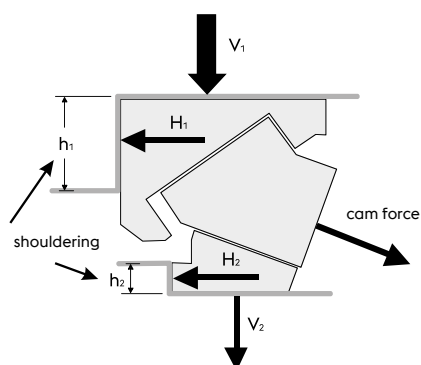
O-KS SIZE 2

PERMISSIBLE CAM FORCES

Cam unit force distribution size 2 O-KS, 1,000,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	247	207	247	207	0	190	30	6,8
5°	297	233	278	207	18	190	30	7,6
10°	308	308	258	255	45	148	30	6,7
15°	323	302	253	218	59	148	30	7,5
20°	325	367	212	256	93	109	65	6,4
25°	347	367	212	220	103	109	65	7,2
30°	361	294	247	114	66	143	65	12,2
35°	372	295	248	82	57	143	65	16,1
40°	370	341	197	103	87	102	105	11,7
45°	373	334	193	71	71	102	105	15,4
50°	385	339	195	44	52	102	105	24,4
55°	390	339	196	20	28	102	105	25,3
60°	366	384	68	67	115	52	135	11,1
65°	376	383	68	43	91	52	135	14,0
70°	384	384	68	23	64	52	135	22,1
75°	388	384	68	9	33	52	135	25,2

The cam unit force is distributed as shown in the sketch:



Shouldering: h₁ (top)
h₂ (bottom)
Press: V₁ (vertical)
Cam base: H₁ (horizontal)
Driver: H₂ (horizontal)
V₂ (vertical)

O-KS SIZE 2

O-KS 90-110 | support via fitting key

0°								20°								40°								60°							
27	50	58	54	58	50	27		35	57	98	99	98	57	35		13	17	34	86	34	17	13		13	17	36	107	36	17	13	
33	60	62	62	62	60	33		50	87	99	94	99	87	50		15	21	59	124	59	21	15		15	22	59	190	59	22	15	
33	61	62	63	62	61	33		47	98	99	100	99	98	47		19	31	119	124	119	31	19		20	33	118	292	118	33	20	
56	60	60	63	60	60	56		45	98	99	100	99	98	45		27	53	120	124	120	53	27		27	58	244	347	244	58	27	
60	57	60	56	60	57	60		47	99	98	100	98	99	47		33	67	117	124	117	67	33		37	83	256	357	256	83	37	
61	59	61	58	61	59	61		70	98	98	100	98	98	70		42	81	116	124	116	81	42		45	95	241	358	241	95	45	
62	62	56	60	56	62	62		83	97	99	100	99	97	83		44	84	116	122	116	84	44		54	97	215	358	215	97	54	
90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width							
5°								25°								45°								65°							
27	40	67	66	67	40	27		27	41	83	106	83	41	27		12	15	27	62	27	15	12		11	14	25	28	25	14	11	
33	45	67	61	67	45	33		33	55	105	107	105	55	33		14	18	42	119	42	18	14		13	17	36	45	36	17	13	
44	66	67	71	67	66	44		36	36	102	103	102	36	36		18	23	43	126	43	23	18		17	24	34	269	34	24	17	
47	62	63	66	63	62	47		54	91	102	104	102	91	54		21	33	113	125	113	33	21		21	33	42	350	42	33	21	
56	64	64	63	64	64	56		63	104	105	105	105	104	63		25	41	125	128	125	41	25		28	56	211	368	211	56	28	
61	63	65	64	65	63	61		65	101	107	106	107	101	65		29	48	126	129	126	48	29		34	72	267	368	267	72	34	
60	63	66	66	66	63	60		66	101	108	107	108	101	66		37	64	126	121	126	64	37		40	78	236	369	236	78	40	
90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width							
10°								30°								50°								70°							
24	45	76	78	76	45	24		12	16	31	57	31	16	12		8	9	14	35	14	9	8		8	10	16	37	16	10	8	
34	74	75	78	75	74	34		15	20	49	92	49	20	15		9	12	21	82	21	12	9		9	13	27	98	27	13	9	
39	69	68	75	68	69	39		19	27	41	95	41	27	19		11	14	36	128	36	14	11		12	17	27	221	27	17	12	
52	70	75	69	75	70	52		27	49	84	95	84	49	27		15	25	114	131	114	25	15		13	20	119	329	119	20	13	
68	74	76	75	76	74	68		33	63	95	95	95	63	33		21	40	129	128	129	40	21		19	38	221	366	221	38	19	
56	75	75	68	75	75	56		36	74	95	95	95	74	36		29	55	129	122	129	55	29		24	49	247	373	247	49	24	
57	75	70	67	70	75	57		44	79	95	95	95	79	44		33	60	128	115	128	60	33		28	55	236	373	236	55	28	
90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width							
15°								35°								55°								75°							
25	40	62	80	62	40	25		11	14	24	30	24	14	11		7	8	11	13	11	8	7		8	8	11	22	11	8	8	
31	52	80	85	80	52	31		12	16	37	45	37	16	12		9	11	16	32	16	11	9		9	11	19	59	19	11	9	
40	64	79	80	79	64	40		17	23	43	95	43	23	17		11	16	39	125	39	16	11		10	15	48	183	48	15	10	
47	63	65	81	65	63	47		18	21	89	97	89	21	18		14	22	77	132	77	22	14		13	19	56	312	56	19	13	
57	75	74	82	74	75	57		19	21	98	94	98	21	19		17	28	117	132	117	28	17		18	33	164	365	164	33	18	
68	80	81	82	81	80	68		29	47	98	95	98	47	29		21	39	131	132	131	39	21		24	41	211	377	211	41	24	
73	80	81	81	81	80	73		37	69	98	96	98	69	37		21	44	131	125	131	44	21		27	41	164	378	164	41	27	
90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width								90 mm width 110 mm width							

rounded values

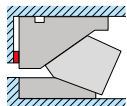
O-KS SIZE 3

FORCE DISTRIBUTION

Cam unit specifications O-KS 125-160

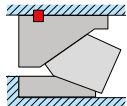
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-KS 125	O-KS 160	size	size		O-KS 125	O-KS 160			
27100	27120	O-KS 125-0°	O-KS 160-0°	0°	58	60	35,35	300	300
27101	27121	O-KS 125-5°	O-KS 160-5°	5°	57	60	35,49	300	298
27102	27122	O-KS 125-10°	O-KS 160-10°	10°	57	60	42,78	300	288
27103	27123	O-KS 125-15°	O-KS 160-15°	15°	57	59	43,62	300	290
27104	27124	O-KS 125-20°	O-KS 160-20°	20°	57	59	46,08	300	301
27105	27125	O-KS 125-25°	O-KS 160-25°	25°	57	59	47,78	300	298
27106	27126	O-KS 125-30°	O-KS 160-30°	30°	54	56	44,23	300	323
27107	27127	O-KS 125-35°	O-KS 160-35°	35°	54	57	46,76	300	322
27108	27128	O-KS 125-40°	O-KS 160-40°	40°	54	57	50,87	300	323
27109	27129	O-KS 125-45°	O-KS 160-45°	45°	54	57	55,11	300	323
27110	27130	O-KS 125-50°	O-KS 160-50°	50°	55	57	48,50	300	323
27111	27131	O-KS 125-55°	O-KS 160-55°	55°	55	58	54,36	300	323
27112	27132	O-KS 125-60°	O-KS 160-60°	60°	55	57	49,24	300	333
27113	27133	O-KS 125-65°	O-KS 160-65°	65°	55	57	46,61	300	328
27114	27134	O-KS 125-70°	O-KS 160-70°	70°	55	57	57,59	300	323
27115	27135	O-KS 125-75°	O-KS 160-75°	75°	55	57	76,10	300	323

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

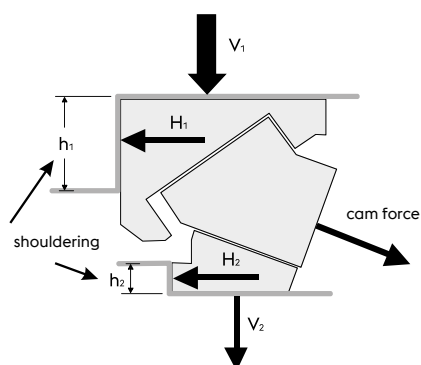
O-KS SIZE 3

PERMISSIBLE CAM FORCES

Cam unit force distribution size 3 O-KS, 1,000,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	302	253	302	253	0	190	40	9,2
5°	305	239	285	213	19	190	40	10,3
10°	376	376	316	311	55	150	40	9,2
15°	395	369	310	267	72	150	40	10,3
20°	392	443	256	309	113	115	85	8,8
25°	422	446	258	268	125	115	85	9,9
30°	405	330	277	128	74	130	85	17,6
35°	420	333	280	92	65	130	85	23,2
40°	422	389	225	118	99	105	135	16,8
45°	440	394	228	83	83	105	135	22,2
50°	430	378	218	49	58	105	135	28,9
55°	445	387	223	22	32	105	135	28,6
60°	428	449	79	78	135	53	160	14,8
65°	441	450	79	50	107	53	160	18,6
70°	460	460	81	28	76	53	160	27,7
75°	445	440	78	10	38	53	160	28,5

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-KS SIZE 3

O-KS 125-160 | support via cast shoulder

0°								20°								40°								60°							
70	105	176	216	176	105	70		57	80	150	300	150	80	57		12	18	38	102	38	18	12		14	20	42	113	42	20	14	
85	131	213	239	213	131	85		71	110	204	345	204	110	71		15	24	63	191	63	24	15		17	27	69	217	69	27	17	
103	161	251	264	251	161	103		91	146	265	380	265	146	91		20	38	106	320	106	38	20		22	40	109	359	109	40	22	
111	152	226	293	226	152	111		111	168	270	388	270	168	111		30	72	221	405	221	72	30		33	73	213	420	213	73	33	
105	138	195	302	195	138	105		118	173	274	392	274	173	118		41	85	234	422	234	85	41		47	100	273	428	273	100	47	
99	125	169	263	169	125	99		117	161	242	385	242	161	117		54	99	212	410	212	99	54		59	115	257	428	257	115	59	
93	114	149	222	149	114	93		108	145	206	335	206	145	108		61	101	180	347	180	101	61		66	114	221	413	221	114	66	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
5°								25°								45°								65°							
45	62	111	177	111	62	45		49	75	139	295	139	75	49		10	14	27	70	27	14	10		10	14	27	71	27	14	10	
54	80	149	211	149	80	54		60	93	170	358	170	93	60		12	20	53	162	53	20	12		12	20	52	174	52	20	12	
64	107	210	232	210	107	64		71	132	244	400	244	132	71		16	33	113	309	113	33	16		16	31	106	333	106	31	16	
82	146	240	264	240	146	82		91	166	341	422	341	166	91		25	63	213	411	213	63	25		24	59	195	434	195	59	24	
94	136	208	305	208	136	94		107	169	304	420	304	169	107		38	83	229	435	229	83	38		37	87	265	441	265	87	37	
94	124	177	282	177	124	94		109	158	257	416	257	158	109		48	94	220	440	220	94	48		49	102	256	440	256	102	49	
87	114	154	240	154	114	87		104	145	218	366	218	145	104		54	93	189	386	189	93	54		56	103	223	431	223	103	56	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
10°								30°								50°								70°							
58	88	154	247	154	88	58		13	18	37	88	37	18	13		14	44	106	131	106	44	14		6	23	107	130	107	23	6	
68	111	208	283	208	111	68		15	25	62	169	62	25	15		19	47	112	165	112	47	19		8	25	116	188	116	25	8	
85	142	288	317	288	142	85		20	38	106	285	106	38	20		21	49	119	253	119	49	21		10	31	129	265	129	31	10	
106	173	283	342	283	173	106		31	75	235	359	235	75	31		23	51	130	403	130	51	23		15	41	147	434	147	41	15	
114	160	243	376	243	160	114		46	93	226	405	226	93	46		24	63	194	427	194	63	24		21	59	221	457	221	59	21	
109	145	207	334	207	145	109		55	101	200	374	200	101	55		24	66	200	430	200	66	24		26	68	226	460	226	68	26	
99	132	178	279	178	132	99		61	98	168	314	168	98	61		31	68	175	391	175	68	31		33	73	204	440	204	73	33	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
15°								35°								55°								75°							
49	66	137	244	137	66	49		9	12	23	55	23	12	9		13	22	57	106	57	22	13		10	21	98	148	98	21	10	
58	96	197	297	197	96	58		11	18	46	138	46	18	11		15	28	68	137	68	28	15		11	25	111	184	111	25	11	
68	126	277	332	277	126	68		14	29	101	274	101	29	14		20	39	88	207	88	39	20		14	33	136	215	136	33	14	
95	165	304	365	304	165	95		22	54	180	370	180	54	22		28	60	113	398	113	60	28		20	45	168	414	168	45	20	
105	161	261	395	261	161	105		35	79	215	420	215	79	35		40	86	168	441	168	86	40		31	62	188	442	188	62	31	
105	145	220	366	220	145	105		46	88	194	400	194	88	46		49	104	178	445	178	104	49		41	71	194	445	194	71	41	
100	133	190	308	190	133	100		52	88	165	339	165	88	52		50	107	164	396	164	107	50		47	73	181	397	181	73	47	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							

rounded values

O-KS 125-160 | support via fitting key

Figure 10 displays 16 heatmaps arranged in a 4x4 grid, showing the spatial distribution of the number of people per square meter (N_p) for different solar angles. The heatmaps are organized by solar angle in degrees: 0°, 20°, 40°, 60° (top row); 5°, 25°, 45°, 65° (second row); 10°, 30°, 50°, 70° (third row); and 15°, 35°, 55°, 75° (bottom row). Each heatmap is a 10x10 grid with a 125 mm width and 160 mm height. The color scale represents the number of people per square meter, ranging from 0 (light blue) to 100 (dark blue). The heatmaps show that the distribution of people is highly dependent on the solar angle, with higher angles generally resulting in higher values of N_p in the center of the grid.

rounded values

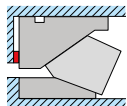
O-KS SIZE 4

FORCE DISTRIBUTION

Cam unit specifications O-KS 175-220

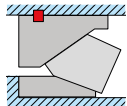
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-KS 175	O-KS 220	size	size		O-KS 175	O-KS 220			
27140	27160	O-KS 175-0°	O-KS 220-0°	0°	86	88	41,78	300	300
27141	27161	O-KS 175-5°	O-KS 220-5°	5°	85	88	41,94	300	298
27142	27162	O-KS 175-10°	O-KS 220-10°	10°	84	87	50,56	300	304
27143	27163	O-KS 175-15°	O-KS 220-15°	15°	84	87	51,55	300	310
27144	27164	O-KS 175-20°	O-KS 220-20°	20°	82	85	55,30	300	323
27145	27165	O-KS 175-25°	O-KS 220-25°	25°	82	85	57,33	300	323
27146	27166	O-KS 175-30°	O-KS 220-30°	30°	79	82	53,07	300	306
27147	27167	O-KS 175-35°	O-KS 220-35°	35°	80	83	56,11	300	311
27148	27168	O-KS 175-40°	O-KS 220-40°	40°	79	82	62,18	300	323
27149	27169	O-KS 175-45°	O-KS 220-45°	45°	79	82	67,36	300	323
27150	27170	O-KS 175-50°	O-KS 220-50°	50°	80	83	60,63	300	323
27151	27171	O-KS 175-55°	O-KS 220-55°	55°	80	83	67,94	300	328
27152	27172	O-KS 175-60°	O-KS 220-60°	60°	80	83	68,94	300	323
27153	27173	O-KS 175-65°	O-KS 220-65°	65°	79	82	60,59	300	323
27154	27174	O-KS 175-70°	O-KS 220-70°	70°	80	83	74,86	300	323
27155	27175	O-KS 175-75°	O-KS 220-75°	75°	79	82	76,10	300	323

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

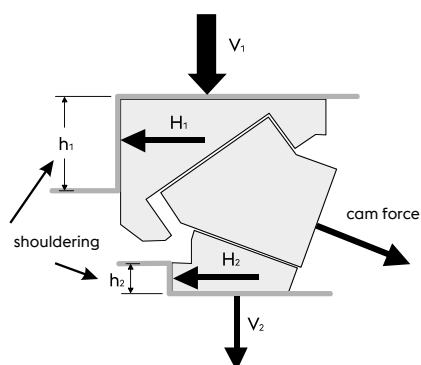
O-KS SIZE 4

PERMISSIBLE CAM FORCES

Cam unit force distribution size 4 O-KS, 1,000,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
		V1	H1	V2	H2	h1	h2	
0°	404	339	404	339	0	190	38	15,6
5°	456	358	426	318	28	190	38	17,5
10°	566	566	475	468	82	148	38	15,5
15°	606	567	476	410	110	148	38	17,3
20°	576	651	376	454	165	115	82	14,9
25°	605	640	369	384	179	115	82	16,7
30°	562	458	384	177	102	130	82	28,3
35°	544	431	362	119	84	130	82	37,4
40°	605	558	322	169	142	100	130	28,8
45°	615	551	318	117	117	100	130	38,0
50°	650	572	330	74	88	100	130	44,9
55°	643	559	323	32	46	100	130	44,4
60°	637	668	118	116	201	50	148	25,9
65°	638	650	115	72	155	50	148	31,4
70°	663	663	117	40	110	50	148	44,7
75°	662	654	115	15	56	50	148	44,3

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-KS SIZE 4

O-KS 175-220 | support via cast shoulder

0°								20°								40°								60°							
79	66	173	314	173	66	79		87	125	208	427	208	125	87		62	91	159	234	159	91	62		57	81	143	260	143	81	57	
86	78	236	334	236	78	86		97	146	266	481	266	146	97		67	99	174	358	174	99	67		61	90	170	431	170	90	61	
102	109	298	363	298	109	102		105	160	331	521	331	160	105		71	109	203	536	203	109	71		65	102	202	595	202	102	65	
120	137	261	404	261	137	120		120	185	392	565	392	185	120		75	121	262	597	262	121	75		69	110	211	627	211	110	69	
133	145	231	395	231	145	133		127	183	343	576	343	183	127		75	116	237	605	237	116	75		71	115	234	637	234	115	71	
125	134	207	358	207	134	125		125	171	296	572	296	171	125		73	113	224	515	224	113	73		70	113	243	634	243	113	70	
116	125	186	307	186	125	116		120	163	278	500	278	163	120		70	107	201	417	201	107	70		66	105	216	579	216	105	66	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							
5°								25°								45°								65°							
74	112	147	253	147	112	74		74	100	175	425	175	100	74		45	54	105	186	105	54	45		44	60	107	158	107	60	44	
87	124	183	234	183	124	87		76	91	183	486	183	91	76		53	75	147	252	147	75	53		48	69	133	224	133	69	48	
94	137	319	381	319	137	94		85	117	312	524	312	117	85		53	68	130	388	130	68	53		53	79	168	475	168	79	53	
107	159	272	404	272	159	107		90	154	322	596	322	154	90		50	55	141	569	141	55	50		59	94	227	601	227	94	59	
94	151	242	456	242	151	94		104	156	335	605	335	156	104		61	86	207	615	207	86	61		63	106	258	638	258	106	63	
100	137	200	399	200	137	100		108	165	306	601	306	165	108		65	97	256	614	256	97	65		68	115	280	633	280	115	68	
101	130	182	331	182	130	101		110	161	268	531	268	161	110		68	104	240	535	240	104	68		70	116	272	631	272	116	70	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							
10°								30°								50°								70°							
64	101	201	364	201	101	64		63	90	158	241	158	90	63		39	53	91	137	91	53	39		37	51	86	129	86	51	37	
73	122	254	428	254	122	73		67	98	176	360	176	98	67		44	62	115	162	115	62	44		41	59	105	154	105	59	41	
79	135	346	478	346	135	79		71	97	143	391	143	97	71		48	71	134	186	134	71	48		46	67	128	175	128	67	46	
95	155	313	518	313	155	95		71	104	252	562	252	104	71		53	81	172	532	172	81	53		51	76	167	582	167	76	51	
99	155	275	566	275	155	99		75	114	244	548	244	114	75		57	89	190	621	190	89	57		55	86	198	655	198	86	55	
104	148	241	482	241	148	104		74	110	204	454	204	110	74		62	98	203	650	203	98	62		59	95	212	663	212	95	59	
102	137	211	388	211	137	102		71	103	175	364	175	103	71		65	101	205	592	205	101	65		62	99	207	652	207	99	62	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							
15°								35°								55°								75°							
56	88	180	390	180	88	56		29	40	80	172	80	40	29		37	51	86	116	86	51	37		37	49	77	113	77	49	37	
61	100	240	454	240	100	61		32	46	107	293	107	46	32		41	59	108	139	108	59	41		41	56	99	151	99	56	41	
68	117	311	497	311	117	68		36	55	122	446	122	55	36		47	68	119	177	119	68	47		45	65	129	199	129	65	45	
81	144	320	497	320	144	81		38	60	123	535	123	60	38		51	77	157	535	157	77	51		49	74	166	557	166	74	49	
84	141	291	606	291	141	84		43	75	211	544	211	75	43		56	86	190	622	190	86	56		53	82	193	657	193	82	53	
91	139	256	534	256	139	91		44	78	226	533	226	78	44		59	90	170	643	170	90	59		57	89	202	662	202	89	57	
93	136	225	424	225	136	93		47	79	202	476	202	79	47		61	95	194	643	194	95	61		59	91	192	632	192	91	59	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							

rounded values

O-KS SIZE 4

O-KS 175-220 | support via fitting key

0°								20°								40°								60°							
79	65	138	167	138	65	79		87	125	201	270	201	125	87		62	91	159	234	159	91	62		57	81	143	260	143	81	57	
86	74	142	183	142	74	86		97	145	252	274	252	145	97		67	99	172	320	172	99	67		61	90	170	431	170	90	61	
102	99	159	182	159	99	102		105	157	287	280	287	157	105		71	109	193	298	193	109	71		65	102	202	595	202	102	65	
120	128	154	177	154	128	120		120	176	286	281	286	176	120		75	121	250	346	250	121	75		69	110	211	627	211	110	69	
133	141	160	176	160	141	133		127	179	286	286	286	179	127		75	116	225	350	225	116	75		71	115	234	637	234	115	71	
125	133	173	181	173	133	125		125	170	274	287	274	170	125		73	113	216	354	216	113	73		70	113	243	634	243	113	70	
116	122	158	183	158	122	116		120	163	272	286	272	163	120		70	107	198	347	198	107	70		66	105	216	579	216	105	66	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
5°								25°								45°								65°							
74	112	144	180	144	112	74		74	100	170	306	170	100	74		45	54	105	186	105	54	45		44	60	107	158	107	60	44	
87	123	161	166	161	123	87		76	91	174	295	174	91	76		53	75	147	250	147	75	53		48	69	133	224	133	69	48	
94	126	195	192	195	126	94		85	117	301	275	301	117	85		53	68	129	366	129	68	53		53	79	168	475	168	79	53	
107	151	179	180	179	151	107		90	154	309	306	309	154	90		50	55	130	328	130	55	50		59	94	227	601	227	94	59	
94	147	189	180	189	147	94		104	155	307	303	307	155	104		61	86	195	352	195	86	61		63	106	258	638	258	106	63	
100	136	180	176	180	136	100		108	164	287	305	287	164	108		65	97	244	360	244	97	65		68	115	280	633	280	115	68	
101	129	167	194	167	129	101		110	161	257	304	257	161	110		68	104	233	363	233	104	68		70	116	272	631	272	116	70	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
10°								30°								50°								70°							
64	101	184	189	184	101	64		63	90	157	213	157	90	63		39	53	91	137	91	53	39		37	51	86	129	86	51	37	
73	119	169	214	169	119	73		67	98	172	274	172	98	67		44	62	115	162	115	62	44		41	59	105	154	105	59	41	
79	124	222	214	222	124	79		71	97	137	261	137	97	71		48	71	134	175	134	71	48		46	67	128	175	128	67	46	
95	148	220	215	220	148	95		71	104	238	250	238	104	71		53	81	161	283	161	81	53		51	76	167	582	167	76	51	
99	151	220	213	220	151	99		75	114	231	270	231	114	75		57	89	178	353	178	89	57		55	86	198	655	198	86	55	
104	147	219	212	219	147	104		74	110	196	275	196	110	74		62	98	190	369	190	98	62		59	95	212	663	212	95	59	
102	137	204	221	204	137	102		71	103	171	274	171	103	71		65	101	195	371	195	101	65		62	99	207	652	207	99	62	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
15°								35°								55°								75°							
56	88	173	236	173	88	56		29	40	80	172	80	40	29		37	51	86	116	86	51	37		37	49	77	113	77	49	37	
61	99	217	236	217	99	61		32	46	106	269	106	46	32		41	59	108	139	108	59	41		41	56	99	151	99	56	41	
68	109	214	237	214	109	68		36	55	115	287	115	55	36		47	68	118	168	118	68	47		45	65	129	199	129	65	45	
81	137	232	237	232	137	81		38	60	110	245	110	60	38		51	77	148	333	148	77	51		49	74	166	557	166	74	49	
84	137	230	216	230	137	84		43	75	197	241	197	75	43		56	86	179	367	179	86	56		53	82	193	657	193	82	53	
91	138	231	214	231	138	91		44	78	214	268	214	78	44		59	90	166	559	166	90	59		57	89	202	662	202	89	57	
93	136	216	232	216	136	93		47	79	193	282	193	79	47		61	95	194	643	194	95	61		59	91	192	632	192	91	59	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							

rounded values

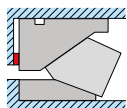
O-KS SIZE 5

FORCE DISTRIBUTION

Cam unit specifications O-KS 260-330

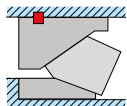
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-KS 260	O-KS 330	size	size		O-KS 260	O-KS 330			
27180	27200	O-KS 260-0°	O-KS 330-0°	0°	152	157	41,78	300	310
27181	27201	O-KS 260-5°	O-KS 330-5°	5°	151	157	42,75	300	305
27182	27202	O-KS 260-10°	O-KS 330-10°	10°	149	154	52,04	300	305
27183	27203	O-KS 260-15°	O-KS 330-15°	15°	149	154	53,68	300	305
27184	27204	O-KS 260-20°	O-KS 330-20°	20°	148	153	57,82	300	311
27185	27205	O-KS 260-25°	O-KS 330-25°	25°	148	153	61,50	300	306
27186	27206	O-KS 260-30°	O-KS 330-30°	30°	142	148	56,61	300	325
27187	27207	O-KS 260-35°	O-KS 330-35°	35°	143	148	60,26	300	325
27188	27208	O-KS 260-40°	O-KS 330-40°	40°	141	146	67,04	300	330
27189	27209	O-KS 260-45°	O-KS 330-45°	45°	141	146	73,32	300	325
27190	27210	O-KS 260-50°	O-KS 330-50°	50°	142	147	64,94	300	325
27191	27211	O-KS 260-55°	O-KS 330-55°	55°	142	147	75,63	300	325
27192	27212	O-KS 260-60°	O-KS 330-60°	60°	143	149	68,94	300	325
27193	27213	O-KS 260-65°	O-KS 330-65°	65°	143	149	60,59	300	325
27194	27214	O-KS 260-70°	O-KS 330-70°	70°	143	149	74,86	300	325
27195	27215	O-KS 260-75°	O-KS 330-75°	75°	143	148	98,93	300	325

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

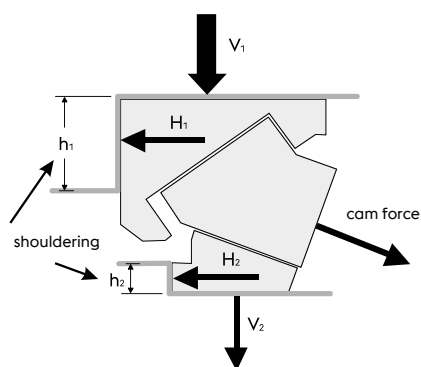
O-KS SIZE 5

PERMISSIBLE CAM FORCES

Cam unit force distribution size 5 O-KS, 1,000,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	781	655	781	655	0	186	48	30,9
5°	827	649	773	577	50	186	48	34,6
10°	802	802	673	663	117	142	48	30,7
15°	857	801	672	580	155	142	48	34,4
20°	773	874	505	610	222	110	82	29,6
25°	827	874	505	525	245	110	82	33,2
30°	806	657	551	254	147	125	83	47,8
35°	829	657	552	182	127	125	83	47,0
40°	830	765	442	231	194	95	145	48,0
45°	846	759	438	160	160	95	145	47,2
50°	536	471	272	61	72	95	145	45,6
55°	725	630	364	36	52	95	145	44,2
60°	830	870	153	151	262	45	180	47,4
65°	849	866	153	96	206	45	190	46,2
70°	666	666	117	40	110	45	190	45,3
75°	639	632	111	14	54	45	190	44,0

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-KS SIZE 5

O-KS 260-330 | support via cast shoulder

0°								20°								40°								60°							
88	200	364	553	364	200	88		92	196	346	525	346	196	92		63	86	162	313	162	86	63		61	70	141	289	141	70	61	
98	225	434	653	434	225	98		102	219	413	625	413	219	102		70	107	262	487	262	107	70		69	84	179	462	179	84	69	
111	255	520	738	520	255	111		114	247	496	715	496	247	114		79	134	382	687	382	134	79		78	100	223	663	223	100	78	
123	287	609	778	609	287	123		128	278	584	768	584	278	128		89	162	500	818	500	162	89		88	118	257	804	257	118	88	
137	318	686	781	686	318	137		142	307	664	773	664	307	142		100	187	580	830	580	187	100		98	135	286	828	286	135	98	
152	346	736	781	736	346	152		157	335	728	773	728	335	157		108	202	594	830	594	202	108		107	150	307	830	307	150	107	
165	365	724	781	724	365	165		172	356	727	773	727	356	172		112	198	537	830	537	198	112		112	154	313	830	313	154	112	
260 mm width						260 mm width						260 mm width						260 mm width													
330 mm width						330 mm width						330 mm width						330 mm width													

5°								25°								45°								65°							
59	156	276	424	276	156	59		61	159	265	413	265	159	61		53	80	231	176	231	80	53		52	63	85	174	85	63	52	
66	179	350	555	350	179	66		68	182	338	531	338	182	68		61	96	275	372	275	96	61		58	84	182	373	182	84	58	
76	207	439	693	439	207	76		77	209	425	670	425	209	77		69	114	327	580	327	114	69		66	108	312	581	312	108	66	
86	238	540	792	540	238	86		88	240	525	778	525	240	88		78	133	380	759	380	133	78		74	134	431	760	431	134	74	
97	270	637	822	637	270	97		99	273	626	819	626	273	99		85	152	426	832	426	152	85		82	156	522	834	522	156	82	
109	302	721	827	721	302	109		112	306	715	827	715	306	112		92	167	460	846	460	167	92		88	171	559	849	559	171	88	
120	324	736	827	736	324	120		123	329	736	827	736	329	123		97	178	483	846	483	178	97		93	174	532	849	532	174	93	
260 mm width						260 mm width						260 mm width						260 mm width													
330 mm width						330 mm width						330 mm width						330 mm width													

10°								30°								50°								70°							
100	222	387	586	387	222	100		57	75	130	252	130	75	57		22	43	182	159	182	43	22		21	34	102	181	102	34	21	
109	247	456	678	456	247	109		65	96	226	436	226	96	65		26	54	230	343	230	54	26		24	47	183	315	183	47	24	
123	278	544	773	544	278	123		74	122	343	618	343	122	74		30	66	280	421	280	66	30		27	62	280	473	280	62	27	
136	309	632	799	632	309	136		84	150	462	765	462	150	84		35	78	330	495	330	78	35		30	78	379	602	379	78	30	
150	339	708	802	708	339	150		93	176	549	801	549	176	93		39	90	370	530	370	90	39		33	90	443	655	443	90	33	
164	366	753	802	753	366	164		103	193	582	806	582	193	103		44	102	404	536	404	102	44		37	100	470	666	470	100	37	
172	370	738	802	738	370	172		108	194	535	806	535	194	108		48	110	430	536	430	110	48		39	99	456	666	456	99	39	
260 mm width						260 mm width						260 mm width						260 mm width													
330 mm width						330 mm width						330 mm width						330 mm width													

15°								35°								55°								75°							
69	188	311	493	311	188	69		50	62	76	152	76	62	50		24	43	188	153	188	43	24		22	35	103	188	103	35	22	
76	213	389	625	389	213	76		55	80	173	359	173	80	55		28	55	238	320	238	55	28		23	47	187	353	187	47	23	
87	244	484	758	484	244	87		62	104	297	590	297	104	62		32	68	297	502	297	68	32		25	61	292	526	292	61	25	
98	278	591	849	591	278	98		69	129	423	768	423	129	69		35	77	343	652	343	77	35		24	69	381	630	381	69	24	
108	310	685	857	685	310	108		76	148	509	820	509	148	76		37	84	381	713	381	84	37		24	74	414	639	414	74	24	
120	342	761	857	761	342	120		80	158	539	829	539	158	80		39	92	410	725	410	92	39		23	72	417	639	417	72	23	
121	338	751	857	751	338	121		81	152	498	829	498	152	81		41	93	417	725	417	93	41		23	67	375	625	375	67	23	
260 mm width						260 mm width						260 mm width						260 mm width													
330 mm width						330 mm width						330 mm width						330 mm width													

rounded values

O-KS SIZE 5

O-KS 260-330 | support via fitting key

0°								20°								40°								60°							
65	115	164	221	164	115	65		70	112	156	210	156	112	70		63	77	82	157	82	77	63		61	70	141	289	141	70	61	
72	128	195	261	195	128	72		77	125	186	250	186	125	77		70	92	119	221	119	92	70		69	84	179	462	179	84	69	
82	145	234	295	234	145	82		87	141	223	286	223	141	87		79	112	174	312	174	112	79		78	100	223	663	223	100	78	
92	163	274	311	274	163	92		98	158	263	307	263	158	98		89	134	227	372	227	134	89		88	118	257	804	257	118	88	
103	180	309	313	309	180	103		108	174	299	309	299	174	108		100	153	264	377	264	153	100		98	135	286	828	286	135	98	
114	196	332	313	332	196	114		120	190	329	309	329	190	120		108	168	270	377	270	168	108		107	150	307	830	307	150	107	
124	207	327	313	327	207	124		132	202	328	309	328	202	132		112	167	244	377	244	167	112		112	154	313	830	313	154	112	
260 mm width							260 mm width							260 mm width							260 mm width										
330 mm width							330 mm width							330 mm width							330 mm width										

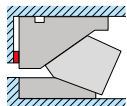
O-KS SIZE 6

FORCE DISTRIBUTION

Cam unit specifications O-KS 400-500

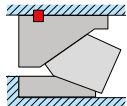
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-KS 400	O-KS 500	size	size		O-KS 400	O-KS 500			
27220	27240	O-KS 400-0°	O-KS 500-0°	0°	309	321	41,78	375	407
27221	27241	O-KS 400-5°	O-KS 500-5°	5°	307	320	42,75	375	407
27222	27242	O-KS 400-10°	O-KS 500-10°	10°	301	313	52,04	375	407
27223	27243	O-KS 400-15°	O-KS 500-15°	15°	300	313	53,68	375	407
27224	27244	O-KS 400-20°	O-KS 500-20°	20°	295	307	57,82	375	406
27225	27245	O-KS 400-25°	O-KS 500-25°	25°	294	307	61,50	375	406
27226	27246	O-KS 400-30°	O-KS 500-30°	30°	284	296	56,61	375	407
27227	27247	O-KS 400-35°	O-KS 500-35°	35°	288	301	60,26	375	407
27228	27248	O-KS 400-40°	O-KS 500-40°	40°	280	293	67,04	375	406
27229	27249	O-KS 400-45°	O-KS 500-45°	45°	287	300	73,32	375	406
27230	27250	O-KS 400-50°	O-KS 500-50°	50°	288	301	64,94	375	406
27231	27251	O-KS 400-55°	O-KS 500-55°	55°	292	304	75,62	375	406
27232	27252	O-KS 400-60°	O-KS 500-60°	60°	281	293	68,94	375	421
27233	27253	O-KS 400-65°	O-KS 500-65°	65°	285	298	60,59	375	426
27234	27254	O-KS 400-70°	O-KS 500-70°	70°	289	302	74,86	375	431
27235	27255	O-KS 400-75°	O-KS 500-75°	75°	289	301	98,93	375	431

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

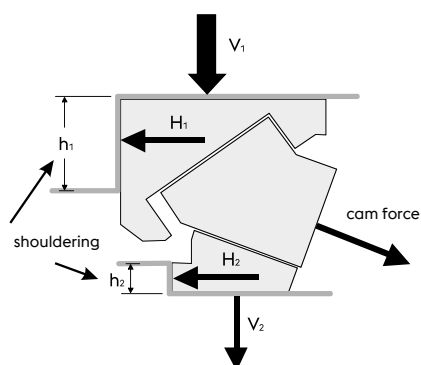
O-KS SIZE 6

PERMISSIBLE CAM FORCES

Cam unit force distribution size 6 O-KS , 1,000,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	1361	1142	1361	1142	0	228	30	78,4
5°	1453	1140	1359	1014	89	228	41	75,1
10°	1264	1264	1061	1045	184	179	45	78,4
15°	1179	1103	925	797	214	179	45	75,1
20°	1358	1535	886	1071	390	135	79	77,0
25°	1449	1532	884	920	429	135	90	73,8
30°	1237	1008	846	390	225	157	90	66,1
35°	1148	910	764	252	176	157	90	61,0
40°	1125	1037	599	314	263	120	140	65,3
45°	1156	1036	598	219	219	120	160	60,5
50°	1090	959	553	124	147	120	160	54,3
55°	1013	881	508	51	73	120	160	49,0
60°	1131	1185	209	206	356	59	155	62,3
65°	1151	1173	207	130	280	59	170	57,1
70°	1174	1174	207	71	195	59	185	52,9
75°	1022	1010	178	23	86	59	185	48,2

The cam unit force is distributed as shown in the sketch:



Shouldering:	h_1 (top)
	h_2 (bottom)
Press:	V_1 (vertical)
Cam base:	H_1 (horizontal)
Driver:	H_2 (horizontal)
	V_2 (vertical)

O-KS SIZE 6

O-KS 400-500 | support via cast shoulder

0°										20°										40°										60°									
182	409	580	765	580	409	182				206	361	680	1007	680	361	206				76	245	228	402	228	245	76				66	267	402	451	402	267	66			
188	432	705	1010	705	432	188				217	384	813	1245	813	384	217				78	261	405	710	405	261	78				66	275	548	764	548	275	66			
181	448	843	1248	843	448	181				227	406	933	1358	933	406	227				79	273	588	1023	588	273	79				65	279	678	1059	678	279	65			
162	441	966	1361	966	441	162				232	428	1031	1357	1031	428	232				80	281	724	1125	724	281	80				61	275	765	1131	765	275	61			
142	407	1063	1361	1063	407	142				228	429	1089	1356	1089	429	228				79	284	777	1125	777	284	79				51	266	777	1131	777	266	51			
122	371	1123	1360	1123	371	122				223	436	1103	1357	1103	436	223				77	279	713	1125	713	279	77				39	250	707	1131	707	250	39			
106	334	1006	1360	1006	334	106				204	410	1035	1356	1035	410	204				66	269	525	1072	525	269	66				32	230	557	1023	557	230	32			
400 mm width										400 mm width										400 mm width										400 mm width									
500 mm width										500 mm width										500 mm width										500 mm width									

O-KS SIZE 6

O-KS 400-500 | support via fitting key

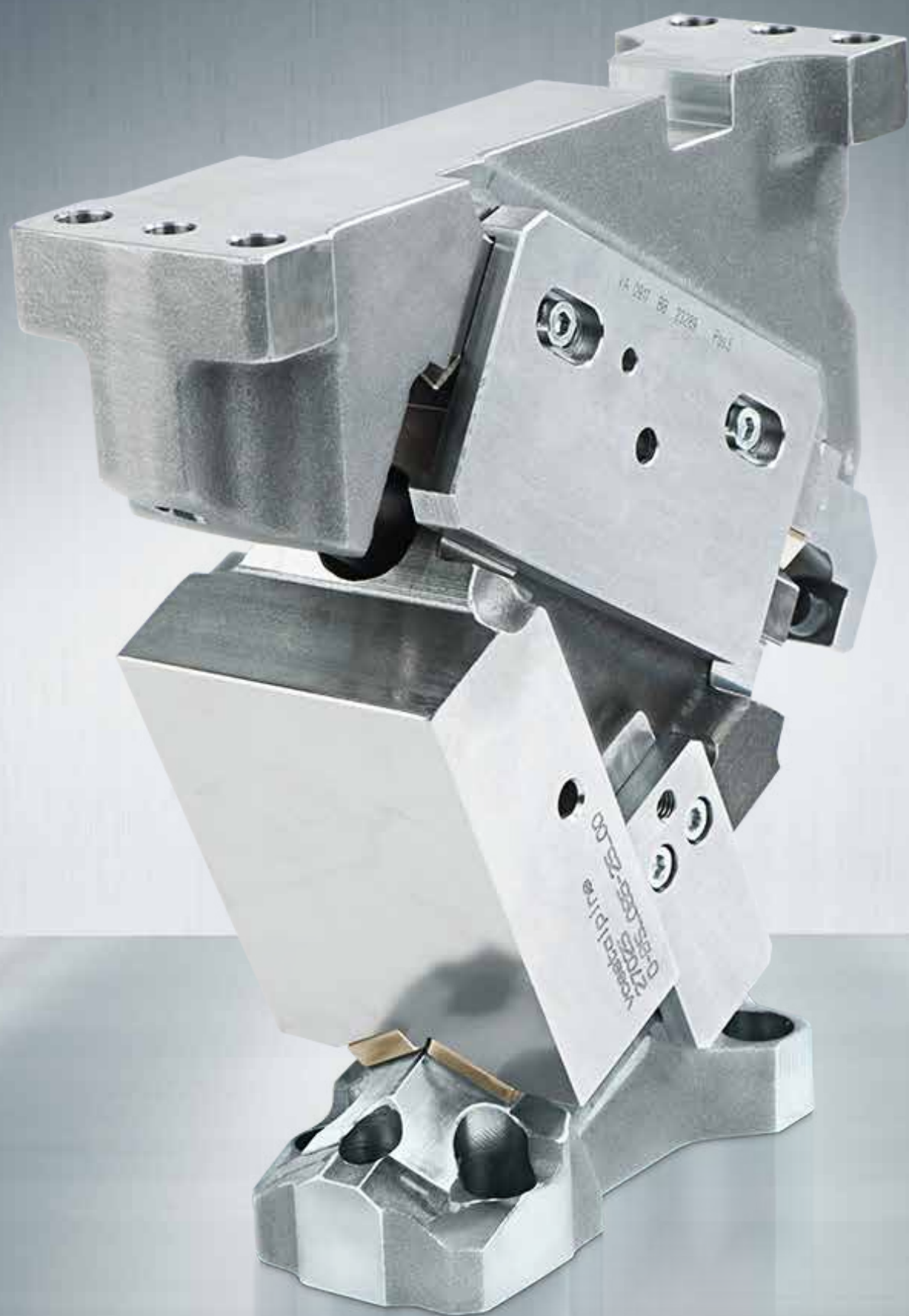
0°							20°							40°							60°						
128	163	145	305	145	163	128	124	144	204	361	204	144	124	69	123	137	335	137	123	69	66	267	402	451	402	267	66
132	173	176	305	176	173	132	130	153	244	361	244	153	130	70	131	243	592	243	131	70	66	275	548	764	548	275	66
126	179	211	305	211	179	126	136	162	280	361	280	162	136	71	137	353	612	353	137	71	65	279	678	1059	678	279	65
113	176	242	305	242	176	113	139	171	309	361	309	171	139	72	141	434	612	434	141	72	61	275	765	1131	765	275	61
99	163	266	305	266	163	99	137	172	327	361	327	172	137	71	142	466	612	466	142	71	51	266	777	1131	777	266	51
85	148	281	305	281	148	85	134	174	331	361	331	174	134	69	139	428	612	428	139	69	39	250	707	1131	707	250	39
74	133	252	305	252	133	74	123	164	310	361	310	164	123	60	135	315	612	315	135	60	32	230	557	1023	557	230	32
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
5°							25°							45°							65°						
36	102	98	336	98	102	36	95	100	115	330	115	100	95	23	102	108	123	108	102	23	32	191	208	210	208	191	32
38	109	137	336	137	109	38	101	106	158	375	158	106	101	24	122	139	328	139	122	24	32	203	354	467	354	203	32
42	115	179	336	179	115	42	109	114	176	375	176	114	109	25	128	246	582	246	128	25	32	216	508	828	508	216	32
44	119	223	336	223	119	44	117	122	220	375	220	122	117	25	131	337	777	337	131	25	33	222	623	1106	623	222	33
38	122	266	336	266	122	38	125	129	263	375	263	129	125	25	130	389	777	389	130	25	34	224	684	1151	684	224	34
33	115	299	336	299	115	33	133	137	297	375	297	137	133	23	127	370	777	370	127	23	32	220	664	1151	664	220	32
28	104	294	336	294	104	28	138	144	308	375	308	144	138	20	121	284	748	284	121	20	28	212	576	1064	576	212	28
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
10°							30°							50°							70°						
59	86	58	290	58	86	59	73	79	104	402	104	79	73	24	118	234	272	234	118	24	24	210	215	220	215	210	24
64	93	96	355	96	93	64	74	84	183	402	183	84	74	25	134	262	622	262	134	25	21	215	372	424	372	215	21
70	100	137	355	137	100	70	75	88	262	402	262	88	75	26	150	289	991	289	150	26	22	218	528	821	528	218	22
76	108	177	355	177	108	76	76	90	324	402	324	90	76	26	163	303	991	303	163	26	22	214	638	1127	638	214	22
82	117	221	355	221	117	82	74	91	348	402	348	91	74	27	174	304	991	304	174	27	22	205	677	1174	677	205	22
88	125	262	355	262	125	88	72	90	319	402	319	90	72	27	181	304	991	304	181	27	21	190	622	1174	622	190	21
93	133	286	355	286	133	93	64	87	234	402	234	87	64	27	183	304	991	304	183	27	20	176	513	1039	513	176	20
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
15°							35°							55°							75°						
124	144	204	361	204	144	124	30	54	55	167	55	54	30	24	160	305	330	305	160	24	22	213	216	392	216	213	22
130	153	244	361	244	153	130	33	65	101	396	101	65	33	24	180	354	409	354	180	24	20	208	374	690	374	208	20
136	162	280	361	280	162	136	34	78	153	410	153	78	34	26	200	386	701	386	200	26	18	199	549	956	549	199	18
139	171	309	361	309	171	139	36	85	219	410	219	85	36	28	214	394	940	394	214	28	16	186	641	1022	641	186	16
137	172	327	361	327	172	137	37	89	263	410	263	89	37	29	224	394	1013	394	224	29	13	169	651	1022	651	169	13
134	174	331	361	331	174	134	38	91	261	410	261	91	38	30	228	394	1013	394	228	30	10	148	563	1022	563	148	10
123	164	310	361	310	164	123	39	91	215	410	215	91	39	30	228	394	1013	394	228	30	9	125	440	861	440	125	9
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						

rounded values



O-BS
OPTIMIZED
BASIC CAM UNIT





TECHNICAL DETAILS

O-BS

Important information at a glance

Here you will find important technical data for the optimized basic cam unit. Should you have any further questions about O-BS, our experienced team of specialists will be happy to assist you at any time. Please contact us at sales.camtec@voestalpine.com

	O-BS
Average service life	1.500.000 strokes*
Guaranteed service life	500.000 / 750.000 strokes*
Sliding surfaces	at least Rz 6.3, unhardened
Field of application	shaping, beveling, punching, cutting
Angle range	0° – 75°
Tensile strength of driver, sliding element and cam base materials	600 N/mm ² minimum
Available widths [mm]	60, 65/85, 90/110, 125/160, 175/220, 260/330, 400/500
Lock Out System	yes
Sliding element removable to the rear	yes
Guide clamps	1.7225 / Sinter
Positive return	both sides
Measuring holes	yes
Gas spring	yes
Special cam unit options	yes
Compliant with VDI	yes
NAAMs insert point	yes
Pre-machining	yes

*depending on load



The QR code leads you directly to the force diagrams

Discover all current O-BS models including force diagrams on our website: <https://www.voestalpine.com/camtec/en/Product-Finder>

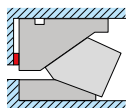
O-BS SIZE 0

FORCE DISTRIBUTION

Cam unit specifications O-BS 60

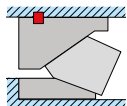
ident. no.	designation	angle [degree]	weight [kg]	stroke [mm]	height cam unit [mm]	length cam unit [mm]
27580	O-BS 60-0°	0°	11	21,85	205	195
27581	O-BS 60-5°	5°	11	21,94	205	195
27582	O-BS 60-10°	10°	11	26,45	205	195
27583	O-BS 60-15°	15°	11	26,96	205	195
27584	O-BS 60-20°	20°	11	25,81	205	195
27585	O-BS 60-25°	25°	11	26,76	205	195
27586	O-BS 60-30°	30°	11	21,23	205	195
27587	O-BS 60-35°	35°	11	22,44	205	199
27588	O-BS 60-40°	40°	11	23,74	205	197
27589	O-BS 60-45°	45°	12	25,72	205	201
27590	O-BS 60-50°	50°	12	28,29	205	196
27591	O-BS 60-55°	55°	12	31,71	205	198
27592	O-BS 60-60°	60°	11	35,45	205	195
27593	O-BS 60-65°	65°	11	41,95	205	195
27594	O-BS 60-70°	70°	11	51,83	205	195
27595	O-BS 60-75°	75°	11	68,49	205	195

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

O-BS SIZE 0

PERMISSIBLE CAM FORCES

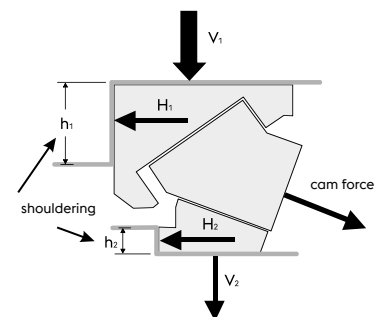
Cam unit force distribution O-BS 60 Level 1, 500,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	93	54	65	54	0	145	26	3,7
5°	98	54	65	48	4	145	26	4,1
10°	89	63	53	52	9	120	26	3,7
15°	95	63	53	46	12	120	26	4,1
20°	89	72	42	50	18	106	48	3,4
25°	95	71	41	43	20	106	48	3,8
30°	114	67	56	26	15	120	48	6,1
35°	118	67	56	18	13	120	48	8,1
40°	115	75	44	23	19	106	48	6,1
45°	118	75	43	16	16	106	48	8,1
50°	120	75	43	10	11	106	48	12,0
55°	122	75	43	4	6	106	48	18,0
60°	116	86	15	15	26	50	90	5,8
65°	122	88	16	10	21	50	90	7,6
70°	121	86	15	5	14	50	90	11,4
75°	122	87	15	2	7	50	90	18,0

Cam unit force distribution O-BS 60 Level 2, 750,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	62	36	43	36	0	145	20	3,7
5°	66	36	43	32	3	145	20	4,1
10°	60	42	35	35	6	120	20	3,7
15°	63	42	35	30	8	120	20	4,1
20°	60	48	28	34	12	106	30	3,4
25°	63	48	27	29	13	106	30	3,8
30°	76	44	37	17	10	120	30	6,1
35°	79	44	37	12	9	120	30	8,1
40°	77	50	29	15	13	106	30	6,1
45°	79	50	29	11	11	106	50	8,1
50°	80	50	29	6	8	106	50	12,0
55°	81	50	29	3	4	106	60	18,0
60°	77	57	10	10	17	50	60	5,8
65°	81	59	10	7	14	50	80	7,6
70°	81	57	10	3	9	50	80	11,4
75°	81	58	10	1	5	50	80	18,0

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-BS SIZE 0

O-BS 60 | support via cast shoulder, Level 1

00°			20°			40°			60°			105 mm height
34	76	34	32	77	32	12	63	12	13	64	13	
50	90	50	47	89	47	24	107	24	24	107	24	
64	93	64	64	88	64	45	115	45	46	115	46	
54	89	54	56	89	56	55	104	55	67	115	67	
43	81	43	44	87	44	44	98	44	47	107	47	
50 mm width			50 mm width			50 mm width			50 mm width			
05°			25°			45°			65°			105 mm height
35	85	35	32	85	32	6	43	6	9	56	9	
55	97	55	51	95	51	13	93	13	19	106	19	
62	98	62	64	94	64	31	118	31	35	120	35	
49	96	49	52	94	52	53	110	53	60	121	60	
37	86	37	41	87	41	47	85	47	50	113	50	
50 mm width			50 mm width			50 mm width			50 mm width			
10°			30°			50°			70°			105 mm height
31	73	31	13	67	13	5	52	5	8	61	8	
46	88	46	26	108	26	11	110	11	18	111	18	
65	89	65	48	114	48	32	120	32	35	120	35	
58	89	58	52	107	52	47	97	47	53	118	53	
45	88	45	43	89	43	35	84	35	40	94	40	
50 mm width			50 mm width			50 mm width			50 mm width			
15°			35°			55°			75°			105 mm height
31	82	31	8	50	8	4	38	4	11	41	11	
50	94	50	18	97	18	5	96	5	11	98	11	
64	94	64	34	117	34	14	121	14	24	120	24	
51	94	51	54	112	54	41	97	41	46	121	46	
39	90	39	46	85	46	38	86	38	41	95	41	
50 mm width			50 mm width			50 mm width			50 mm width			

rounded values

O-BS SIZE 0

O-BS-60 | support via fitting key, Level 1

00° <table><tr><td>28</td><td>28</td><td>28</td></tr><tr><td>28</td><td>28</td><td>28</td></tr><tr><td>29</td><td>29</td><td>29</td></tr><tr><td>29</td><td>29</td><td>29</td></tr><tr><td>29</td><td>29</td><td>29</td></tr></table> 50 mm width	28	28	28	28	28	28	29	29	29	29	29	29	29	29	29	20° <table><tr><td>32</td><td>44</td><td>32</td></tr><tr><td>43</td><td>45</td><td>43</td></tr><tr><td>44</td><td>45</td><td>44</td></tr><tr><td>45</td><td>46</td><td>45</td></tr><tr><td>43</td><td>45</td><td>43</td></tr></table> 50 mm width	32	44	32	43	45	43	44	45	44	45	46	45	43	45	43	40° <table><tr><td>12</td><td>49</td><td>12</td></tr><tr><td>24</td><td>55</td><td>24</td></tr><tr><td>46</td><td>55</td><td>46</td></tr><tr><td>54</td><td>55</td><td>54</td></tr><tr><td>44</td><td>56</td><td>44</td></tr></table> 50 mm width	12	49	12	24	55	24	46	55	46	54	55	54	44	56	44	60° <table><tr><td>10</td><td>46</td><td>10</td></tr><tr><td>17</td><td>76</td><td>17</td></tr><tr><td>34</td><td>81</td><td>34</td></tr><tr><td>48</td><td>81</td><td>48</td></tr><tr><td>35</td><td>76</td><td>35</td></tr></table> 50 mm width	10	46	10	17	76	17	34	81	34	48	81	48	35	76	35	105 mm height
28	28	28																																																														
28	28	28																																																														
29	29	29																																																														
29	29	29																																																														
29	29	29																																																														
32	44	32																																																														
43	45	43																																																														
44	45	44																																																														
45	46	45																																																														
43	45	43																																																														
12	49	12																																																														
24	55	24																																																														
46	55	46																																																														
54	55	54																																																														
44	56	44																																																														
10	46	10																																																														
17	76	17																																																														
34	81	34																																																														
48	81	48																																																														
35	76	35																																																														
05° <table><tr><td>29</td><td>30</td><td>29</td></tr><tr><td>31</td><td>30</td><td>31</td></tr><tr><td>30</td><td>31</td><td>30</td></tr><tr><td>31</td><td>32</td><td>31</td></tr><tr><td>31</td><td>31</td><td>31</td></tr></table> 50 mm width	29	30	29	31	30	31	30	31	30	31	32	31	31	31	31	25° <table><tr><td>32</td><td>48</td><td>32</td></tr><tr><td>45</td><td>48</td><td>45</td></tr><tr><td>48</td><td>48</td><td>48</td></tr><tr><td>48</td><td>49</td><td>48</td></tr><tr><td>41</td><td>49</td><td>41</td></tr></table> 50 mm width	32	48	32	45	48	45	48	48	48	48	49	48	41	49	41	45° <table><tr><td>5</td><td>40</td><td>5</td></tr><tr><td>10</td><td>56</td><td>10</td></tr><tr><td>32</td><td>56</td><td>32</td></tr><tr><td>54</td><td>57</td><td>54</td></tr><tr><td>48</td><td>58</td><td>48</td></tr></table> 50 mm width	5	40	5	10	56	10	32	56	32	54	57	54	48	58	48	65° <table><tr><td>7</td><td>40</td><td>7</td></tr><tr><td>14</td><td>75</td><td>14</td></tr><tr><td>26</td><td>86</td><td>26</td></tr><tr><td>43</td><td>86</td><td>43</td></tr><tr><td>37</td><td>80</td><td>37</td></tr></table> 50 mm width	7	40	7	14	75	14	26	86	26	43	86	43	37	80	37	105 mm height
29	30	29																																																														
31	30	31																																																														
30	31	30																																																														
31	32	31																																																														
31	31	31																																																														
32	48	32																																																														
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48	48	48																																																														
48	49	48																																																														
41	49	41																																																														
5	40	5																																																														
10	56	10																																																														
32	56	32																																																														
54	57	54																																																														
48	58	48																																																														
7	40	7																																																														
14	75	14																																																														
26	86	26																																																														
43	86	43																																																														
37	80	37																																																														
10° <table><tr><td>30</td><td>34</td><td>30</td></tr><tr><td>34</td><td>34</td><td>34</td></tr><tr><td>34</td><td>34</td><td>34</td></tr><tr><td>35</td><td>35</td><td>35</td></tr><tr><td>35</td><td>34</td><td>35</td></tr></table> 50 mm width	30	34	30	34	34	34	34	34	34	35	35	35	35	34	35	30° <table><tr><td>15</td><td>42</td><td>15</td></tr><tr><td>26</td><td>42</td><td>26</td></tr><tr><td>43</td><td>43</td><td>43</td></tr><tr><td>43</td><td>44</td><td>43</td></tr><tr><td>41</td><td>43</td><td>41</td></tr></table> 50 mm width	15	42	15	26	42	26	43	43	43	43	44	43	41	43	41	50° <table><tr><td>3</td><td>39</td><td>3</td></tr><tr><td>6</td><td>58</td><td>6</td></tr><tr><td>32</td><td>58</td><td>32</td></tr><tr><td>48</td><td>59</td><td>48</td></tr><tr><td>36</td><td>60</td><td>36</td></tr></table> 50 mm width	3	39	3	6	58	6	32	58	32	48	59	48	36	60	36	70° <table><tr><td>6</td><td>44</td><td>6</td></tr><tr><td>14</td><td>79</td><td>14</td></tr><tr><td>26</td><td>85</td><td>26</td></tr><tr><td>39</td><td>84</td><td>39</td></tr><tr><td>29</td><td>68</td><td>29</td></tr></table> 50 mm width	6	44	6	14	79	14	26	85	26	39	84	39	29	68	29	105 mm height
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15° <table><tr><td>31</td><td>36</td><td>31</td></tr><tr><td>37</td><td>37</td><td>37</td></tr><tr><td>37</td><td>37</td><td>37</td></tr><tr><td>37</td><td>38</td><td>37</td></tr><tr><td>36</td><td>38</td><td>36</td></tr></table> 50 mm width	31	36	31	37	37	37	37	37	37	37	38	37	36	38	36	35° <table><tr><td>9</td><td>37</td><td>9</td></tr><tr><td>18</td><td>44</td><td>18</td></tr><tr><td>35</td><td>44</td><td>35</td></tr><tr><td>45</td><td>45</td><td>45</td></tr><tr><td>43</td><td>45</td><td>43</td></tr></table> 50 mm width	9	37	9	18	44	18	35	44	35	45	45	45	43	45	43	55° <table><tr><td>3</td><td>35</td><td>3</td></tr><tr><td>4</td><td>57</td><td>4</td></tr><tr><td>7</td><td>59</td><td>7</td></tr><tr><td>42</td><td>60</td><td>42</td></tr><tr><td>39</td><td>61</td><td>39</td></tr></table> 50 mm width	3	35	3	4	57	4	7	59	7	42	60	42	39	61	39	75° <table><tr><td>4</td><td>30</td><td>4</td></tr><tr><td>8</td><td>70</td><td>8</td></tr><tr><td>18</td><td>86</td><td>18</td></tr><tr><td>34</td><td>88</td><td>34</td></tr><tr><td>31</td><td>69</td><td>31</td></tr></table> 50 mm width	4	30	4	8	70	8	18	86	18	34	88	34	31	69	31	105 mm height
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34	88	34																																																														
31	69	31																																																														

rounded values

O-BS SIZE 0

O-BS 60 | support via cast shoulder, Level 2

0°			20°			40°			60°			75 mm height
23	51	23	21	51	21	8	42	8	8	43	8	
34	60	34	32	59	32	16	71	16	16	71	16	
43	62	43	43	59	43	30	77	30	31	77	31	
36	59	36	37	59	37	37	69	37	44	77	44	
29	54	29	29	58	29	29	65	29	32	71	32	
60 mm width			60 mm width			60 mm width			60 mm width			
5°			25°			45°			65°			75 mm height
24	57	24	21	57	21	4	29	4	6	37	6	
36	65	36	34	63	34	9	62	9	13	71	13	
41	65	41	43	63	43	20	78	20	24	80	24	
33	64	33	35	63	35	35	74	35	40	81	40	
25	57	25	27	58	27	31	56	31	34	75	34	
60 mm width			60 mm width			60 mm width			60 mm width			
10°			30°			50°			70°			75 mm height
20	49	20	9	44	9	3	35	3	5	41	5	
30	58	30	17	72	17	7	74	7	12	74	12	
43	59	43	32	76	32	21	80	21	24	80	24	
39	59	39	35	72	35	31	64	31	36	79	36	
30	59	30	29	60	29	23	56	23	26	63	26	
60 mm width			60 mm width			60 mm width			60 mm width			
15°			35°			55°			75°			75 mm height
21	55	21	5	33	5	2	25	2	7	27	7	
34	63	34	12	65	12	3	64	3	7	65	7	
43	63	43	23	78	23	9	81	9	16	80	16	
34	63	34	36	75	36	28	65	28	30	81	30	
26	60	26	30	57	30	25	57	25	27	63	27	
60 mm width			60 mm width			60 mm width			60 mm width			

rounded values

O-BS SIZE 0

O-BS-60 | support via fitting key, Level 2

0° <table><tr><td>19</td><td>19</td><td>19</td></tr><tr><td>19</td><td>19</td><td>19</td></tr><tr><td>19</td><td>19</td><td>19</td></tr><tr><td>19</td><td>19</td><td>19</td></tr><tr><td>19</td><td>19</td><td>19</td></tr></table> 60 mm width	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	20° <table><tr><td>21</td><td>29</td><td>21</td></tr><tr><td>28</td><td>30</td><td>28</td></tr><tr><td>29</td><td>30</td><td>29</td></tr><tr><td>30</td><td>31</td><td>30</td></tr><tr><td>28</td><td>30</td><td>28</td></tr></table> 60 mm width	21	29	21	28	30	28	29	30	29	30	31	30	28	30	28	40° <table><tr><td>8</td><td>33</td><td>8</td></tr><tr><td>16</td><td>37</td><td>16</td></tr><tr><td>30</td><td>36</td><td>30</td></tr><tr><td>36</td><td>37</td><td>36</td></tr><tr><td>30</td><td>37</td><td>30</td></tr></table> 60 mm width	8	33	8	16	37	16	30	36	30	36	37	36	30	37	30	60° <table><tr><td>6</td><td>31</td><td>6</td></tr><tr><td>12</td><td>51</td><td>12</td></tr><tr><td>23</td><td>54</td><td>23</td></tr><tr><td>32</td><td>54</td><td>32</td></tr><tr><td>23</td><td>51</td><td>23</td></tr></table> 60 mm width	6	31	6	12	51	12	23	54	23	32	54	32	23	51	23	75 mm height
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5° <table><tr><td>19</td><td>20</td><td>19</td></tr><tr><td>21</td><td>20</td><td>21</td></tr><tr><td>20</td><td>21</td><td>20</td></tr><tr><td>21</td><td>21</td><td>21</td></tr><tr><td>21</td><td>21</td><td>21</td></tr></table> 60 mm width	19	20	19	21	20	21	20	21	20	21	21	21	21	21	21	25° <table><tr><td>21</td><td>32</td><td>21</td></tr><tr><td>30</td><td>32</td><td>30</td></tr><tr><td>32</td><td>32</td><td>32</td></tr><tr><td>32</td><td>33</td><td>32</td></tr><tr><td>27</td><td>32</td><td>27</td></tr></table> 60 mm width	21	32	21	30	32	30	32	32	32	32	33	32	27	32	27	45° <table><tr><td>3</td><td>26</td><td>3</td></tr><tr><td>7</td><td>37</td><td>7</td></tr><tr><td>21</td><td>37</td><td>21</td></tr><tr><td>36</td><td>38</td><td>36</td></tr><tr><td>32</td><td>39</td><td>32</td></tr></table> 60 mm width	3	26	3	7	37	7	21	37	21	36	38	36	32	39	32	65° <table><tr><td>5</td><td>26</td><td>5</td></tr><tr><td>9</td><td>50</td><td>9</td></tr><tr><td>17</td><td>57</td><td>17</td></tr><tr><td>29</td><td>57</td><td>29</td></tr><tr><td>25</td><td>54</td><td>25</td></tr></table> 60 mm width	5	26	5	9	50	9	17	57	17	29	57	29	25	54	25	75 mm height
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rounded values

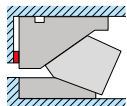
O-BS SIZE 1

FORCE DISTRIBUTION

Cam unit specifications O-BS 65-85

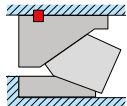
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-BS 65	O-BS 85	size	size		O-BS 65	O-BS 85			
27500	27520	O-BS 65-0°	O-BS 85-0°	0°	16	17	28,93	225	227
27501	27521	O-BS 65-5°	O-BS 85-5°	5°	16	17	29,04	225	227
27502	27522	O-BS 65-10°	O-BS 85-10°	10°	16	17	35,00	225	229
27503	27523	O-BS 65-15°	O-BS 85-15°	15°	16	17	35,69	225	232
27504	27524	O-BS 65-20°	O-BS 85-20°	20°	16	17	36,86	225	247
27505	27525	O-BS 65-25°	O-BS 85-25°	25°	16	17	38,22	225	247
27506	27526	O-BS 65-30°	O-BS 85-30°	30°	16	16	35,38	225	236
27507	27527	O-BS 65-35°	O-BS 85-35°	35°	16	17	37,41	225	239
27508	27528	O-BS 65-40°	O-BS 85-40°	40°	16	17	39,57	225	247
27509	27529	O-BS 65-45°	O-BS 85-45°	45°	16	17	42,87	225	247
27510	27530	O-BS 65-50°	O-BS 85-50°	50°	16	17	47,16	225	247
27511	27531	O-BS 65-55°	O-BS 85-55°	55°	16	17	52,85	225	247
27512	27532	O-BS 65-60°	O-BS 85-60°	60°	16	17	49,24	225	247
27513	27533	O-BS 65-65°	O-BS 85-65°	65°	16	17	46,61	225	252
27514	27534	O-BS 65-70°	O-BS 85-70°	70°	16	17	57,59	225	252
27515	27535	O-BS 65-75°	O-BS 85-75°	75°	16	17	76,10	225	252

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

O-BS SIZE 1

PERMISSIBLE CAM FORCES

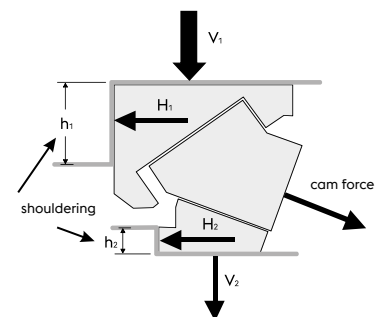
Cam unit force distribution size 1 O-BS, Level 1, 500,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	138	116	138	116	0	155	20	6,8
5°	157	123	147	109	10	155	20	7,6
10°	140	140	117	115	20	125	30	6,8
15°	152	142	119	102	27	125	30	7,6
20°	140	159	92	111	40	100	60	6,5
25°	152	161	93	97	45	100	60	7,3
30°	150	122	103	47	27	105	60	12,2
35°	154	122	102	34	24	105	60	16,1
40°	156	144	83	44	37	100	80	11,6
45°	160	143	83	30	30	100	80	15,3
50°	163	143	83	18	22	100	80	22,9
55°	165	143	83	8	12	100	80	20,5
60°	159	167	29	29	50	40	110	11,6
65°	164	167	29	19	40	40	110	13,8
70°	167	167	29	10	28	40	110	20,5
75°	169	167	29	4	14	40	110	20,5

Cam unit force distribution size 1 O-BS, Level 2, 750,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	92	77	92	77	0	155	20	6,8
5°	105	82	98	73	6	155	20	7,6
10°	93	93	78	77	14	125	30	6,8
15°	101	94	79	68	18	125	30	7,6
20°	94	106	61	74	27	100	60	6,5
25°	102	107	62	64	30	100	60	7,3
30°	100	82	68	32	18	105	60	12,2
35°	103	81	68	23	16	105	60	16,1
40°	104	96	55	29	24	100	80	11,6
45°	107	95	55	20	20	100	80	15,3
50°	109	95	55	12	15	100	80	22,9
55°	110	96	55	6	8	100	80	20,5
60°	106	111	20	19	33	40	110	11,6
65°	109	111	20	12	26	40	110	13,8
70°	111	111	20	7	18	40	110	20,5
75°	113	111	20	3	10	40	110	20,5

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-BS SIZE 1

O-BS 65-85 | support via fitting key, Level 1

0°							20°							40°							60°						
24	27	28	28	28	27	24	27	37	43	44	43	37	27	14	22	41	55	41	22	14	13	22	47	88	47	22	13
27	27	28	28	28	27	27	33	43	44	44	44	43	33	18	30	55	55	55	30	18	17	32	74	124	74	32	17
27	27	28	28	28	27	27	38	44	44	44	44	44	38	24	39	56	56	56	39	24	23	49	119	154	119	49	23
28	28	27	28	27	28	28	43	44	44	44	44	44	43	33	53	56	56	56	53	33	33	66	128	156	128	66	33
28	28	27	28	27	28	28	44	44	44	44	44	44	44	39	56	56	56	56	56	39	37	65	116	157	116	65	37
28	28	28	28	28	28	28	43	44	44	44	44	44	43	41	56	57	57	57	56	41	37	59	100	158	100	59	37
28	28	28	28	28	28	28	42	44	44	44	44	44	42	39	52	57	57	57	52	39	34	51	83	135	83	51	34
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						
5°							25°							45°							65°						
22	27	30	30	30	27	22	22	33	46	47	46	33	22	11	17	31	53	31	17	11	12	18	37	79	37	18	12
25	29	30	30	30	29	25	28	41	47	47	47	41	28	14	24	45	58	45	24	14	14	26	59	124	59	26	14
29	29	30	30	30	29	29	34	47	47	47	47	47	34	19	32	57	57	57	32	19	19	40	102	164	102	40	19
30	30	30	30	30	30	30	41	47	47	47	47	47	41	26	43	58	58	58	43	26	26	54	129	162	129	54	26
30	30	30	30	30	30	30	43	47	47	47	47	47	43	34	54	58	58	58	54	34	33	60	119	163	119	60	33
30	30	30	30	30	30	30	43	47	47	47	47	47	43	38	55	58	58	58	55	38	35	58	106	163	106	58	35
30	30	30	30	30	30	30	41	47	47	47	47	47	41	36	51	58	58	58	51	36	33	51	88	137	88	51	33
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						
10°							30°							50°							70°						
26	33	34	34	34	33	26	13	19	33	43	33	19	13	8	12	21	39	21	12	8	9	12	25	55	25	12	9
29	33	34	34	34	33	29	16	26	43	43	43	26	16	10	16	35	59	35	16	10	10	17	43	102	43	17	10
33	33	33	33	33	33	33	22	34	43	43	43	34	22	13	25	58	59	58	25	13	14	28	77	154	77	28	14
33	33	34	34	34	33	33	28	42	43	43	43	42	28	18	34	59	59	59	34	18	19	44	121	164	121	44	19
34	34	34	33	34	34	34	33	43	43	43	43	43	33	26	45	59	59	59	45	26	26	54	123	166	123	54	26
34	34	34	33	34	34	34	34	43	43	43	43	43	34	31	48	59	59	59	48	31	29	55	110	166	110	55	29
34	34	34	34	34	34	34	33	42	43	43	43	42	33	31	46	60	60	60	46	31	29	50	91	141	91	50	29
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						
15°							35°							55°							75°						
22	30	36	36	36	30	22	11	16	28	42	28	16	11	7	10	17	33	17	10	7	7	10	19	41	19	10	7
27	36	36	36	36	36	27	13	21	39	44	39	21	13	9	13	28	60	28	13	9	9	14	33	84	33	14	9
31	36	36	36	36	36	31	18	29	44	44	44	29	18	11	19	47	60	47	19	11	12	22	59	137	59	22	12
35	36	36	36	36	36	35	24	38	45	44	45	38	24	15	28	59	60	59	28	15	15	35	103	164	103	35	15
36	36	36	36	36	36	36	30	43	45	45	45	43	30	21	38	60	60	60	38	21	20	45	117	168	117	45	20
37	36	36	36	36	36	37	32	45	45	44	45	45	32	24	40	61	61	61	40	24	23	46	114	167	114	46	23
36	37	37	37	37	37	36	32	43	45	45	45	43	32	26	41	62	61	62	41	26	23	42	97	141	97	42	23
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						

rounded values

O-BS SIZE 1

O-BS 65-85 | support via cast shoulder, Level 2

0°								20°								40°								60°							
19	29	45	60	45	29	19		18	28	47	66	47	28	18		9	15	29	56	29	15	9		9	15	31	58	31	15	9	
24	38	59	71	59	38	24		24	38	60	79	60	38	24		12	21	44	81	44	21	12		11	21	49	83	49	21	11	
31	48	75	85	75	48	31		31	49	74	93	74	49	31		16	31	72	104	72	31	16		16	33	79	105	79	33	16	
33	46	68	92	68	46	33		37	54	80	93	80	54	37		22	43	84	104	84	43	22		22	44	86	106	86	44	22	
32	43	59	87	59	43	32		37	50	73	93	73	50	37		26	44	75	103	75	44	26		25	43	77	106	77	43	25	
30	40	53	76	53	40	30		34	46	65	91	65	46	34		28	41	65	102	65	41	28		25	39	67	105	67	39	25	
28	37	48	67	48	37	28		31	42	57	83	57	42	31		26	37	56	90	56	37	26		23	34	56	90	56	34	23	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
5°								25°								45°								65°							
15	23	40	59	40	23	15		15	23	40	63	40	23	15		8	11	22	46	22	11	8		8	12	25	53	25	12	8	
20	32	56	71	56	32	20		19	32	57	79	57	32	19		9	16	35	74	35	16	9		10	17	40	82	40	17	10	
26	45	75	87	75	45	26		25	44	75	96	75	44	25		12	25	62	102	62	25	12		13	26	68	109	68	26	13	
31	48	73	105	73	48	31		34	55	87	101	87	55	34		17	35	81	105	81	35	17		17	36	86	108	86	36	17	
31	45	65	103	65	45	31		34	51	78	101	78	51	34		23	42	76	106	76	42	23		22	40	80	108	80	40	22	
29	42	58	96	58	42	29		33	47	69	101	69	47	33		25	41	68	105	68	41	25		23	38	71	109	71	38	23	
27	38	52	80	52	38	27		30	42	60	94	60	42	30		24	37	59	92	59	37	24		22	34	59	91	59	34	22	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
10°								30°								50°								70°							
19	29	46	64	46	29	19		9	13	25	49	25	13	9		6	8	15	31	15	8	6		6	8	17	37	17	8	6	
24	38	60	77	60	38	24		11	19	38	73	38	19	11		7	11	25	59	25	11	7		7	12	29	68	29	12	7	
30	48	76	91	76	48	30		15	28	64	95	64	28	15		9	17	45	96	45	17	9		9	18	51	102	51	18	9	
35	50	76	93	76	50	35		21	41	84	100	84	41	21		12	28	76	107	76	28	12		13	30	81	111	81	30	13	
34	47	68	93	68	47	34		24	40	75	100	75	40	24		17	36	77	108	77	36	17		17	36	82	111	82	36	17	
32	43	60	86	60	43	32		24	37	64	99	64	37	24		21	37	72	108	72	37	21		19	37	73	111	73	37	19	
30	39	53	76	53	39	30		22	32	52	89	52	32	22		21	34	62	93	62	34	21		19	33	61	94	61	33	19	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
15°								35°								55°								75°							
15	23	41	63	41	23	15		7	10	20	39	20	10	7		5	7	11	23	11	7	5		5	7	12	27	12	7	5	
19	32	57	78	57	32	19		9	15	32	66	32	15	9		6	9	19	48	19	9	6		6	9	22	56	22	9	6	
25	44	76	94	76	44	25		12	23	55	96	55	23	12		7	13	36	88	36	13	7		8	14	39	91	39	14	8	
33	52	82	101	82	52	33		16	34	83	102	83	34	16		10	22	62	108	62	22	10		10	23	69	110	69	23	10	
33	49	73	101	73	49	33		21	38	78	102	78	38	21		14	31	75	110	75	31	14		13	30	78	113	78	30	13	
31	44	64	97	64	44	31		22	37	66	103	66	37	22		16	32	73	107	73	32	16		15	31	76	111	76	31	15	
29	40	57	87	57	40	29		22	33	54	89	54	33	22		17	30	62	91	62	30	17		15	28	65	94	65	28	15	
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							

rounded values

O-BS SIZE 1

O-BS 65-85 | support via fitting key, Level 2

0°							20°							40°							60°						
16	18	18	19	18	18	16	18	25	29	29	29	25	18	9	15	27	37	27	15	9	9	15	31	58	31	15	9
18	18	19	19	19	18	18	22	29	29	29	29	22	12	20	36	37	36	20	12	11	21	49	83	49	21	11	
18	18	18	19	18	18	18	25	29	29	29	29	25	16	26	37	37	37	26	16	16	33	79	103	79	33	16	
19	19	18	19	18	19	19	29	29	29	29	29	29	22	35	37	37	37	35	22	22	44	85	104	85	44	22	
19	19	18	19	18	19	19	29	29	29	29	29	29	26	37	37	37	37	37	26	25	43	77	105	77	43	25	
18	19	19	19	19	19	18	29	29	29	29	29	29	27	37	38	38	38	37	27	25	39	67	105	67	39	25	
18	19	19	19	19	19	18	28	30	30	29	30	30	26	35	38	38	38	35	26	23	34	56	90	56	34	23	
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						
5°							25°							45°							65°						
14	18	20	20	20	18	14	15	22	31	31	31	22	15	8	11	21	35	21	11	8	8	12	25	53	25	12	8
17	19	20	20	20	19	17	19	27	31	31	31	27	19	9	16	30	38	30	16	9	10	17	40	82	40	17	10
19	20	20	20	20	20	19	23	31	31	31	31	23	12	21	38	38	38	21	12	13	26	68	109	68	26	13	
20	20	20	20	20	20	20	27	31	31	31	31	27	17	28	39	39	39	28	17	17	36	86	108	86	36	17	
20	20	20	20	20	20	20	29	31	31	31	31	29	23	36	39	39	39	36	23	22	40	80	108	80	40	22	
20	20	20	20	20	20	20	29	31	31	31	31	29	25	37	39	39	39	37	25	23	38	71	109	71	38	23	
20	20	20	20	20	20	20	28	32	32	31	32	32	24	34	39	39	39	34	24	22	34	59	91	59	34	22	
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						
10°							30°							50°							70°						
17	22	22	22	22	22	17	9	13	22	28	22	13	9	6	8	14	26	14	8	6	6	8	17	37	17	8	6
20	22	22	22	22	22	20	11	17	28	28	28	17	11	7	11	23	39	23	11	7	7	12	29	68	29	12	7
22	22	22	22	22	22	22	15	23	29	28	29	23	15	9	17	39	39	39	17	9	9	18	51	102	51	18	9
22	22	23	22	23	22	22	19	28	29	28	29	28	19	12	22	39	39	39	22	12	13	30	81	109	81	30	13
22	23	22	22	22	23	22	22	29	29	28	29	29	22	17	30	39	39	39	30	17	17	36	82	111	82	36	17
22	23	23	22	23	23	22	23	29	29	29	29	23	21	32	39	39	39	32	21	19	37	73	111	73	37	19	
23	23	23	23	23	23	23	22	28	29	29	29	28	22	21	31	40	40	40	31	21	19	33	61	94	61	33	19
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						
15°							35°							55°							75°						
15	20	24	24	24	20	15	7	10	19	28	19	10	7	5	7	11	22	11	7	5	5	7	12	27	12	7	5
18	24	24	24	24	24	18	9	14	26	29	26	14	9	6	9	18	40	18	9	6	6	9	22	56	22	9	6
20	24	24	24	24	24	20	12	19	30	29	30	19	12	7	13	31	40	31	13	7	8	14	39	91	39	14	8
24	24	24	24	24	24	24	16	25	30	29	30	25	16	10	19	39	40	39	19	10	10	23	69	109	69	23	10
24	24	24	24	24	24	24	20	29	30	30	30	29	20	14	25	40	40	40	25	14	13	30	78	112	78	30	13
24	24	24	24	24	24	24	22	30	30	30	30	30	22	16	27	41	40	41	27	16	15	31	76	111	76	31	15
24	24	24	24	24	24	24	21	29	30	30	30	29	21	17	27	41	41	41	27	17	15	28	65	94	65	28	15
65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width							65 mm width 85 mm width						

rounded values

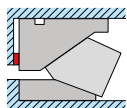
O-BS SIZE 2

FORCE DISTRIBUTION

Cam unit specifications O-BS 90-100

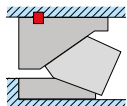
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-BS 90	O-BS 110	size	size		O-BS 90	O-BS 110			
27540	27560	O-BS 90-0°	O-BS 110-0°	0°	35	36	28,93	275	277
27541	27561	O-BS 90-5°	O-BS 110-5°	5°	35	36	29,04	275	277
27542	27562	O-BS 90-10°	O-BS 110-10°	10°	35	36	35,00	275	302
27543	27563	O-BS 90-15°	O-BS 110-15°	15°	35	36	35,69	275	302
27544	27564	O-BS 90-20°	O-BS 110-20°	20°	34	35	36,86	275	302
27545	27565	O-BS 90-25°	O-BS 110-25°	25°	34	35	38,22	275	302
27546	27566	O-BS 90-30°	O-BS 110-30°	30°	34	36	35,38	275	302
27547	27567	O-BS 90-35°	O-BS 110-35°	35°	35	36	37,41	275	302
27548	27568	O-BS 90-40°	O-BS 110-40°	40°	34	35	39,57	275	302
27549	27569	O-BS 90-45°	O-BS 110-45°	45°	34	35	42,89	275	302
27550	27570	O-BS 90-50°	O-BS 110-50°	50°	34	35	47,16	275	302
27551	27571	O-BS 90-55°	O-BS 110-55°	55°	34	36	52,85	275	303
27552	27572	O-BS 90-60°	O-BS 110-60°	60°	33	34	49,24	275	300
27553	27573	O-BS 90-65°	O-BS 110-65°	65°	34	34	46,61	275	300
27554	27574	O-BS 90-70°	O-BS 110-70°	70°	34	35	57,59	275	300
27555	27575	O-BS 90-75°	O-BS 110-75°	75°	34	35	76,10	275	300

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

O-BS SIZE 2

PERMISSIBLE CAM FORCES

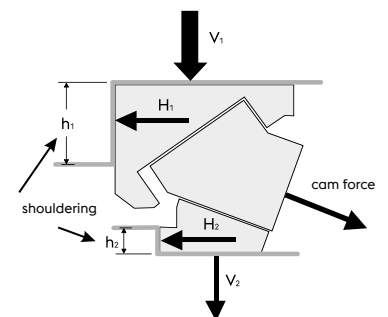
Cam unit force distribution size 2 O-BS, Level 1, 500,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	185	155	185	155	0	190	30	6,8
5°	223	175	209	155	14	190	30	7,6
10°	231	231	194	191	34	148	30	6,7
15°	242	227	190	164	44	148	30	7,5
20°	244	275	159	192	70	109	65	6,4
25°	260	275	159	165	77	109	65	7,2
30°	271	221	185	86	50	143	65	12,2
35°	279	221	186	62	43	143	65	16,1
40°	278	256	148	77	65	102	105	11,7
45°	280	251	145	53	53	102	105	15,4
50°	289	254	146	33	39	102	105	24,4
55°	293	254	147	15	21	102	105	25,3
60°	275	288	51	50	86	52	135	11,1
65°	282	287	51	32	68	52	135	14,0
70°	288	288	51	17	48	52	135	22,1
75°	291	288	51	7	25	52	135	25,2

Cam unit force distribution size 2 O-BS, Level 2, 750,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	124	104	124	104	0	190	30	6,8
5°	149	117	139	104	9	190	30	7,6
10°	154	154	129	128	23	148	30	6,7
15°	162	151	127	109	30	148	30	7,5
20°	163	184	106	128	47	109	65	6,4
25°	174	184	106	110	52	109	65	7,2
30°	181	147	124	57	33	143	65	12,2
35°	186	148	124	41	29	143	65	16,1
40°	185	171	99	52	44	102	105	11,7
45°	187	167	97	36	36	102	105	15,4
50°	193	170	98	22	26	102	105	24,4
55°	195	170	98	10	14	102	105	25,3
60°	183	192	34	34	58	52	135	11,1
65°	188	192	34	22	46	52	135	14,0
70°	192	192	34	12	32	52	135	22,1
75°	194	192	34	5	17	52	135	25,2

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-BS SIZE 2

O-BS 90-110 | support via cast shoulder, Level 1

0°							20°							40°							60°						
20	39	83	113	83	39	20	26	44	94	157	94	44	26	10	13	26	72	26	13	10	10	12	27	81	27	12	10
26	51	105	131	105	51	26	38	69	131	188	131	69	38	11	16	45	124	45	16	11	12	17	45	142	45	17	12
38	94	134	148	134	94	38	41	97	172	217	172	97	41	14	23	91	203	91	23	14	15	25	89	219	89	25	15
57	91	139	174	139	91	57	42	110	210	238	210	110	42	20	42	166	261	166	42	20	21	44	183	265	183	44	21
62	87	124	185	124	87	62	44	111	190	243	190	111	44	25	53	182	277	182	53	25	28	62	192	274	192	62	28
61	82	112	168	112	82	61	61	106	162	240	162	106	61	32	64	171	274	171	64	32	33	71	181	274	181	71	33
58	74	101	149	101	74	58	68	96	140	220	140	96	68	33	65	148	264	148	65	33	41	73	161	274	161	73	41
90 mm width							90 mm width							90 mm width							90 mm width						
110 mm width							110 mm width							110 mm width							110 mm width						
5°							25°							45°							65°						
20	30	65	109	65	30	20	21	31	73	139	73	31	21	9	11	20	46	20	11	9	9	10	19	21	19	10	9
25	37	95	138	95	37	25	25	42	114	179	114	42	25	10	14	32	98	32	14	10	10	13	27	34	27	13	10
38	69	129	152	129	69	38	27	30	160	217	160	30	27	13	18	34	184	34	18	13	13	18	26	202	26	18	13
48	95	151	210	151	95	48	48	100	205	252	205	100	48	16	27	127	255	127	27	16	16	25	32	263	32	25	16
53	88	135	223	135	88	53	55	108	189	260	189	108	55	19	34	178	276	178	34	19	21	42	158	279	158	42	21
54	78	120	194	120	78	54	55	98	168	260	168	98	55	22	39	176	280	176	39	22	25	54	200	282	200	54	25
52	73	108	161	108	73	52	53	92	146	243	146	92	53	28	50	153	276	153	50	28	30	59	177	282	177	59	30
90 mm width							90 mm width							90 mm width							90 mm width						
110 mm width							110 mm width							110 mm width							110 mm width						
10°							30°							50°							70°						
18	35	88	130	88	35	18	9	12	23	54	23	12	9	6	7	10	26	10	7	6	6	8	12	28	12	8	6
27	63	115	161	115	63	27	11	15	38	111	38	15	11	7	9	16	66	16	9	7	7	10	20	73	20	10	7
38	86	154	180	154	86	38	14	20	33	169	33	20	14	8	11	27	144	27	11	8	9	12	20	166	20	12	9
54	111	165	209	165	111	54	20	40	141	223	141	40	20	11	19	96	225	96	19	11	10	15	89	247	89	15	10
69	106	161	230	161	106	69	24	51	160	258	160	51	24	16	32	147	278	147	32	16	14	29	166	280	166	29	14
55	93	143	215	143	93	55	27	58	148	271	148	58	27	21	44	174	289	174	44	21	18	37	185	288	185	37	18
50	83	123	183	123	83	50	33	61	130	246	130	61	33	25	48	173	284	173	48	25	21	41	177	288	177	41	21
90 mm width							90 mm width							90 mm width							90 mm width						
110 mm width							110 mm width							110 mm width							110 mm width						
15°							35°							55°							75°						
19	30	58	121	58	30	19	8	11	18	22	18	11	8	5	6	8	10	8	6	5	6	6	8	17	8	6	6
23	41	101	156	101	41	23	9	12	28	41	28	12	9	7	8	12	26	12	8	7	7	8	14	44	14	8	7
30	51	153	191	153	51	30	13	17	34	152	34	17	13	8	12	30	122	30	12	8	8	11	36	137	36	11	8
36	52	187	216	187	52	36	14	18	121	219	121	18	14	10	16	60	213	60	16	10	10	14	42	234	42	14	10
50	85	173	240	173	85	50	14	19	160	266	160	19	14	13	22	118	271	118	22	13	13	25	123	280	123	25	13
60	94	151	239	151	94	60	21	38	158	280	158	38	21	16	31	145	289	145	31	16	18	31	159	291	159	31	18
61	83	132	211	132	83	61	28	54	139	262	139	54	28	16	35	155	292	155	35	16	20	31	123	288	123	31	20
90 mm width							90 mm width							90 mm width							90 mm width						
110 mm width							110 mm width							110 mm width							110 mm width						

rounded values

O-BS SIZE 2

O-BS 90-110 | support via fitting key, Level 1

0°								20°								40°								60°							
20	37	43	40	43	37	20		26	43	73	74	73	43	26		10	13	26	64	26	13	10		10	12	27	81	27	12	10	
25	45	47	47	47	45	25		37	65	74	70	74	65	37		11	16	45	93	45	16	11		12	17	45	142	45	17	12	
25	46	47	48	47	46	25		36	73	74	75	74	73	36		14	23	89	93	89	23	14		15	25	89	219	89	25	15	
42	45	45	47	45	45	42		33	73	74	75	74	73	33		20	40	90	93	90	40	20		21	44	183	260	183	44	21	
45	43	45	42	45	43	45		35	74	73	75	73	74	35		25	50	88	93	88	50	25		28	62	192	268	192	62	28	
46	44	46	43	46	44	46		53	74	74	75	74	74	53		32	61	87	93	87	61	32		33	71	181	268	181	71	33	
46	47	42	45	42	47	46		62	73	74	75	74	73	62		33	63	87	91	87	63	33		41	73	161	269	161	73	41	
90 mm width								90 mm width								90 mm width								90 mm width							
110 mm width								110 mm width								110 mm width								110 mm width							

O-BS SIZE 2

O-BS 90-110 | support via cast shoulder, Level 2

0°							20°							40°							60°							125 mm height
14	26	55	76	55	26	14	17	29	63	105	63	29	17	6	8	17	48	17	8	6	6	8	18	54	18	8	6	
17	34	70	87	70	34	17	25	46	87	125	87	46	25	8	11	30	82	30	11	8	8	11	30	95	30	11	8	
25	63	89	98	89	63	25	27	64	115	145	115	64	27	10	15	61	135	61	15	10	10	16	59	146	59	16	10	
38	61	92	116	92	61	38	28	73	140	159	140	73	28	14	28	111	174	111	28	14	14	29	122	177	122	29	14	
41	58	83	123	83	58	41	30	74	127	162	127	74	30	17	36	122	185	122	36	17	19	41	128	183	128	41	19	
41	54	75	112	75	54	41	41	71	108	160	108	71	41	21	42	114	183	114	42	21	22	47	121	183	121	47	22	
38	50	67	100	67	50	38	45	64	93	147	93	64	45	22	43	99	176	99	43	22	27	49	107	183	107	49	27	
90 mm width							90 mm width							90 mm width							90 mm width							
110 mm width							110 mm width							110 mm width							110 mm width							

5°							25°							45°							65°							125 mm height
13	20	44	73	44	20	13	14	21	48	92	48	21	14	6	7	13	31	13	7	6	6	7	12	14	12	7	6	
17	24	64	92	64	24	17	17	28	76	119	76	28	17	7	9	21	65	21	9	7	7	9	18	22	18	9	7	
25	46	86	102	86	46	25	18	20	106	145	106	20	18	9	12	22	123	22	12	9	9	12	17	134	17	12	9	
32	64	100	140	100	64	32	32	66	136	168	136	66	32	11	18	85	170	85	18	11	11	16	21	175	21	16	11	
35	59	90	148	90	59	35	36	72	126	173	126	72	36	13	22	118	184	118	22	13	14	28	106	186	106	28	14	
36	52	80	130	80	52	36	36	66	112	174	112	66	36	14	26	117	186	117	26	14	17	36	134	188	134	36	17	
35	49	72	108	72	49	35	36	62	98	162	98	62	36	18	33	102	184	102	33	18	20	39	118	188	118	39	20	
90 mm width							90 mm width							90 mm width							90 mm width							
110 mm width							110 mm width							110 mm width							110 mm width							

10°							30°							50°							70°							125 mm height
12	24	59	87	59	24	12	6	8	16	36	16	8	6	4	5	7	17	7	5	4	4	5	8	19	8	5	4	
18	42	77	107	77	42	18	7	10	25	74	25	10	7	5	6	10	44	10	6	5	5	6	13	49	13	6	5	
25	57	103	120	103	57	25	9	13	22	112	22	13	9	5	7	18	96	18	7	5	6	8	14	111	14	8	6	
36	74	110	139	110	74	36	13	26	94	149	94	26	13	7	13	64	150	64	13	7	7	10	60	164	60	10	7	
46	71	107	153	107	71	46	16	34	107	172	107	34	16	11	21	98	185	98	21	11	9	19	111	187	111	19	9	
36	62	95	143	95	62	36	18	39	99	180	99	39	18	14	29	116	193	116	29	14	12	24	123	192	123	24	12	
33	55	82	122	82	55	33	22	41	86	164	86	41	22	17	32	115	189	115	32	17	14	28	118	192	118	28	14	
90 mm width							90 mm width							90 mm width							90 mm width							
110 mm width							110 mm width							110 mm width							110 mm width							

15°							35°							55°							75°							125 mm height
12	20	39	80	39	20	12	6	7	12	15	12	7	6	4	4	5	7	5	4	4	4	4	6	11	6	4	4	
15	27	67	104	67	27	15	6	8	19	27	19	8	6	4	5	8	18	8	5	4	5	5	10	29	10	5	5	
20	34	102	128	102	34	20	9	11	23	102	23	11	9	6	8	20	81	20	8	6	5	7	24	91	24	7	5	
24	35	125	144	125	35	24	9	12	81	146	81	12	9	7	11	40	142	40	11	7	7	10	28	156	28	10	7	
33	57	115	160	115	57	33	10	12	106	178	106	12	10	9	15	79	181	79	15	9	9	17	82	186	82	17	9	
40	62	101	160	101	62	40	14	26	105	186	105	26	14	10	21	97	193	97	21	10	12	20	106	194	106	20	12	
40	55	88	140	88	55	40	19	36	93	175	93	36	19	11	23	103	195	103	23	11	14	20	82	192	82	20	14	
90 mm width							90 mm width							90 mm width							90 mm width							
110 mm width							110 mm width							110 mm width							110 mm width							

rounded values

O-BS SIZE 2

O-BS 90-110 | support via fitting key, Level 2

0°							20°							40°							60°						
14	25	29	27	29	25	14	17	29	49	49	49	29	17	6	8	17	43	17	8	6	6	8	18	54	18	8	6
16	30	31	31	31	30	16	25	44	50	47	50	44	25	8	11	30	62	30	11	8	8	11	30	95	30	11	8
17	30	31	32	31	30	17	24	49	49	50	49	49	24	10	15	59	62	59	15	10	10	16	59	146	59	16	10
28	30	30	31	30	30	28	22	49	49	50	49	49	22	14	26	60	62	60	26	14	14	29	122	173	122	29	14
30	29	30	28	30	29	30	23	49	49	50	49	49	23	17	33	58	62	58	33	17	19	41	128	179	128	41	19
31	30	31	29	31	30	31	35	49	49	50	49	49	35	21	40	58	62	58	40	21	22	47	120	179	120	47	22
31	31	28	30	28	31	31	41	48	50	50	50	48	41	22	42	58	61	58	42	22	27	49	107	179	107	49	27
90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width						
5°							25°							45°							65°						
13	20	34	33	34	20	13	14	21	42	53	42	21	14	6	7	13	31	13	7	6	6	7	12	14	12	7	6
17	22	34	30	34	22	17	17	27	53	54	53	27	17	7	9	21	60	21	9	7	7	9	18	22	18	9	7
22	33	33	36	33	33	22	18	18	51	52	51	18	18	9	12	21	63	21	12	9	9	12	17	134	17	12	9
23	31	31	33	31	31	23	27	45	51	52	51	45	27	11	17	56	62	56	17	11	11	16	21	175	21	16	11
28	32	32	32	32	32	28	32	52	52	52	52	52	32	13	20	62	64	62	20	13	14	28	105	184	105	28	14
30	32	33	32	33	32	30	33	50	54	53	54	50	33	14	24	63	64	63	24	14	17	36	134	184	134	36	17
30	31	33	33	33	31	30	33	51	54	53	54	51	33	18	32	63	60	63	32	18	20	39	118	184	118	39	20
90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width						
10°							30°							50°							70°						
12	22	38	39	38	22	12	6	8	15	28	15	8	6	4	5	7	17	7	5	4	4	5	8	19	8	5	4
17	37	38	39	38	37	17	7	10	24	46	24	10	7	5	6	10	41	10	6	5	5	6	13	49	13	6	5
20	34	34	38	34	34	20	9	13	21	48	21	13	9	5	7	18	64	18	7	5	6	8	14	111	14	8	6
26	35	37	35	37	35	26	13	25	42	47	42	25	13	7	13	57	65	57	13	7	7	10	60	164	60	10	7
34	37	38	37	38	37	34	16	32	47	47	47	32	16	11	20	65	64	65	20	11	9	19	110	183	110	19	9
28	38	38	34	38	38	28	18	37	48	48	48	37	18	14	27	64	61	64	27	14	12	24	123	186	123	24	12
29	38	35	34	35	38	29	22	39	47	48	47	39	22	17	30	64	57	64	30	17	14	28	118	186	118	28	14
90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width						
15°							35°							55°							75°						
12	20	31	40	31	20	12	6	7	12	15	12	7	6	4	4	5	7	5	4	4	4	4	6	11	6	4	4
15	26	40	42	40	26	15	6	8	19	22	19	8	6	4	5	8	16	8	5	4	5	5	10	29	10	5	5
20	32	40	40	40	32	20	9	11	22	48	22	11	9	6	8	20	63	20	8	6	5	7	24	91	24	7	5
24	31	32	40	32	31	24	9	10	44	49	44	10	9	7	11	39	66	39	11	7	7	10	28	156	28	10	7
29	37	37	41	37	37	29	10	10	49	47	49	10	10	9	14	58	66	58	14	9	9	17	82	182	82	17	9
34	40	40	41	40	40	34	14	24	49	47	49	24	14	10	20	66	66	66	20	10	12	20	106	189	106	20	12
37	40	41	40	41	40	37	19	34	49	48	49	34	19	11	22	65	63	65	22	11	14	20	82	189	82	20	14
90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width							90 mm width 110 mm width						

rounded values

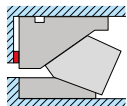
O-BS SIZE 3

FORCE DISTRIBUTION

Cam unit specifications O-BS 125-160

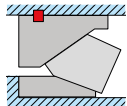
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-BS 125	O-BS 160	size	size		O-BS 125	O-BS 160			
27600	27620	O-BS 125-0°	O-BS 160-0°	0°	58	60	35,35	300	300
27601	27621	O-BS 125-5°	O-BS 160-5°	5°	57	60	35,49	300	298
27602	27622	O-BS 125-10°	O-BS 160-10°	10°	57	59	42,78	300	288
27603	27623	O-BS 125-15°	O-BS 160-15°	15°	57	59	43,62	300	290
27604	27624	O-BS 125-20°	O-BS 160-20°	20°	57	59	46,08	300	301
27605	27625	O-BS 125-25°	O-BS 160-25°	25°	57	59	47,78	300	298
27606	27626	O-BS 125-30°	O-BS 160-30°	30°	54	56	44,23	300	323
27607	27627	O-BS 125-35°	O-BS 160-35°	35°	54	57	46,76	300	322
27608	27628	O-BS 125-40°	O-BS 160-40°	40°	54	56	50,87	300	323
27609	27629	O-BS 125-45°	O-BS 160-45°	45°	54	57	55,11	300	323
27610	27630	O-BS 125-50°	O-BS 160-50°	50°	55	57	48,50	300	323
27611	27631	O-BS 125-55°	O-BS 160-55°	55°	55	58	54,36	300	323
27612	27632	O-BS 125-60°	O-BS 160-60°	60°	55	57	49,24	300	333
27613	27633	O-BS 125-65°	O-BS 160-65°	65°	55	57	46,61	300	328
27614	27634	O-BS 125-70°	O-BS 160-70°	70°	55	57	57,59	300	323
27615	27635	O-BS 125-75°	O-BS 160-75°	75°	55	57	76,10	300	323

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

O-BS SIZE 3

PERMISSIBLE CAM FORCES

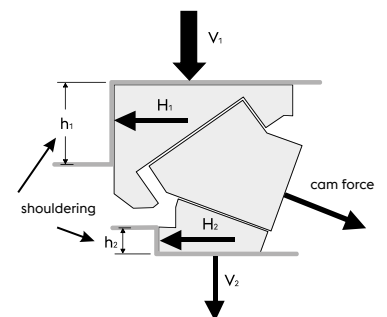
Cam unit force distribution size 3 O-BS, Level 1, 500,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	227	190	227	190	0	190	40	9,2
5°	229	179	214	160	14	190	40	10,3
10°	282	282	237	233	41	150	40	9,2
15°	296	277	233	200	54	150	40	10,3
20°	294	332	192	232	85	115	85	8,8
25°	317	335	194	201	94	115	85	9,9
30°	304	248	208	96	56	130	85	17,6
35°	315	250	210	69	49	130	85	23,2
40°	317	292	169	89	74	105	135	16,8
45°	330	296	171	62	62	105	135	22,2
50°	323	284	164	37	44	105	135	28,9
55°	334	290	167	17	24	105	135	28,6
60°	321	337	59	59	101	53	160	14,8
65°	331	338	59	38	80	53	160	18,6
70°	345	345	61	21	57	53	160	27,7
75°	334	330	59	8	29	53	160	28,5

Cam unit force distribution size 3 O-BS, Level 2, 750,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	151	127	151	127	0	190	40	9,2
5°	153	120	143	107	10	190	40	10,3
10°	188	188	158	156	28	150	40	9,2
15°	198	185	155	134	36	150	40	10,3
20°	196	222	128	155	57	115	85	8,8
25°	211	223	129	134	63	115	85	9,9
30°	203	165	139	64	37	130	85	17,6
35°	210	167	140	46	33	130	85	23,2
40°	211	195	113	59	50	105	135	16,8
45°	220	197	114	42	42	105	135	22,2
50°	215	189	109	25	29	105	135	28,9
55°	223	194	112	11	16	105	135	28,6
60°	214	225	40	39	68	53	160	14,8
65°	221	225	40	25	54	53	160	18,6
70°	230	230	41	14	38	53	160	27,7
75°	223	220	39	5	19	53	160	28,5

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-BS SIZE 3

O-BS 125-160 | support via cast shoulder, Level 1

0°								20°								40°								60°								150 mm height
53	79	132	162	132	79	53		43	60	112	225	112	60	43		9	13	28	76	28	13	9		10	15	31	84	31	15	10		
64	98	160	179	160	98	64		53	82	153	259	153	82	53		11	18	47	143	47	18	11		13	20	52	163	52	20	13		
77	120	188	198	188	120	77		68	110	199	285	199	110	68		15	29	79	240	79	29	15		17	30	81	269	81	30	17		
83	114	169	220	169	114	83		83	126	202	291	202	126	83		23	54	166	304	166	54	23		25	55	159	315	159	55	25		
79	104	146	227	146	104	79		89	130	206	294	206	130	89		31	64	176	316	176	64	31		35	75	205	321	205	75	35		
74	94	127	197	127	94	74		88	121	182	288	182	121	88		40	74	159	308	159	74	40		44	86	193	321	193	86	44		
70	85	112	166	112	85	70		81	109	155	251	155	109	81		46	76	135	260	135	76	46		50	86	166	310	166	86	50		
125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				

5°								25°								45°								65°								150 mm height
34	46	83	133	83	46	34		36	56	105	221	105	56	36		8	11	20	52	20	11	8		8	10	20	53	20	10	8		
41	60	112	158	112	60	41		45	70	128	269	128	70	45		9	15	40	122	40	15	9		9	15	39	130	39	15	9		
48	80	158	174	158	80	48		53	99	183	300	183	99	53		12	25	85	231	85	25	12		12	24	80	250	80	24	12		
61	109	180	198	180	109	61		68	124	256	317	256	124	68		19	47	160	308	160	47	19		18	45	147	325	147	45	18		
70	102	156	229	156	102	70		80	127	228	315	228	127	80		28	62	172	326	172	62	28		28	65	199	330	199	65	28		
70	93	133	211	133	93	70		82	118	193	312	193	118	82		36	71	165	330	165	71	36		37	76	192	330	192	76	37		
65	85	115	180	115	85	65		78	109	163	274	163	109	78		40	70	142	290	142	70	40		42	77	167	323	167	77	42		
125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				

10°								30°								50°								70°								150 mm height
43	66	116	185	116	66	43		9	13	27	66	27	13	9		11	33	79	98	79	33	11		5	17	80	98	80	17	5		
51	83	156	212	156	83	51		12	19	46	127	46	19	12		15	35	84	124	84	35	15		6	19	87	141	87	19	6		
64	107	216	237	216	107	64		15	29	79	214	79	29	15		15	37	89	190	89	37	15		8	23	97	199	97	23	8		
80	130	212	256	212	130	80		24	56	176	269	176	56	24		17	39	98	302	98	39	17		11	31	111	325	111	31	11		
85	120	182	282	182	120	85		34	70	170	304	170	70	34		18	47	145	320	145	47	18		15	44	166	343	166	44	15		
82	109	155	251	155	109	82		41	76	150	281	150	76	41		18	50	150	323	150	50	18		20	51	170	345	170	51	20		
74	99	134	210	134	99	74		45	73	126	235	126	73	45		23	51	132	293	132	51	23		24	55	153	330	153	55	24		
125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				

15°								35°								55°								75°								150 mm height
37	50	103	183	103	50	37		7	9	17	41	17	9	7		10	17	43	80	43	17	10		7	16	73	111	73	16	7		
44	72	148	223	148	72	44		8	13	34	103	34	13	8		11	21	51	103	51	21	11		8	18	83	138	83	18	8		
51	95	208	249	208	95	51		11	22	76	206	76	22	11		15	29	66	155	66	29	15		11	24	102	161	102	24	11		
71	123	228	274	228	123	71		17	41	135	277	135	41	17		21	45	85	298	85	45	21		15	34	126	310	126	34	15		
79	121	195	296	195	121	79		26	59	161	315	161	59	26		30	65	126	331	126	65	30		23	46	141	332	141	46	23		
78	109	165	274	165	109	78		35	66	146	300	146	66	35		36	78	133	334	133	78	36		31	53	146	334	146	53	31		
75	100	142	231	142	100	75		39	66	123	254	123	66	39		38	80	123	297	123	80	38		35	54	136	298	136	54	35		
125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				125 mm width				160 mm width				

rounded values

O-BS SIZE 3

O-BS 125-160 | support via fitting key, Level 1

0°							20°							40°							60°						
56	69	83	84	83	69	56	47	66	110	151	110	66	47	16	22	39	95	39	22	16	17	23	40	97	40	23	17
66	85	84	84	84	85	66	56	89	136	152	136	89	56	19	29	55	152	55	29	19	20	29	58	170	58	29	20
72	84	84	84	84	84	72	67	95	151	152	151	95	67	25	41	91	202	91	41	25	26	44	107	266	107	44	26
77	84	84	84	84	84	77	81	122	152	152	152	122	81	31	58	164	202	164	58	31	32	57	163	311	163	57	32
75	83	84	84	84	83	75	87	125	152	149	152	125	87	38	70	170	202	170	70	38	41	78	207	314	207	78	41
74	84	84	85	84	84	74	86	118	152	151	152	118	86	45	80	155	202	155	80	45	50	91	194	314	194	91	50
70	82	84	84	84	82	70	80	108	143	152	143	108	80	50	80	135	202	135	80	50	56	91	167	305	167	91	56
125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width						
5°							25°							45°							65°						
37	53	82	94	82	53	37	44	59	99	166	99	59	44	14	20	34	74	34	20	14	14	20	35	78	35	20	14
42	65	93	94	93	65	42	49	70	126	166	126	70	49	17	25	50	134	50	25	17	17	26	53	145	53	26	17
51	85	92	94	92	85	51	64	101	166	166	166	101	64	23	37	84	211	84	37	23	22	35	80	248	80	35	22
65	92	91	94	91	92	65	77	116	166	166	166	116	77	29	57	161	211	161	57	29	29	56	140	318	140	56	29
71	92	89	93	89	92	71	86	125	166	166	166	125	86	37	69	175	210	175	69	37	38	77	200	323	200	77	38
71	89	92	94	92	89	71	86	120	166	166	166	120	86	44	76	158	211	158	76	44	45	85	194	324	194	85	45
66	83	93	92	93	83	66	78	108	154	166	154	108	78	47	75	139	211	139	75	47	50	83	165	319	165	83	50
125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width						
10°							30°							50°							70°						
50	72	103	108	103	72	50	16	22	38	85	38	22	16	14	33	80	98	80	33	14	9	12	20	36	20	12	9
64	90	110	107	110	90	64	20	29	53	133	53	29	20	16	35	84	124	84	35	16	11	16	32	86	32	16	11
68	106	109	109	109	106	68	25	41	92	148	92	41	25	17	37	89	190	89	37	17	14	23	64	203	64	23	14
80	109	109	109	109	109	80	30	53	144	148	144	53	30	20	38	98	302	98	38	20	19	36	110	324	110	36	19
82	109	107	107	107	109	82	42	75	149	146	149	75	42	24	47	146	320	146	47	24	25	53	173	337	173	53	25
80	103	108	108	108	103	80	46	80	140	145	140	80	46	28	50	150	323	150	50	28	31	63	178	337	178	63	31
75	96	109	107	109	96	75	49	77	125	146	125	77	49	31	51	131	293	131	51	31	35	65	159	323	159	65	35
125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width						
15°							35°							55°							75°						
44	64	101	120	101	64	44	14	18	32	65	32	18	14	8	10	14	23	14	10	8	8	10	14	23	14	10	8
49	75	120	120	120	75	49	16	23	46	111	46	23	16	9	13	26	62	26	13	9	9	13	25	62	25	13	9
62	93	121	121	121	93	62	21	34	71	157	71	34	21	11	19	50	170	50	19	11	11	18	50	176	50	18	11
79	114	121	121	121	114	79	28	53	139	157	139	53	28	15	30	88	203	88	30	15	14	29	93	308	93	29	14
82	111	117	119	117	111	82	37	68	153	154	153	68	37	22	45	131	209	131	45	22	21	45	145	324	145	45	21
80	106	119	119	119	106	80	43	73	138	152	138	73	43	27	52	134	209	134	52	27	27	55	156	326	156	55	27
74	98	120	118	120	98	74	46	71	119	153	119	71	46	30	53	122	210	122	53	30	31	56	143	300	143	56	31
125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width							125 mm width 160 mm width						

rounded values

O-BS SIZE 3

O-BS 125-160 | support via cast shoulder, Level 2

0°								20°								40°								60°							
35	52	88	108	88	52	35		28	40	75	150	75	40	28		6	9	19	51	19	9	6		7	10	21	56	21	10	7	
43	65	107	119	107	65	43		35	55	102	173	102	55	35		8	12	31	96	31	12	8		8	14	34	109	34	14	8	
52	80	126	132	126	80	52		45	73	132	190	132	73	45		10	19	53	160	53	19	10		11	20	54	179	54	20	11	
55	76	113	147	113	76	55		55	84	135	194	135	84	55		15	36	111	202	111	36	15		17	36	106	210	106	36	17	
53	69	97	151	97	69	53		59	86	137	196	137	86	59		21	42	117	211	117	42	21		23	50	136	214	136	50	23	
49	63	84	132	84	63	49		58	80	121	192	121	80	58		27	50	106	205	106	50	27		29	57	129	214	129	57	29	
47	57	74	111	74	57	47		54	73	103	167	103	73	54		31	50	90	173	90	50	31		33	57	110	206	110	57	33	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
5°								25°								45°								65°							
23	31	56	89	56	31	23		24	38	70	148	70	38	24		5	7	14	35	14	7	5		5	7	13	35	13	7	5	
27	40	74	106	74	40	27		30	46	85	179	85	46	30		6	10	26	81	26	10	6		6	10	26	87	26	10	6	
32	53	105	116	105	53	32		35	66	122	200	122	66	35		8	16	57	154	57	16	8		8	16	53	167	53	16	8	
41	73	120	132	120	73	41		45	83	171	211	171	83	45		13	31	107	206	107	31	13		12	30	98	217	98	30	12	
47	68	104	152	104	68	47		54	85	152	210	152	85	54		19	42	115	217	115	42	19		18	43	133	220	133	43	18	
47	62	89	141	89	62	47		55	79	128	208	128	79	55		24	47	110	220	110	47	24		25	51	128	220	128	51	25	
43	57	77	120	77	57	43		52	73	109	183	109	73	52		27	47	95	193	95	47	27		28	51	111	215	111	51	28	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
10°								30°								50°								70°							
29	44	77	123	77	44	29		6	9	18	44	18	9	6		7	22	53	65	53	22	7		3	11	53	65	53	11	3	
34	55	104	141	104	55	34		8	12	31	85	31	12	8		10	24	56	83	56	24	10		4	13	58	94	58	13	4	
43	71	144	158	144	71	43		10	19	53	142	53	19	10		10	24	60	126	60	24	10		5	16	65	133	65	16	5	
53	87	141	171	141	87	53		16	37	117	179	117	37	16		11	26	65	201	65	26	11		7	21	74	217	74	21	7	
57	80	122	188	122	80	57		23	47	113	202	113	47	23		12	31	97	214	97	31	12		10	29	110	229	110	29	10	
55	72	103	167	103	72	55		28	50	100	187	100	50	28		12	33	100	215	100	33	12		13	34	113	230	113	34	13	
49	66	89	140	89	66	49		30	49	84	157	84	49	30		15	34	88	196	88	34	15		16	36	102	220	102	36	16	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
15°								35°								55°								75°							
24	33	68	122	68	33	24		5	6	11	27	11	6	5		6	11	29	53	29	11	6		5	11	49	74	49	11	5	
29	48	98	148	98	48	29		6	9	23	69	23	9	6		8	14	34	68	34	14	8		6	12	55	92	55	12	6	
34	63	139	166	139	63	34		7	15	51	137	51	15	7		10	19	44	103	44	19	10		7	16	68	108	68	16	7	
47	82	152	183	152	82	47		11	27	90	185	90	27	11		14	30	57	199	57	30	14		10	23	84	207	84	23	10	
53	80	130	197	130	80	53		17	39	108	210	108	39	17		20	43	84	221	84	43	20		16	31	94	221	94	31	16	
52	72	110	183	110	72	52		23	44	97	200	97	44	23		24	52	89	223	89	52	24		20	35	97	223	97	35	20	
50	67	95	154	95	67	50		26	44	82	170	82	44	26		25	53	82	198	82	53	25		23	36	90	198	90	36	23	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							

rounded values

O-BS SIZE 3

O-BS 125-160 | support via fitting key, Level 2

0°							20°							40°							60°						
37	46	56	56	56	46	37	32	44	74	101	74	44	32	11	15	26	63	26	15	11	11	16	27	65	27	16	11
44	57	56	56	56	57	44	37	59	91	101	91	59	37	13	19	37	102	37	19	13	13	20	39	114	39	20	13
48	56	56	56	56	56	48	45	64	101	101	101	64	45	17	28	61	135	61	28	17	17	29	72	178	72	29	17
51	56	56	56	56	56	51	54	82	101	101	101	82	54	21	39	109	135	109	39	21	21	38	109	208	109	38	21
50	56	56	56	56	56	50	58	83	101	99	101	83	58	26	47	114	135	114	47	26	28	52	138	209	138	52	28
49	56	56	57	56	56	49	57	79	101	101	101	79	57	30	53	104	135	104	53	30	34	61	130	210	130	61	34
47	55	56	56	56	55	47	53	72	96	101	96	72	53	33	53	90	135	90	53	33	37	61	112	203	112	61	37
125 mm width							125 mm width							125 mm width							125 mm width						
160 mm width							160 mm width							160 mm width							160 mm width						
5°							25°							45°							65°						
25	36	55	63	55	36	25	29	40	66	111	66	40	29	10	13	23	50	23	13	10	10	13	24	52	24	13	10
28	43	62	63	62	43	28	33	47	84	111	84	47	33	12	17	33	89	33	17	12	11	17	35	97	35	17	11
34	57	62	63	62	57	34	43	68	111	111	111	68	43	15	25	56	141	56	25	15	15	24	53	165	53	24	15
43	61	61	63	61	61	43	51	78	111	111	111	78	51	20	38	107	141	107	38	20	20	37	94	212	94	37	20
47	61	59	62	59	61	47	58	83	111	111	111	83	58	25	46	117	140	117	46	25	26	51	133	215	133	51	26
47	59	61	63	61	59	47	58	80	111	111	111	80	58	30	51	105	141	105	51	30	30	57	129	216	129	57	30
44	55	62	62	62	55	44	52	72	103	111	103	72	52	32	50	93	141	93	50	32	33	55	110	213	110	55	33
125 mm width							125 mm width							125 mm width							125 mm width						
160 mm width							160 mm width							160 mm width							160 mm width						
10°							30°							50°							70°						
33	48	69	72	69	48	33	11	15	25	57	25	15	11	10	22	53	66	53	22	10	6	8	13	24	13	8	6
43	60	73	72	73	60	43	13	19	36	89	36	19	13	11	24	56	83	56	24	11	7	11	22	58	22	11	7
45	71	73	73	73	71	45	17	27	61	99	61	27	17	12	25	60	127	60	25	12	9	15	43	135	43	15	9
53	73	73	73	73	73	53	20	36	96	99	96	36	20	13	26	65	202	65	26	13	13	24	74	216	74	24	13
55	73	72	72	72	73	55	28	50	99	98	99	50	28	16	32	97	214	97	32	16	17	36	116	225	116	36	17
54	69	72	72	72	69	54	31	54	93	97	93	54	31	19	33	100	215	100	33	19	21	42	119	225	119	42	21
50	64	73	72	73	64	50	33	52	83	97	83	52	33	21	34	88	196	88	34	21	23	44	106	215	106	44	23
125 mm width							125 mm width							125 mm width							125 mm width						
160 mm width							160 mm width							160 mm width							160 mm width						
15°							35°							55°							75°						
29	43	67	80	67	43	29	9	12	21	44	21	12	9	5	7	10	16	10	7	5	5	7	10	16	10	7	5
33	50	80	80	80	50	33	11	16	31	74	31	16	11	6	9	17	41	17	9	6	6	9	17	41	17	9	6
42	62	81	81	81	62	42	14	23	48	105	48	23	14	8	13	34	113	34	13	8	8	12	33	117	33	12	8
53	76	81	81	81	76	53	19	36	93	105	93	36	19	10	20	59	136	59	20	10	10	20	62	205	62	20	10
55	74	78	79	78	74	55	25	46	102	103	102	46	25	15	30	87	140	87	30	15	14	30	97	216	97	30	14
54	71	80	80	80	71	54	29	49	92	101	92	49	29	18	35	89	140	89	35	18	18	37	104	218	104	37	18
49	66	80	79	80	66	49	31	48	80	102	80	48	31	20	35	81	140	81	35	20	21	38	95	200	95	38	21
125 mm width							125 mm width							125 mm width							125 mm width						
160 mm width							160 mm width							160 mm width							160 mm width						

rounded values

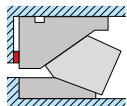
O-BS SIZE 4

FORCE DISTRIBUTION

Cam unit specifications O-BS 175-220

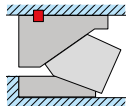
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-BS 175	O-BS 220	size	size		O-BS 175	O-BS 220			
27640	27660	O-BS 175-0°	O-BS 220-0°	0°	86	88	41,78	300	300
27641	27661	O-BS 175-5°	O-BS 220-5°	5°	85	88	41,94	300	298
27642	27662	O-BS 175-10°	O-BS 220-10°	10°	84	87	50,56	300	304
27643	27663	O-BS 175-15°	O-BS 220-15°	15°	84	87	51,55	300	310
27644	27664	O-BS 175-20°	O-BS 220-20°	20°	82	85	55,30	300	323
27645	27665	O-BS 175-25°	O-BS 220-25°	25°	82	82	57,33	300	323
27646	27666	O-BS 175-30°	O-BS 220-30°	30°	79	82	53,07	300	306
27647	27667	O-BS 175-35°	O-BS 220-35°	35°	80	83	56,11	300	311
27648	27668	O-BS 175-40°	O-BS 220-40°	40°	79	82	62,18	300	323
27649	27669	O-BS 175-45°	O-BS 220-45°	45°	79	82	67,36	300	323
27650	27670	O-BS 175-50°	O-BS 220-50°	50°	80	83	60,63	300	323
27651	27671	O-BS 175-55°	O-BS 220-55°	55°	80	83	67,94	300	328
27652	27672	O-BS 175-60°	O-BS 220-60°	60°	80	83	68,94	300	323
27653	27673	O-BS 175-65°	O-BS 220-65°	65°	79	82	60,59	300	323
27654	27674	O-BS 175-70°	O-BS 220-70°	70°	80	83	74,86	300	323
27655	27675	O-BS 175-75°	O-BS 220-75°	75°	79	82	76,10	300	323

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

O-BS SIZE 4

PERMISSIBLE CAM FORCES

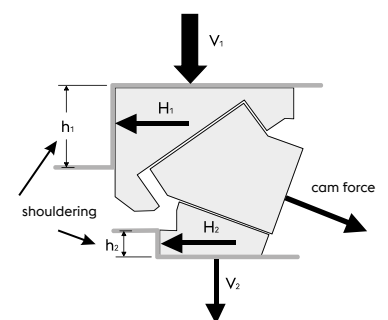
Cam unit force distribution size 4 O-BS, Level 1, 500,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	303	254	303	254	0	190	38	15,6
5°	342	268	320	239	21	190	38	17,5
10°	425	425	356	351	62	148	38	15,5
15°	455	425	357	307	82	148	38	17,3
20°	432	488	282	341	124	115	82	14,9
25°	454	480	277	288	134	115	82	16,7
30°	422	344	288	133	77	130	82	28,3
35°	408	324	272	90	63	130	82	37,4
40°	454	418	241	127	106	100	130	28,8
45°	461	414	239	87	87	100	130	38,0
50°	488	429	248	55	66	100	130	44,9
55°	482	419	242	24	35	100	130	44,4
60°	478	501	88	87	151	50	148	25,9
65°	479	488	86	54	116	50	148	31,4
70°	497	497	88	30	82	50	148	44,7
75°	497	491	87	11	42	50	148	44,3

Cam unit force distribution size 4 O-BS, Level 2, 750,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	202	169	202	169	0	190	38	15,6
5°	228	179	213	159	14	190	38	17,5
10°	283	283	237	234	41	148	38	15,5
15°	303	283	238	205	55	148	38	17,3
20°	288	326	188	227	83	115	82	14,9
25°	303	320	185	192	90	115	82	16,7
30°	281	229	192	89	51	130	82	28,3
35°	272	216	181	60	42	130	82	37,4
40°	303	279	161	84	71	100	130	28,8
45°	308	276	159	58	58	100	130	38,0
50°	325	286	165	37	44	100	130	44,9
55°	322	279	161	16	23	100	130	44,4
60°	319	334	59	58	100	50	148	25,9
65°	319	325	57	36	77	50	148	31,4
70°	332	332	58	20	55	50	148	44,7
75°	331	327	58	7	28	50	148	44,3

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-BS SIZE 4

O-BS 175-220 | support via cast shoulder, Level 1

0°								20°								40°								60°							
59	50	130	236	130	50	59		65	94	156	320	156	94	65		47	68	119	176	119	68	47		43	61	107	195	107	61	43	
65	59	177	251	177	59	65		73	110	200	361	200	110	73		50	74	131	269	131	74	50		46	68	128	323	128	68	46	
77	82	224	272	224	82	77		79	120	248	391	248	120	79		53	82	152	402	152	82	53		49	77	152	446	152	77	49	
90	103	196	303	196	103	90		90	139	294	424	294	139	90		56	91	197	448	197	91	56		52	83	158	470	158	83	52	
100	109	173	296	173	109	100		95	137	257	432	257	137	95		56	87	178	454	178	87	56		53	86	176	478	176	86	53	
94	101	155	269	155	101	94		94	128	222	429	222	128	94		55	85	168	386	168	85	55		53	85	182	476	182	85	53	
87	94	140	230	140	94	87		90	122	209	375	209	122	90		53	80	151	313	151	80	53		50	79	162	434	162	79	50	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
5°								25°								45°								65°							
56	84	110	190	110	84	56		56	75	131	319	131	75	56		34	41	79	140	79	41	34		33	45	80	119	80	45	33	
65	93	137	176	137	93	65		57	68	137	365	137	68	57		40	56	110	189	110	56	40		36	52	100	168	100	52	36	
71	103	239	286	239	103	71		64	88	234	393	234	88	64		40	51	98	291	98	51	40		40	59	126	356	126	59	40	
80	119	204	303	204	119	80		68	116	242	447	242	116	68		38	41	106	427	106	41	38		44	71	170	451	170	71	44	
71	113	182	342	182	113	71		78	117	251	454	251	117	78		46	65	155	461	155	65	46		47	80	194	479	194	80	47	
75	103	150	299	150	103	75		81	124	230	451	230	124	81		49	73	192	461	192	73	49		51	86	210	475	210	86	51	
76	98	137	248	137	98	76		83	121	201	398	201	121	83		51	78	180	401	180	78	51		53	87	204	473	204	87	53	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
10°								30°								50°								70°							
48	76	151	273	151	76	48		47	68	119	181	119	68	47		29	40	68	103	68	40	29		28	38	65	97	65	38	28	
55	92	191	321	191	92	55		50	74	132	270	132	74	50		33	47	86	122	86	47	33		31	44	79	116	79	44	31	
59	101	260	359	260	101	59		53	73	107	293	107	73	53		36	53	101	140	101	53	36		35	50	96	131	96	50	35	
71	116	235	389	235	116	71		53	78	189	422	189	78	53		40	61	129	399	129	61	40		38	57	125	437	125	57	38	
74	116	206	425	206	116	74		56	86	183	411	183	86	56		43	67	143	466	143	67	43		41	65	149	491	149	65	41	
78	111	181	362	181	111	78		56	83	153	341	153	83	56		47	74	152	488	152	74	47		44	71	159	497	159	71	44	
77	103	158	291	158	103	77		53	77	131	273	131	77	53		49	76	154	444	154	76	49		47	74	155	489	155	74	47	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
15°								35°								55°								75°							
42	66	135	293	135	66	42		22	30	60	129	60	30	22		28	38	65	87	65	38	28		28	37	58	85	58	37	28	
46	75	180	341	180	75	46		24	35	80	220	80	35	24		31	44	81	104	81	44	31		31	42	74	113	74	42	31	
51	88	233	373	233	88	51		27	41	92	335	92	41	27		35	51	89	133	89	51	35		34	49	97	149	97	49	34	
61	108	240	373	240	108	61		29	45	92	401	92	45	29		38	58	118	401	118	58	38		37	56	125	418	125	56	37	
63	106	218	455	218	106	63		32	56	158	408	158	56	32		42	65	143	467	143	65	42		40	62	145	493	145	62	40	
68	104	192	401	192	104	68		33	59	170	400	170	59	33		44	68	128	482	128	68	44		43	67	152	497	152	67	43	
70	102	169	318	169	102	70		35	59	152	357	152	59	35		46	71	146	482	146	71	46		44	68	144	474	144	68	44	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							

rounded values

O-BS SIZE 4

O-BS 175-220 | support via fitting key, Level 1

0°								20°								40°								60°							
59	49	104	125	104	49	59		65	94	151	203	151	94	65		47	68	119	176	119	68	47		43	61	107	195	107	61	43	
65	56	107	137	107	56	65		73	109	189	206	189	109	73		50	74	129	240	129	74	50		46	68	128	323	128	68	46	
77	74	119	137	119	74	77		79	118	215	210	215	118	79		53	82	145	224	145	82	53		49	77	152	446	152	77	49	
90	96	116	133	116	96	90		90	132	215	211	215	132	90		56	91	188	260	188	91	56		52	83	158	470	158	83	52	
100	106	120	132	120	106	100		95	134	215	215	215	134	95		56	87	169	263	169	87	56		53	86	176	478	176	86	53	
94	100	130	136	130	100	94		94	128	206	215	206	128	94		55	85	162	266	162	85	55		53	85	182	476	182	85	53	
87	92	119	137	119	92	87		90	122	204	215	204	122	90		53	80	149	260	149	80	53		50	79	162	434	162	79	50	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
5°								25°								45°								65°							
56	84	108	135	108	84	56		56	75	128	230	128	75	56		34	41	79	140	79	41	34		33	45	80	119	80	45	33	
65	92	121	125	121	92	65		57	68	131	221	131	68	57		40	56	110	188	110	56	40		36	52	100	168	100	52	36	
71	95	146	144	146	95	71		64	88	226	206	226	88	64		40	51	97	275	97	51	40		40	59	126	356	126	59	40	
80	113	134	135	134	113	80		68	116	232	230	232	116	68		38	41	98	246	98	41	38		44	71	170	451	170	71	44	
71	110	142	135	142	110	71		78	116	230	227	230	116	78		46	65	146	264	146	65	46		47	80	194	479	194	80	47	
75	102	135	132	135	102	75		81	123	215	229	215	123	81		49	73	183	270	183	73	49		51	86	210	475	210	86	51	
76	97	125	146	125	97	76		83	121	193	228	193	121	83		51	78	175	272	175	78	51		53	87	204	473	204	87	53	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
10°								30°								50°								70°							
48	76	138	142	138	76	48		47	68	118	160	118	68	47		29	40	68	103	68	40	29		28	38	65	97	65	38	28	
55	89	127	161	127	89	55		50	74	129	206	129	74	50		33	47	86	122	86	47	33		31	44	79	116	79	44	31	
59	93	167	161	167	93	59		53	73	103	196	103	73	53		36	53	101	131	101	53	36		35	50	96	131	96	50	35	
71	111	165	161	165	111	71		53	78	179	188	179	78	53		40	61	121	212	121	61	40		38	57	125	437	125	57	38	
74	113	165	160	165	113	74		56	86	173	203	173	86	56		43	67	134	265	134	67	43		41	65	149	491	149	65	41	
78	110	164	159	164	110	78		56	83	147	206	147	83	56		47	74	143	277	143	74	47		44	71	159	497	159	71	44	
77	103	153	166	153	103	77		53	77	128	206	128	77	53		49	76	146	278	146	76	49		47	74	155	489	155	74	47	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							
15°								35°								55°								75°							
42	66	130	177	130	66	42		22	30	60	129	60	30	22		28	38	65	87	65	38	28		28	37	58	85	58	37	28	
46	74	163	177	163	74	46		24	35	80	202	80	35	24		31	44	81	104	81	44	31		31	42	74	113	74	42	31	
51	82	161	178	161	82	51		27	41	86	215	86	41	27		35	51	89	126	89	51	35		34	49	97	149	97	49	34	
61	103	174	178	174	103	61		29	45	83	184	83	45	29		38	58	111	250	111	58	38		37	56	125	418	125	56	37	
63	103	173	162	173	103	63		32	56	148	181	148	56	32		42	65	134	275	134	65	42		40	62	145	493	145	62	40	
68	104	173	161	173	104	68		33	59	161	201	161	59	33		44	68	125	419	125	68	44		43	67	152	497	152	67	43	
70	102	162	174	162	102	70		35	59	145	212	145	59	35		46	71	146	482	146	71	46		44	68	144	474	144	68	44	
175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width								175 mm width 220 mm width							

rounded values

O-BS SIZE 4

O-BS175-220 | support via cast shoulder, Level 2

0°							20°							40°							60°						
40	33	87	157	87	33	40	44	63	104	214	104	63	44	31	46	80	117	80	46	31	29	41	72	130	72	41	29
43	39	118	167	118	39	43	49	73	133	241	133	73	49	34	50	87	179	87	50	34	31	45	85	216	85	45	31
51	55	149	182	149	55	51	53	80	166	261	166	80	53	36	55	102	268	102	55	36	33	51	101	298	101	51	33
60	69	131	202	131	69	60	60	93	196	283	196	93	60	38	61	131	299	131	61	38	35	55	106	314	106	55	35
67	73	116	198	116	73	67	64	92	172	288	172	92	64	38	58	119	303	119	58	38	36	58	117	319	117	58	36
63	67	104	179	104	67	63	63	86	148	286	148	86	63	37	57	112	258	112	57	37	35	57	122	317	122	57	35
58	63	93	154	93	63	58	60	82	139	250	139	82	60	35	54	101	209	101	54	35	33	53	108	290	108	53	33
175 mm width							175 mm width							175 mm width							175 mm width						
220 mm width							220 mm width							220 mm width							220 mm width						
5°							25°							45°							65°						
37	56	74	127	74	56	37	37	50	88	213	88	50	37	23	27	53	93	53	27	23	22	30	54	79	54	30	22
44	62	92	117	92	62	44	38	46	92	243	92	46	38	27	38	74	126	74	38	27	24	35	67	112	67	35	24
47	69	160	191	160	69	47	43	59	156	262	156	59	43	27	34	65	194	65	34	27	27	40	84	238	84	40	27
54	80	136	202	136	80	54	45	77	161	298	161	77	45	25	28	71	285	71	28	25	30	47	114	301	114	47	30
47	76	121	228	121	76	47	52	78	168	303	168	78	52	31	43	104	308	104	43	31	32	53	129	319	129	53	32
50	69	100	200	100	69	50	54	83	153	301	153	83	54	33	49	128	307	128	49	33	34	58	140	317	140	58	34
51	65	91	166	91	65	51	55	81	134	266	134	81	55	34	52	120	268	120	52	34	35	58	136	316	136	58	35
175 mm width							175 mm width							175 mm width							175 mm width						
220 mm width							220 mm width							220 mm width							220 mm width						
10°							30°							50°							70°						
32	51	101	182	101	51	32	32	45	79	121	79	45	32	20	27	46	69	46	27	20	19	26	43	65	43	26	19
37	61	127	214	127	61	37	34	49	88	180	88	49	34	22	31	58	81	58	31	22	21	30	53	77	53	30	21
40	68	173	239	173	68	40	36	49	72	196	72	49	36	24	36	67	93	67	36	24	23	34	64	88	64	34	23
48	78	157	259	157	78	48	36	52	126	281	126	52	36	27	41	86	266	86	41	27	26	38	84	291	84	38	26
50	78	138	283	138	78	50	38	57	122	274	122	57	38	29	45	95	311	95	45	29	28	43	99	328	99	43	28
52	74	121	241	121	74	52	37	55	102	227	102	55	37	31	49	102	325	102	49	31	30	48	106	332	106	48	30
51	69	106	194	106	69	51	36	52	88	182	88	52	36	33	51	103	296	103	51	33	31	50	104	326	104	50	31
175 mm width							175 mm width							175 mm width							175 mm width						
220 mm width							220 mm width							220 mm width							220 mm width						
15°							35°							55°							75°						
28	44	90	195	90	44	28	15	20	40	86	40	20	15	19	26	43	58	43	26	19	19	25	39	57	39	25	19
31	50	120	227	120	50	31	16	23	54	147	54	23	16	21	30	54	70	54	30	21	21	28	50	76	50	28	21
34	59	156	249	156	59	34	18	28	61	223	61	28	18	24	34	60	89	60	34	24	23	33	65	100	65	33	23
41	72	160	249	160	72	41	19	30	62	268	62	30	19	26	39	79	268	79	39	26	25	37	83	279	83	37	25
42	71	146	303	146	71	42	22	38	106	272	106	38	22	28	43	95	311	95	43	28	27	41	97	329	97	41	27
46	70	128	267	128	70	46	22	39	113	267	113	39	22	30	45	85	322	85	45	30	29	45	101	331	101	45	29
47	68	113	212	113	68	47	24	40	101	238	101	40	24	31	48	97	322	97	48	31	30	46	96	316	96	46	30
175 mm width							175 mm width							175 mm width							175 mm width						
220 mm width							220 mm width							220 mm width							220 mm width						

rounded values

O-BS SIZE 4

O-BS 175-220 | support via fitting key, Level 2

0°								20°								40°								60°							
40	33	69	84	69	33	40		44	63	101	135	101	63	44		31	46	80	117	80	46	31		29	41	72	130	72	41	29	
43	37	71	92	71	37	43		49	73	126	137	126	73	49		34	50	86	160	86	50	34		31	45	85	216	85	45	31	
51	50	80	91	80	50	51		53	79	144	140	144	79	53		36	55	97	149	97	55	36		33	51	101	298	101	51	33	
60	64	77	89	77	64	60		60	88	143	141	143	88	60		38	61	125	173	125	61	38		35	55	106	314	106	55	35	
67	71	80	88	80	71	67		64	90	143	143	143	90	64		38	58	113	175	113	58	38		36	58	117	319	117	58	36	
63	67	87	91	87	67	63		63	85	137	144	137	85	63		37	57	108	177	108	57	37		35	57	122	317	122	57	35	
58	61	79	92	79	61	58		60	82	136	143	136	82	60		35	54	99	174	99	54	35		33	53	108	290	108	53	33	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							
5°								25°								45°								65°							
37	56	72	90	72	56	37		37	50	85	153	85	50	37		23	27	53	93	53	27	23		22	30	54	79	54	30	22	
44	62	81	83	81	62	44		38	46	87	148	87	46	38		27	38	74	125	74	38	27		24	35	67	112	67	35	24	
47	63	98	96	98	63	47		43	59	151	138	151	59	43		27	34	65	183	65	34	27		27	40	84	238	84	40	27	
54	76	90	90	90	76	54		45	77	155	153	155	77	45		25	28	65	164	65	28	25		30	47	114	301	114	47	30	
47	74	95	90	95	74	47		52	78	154	152	154	78	52		31	43	98	176	98	43	31		32	53	129	319	129	53	32	
50	68	90	88	90	68	50		54	82	144	153	144	82	54		33	49	122	180	122	49	33		34	58	140	317	140	58	34	
51	65	84	97	84	65	51		55	81	129	152	129	81	55		34	52	117	182	117	52	34		35	58	136	316	136	58	35	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							
10°								30°								50°								70°							
32	51	92	95	92	51	32		32	45	79	107	79	45	32		20	27	46	69	46	27	20		19	26	43	65	43	26	19	
37	60	85	107	85	60	37		34	49	86	137	86	49	34		22	31	58	81	58	31	22		21	30	53	77	53	30	21	
40	62	111	107	111	62	40		36	49	69	131	69	49	36		24	36	67	88	67	36	24		23	34	64	88	64	34	23	
48	74	110	108	110	74	48		36	52	119	125	119	52	36		27	41	81	142	81	41	27		26	38	84	291	84	38	26	
50	76	110	107	110	76	50		38	57	116	135	116	57	38		29	45	89	177	89	45	29		28	43	99	328	99	43	28	
52	74	110	106	110	74	52		37	55	98	138	98	55	37		31	49	95	185	95	49	31		30	48	106	332	106	48	30	
51	69	102	111	102	69	51		36	52	86	137	86	52	36		33	51	98	186	98	51	33		31	50	104	326	104	50	31	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							
15°								35°								55°								75°							
28	44	87	118	87	44	28		15	20	40	86	40	20	15		19	26	43	58	43	26	19		19	25	39	57	39	25	19	
31	50	109	118	109	50	31		16	23	53	135	53	23	16		21	30	54	70	54	30	21		21	28	50	76	50	28	21	
34	55	107	119	107	55	34		18	28	58	144	58	28	18		24	34	59	84	59	34	24		23	33	65	100	65	33	23	
41	69	116	119	116	69	41		19	30	55	123	55	30	19		26	39	74	167	74	39	26		25	37	83	279	83	37	25	
42	69	115	108	115	69	42		22	38	99	121	99	38	22		28	43	90	184	90	43	28		27	41	97	329	97	41	27	
46	69	116	107	116	69	46		22	39	107	134	107	39	22		30	45	83	280	83	45	30		29	45	101	331	101	45	29	
47	68	108	116	108	68	47		24	40	97	141	97	40	24		31	48	97	322	97	48	31		30	46	96	316	96	46	30	
175 mm width								175 mm width								175 mm width								175 mm width							
220 mm width								220 mm width								220 mm width								220 mm width							

rounded values

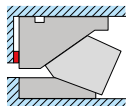
O-BS SIZE 5

FORCE DISTRIBUTION

Cam unit specifications O-BS 260-330

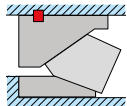
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-BS 260	O-BS 330	size	size		O-BS 260	O-BS 330			
27680	27700	O-BS 260-0°	O-BS 330-0°	0°	152	157	41,78	300	310
27681	27701	O-BS 260-5°	O-BS 330-5°	5°	151	157	42,75	300	305
27682	27702	O-BS 260-10°	O-BS 330-10°	10°	149	154	52,04	300	305
27683	27703	O-BS 260-15°	O-BS 330-15°	15°	149	154	53,68	300	305
27684	27704	O-BS 260-20°	O-BS 330-20°	20°	148	153	57,82	300	311
27685	27705	O-BS 260-25°	O-BS 330-25°	25°	148	153	61,50	300	306
27686	27706	O-BS 260-30°	O-BS 330-30°	30°	142	148	56,61	300	325
27687	27707	O-BS 260-35°	O-BS 330-35°	35°	143	148	60,26	300	325
27688	27708	O-BS 260-40°	O-BS 330-40°	40°	141	146	67,04	300	330
27689	27709	O-BS 260-45°	O-BS 330-45°	45°	141	146	73,32	300	325
27690	27710	O-BS 260-50°	O-BS 330-50°	50°	142	147	64,94	300	325
27691	27711	O-BS 260-55°	O-BS 330-55°	55°	141	147	75,63	300	325
27692	27712	O-BS 260-60°	O-BS 330-60°	60°	143	149	68,94	300	325
27693	27713	O-BS 260-65°	O-BS 330-65°	65°	143	149	60,59	300	325
27694	27714	O-BS 260-70°	O-BS 330-70°	70°	143	149	74,86	300	325
27695	27715	O-BS 260-75°	O-BS 330-75°	75°	143	148	98,93	300	325

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

O-BS SIZE 5

PERMISSIBLE CAM FORCES

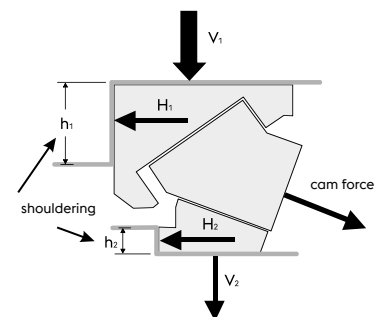
Cam unit force distribution size 5 O-BS, Level 1, 500,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	586	492	586	492	0	186	48	30,9
5°	620	487	580	433	38	186	48	34,6
10°	602	602	505	497	88	142	48	30,7
15°	643	601	504	435	116	142	48	34,4
20°	580	655	378	457	166	110	82	29,6
25°	620	656	379	394	184	110	82	33,2
30°	605	493	414	191	110	125	83	47,8
35°	622	493	414	136	96	125	83	47,0
40°	623	574	331	174	146	95	145	48,0
45°	635	569	328	120	120	95	145	47,2
50°	402	354	204	46	54	95	145	45,6
55°	544	473	273	27	39	95	145	44,2
60°	623	652	115	113	196	45	180	47,4
65°	637	649	114	72	155	45	190	46,2
70°	500	500	88	30	83	45	190	45,3
75°	479	474	84	11	41	45	190	44,0

Cam unit force distribution size 5 O-BS, Level 2, 750,000 strokes

cam unit angle [degree]	max. cam force [kN]	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	391	328	391	328	0	186	48	30,9
5°	414	324	387	288	25	186	48	34,6
10°	401	401	336	331	58	142	48	30,7
15°	429	401	336	290	78	142	48	34,4
20°	387	437	252	305	111	110	82	29,6
25°	414	437	252	262	122	110	82	33,2
30°	403	329	276	127	73	125	83	47,8
35°	415	329	276	91	64	125	83	47,0
40°	415	382	221	116	97	95	145	48,0
45°	423	379	219	80	80	95	145	47,2
50°	268	236	136	30	36	95	145	45,6
55°	363	315	182	18	26	95	145	44,2
60°	415	435	77	76	131	45	180	47,4
65°	425	433	76	48	103	45	190	46,2
70°	333	333	59	20	55	45	190	45,3
75°	320	316	56	7	27	45	190	44,0

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-BS SIZE 5

O-BS 260-330 | support via cast shoulder, Level 1

0°							20°							40°							60°						
66	150	273	415	273	150	66	69	147	259	394	259	147	69	47	64	122	235	122	64	47	46	52	106	216	106	52	46
73	169	326	490	326	169	73	77	164	310	469	310	164	77	53	80	196	365	196	80	53	52	63	134	347	134	63	52
83	191	390	553	390	191	83	86	186	372	536	372	186	86	59	100	287	515	287	100	59	59	75	167	497	167	75	59
93	215	457	583	457	215	93	96	209	438	576	438	209	96	67	122	375	614	375	122	67	66	88	193	603	193	88	66
103	238	514	586	514	238	103	106	230	498	580	498	230	106	75	140	435	623	435	140	75	73	101	214	621	214	101	73
114	260	552	586	552	260	114	117	251	546	580	546	251	117	81	152	445	623	445	152	81	80	112	230	623	230	112	80
124	273	543	586	543	273	124	129	267	545	580	545	267	129	84	149	403	623	403	149	84	84	115	235	623	235	115	84
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
5°							25°							45°							65°						
44	117	207	318	207	117	44	45	120	199	310	199	120	45	40	60	173	132	173	60	40	39	47	63	130	63	47	39
50	134	262	416	262	134	50	51	137	253	398	253	137	51	45	72	206	279	206	72	45	44	63	137	280	137	63	44
57	156	329	520	329	156	57	58	157	319	502	319	157	58	52	85	245	435	245	85	52	49	81	234	436	234	81	49
65	179	405	594	405	179	65	66	180	394	584	394	180	66	58	100	285	569	285	100	58	55	100	324	570	324	100	55
73	203	478	616	478	203	73	74	205	470	614	470	205	74	64	114	320	624	320	114	64	62	117	392	626	392	117	62
82	227	540	620	540	227	82	84	230	536	620	536	230	84	69	125	345	635	345	125	69	66	128	419	637	419	128	66
90	243	552	620	552	243	90	92	247	552	620	552	247	92	73	134	362	635	362	134	73	70	131	399	637	399	131	70
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
10°							30°							50°							70°						
75	166	290	439	290	166	75	43	56	98	189	98	56	43	17	32	137	119	137	32	17	16	26	77	136	77	26	16
82	185	342	509	342	185	82	48	72	170	327	170	72	48	20	40	173	257	173	40	20	18	35	137	236	137	35	18
92	208	408	579	408	208	92	55	92	257	463	257	92	55	23	50	210	316	210	50	23	20	46	210	354	210	46	20
102	232	474	599	474	232	102	63	113	346	573	346	113	63	26	59	247	371	247	59	26	22	58	284	452	284	58	22
112	254	531	601	531	254	112	70	132	412	601	412	132	70	29	67	278	397	278	67	29	25	67	333	492	333	67	25
123	275	565	601	565	275	123	77	145	437	605	437	145	77	33	76	303	402	303	76	33	28	75	353	499	353	75	28
129	277	553	601	553	277	129	81	145	402	605	402	145	81	36	83	323	402	323	83	36	29	74	342	499	342	74	29
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
15°							35°							55°							75°						
52	141	233	370	233	141	52	37	46	57	114	57	46	37	18	32	141	115	141	32	18	16	26	77	141	77	26	16
57	159	292	468	292	159	57	41	60	130	269	130	60	41	21	41	179	240	179	41	21	17	35	140	265	140	35	17
65	183	363	569	363	183	65	47	78	223	443	223	78	47	24	51	223	376	223	51	24	19	46	219	394	219	46	19
73	209	443	637	443	209	73	52	97	317	576	317	97	52	26	58	257	489	257	58	26	18	52	286	472	286	52	18
81	233	514	643	514	233	81	57	111	381	615	381	111	57	27	63	286	535	286	63	27	18	55	311	480	311	55	18
90	256	571	643	571	256	90	60	119	404	622	404	119	60	29	69	307	544	307	69	29	17	54	313	480	313	54	17
91	254	563	643	563	254	91	60	114	374	622	374	114	60	30	70	313	544	313	70	30	17	50	281	469	281	50	17
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						

rounded values

O-BS SIZE 5

O-BS 260-330 | support via fitting key, Level 1

0°							20°							40°							60°						
48	86	123	166	123	86	48	52	84	117	157	117	84	52	47	58	61	118	61	58	47	46	52	106	216	106	52	46
54	96	147	196	147	96	54	58	94	139	188	139	94	58	53	69	89	166	89	69	53	52	63	134	347	134	63	52
62	109	176	221	176	109	62	65	106	168	214	168	106	65	59	84	130	234	130	84	59	59	75	167	497	167	75	59
69	122	206	233	206	122	69	73	118	197	230	197	118	73	67	100	170	279	170	100	67	66	88	193	603	193	88	66
77	135	232	234	232	135	77	81	130	225	232	225	130	81	75	115	198	283	198	115	75	73	101	214	621	214	101	73
85	147	249	234	249	147	85	90	142	247	232	247	142	90	81	126	202	283	202	126	81	80	112	230	623	230	112	80
93	155	245	234	245	155	93	99	152	246	232	246	152	99	84	126	183	283	183	126	84	84	115	235	623	235	115	84
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
5°							25°							45°							65°						
30	67	93	127	93	67	30	14	63	77	108	77	63	14	40	51	89	64	89	51	40	39	47	63	130	63	47	39
34	77	118	167	118	77	34	17	72	106	152	106	72	17	45	60	94	127	94	60	45	44	63	137	280	137	63	44
40	88	148	208	148	88	40	20	83	139	199	139	83	20	52	72	112	198	112	72	52	49	81	234	436	234	81	49
45	101	182	238	182	101	45	24	94	177	236	177	94	24	58	84	129	259	129	84	58	55	100	324	570	324	100	55
51	114	215	246	215	114	51	29	107	218	248	218	107	29	64	96	145	284	145	96	64	62	117	392	626	392	117	62
58	127	244	248	244	127	58	35	120	253	248	253	120	35	69	105	157	288	157	105	69	66	128	419	637	419	128	66
64	137	249	248	249	137	64	39	131	247	248	247	131	39	73	113	165	288	165	113	73	70	131	399	637	399	131	70
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
10°							30°							50°							70°						
55	95	131	176	131	95	55	36	32	44	75	44	32	36	17	25	70	57	70	25	17	16	26	77	136	77	26	16
61	106	154	203	154	106	61	41	41	76	131	76	41	41	20	30	78	117	78	30	20	18	35	137	236	137	35	18
69	119	184	232	184	119	69	46	51	116	185	116	51	46	23	37	96	144	96	37	23	20	46	210	354	210	46	20
76	132	214	240	214	132	76	52	62	156	229	156	62	52	26	44	112	169	112	44	26	22	58	284	452	284	58	22
84	144	240	240	240	144	84	57	73	186	240	186	73	57	29	51	126	181	126	51	29	25	67	333	492	333	67	25
93	156	255	240	255	156	93	63	80	197	242	197	80	63	33	59	138	183	138	59	33	28	75	353	499	353	75	28
98	158	250	240	250	158	98	67	81	181	242	181	81	67	36	64	147	183	147	64	36	29	74	342	499	342	74	29
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
15°							35°							55°							75°						
35	81	105	148	105	81	35	32	27	25	46	25	27	32	18	32	141	115	141	32	18	16	26	77	141	77	26	16
39	91	131	187	131	91	39	35	34	58	108	58	34	35	21	41	179	240	179	41	21	17	35	140	265	140	35	17
44	104	163	227	163	104	44	39	44	100	177	100	44	39	24	51	223	376	223	51	24	19	46	219	394	219	46	19
50	118	199	255	199	118	50	43	53	143	230	143	53	43	26	58	257	489	257	58	26	18	52	286	472	286	52	18
56	132	232	257	232	132	56	47	61	172	246	172	61	47	27	63	286	535	286	63	27	18	55	311	480	311	55	18
62	145	258	257	258	145	62	50	65	182	249	182	65	50	29	69	307	544	307	69	29	17	54	313	480	313	54	17
63	143	254	257	254	143	63	50	63	168	249	168	63	50	30	70	313	544	313	70	30	17	50	281	469	281	50	17
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						

rounded values

O-BS SIZE 5

O-BS 260-330 | support via cast shoulder, Level 2

0°							20°							40°							60°						
44	100	182	277	182	100	44	46	98	173	262	173	98	46	32	43	81	156	81	43	32	31	35	70	144	70	35	31
49	112	217	327	217	112	49	51	110	207	313	207	110	51	35	54	131	243	131	54	35	34	42	89	231	89	42	34
55	127	260	369	260	127	55	57	124	248	357	248	124	57	39	67	191	344	191	67	39	39	50	111	332	111	50	39
62	144	304	389	304	144	62	64	139	292	384	292	139	64	45	81	250	409	250	81	45	44	59	128	402	128	59	44
69	159	343	391	343	159	69	71	154	332	387	332	154	71	50	94	290	415	290	94	50	49	68	143	414	143	68	49
76	173	368	391	368	173	76	78	168	364	387	364	168	78	54	101	297	415	297	101	54	53	75	154	415	154	75	53
82	182	362	391	362	182	82	86	178	364	387	364	178	86	56	99	269	415	269	99	56	56	77	156	415	156	77	56
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
5°							25°							45°							65°						
29	78	138	212	138	78	29	30	80	133	206	133	80	30	26	40	115	88	115	40	26	26	32	42	87	42	32	26
33	90	175	278	175	90	33	34	91	169	266	169	91	34	30	48	137	186	137	48	30	29	42	91	187	91	42	29
38	104	219	346	219	104	38	39	105	213	335	213	105	39	35	57	164	290	164	57	35	33	54	156	291	156	54	33
43	119	270	396	270	119	43	44	120	262	389	262	120	44	39	66	190	379	190	66	39	37	67	216	380	216	67	37
49	135	319	411	319	135	49	50	137	313	409	313	137	50	43	76	213	416	213	76	43	41	78	261	417	261	78	41
54	151	360	413	360	151	54	56	153	357	413	357	153	56	46	83	230	423	230	83	46	44	86	279	425	279	86	44
60	162	368	413	368	162	60	61	165	368	413	368	165	61	49	89	241	423	241	89	49	46	87	266	425	266	87	46
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
10°							30°							50°							70°						
50	111	193	293	193	111	50	29	37	65	126	65	37	29	11	21	91	79	91	21	11	11	17	51	91	51	17	11
55	123	228	339	228	123	55	32	48	113	218	113	48	32	13	27	115	171	115	27	13	12	23	91	157	91	23	12
61	139	272	386	272	139	61	37	61	171	309	171	61	37	15	33	140	211	140	33	15	13	31	140	236	140	31	13
68	155	316	400	316	155	68	42	75	231	382	231	75	42	17	39	165	248	165	39	17	15	39	190	301	190	39	15
75	169	354	401	354	169	75	47	88	275	400	275	88	47	20	45	185	265	185	45	20	17	45	222	328	222	45	17
82	183	376	401	376	183	82	51	97	291	403	291	97	51	22	51	202	268	202	51	22	19	50	235	333	235	50	19
86	185	369	401	369	185	86	54	97	268	403	268	97	54	24	55	215	268	215	55	24	19	50	228	333	228	50	19
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
15°							35°							55°							75°						
34	94	156	246	156	94	34	25	31	38	76	38	31	25	12	21	94	76	94	21	12	11	17	52	94	52	17	11
38	106	195	312	195	106	38	28	40	86	179	86	40	28	14	27	119	160	119	27	14	12	23	93	177	93	23	12
43	122	242	379	242	122	43	31	52	148	295	148	52	31	16	34	149	251	149	34	16	12	31	146	263	146	31	12
49	139	295	424	295	139	49	35	64	212	384	212	64	35	18	39	171	326	171	39	18	12	35	190	315	190	35	12
54	155	343	429	343	155	54	38	74	254	410	254	74	38	18	42	190	356	190	42	18	12	37	207	320	207	37	12
60	171	381	429	381	171	60	40	79	270	414	270	79	40	20	46	205	362	205	46	20	12	36	208	320	208	36	12
60	169	376	429	376	169	60	40	76	249	414	249	76	40	20	46	209	362	209	46	20	12	33	188	312	188	33	12
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						

rounded values

O-BS SIZE 5

O-BS 260-330 | support via fitting key, Level 2

0°							20°							40°							60°						
32	57	82	111	82	57	32	35	56	78	105	78	56	35	32	39	41	79	41	39	32	31	35	70	144	70	35	31
36	64	98	131	98	64	36	39	63	93	125	93	63	39	35	46	59	111	59	46	35	34	42	89	231	89	42	34
41	72	117	148	117	72	41	43	70	112	143	112	70	43	39	56	87	156	87	56	39	39	50	111	332	111	50	39
46	81	137	156	137	81	46	49	79	132	154	132	79	49	45	67	114	186	114	67	45	44	59	128	402	128	59	44
51	90	155	156	155	90	51	54	87	150	155	150	87	54	50	77	132	189	132	77	50	49	68	143	414	143	68	49
57	98	166	156	166	98	57	60	95	164	155	164	95	60	54	84	135	189	135	84	54	53	75	154	415	154	75	53
62	104	163	156	163	104	62	66	101	164	155	164	101	66	56	84	122	189	122	84	56	56	77	156	415	156	77	56
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
5°							25°							45°							65°						
20	45	62	85	62	45	20	9	42	51	72	51	42	9	26	34	59	43	59	34	26	26	32	42	87	42	32	26
23	51	79	111	79	51	23	11	48	71	101	71	48	11	30	40	62	85	62	40	30	29	42	91	187	91	42	29
26	59	99	139	99	59	26	13	55	92	133	92	55	13	35	48	74	132	74	48	35	33	54	156	291	156	54	33
30	67	122	158	122	67	30	16	63	118	158	118	63	16	39	56	86	172	86	56	39	37	67	216	380	216	67	37
34	76	144	164	144	76	34	19	71	145	165	145	71	19	43	64	97	189	97	64	43	41	78	261	417	261	78	41
38	85	163	165	163	85	38	23	80	168	165	168	80	23	46	70	105	192	105	70	46	44	86	279	425	279	86	44
42	91	166	165	166	91	42	26	87	164	165	164	87	26	49	75	110	192	110	75	49	46	87	266	425	266	87	46
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
10°							30°							50°							70°						
37	64	87	117	87	64	37	24	21	29	50	29	21	24	11	16	47	38	47	16	11	11	17	51	91	51	17	11
41	70	103	136	103	70	41	27	27	51	87	51	27	27	13	20	52	78	52	20	13	12	23	91	157	91	23	12
46	79	123	155	123	79	46	31	34	77	124	77	34	31	15	25	64	96	64	25	15	13	31	140	236	140	31	13
51	88	143	160	143	88	51	35	42	104	153	104	42	35	17	30	75	113	75	30	17	15	39	190	301	190	39	15
56	96	160	160	160	96	56	38	48	124	160	124	48	38	20	34	84	120	84	34	20	17	45	222	328	222	45	17
62	104	170	160	170	104	62	42	53	131	161	131	53	42	22	39	92	122	92	39	22	19	50	235	333	235	50	19
65	105	167	160	167	105	65	44	54	120	161	120	54	44	24	43	98	122	98	43	24	19	50	228	333	228	50	19
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
15°							35°							55°							75°						
23	54	70	99	70	54	23	21	18	17	30	17	18	21	12	21	94	76	94	21	12	11	17	52	94	52	17	11
26	61	88	125	88	61	26	23	23	39	72	39	23	23	14	27	119	160	119	27	14	12	23	93	177	93	23	12
30	70	109	152	109	70	30	26	29	67	118	67	29	26	16	34	149	251	149	34	16	12	31	146	263	146	31	12
34	79	133	170	133	79	34	28	35	95	154	95	35	28	18	39	171	326	171	39	18	12	35	190	315	190	35	12
37	88	154	171	154	88	37	31	41	114	164	114	41	31	18	42	190	356	190	42	18	12	37	207	320	207	37	12
41	97	172	171	172	97	41	33	43	121	166	121	43	33	20	46	205	362	205	46	20	12	36	208	320	208	36	12
42	96	169	171	169	96	42	33	42	112	166	112	42	33	20	46	209	362	209	46	20	12	33	188	312	188	33	12
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						

rounded values

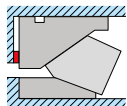
O-BS SIZE 6

FORCE DISTRIBUTION

Cam unit specifications O-BS 400-500

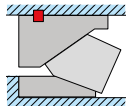
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-BS 400	O-BS 500	size	size		O-BS 400	O-BS 500			
27720	27740	O-BS 400-0°	O-BS 500-0°	0°	309	321	41,78	375	407
27721	27741	O-BS 400-5°	O-BS 500-5°	5°	307	320	42,75	375	407
27722	27742	O-BS 400-10°	O-BS 500-10°	10°	301	313	52,04	375	407
27723	27743	O-BS 400-15°	O-BS 500-15°	15°	300	313	53,68	375	407
27724	27744	O-BS 400-20°	O-BS 500-20°	20°	295	307	57,82	375	406
27725	27745	O-BS 400-25°	O-BS 500-25°	25°	294	307	61,50	375	406
27726	27746	O-BS 400-30°	O-BS 500-30°	30°	284	296	56,61	375	407
27727	27747	O-BS 400-35°	O-BS 500-35°	35°	288	301	60,26	375	407
27728	27748	O-BS 400-40°	O-BS 500-40°	40°	280	293	67,04	375	406
27729	27749	O-BS 400-45°	O-BS 500-45°	45°	287	300	73,32	375	406
27730	27750	O-BS 400-50°	O-BS 500-50°	50°	288	301	64,94	375	406
27731	27751	O-BS 400-55°	O-BS 500-55°	55°	292	304	75,62	375	406
27732	27752	O-BS 400-60°	O-BS 500-60°	60°	280	293	68,94	375	421
27733	27753	O-BS 400-65°	O-BS 500-65°	65°	285	298	60,59	375	426
27734	27754	O-BS 400-70°	O-BS 500-70°	70°	289	302	74,86	375	431
27735	27755	O-BS 400-75°	O-BS 500-75°	75°	289	301	98,93	375	431

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

O-BS SIZE 6

PERMISSIBLE CAM FORCES

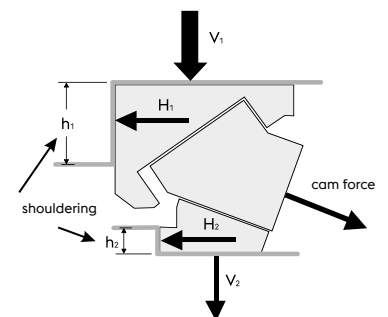
Cam unit force distribution size 6 O-BS, Level 1, 500,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	1021	857	1021	857	0	228	30	78,4
5°	1090	855	1019	760	67	228	41	75,1
10°	948	948	795	783	138	179	45	78,4
15°	884	827	694	598	160	179	45	75,1
20°	1019	1151	665	803	292	135	79	77,0
25°	1087	1149	663	690	322	135	90	73,8
30°	928	756	635	292	169	157	90	66,1
35°	861	683	573	189	132	157	90	61,0
40°	844	778	449	235	197	120	140	65,3
45°	867	777	449	164	164	120	160	60,5
50°	818	719	415	93	110	120	160	54,3
55°	760	660	381	38	54	120	160	49,0
60°	848	889	157	154	267	59	155	62,3
65°	863	880	155	98	210	59	170	57,1
70°	881	881	155	53	146	59	185	52,9
75°	767	758	134	17	65	59	185	48,2

Cam unit force distribution size 6 O-BS, Level 2, 750,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force [kN]
		V1	H1	V2	H2	h1	h2	
0°	681	571	681	571	0	228	30	78,4
5°	727	570	679	507	44	228	41	75,1
10°	632	632	530	522	92	179	45	78,4
15°	590	551	463	399	107	179	45	75,1
20°	679	768	443	535	195	135	79	77,0
25°	725	766	442	460	214	135	90	73,8
30°	619	504	423	195	113	157	90	66,1
35°	574	455	382	126	88	157	90	61,0
40°	563	518	299	157	132	120	140	65,3
45°	578	518	299	110	110	120	160	60,5
50°	545	479	277	62	74	120	160	54,3
55°	507	440	254	25	36	120	160	49,0
60°	566	593	105	103	178	59	155	62,3
65°	576	587	103	65	140	59	170	57,1
70°	587	587	104	35	97	59	185	52,9
75°	511	505	89	12	43	59	185	48,2

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-BS SIZE 6

O-BS 400-500 | support via cast shoulder, Level 1

0°							20°							40°							60°							185 mm height	
137	306	435	574	435	306	137	155	271	510	755	510	271	155	57	184	171	302	171	184	57	50	200	302	338	302	200	50		
141	324	529	757	529	324	141	163	288	610	934	610	288	163	59	196	304	533	304	196	59	50	206	411	573	411	206	50		
136	336	632	936	632	336	136	170	305	700	1019	700	305	170	59	205	441	767	441	205	59	49	209	509	794	509	209	49		
121	331	725	1021	725	331	121	174	321	773	1018	773	321	174	60	211	543	844	543	211	60	46	206	574	848	574	206	46		
107	305	797	1020	797	305	107	171	322	817	1017	817	322	171	59	213	583	844	583	213	59	38	200	583	848	583	200	38		
91	278	842	1020	842	278	91	167	327	827	1018	827	327	167	58	209	535	844	535	209	58	29	188	530	848	530	188	29		
79	250	755	1020	755	250	79	153	308	776	1017	776	308	153	50	202	394	804	394	202	50	24	173	418	767	418	173	24		
400 mm width						400 mm width						400 mm width						400 mm width						400 mm width					
500 mm width						500 mm width						500 mm width						500 mm width						500 mm width					

5°							25°							45°							65°							185 mm height	
39	191	244	252	244	191	39	79	187	248	251	248	187	79	17	83	120	173	120	83	17	24	143	156	158	156	143	24		
41	205	343	465	343	205	41	85	200	338	463	338	200	85	18	152	173	352	173	152	18	24	152	266	350	266	152	24		
45	216	447	710	447	216	45	91	214	440	692	440	214	91	19	161	308	623	308	161	19	24	162	381	621	381	162	24		
47	224	559	938	559	224	47	98	228	550	936	550	228	98	19	164	421	833	421	164	19	25	167	467	830	467	167	25		
41	229	665	1083	665	229	41	104	242	658	1080	658	242	104	19	163	486	867	486	163	19	26	168	513	863	513	168	26		
35	216	747	1090	747	216	35	111	257	743	1087	743	257	111	17	158	462	867	462	158	17	24	165	498	863	498	165	24		
30	196	735	1090	735	196	30	115	269	770	1087	770	269	115	15	152	355	801	355	152	15	21	159	432	798	432	159	21		
400 mm width						400 mm width						400 mm width						400 mm width						400 mm width					
500 mm width						500 mm width						500 mm width						500 mm width						500 mm width					

10°							30°							50°							70°							185 mm height	
125	221	324	392	324	221	125	61	147	195	349	195	147	61	18	111	219	224	219	111	18	18	158	161	165	161	158	18		
132	235	411	577	411	235	132	62	158	343	605	343	158	62	19	125	246	513	246	125	19	16	161	279	318	279	161	16		
141	252	504	782	504	252	141	63	165	492	844	492	165	63	20	140	271	818	271	140	20	17	164	396	616	396	164	17		
148	269	598	916	598	269	148	63	170	607	928	607	170	63	20	153	284	818	284	153	20	17	161	479	845	479	161	17		
154	287	683	948	683	287	154	62	170	653	928	653	170	62	20	164	285	818	285	164	20	17	154	508	881	508	154	17		
159	303	746	948	746	303	159	60	168	598	928	598	168	60	20	170	285	818	285	170	20	16	143	467	881	467	143	16		
155	310	770	948	770	310	155	53	163	440	884	440	163	53	20	171	285	818	285	171	20	15	132	385	779	385	132	15		
400 mm width						400 mm width						400 mm width						400 mm width						400 mm width					
500 mm width						500 mm width						500 mm width						500 mm width						500 mm width					

15°							35°							55°							75°							185 mm height	
64	161	144	218	144	161	64	25	101	100	125	100	101	26	18	120	229	248	229	120	18	17	160	162	294	162	160	17		
68	175	239	383	239	175	68	27	122	188	311	188	122	27	18	135	266	307	266	135	18	15	156	281	518	281	156	15		
75	188	342	548	342	188	75	29	147	287	579	287	147	29	20	150	290	526	290	150	20	14	149	412	717	412	149	14		
82	203	444	722	444	203	82	30	159	412	799	412	159	30	21	161	296	705	296	161	21	12	140	481	767	481	140	12		
88	219	554	855	554	219	88	31	166	492	861	492	166	31	22	168	296	760	296	168	22	10	127	488	767	488	127	10		
94	235	654	884	654	235	94	32	170	489	861	489	170	32	23	171	296	760	296	171	23	8	111	422	767	422	111	8		
99	249	714	884	714	249	99	32	171	403	833	403	171	32	23	171	296	760	296	171	23	7	94	330	646	330	94	7		
400 mm width						400 mm width						400 mm width						400 mm width						400 mm width					
500 mm width						500 mm width						500 mm width						500 mm width						500 mm width					

rounded values

O-BS SIZE 6

O-BS 400-500 | support via fitting key, Level 1

0°							20°							40°							60°						
96	122	109	229	109	122	96	93	108	153	271	153	108	93	52	92	103	251	103	92	52	50	200	302	338	302	200	50
99	130	132	229	132	130	99	98	115	183	271	183	115	98	53	98	182	444	182	98	53	50	206	411	573	411	206	50
95	134	158	229	158	134	95	102	122	210	271	210	122	102	53	103	265	459	265	103	53	49	209	509	794	509	209	49
85	132	182	229	182	132	85	104	128	232	271	232	128	104	54	106	326	459	326	106	54	46	206	574	848	574	206	46
74	122	200	229	200	122	74	103	129	245	271	245	129	103	53	107	350	459	350	107	53	38	200	583	848	583	200	38
64	111	211	229	211	111	64	101	131	248	271	248	131	101	52	104	321	459	321	104	52	29	188	530	848	530	188	29
56	100	189	229	189	100	56	92	123	233	271	233	123	92	45	101	236	459	236	101	45	24	173	418	767	418	173	24
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
5°							25°							45°							65°						
27	77	74	252	74	77	27	71	75	86	248	86	75	71	17	77	81	92	81	77	17	24	143	156	158	156	143	24
29	82	103	252	103	82	29	76	80	119	281	119	80	76	18	92	104	246	104	92	18	24	152	266	350	266	152	24
32	86	134	252	134	86	32	82	86	132	281	132	86	82	19	96	185	437	185	96	19	24	162	381	621	381	162	24
33	89	167	252	167	89	33	88	92	165	281	165	92	88	19	98	253	583	253	98	19	25	167	467	830	467	167	25
29	92	200	252	200	92	29	94	97	197	281	197	97	94	19	98	292	583	292	98	19	26	168	513	863	513	168	26
25	86	224	252	224	86	25	100	103	223	281	223	103	100	17	95	278	583	278	95	17	24	165	498	863	498	165	24
21	78	221	252	221	78	21	104	108	231	281	231	108	104	15	91	213	561	213	91	15	21	159	432	798	432	159	21
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
10°							30°							50°							70°						
44	65	44	218	44	65	44	55	59	78	302	78	59	55	18	89	176	204	176	89	18	18	158	161	165	161	158	18
48	70	72	266	72	70	48	56	63	137	302	137	63	56	19	101	197	467	197	101	19	16	161	279	318	279	161	16
53	75	103	266	103	75	53	56	66	197	302	197	66	56	20	113	217	743	217	113	20	17	164	396	616	396	164	17
57	81	133	266	133	81	57	57	68	243	302	243	68	57	20	122	227	743	227	122	20	17	161	479	845	479	161	17
62	88	166	266	166	88	62	56	68	261	302	261	68	56	20	131	228	743	228	131	20	17	154	508	881	508	154	17
66	94	197	266	197	94	66	54	68	239	302	239	68	54	20	136	228	743	228	136	20	16	143	467	881	467	143	16
70	100	215	266	215	100	70	48	65	176	302	176	65	48	20	137	228	743	228	137	20	15	132	385	779	385	132	15
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
15°							35°							55°							75°						
93	108	153	271	153	108	93	23	41	41	125	41	41	23	18	120	229	248	229	120	18	17	160	162	294	162	160	17
98	115	183	271	183	115	98	25	49	76	297	76	49	25	18	135	266	307	266	135	18	15	156	281	518	281	156	15
102	122	210	271	210	122	102	26	59	115	308	115	59	26	20	150	290	526	290	150	20	14	149	412	717	412	149	14
104	128	232	271	232	128	104	27	64	164	308	164	64	27	21	161	296	705	296	161	21	12	140	481	767	481	140	12
103	129	245	271	245	129	103	28	67	197	308	197	67	28	22	168	296	760	296	168	22	10	127	488	767	488	127	10
101	131	248	271	248	131	101	29	68	196	308	196	68	29	23	171	296	760	296	171	23	8	111	422	767	422	111	8
92	123	233	271	233	123	92	29	68	161	308	161	68	29	23	171	296	760	296	171	23	7	94	330	646	330	94	7
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						

rounded values

O-BS SIZE 6

O-BS 400-500 | support via cast shoulder, Level 2

0°							20°							40°							60°						
91	204	290	382	290	204	91	103	181	340	504	340	181	103	38	123	114	201	114	123	38	33	134	201	226	201	134	33
94	216	353	505	353	216	94	109	192	407	623	407	192	109	39	131	203	355	203	131	39	33	138	274	382	274	138	33
90	224	422	624	422	224	90	114	203	467	679	467	203	114	40	137	294	512	294	137	40	33	140	339	530	339	140	33
81	220	483	681	483	220	81	116	214	516	679	516	214	116	40	141	362	563	362	141	40	31	138	383	566	383	138	31
71	203	532	680	532	203	71	114	215	545	678	545	215	114	40	142	389	563	389	142	40	26	133	389	566	389	133	26
61	186	562	680	562	186	61	112	218	552	679	552	218	112	39	140	357	563	357	140	39	20	125	354	566	354	125	20
53	167	503	680	503	167	53	102	205	518	678	518	205	102	33	135	263	536	263	135	33	16	115	279	512	279	115	16
400 mm width						400 mm width						400 mm width						400 mm width									
500 mm width						500 mm width						500 mm width						500 mm width									

O-BS SIZE 6

O-BS 400-500 | support via fitting key, Level 2

0°							20°							40°							60°						
64	82	73	153	73	82	64	62	72	102	181	102	72	62	35	62	69	168	69	62	35	33	134	201	226	201	134	33
66	87	88	153	88	87	66	65	77	122	181	122	77	65	35	66	122	296	122	66	35	33	138	274	382	274	138	33
63	90	106	153	106	90	63	68	81	140	181	140	81	68	36	69	177	306	177	69	36	33	140	339	530	339	140	33
57	88	121	153	121	88	57	70	86	155	181	155	86	70	36	71	217	306	217	71	36	31	138	383	566	383	138	31
50	82	133	153	133	82	50	69	86	164	181	164	86	69	36	71	233	306	233	71	36	26	133	389	566	389	133	26
43	74	141	153	141	74	43	67	87	166	181	166	87	67	35	70	214	306	214	70	35	20	125	354	566	354	125	20
37	67	126	153	126	67	37	62	82	155	181	155	82	62	30	68	158	306	158	68	30	16	115	279	512	279	115	16
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
5°							25°							45°							65°						
18	51	49	168	49	51	18	48	50	58	165	58	50	48	12	51	54	62	54	51	12	16	96	104	105	104	96	16
19	55	69	168	69	55	19	51	53	79	188	79	53	51	12	61	70	164	70	61	12	16	102	177	234	177	102	16
21	58	90	168	90	58	21	55	57	88	188	88	57	55	13	64	123	291	123	64	13	16	108	254	414	254	108	16
22	60	112	168	112	60	22	59	61	110	188	110	61	59	13	66	169	389	169	66	13	17	111	312	553	312	111	17
19	61	133	168	133	61	19	63	65	132	188	132	65	63	13	65	195	389	195	65	13	17	112	342	576	342	112	17
17	58	150	168	150	58	17	67	69	149	188	149	69	67	12	64	185	389	185	64	12	16	110	332	576	332	110	16
14	52	147	168	147	52	14	69	72	154	188	154	72	69	10	61	142	374	142	61	10	14	106	288	532	288	106	14
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
10°							30°							50°							70°						
30	43	29	145	29	43	30	37	40	52	201	52	40	37	12	59	117	136	117	59	12	12	105	108	110	108	105	12
32	47	48	178	48	47	32	37	42	92	201	92	42	37	13	67	131	311	131	67	13	11	108	186	212	186	108	11
35	50	69	178	69	50	35	38	44	131	201	131	44	38	13	75	145	496	145	75	13	11	109	264	411	264	109	11
38	54	89	178	89	54	38	38	45	162	201	162	45	38	13	82	152	496	152	82	13	11	107	319	564	319	107	11
41	59	111	178	111	59	41	37	46	174	201	174	46	37	14	87	152	496	152	87	14	11	103	339	587	339	103	11
44	63	131	178	131	63	44	36	45	160	201	160	45	36	14	91	152	496	152	91	14	11	95	311	587	311	95	11
47	67	143	178	143	67	47	32	44	117	201	117	44	32	14	92	152	496	152	92	14	10	88	257	520	257	88	10
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
15°							35°							55°							75°						
62	72	102	181	102	72	62	15	27	28	84	28	27	15	12	80	153	165	153	80	12	11	107	108	196	108	107	11
65	77	122	181	122	77	65	17	33	51	198	51	33	17	12	90	177	205	177	90	12	10	104	187	345	187	104	10
68	81	140	181	140	81	68	17	39	77	205	77	39	17	13	100	193	351	193	100	13	9	100	275	478	275	100	9
70	86	155	181	155	86	70	18	43	110	205	110	43	18	14	107	197	470	197	107	14	8	93	321	511	321	93	8
69	86	164	181	164	86	69	19	45	132	205	132	45	19	15	112	197	507	197	112	15	7	85	326	511	326	85	7
67	87	166	181	166	87	67	19	46	131	205	131	46	19	15	114	197	507	197	114	15	5	74	282	511	282	74	5
62	82	155	181	155	82	62	20	46	108	205	108	46	20	15	114	197	507	197	114	15	5	63	220	431	220	63	5
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						

rounded values



O-ES
OPTIMIZED
ELEMENTARY CAM





TECHNICAL DETAILS

O-ES

Important information at a glance

Here you will find important technical data for the optimized elementary cam unit. Should you have any further questions about O-ES, our experienced team of specialists will be happy to assist you at any time. Please contact us at sales.camtec@voestalpine.com

	O-ES
Average service life	1.000.000 strokes*
Guaranteed service life	300.000 strokes*
Sliding surfaces	at least Rz 6.3, unhardened
Field of application	shaping, beveling, punching, cutting
Angle range	0° – 75°
Tensile strength of driver, sliding element and cam base materials	400 N/mm ² minimum
Available widths (mm)	50, 65/85, 90/110, 125/160, 175/220, 260/330, 400/500
Lock Out System	yes
Sliding element removable to the rear	yes
Guide clamps	1.7225 + Graphite
Positive return	both sides
Measuring holes	yes
Gas spring	yes
Special cam unit options	no
Compliant with VDI	yes
NAAMs insert point	yes
Pre-machining	yes

*depending on load



The QR code leads you directly to the force diagrams

Discover all current O-ES models including force diagrams on our website: <https://www.voestalpine.com/camtec/en/Product-Finder>

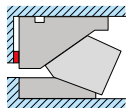
O-ES SIZE 0

FORCE DISTRIBUTION

Cam unit specifications O-ES 50

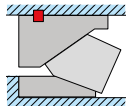
ident. no.	designation	angle [degree]	weight [kg]	stroke [mm]	height cam unit [mm]	length cam unit [mm]
29600	O-ES 50-0°	0°	9	19,28	210	200
29601	O-ES 50-5°	5°	11	21,29	210	200
29602	O-ES 50-10°	10°	11	23,34	210	210
29603	O-ES 50-15°	15°	11	23,79	210	210
29604	O-ES 50-20°	20°	11	26,15	210	220
29605	O-ES 50-25°	25°	11	28,67	210	220
29606	O-ES 50-30°	30°	11	28,37	210	220
29607	O-ES 50-35°	35°	11	31,70	210	220
29608	O-ES 50-40°	40°	11	35,49	210	225
29609	O-ES 50-45°	45°	12	34,75	210	225
29610	O-ES 50-50°	50°	12	40,42	210	225
29611	O-ES 50-55°	55°	12	47,40	210	227
29612	O-ES 50-60°	60°	12	56,38	210	227
29613	O-ES 50-65°	65°	12	68,57	210	240
29614	O-ES 50-70°	70°	11	57,58	210	240
29615	O-ES 50-75°	75°	11	76,10	210	240

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

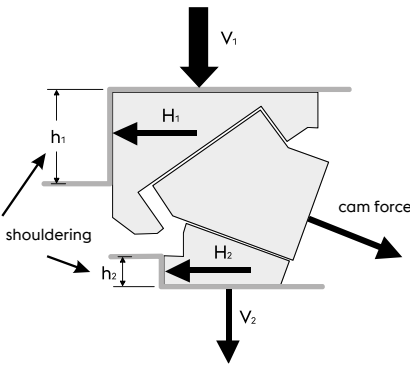
O-ES SIZE 0

PERMISSIBLE CAM FORCES

Cam unit force distribution O-ES 50, 300,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	54	45	54	45	0	60	20	3,0
5°	54	50	50	46	4	60	20	3,0
10°	42	42	35	35	6	60	20	3,0
15°	48	79	29	66	18	60	20	3,3
20°	50	50	35	33	12	60	30	3,3
25°	52	55	32	33	15	50	30	3,3
30°	58	52	36	23	13	50	30	4,5
35°	65	62	36	25	17	50	30	4,5
40°	61	61	28	22	18	50	30	4,5
45°	57	47	33	7	7	50	50	6,5
50°	61	53	31	7	8	40	50	6,5
55°	60	55	26	6	9	40	60	6,5
60°	54	51	19	5	8	40	60	6,5
65°	65	64	17	5	10	40	80	6,5
70°	65	65	11	4	11	40	80	6,5
75°	65	64	11	1	5	40	80	6,5

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-ES SIZE 0

O-ES 50 | support via cast shoulder

0°	20°	40°	60°																																																												
<table><tr><td>13</td><td>32</td><td>13</td></tr><tr><td>15</td><td>43</td><td>15</td></tr><tr><td>18</td><td>54</td><td>18</td></tr><tr><td>15</td><td>40</td><td>15</td></tr><tr><td>13</td><td>30</td><td>13</td></tr></table> 50 mm width	13	32	13	15	43	15	18	54	18	15	40	15	13	30	13	<table><tr><td>10</td><td>22</td><td>10</td></tr><tr><td>15</td><td>37</td><td>15</td></tr><tr><td>16</td><td>45</td><td>16</td></tr><tr><td>16</td><td>50</td><td>16</td></tr><tr><td>16</td><td>39</td><td>16</td></tr></table> 50 mm width	10	22	10	15	37	15	16	45	16	16	50	16	16	39	16	<table><tr><td>7</td><td>26</td><td>7</td></tr><tr><td>8</td><td>44</td><td>8</td></tr><tr><td>8</td><td>61</td><td>8</td></tr><tr><td>8</td><td>51</td><td>8</td></tr><tr><td>8</td><td>35</td><td>8</td></tr></table> 50 mm width	7	26	7	8	44	8	8	61	8	8	51	8	8	35	8	<table><tr><td>2</td><td>5</td><td>2</td></tr><tr><td>3</td><td>26</td><td>3</td></tr><tr><td>4</td><td>52</td><td>4</td></tr><tr><td>4</td><td>54</td><td>4</td></tr><tr><td>4</td><td>36</td><td>4</td></tr></table> 50 mm width	2	5	2	3	26	3	4	52	4	4	54	4	4	36	4
13	32	13																																																													
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7	45	7																																																													
6	29	6																																																													
105 mm height																																																															

rounded values

O-ES SIZE 0

O-ES-50 | support via fitting key

0° <table><tr><td>13</td><td>17</td><td>13</td></tr><tr><td>14</td><td>17</td><td>14</td></tr><tr><td>14</td><td>17</td><td>14</td></tr><tr><td>14</td><td>17</td><td>14</td></tr><tr><td>13</td><td>17</td><td>13</td></tr></table> 50 mm width	13	17	13	14	17	14	14	17	14	14	17	14	13	17	13	20° <table><tr><td>10</td><td>22</td><td>10</td></tr><tr><td>15</td><td>25</td><td>15</td></tr><tr><td>16</td><td>25</td><td>16</td></tr><tr><td>16</td><td>25</td><td>16</td></tr><tr><td>16</td><td>25</td><td>16</td></tr></table> 50 mm width	10	22	10	15	25	15	16	25	16	16	25	16	16	25	16	40° <table><tr><td>7</td><td>26</td><td>7</td></tr><tr><td>8</td><td>37</td><td>8</td></tr><tr><td>8</td><td>37</td><td>8</td></tr><tr><td>8</td><td>37</td><td>8</td></tr><tr><td>8</td><td>35</td><td>8</td></tr></table> 50 mm width	7	26	7	8	37	8	8	37	8	8	37	8	8	35	8	60° <table><tr><td>2</td><td>5</td><td>2</td></tr><tr><td>3</td><td>26</td><td>3</td></tr><tr><td>4</td><td>48</td><td>4</td></tr><tr><td>4</td><td>56</td><td>4</td></tr><tr><td>4</td><td>36</td><td>4</td></tr></table> 50 mm width	2	5	2	3	26	3	4	48	4	4	56	4	4	36	4	105 mm height
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15° <table><tr><td>9</td><td>22</td><td>9</td></tr><tr><td>14</td><td>22</td><td>14</td></tr><tr><td>14</td><td>22</td><td>14</td></tr><tr><td>14</td><td>22</td><td>14</td></tr><tr><td>14</td><td>22</td><td>14</td></tr></table> 50 mm width	9	22	9	14	22	14	14	22	14	14	22	14	14	22	14	35° <table><tr><td>6</td><td>29</td><td>6</td></tr><tr><td>7</td><td>31</td><td>7</td></tr><tr><td>7</td><td>31</td><td>7</td></tr><tr><td>7</td><td>31</td><td>7</td></tr><tr><td>6</td><td>29</td><td>6</td></tr></table> 50 mm width	6	29	6	7	31	7	7	31	7	7	31	7	6	29	6	55° <table><tr><td>3</td><td>5</td><td>3</td></tr><tr><td>4</td><td>19</td><td>4</td></tr><tr><td>5</td><td>43</td><td>5</td></tr><tr><td>5</td><td>53</td><td>5</td></tr><tr><td>5</td><td>39</td><td>5</td></tr></table> 50 mm width	3	5	3	4	19	4	5	43	5	5	53	5	5	39	5	75° <table><tr><td>3</td><td>5</td><td>3</td></tr><tr><td>4</td><td>19</td><td>4</td></tr><tr><td>5</td><td>46</td><td>5</td></tr><tr><td>5</td><td>63</td><td>5</td></tr><tr><td>5</td><td>39</td><td>5</td></tr></table> 50 mm width	3	5	3	4	19	4	5	46	5	5	63	5	5	39	5	105 mm height
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rounded values

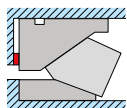
O-ES SIZE 1

FORCE DISTRIBUTION

Cam unit specifications O-ES 65-85

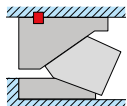
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-ES 65	O-ES 85	size	size		O-ES 65	O-ES 85			
29640	29660	O-ES 65-0°	O-ES 85-0°	0°	16	17	28,93	225	227
29641	29661	O-ES 65-5°	O-ES 85-5°	5°	16	17	29,04	225	227
29642	29662	O-ES 65-10°	O-ES 85-10°	10°	16	17	35,00	225	229
29643	29663	O-ES 65-15°	O-ES 85-15°	15°	16	17	35,69	225	232
29644	29664	O-ES 65-20°	O-ES 85-20°	20°	16	17	36,86	225	247
29645	29665	O-ES 65-25°	O-ES 85-25°	25°	16	17	38,22	225	247
29646	29666	O-ES 65-30°	O-ES 85-30°	30°	16	16	35,38	225	236
29647	29667	O-ES 65-35°	O-ES 85-35°	35°	16	17	37,41	225	239
29648	29668	O-ES 65-40°	O-ES 85-40°	40°	16	17	39,57	225	247
29649	29669	O-ES 65-45°	O-ES 85-45°	45°	16	17	42,87	225	247
29650	29670	O-ES 65-50°	O-ES 85-50°	50°	16	17	47,16	225	247
29651	29671	O-ES 65-55°	O-ES 85-55°	55°	16	17	52,85	225	247
29652	29672	O-ES 65-60°	O-ES 85-60°	60°	16	17	49,24	225	247
29653	29673	O-ES 65-65°	O-ES 85-65°	65°	16	17	46,61	225	252
29654	29674	O-ES 65-70°	O-ES 85-70°	70°	16	17	57,59	225	252
29655	29675	O-ES 65-75°	O-ES 85-75°	75°	16	17	76,10	225	252

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

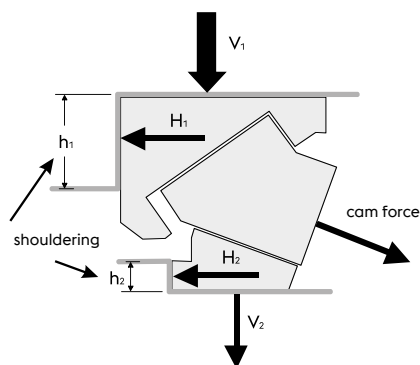
O-ES SIZE 1

PERMISSIBLE CAM FORCES

Cam unit force distribution size 1 O-ES, 300,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	74	62	74	62	0	155	20	6,8
5°	84	66	78	58	5	155	20	7,6
10°	74	74	62	61	11	125	20	6,8
15°	81	76	63	55	15	125	20	7,6
20°	75	85	49	59	21	100	30	6,5
25°	81	86	50	52	24	100	30	7,3
30°	80	65	55	25	15	105	30	8,6
35°	82	65	55	18	13	105	30	8,4
40°	83	77	44	23	19	100	30	8,7
45°	85	76	44	16	16	100	30	8,5
50°	87	76	44	10	12	100	40	8,3
55°	88	77	44	4	6	100	40	8,0
60°	85	89	16	15	27	40	60	8,9
65°	87	89	16	10	21	40	60	8,6
70°	89	89	16	5	15	40	60	8,5
75°	90	89	16	2	8	40	60	8,2

The cam unit force is distributed as shown in the sketch:



Shouldering: h₁ (top)
h₂ (bottom)
Press: V₁ (vertical)
Cam base: H₁ (horizontal)
Driver: H₂ (horizontal)
V₂ (vertical)

O-ES SIZE 1

O-ES 65-85 | support via cast shoulder

0°							20°							40°							60°							95 mm height
15	23	36	48	36	23	15	15	23	37	53	37	23	15	7	12	23	45	23	12	7	7	12	25	47	25	12	7	
19	30	47	57	47	30	19	19	30	48	63	48	30	19	9	17	35	65	35	17	9	9	17	39	67	39	17	9	
24	39	60	68	60	39	24	25	39	59	75	59	39	25	13	25	57	83	57	25	13	12	26	63	84	63	26	12	
26	37	54	73	54	37	26	30	43	64	75	64	43	30	18	34	67	83	67	34	18	18	35	68	85	68	35	18	
26	35	47	70	47	35	26	29	40	58	74	58	40	29	21	35	60	83	60	35	21	20	35	62	85	62	35	20	
24	32	42	61	42	32	24	27	37	52	72	52	37	27	22	33	52	82	52	33	22	20	31	53	84	53	31	20	
22	30	39	53	39	30	22	25	33	46	67	46	33	25	21	30	44	72	44	30	21	18	27	44	72	44	27	18	
65 mm width							65 mm width							65 mm width							65 mm width							
85 mm width							85 mm width							85 mm width							85 mm width							

5°							25°							45°							65°							95 mm height
12	19	32	47	32	19	12	12	19	32	51	32	19	12	6	9	17	37	17	9	6	6	10	20	42	20	10	6	
16	26	45	57	45	26	16	15	25	45	63	45	25	15	8	13	28	60	28	13	8	8	14	32	66	32	14	8	
21	36	60	70	60	36	21	20	35	60	77	60	35	20	10	20	50	82	50	20	10	10	21	54	87	54	21	10	
25	39	59	84	59	39	25	27	44	70	81	70	44	27	14	28	65	84	65	28	14	14	29	69	86	69	29	14	
25	36	52	82	52	36	25	27	41	62	81	62	41	27	18	33	61	85	61	33	18	17	32	64	87	64	32	17	
23	33	47	77	47	33	23	26	38	55	81	55	38	26	20	33	55	84	55	33	20	19	31	57	87	57	31	19	
22	30	42	64	42	30	22	24	34	48	75	48	34	24	19	29	47	73	47	29	19	18	27	47	73	47	27	18	
65 mm width							65 mm width							65 mm width							65 mm width							
85 mm width							85 mm width							85 mm width							85 mm width							

10°							30°							50°							70°							95 mm height
15	23	37	51	37	23	15	7	10	20	39	20	10	7	5	6	12	25	12	6	5	5	7	13	29	13	7	5	
19	30	48	62	48	30	19	9	15	31	59	31	15	9	6	9	20	48	20	9	6	6	9	23	54	23	9	6	
24	39	60	73	60	39	24	12	22	51	76	51	22	12	7	14	36	77	36	14	7	7	15	41	82	41	15	7	
28	40	61	74	61	40	28	17	33	67	80	67	33	17	10	22	61	86	61	22	10	10	24	65	89	65	24	10	
27	38	54	74	54	38	27	19	32	60	80	60	32	19	14	29	62	87	62	29	14	14	29	66	89	66	29	14	
26	35	48	69	48	35	26	19	29	51	79	51	29	19	16	30	57	86	57	30	16	16	29	59	89	59	29	16	
24	32	42	61	42	32	24	18	26	41	71	41	26	18	17	27	49	74	49	27	17	15	27	49	75	49	27	15	
65 mm width							65 mm width							65 mm width							65 mm width							
85 mm width							85 mm width							85 mm width							85 mm width							

15°							35°							55°							75°							95 mm height
12	19	33	50	33	19	12	6	8	16	31	16	8	6	4	5	9	18	9	5	4	4	6	10	22	10	6	4	
15	25	46	63	46	25	15	7	12	25	53	25	12	7	5	7	15	38	15	7	5	5	8	17	45	17	8	5	
20	35	61	75	61	35	20	9	18	44	77	44	18	9	6	10	28	70	28	10	6	6	12	32	73	32	12	6	
26	41	65	80	65	41	26	13	27	67	82	67	27	13	8	17	50	87	50	17	8	8	19	55	88	55	19	8	
27	39	59	81	59	39	27	16	31	62	82	62	31	16	11	24	60	88	60	24	11	11	24	62	90	62	24	11	
25	36	51	78	51	36	25	18	29	53	82	53	29	18	13	25	59	86	59	25	13	12	25	61	89	61	25	12	
23	32	45	69	45	32	23	17	26	43	71	43	26	17	14	24	50	73	50	24	14	12	23	52	75	52	23	12	
65 mm width							65 mm width							65 mm width							65 mm width							
85 mm width							85 mm width							85 mm width							85 mm width							

rounded values

O-ES SIZE 1

O-ES 65-85 | support via fitting key

0°								20°								40°								60°							
13	15	15	15	15	15	15	13	14	20	23	23	23	20	14	7	12	22	30	22	12	7	7	12	25	47	25	12	7	95 mm height		
14	15	15	15	15	15	15	14	18	23	23	23	23	18	9	16	29	30	29	16	9	9	17	39	66	39	17	9				
14	15	15	15	15	15	15	14	20	23	23	23	23	20	13	21	30	30	30	21	13	12	26	63	82	63	26	12				
15	15	15	15	15	15	15	15	23	23	23	24	23	23	23	18	28	30	30	30	28	18	18	35	68	83	68	35	18			
15	15	15	15	15	15	15	15	24	24	24	23	24	24	24	21	30	30	30	30	30	21	20	35	62	84	62	35	20			
15	15	15	15	15	15	15	15	23	23	24	24	24	23	23	22	30	30	30	30	30	22	20	31	53	84	53	31	20			
15	15	15	15	15	15	15	15	22	24	24	23	24	24	22	21	28	31	30	31	28	21	18	27	44	72	44	27	18			
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
5°								25°								45°								65°							
12	15	16	16	16	16	15	12	12	18	25	25	25	18	12	6	9	17	28	17	9	6	6	10	20	42	20	10	6	95 mm height		
13	15	16	16	16	16	15	13	15	22	25	25	25	22	15	8	13	24	31	24	13	8	8	14	32	66	32	14	8			
15	16	16	16	16	16	16	15	18	25	25	25	25	25	18	10	17	31	31	31	17	10	10	21	54	87	54	21	10			
16	16	16	16	16	16	16	16	22	25	25	25	25	25	22	14	23	31	31	31	23	14	14	29	69	86	69	29	14			
16	16	16	16	16	16	16	16	23	25	25	25	25	25	23	18	29	31	31	31	29	18	17	32	64	87	64	32	17			
16	16	16	16	16	16	16	16	23	25	25	25	25	25	23	20	29	31	31	31	29	20	19	31	57	87	57	31	19			
16	16	16	16	16	16	16	16	22	25	25	25	25	25	22	19	27	31	31	31	27	19	18	27	47	73	47	27	18			
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
10°								30°								50°								70°							
14	18	18	18	18	18	18	14	7	10	18	23	18	10	7	5	6	11	21	11	6	5	5	7	13	29	13	7	5	95 mm height		
16	18	18	18	18	18	18	16	9	14	23	23	23	14	9	6	9	19	31	19	9	6	6	9	23	54	23	9	6			
18	18	18	18	18	18	18	18	12	18	23	23	23	18	12	7	13	31	31	31	13	7	7	15	41	82	41	15	7			
18	18	18	18	18	18	18	18	15	22	23	23	23	22	15	10	18	31	32	31	18	10	10	24	65	87	65	24	10			
18	18	18	18	18	18	18	18	18	23	23	23	23	23	18	14	24	31	32	31	24	14	14	29	66	88	66	29	14			
18	18	18	18	18	18	18	18	18	23	23	23	23	23	18	16	26	32	32	32	26	16	16	29	59	89	59	29	16			
18	18	18	18	18	18	18	18	18	22	23	23	23	22	18	17	25	32	32	32	25	17	15	27	49	75	49	27	15			
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							
15°								35°								55°								75°							
12	16	19	19	19	19	16	12	6	8	15	22	15	8	6	4	5	9	18	9	5	4	4	6	10	22	10	6	4	95 mm height		
14	19	19	19	19	19	19	14	7	11	21	24	21	11	7	5	7	15	32	15	7	5	5	8	17	45	17	8	5			
16	19	19	19	19	19	19	16	9	15	24	24	24	15	9	6	10	25	32	25	10	6	6	12	32	73	32	12	6			
19	19	19	19	19	19	19	19	13	20	24	24	24	20	13	8	15	31	32	31	15	8	8	19	55	87	55	19	8			
19	19	19	19	19	19	19	19	16	23	24	24	24	23	16	11	20	32	32	32	20	11	11	24	62	90	62	24	11			
20	19	19	19	19	19	19	20	17	24	24	24	24	24	17	13	21	32	32	32	21	13	12	25	61	89	61	25	12			
19	20	20	20	20	20	20	19	17	23	24	24	24	23	17	14	22	33	33	33	22	14	12	23	52	75	52	23	12			
65 mm width								65 mm width								65 mm width								65 mm width							
85 mm width								85 mm width								85 mm width								85 mm width							

rounded values

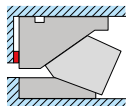
O-ES SIZE 2

FORCE DISTRIBUTION

Cam unit specifications O-ES 90-110

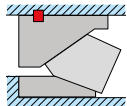
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-ES 90	O-ES 110	size	size		O-ES 90	O-ES 110			
29680	29700	O-ES 90-0°	O-ES 110-0°	0°	35	36	28,93	275	277
29681	29701	O-ES 90-5°	O-ES 110-5°	5°	35	36	29,04	275	277
29682	29702	O-ES 90-10°	O-ES 110-10°	10°	35	36	35,00	275	302
29683	29703	O-ES 90-15°	O-ES 110-15°	15°	35	36	35,69	275	302
29684	29704	O-ES 90-20°	O-ES 110-20°	20°	34	35	36,86	275	302
29685	29705	O-ES 90-25°	O-ES 110-25°	25°	34	35	38,22	275	302
29686	29706	O-ES 90-30°	O-ES 110-30°	30°	34	36	35,38	275	302
29687	29707	O-ES 90-35°	O-ES 110-35°	35°	35	36	37,41	275	302
29688	29708	O-ES 90-40°	O-ES 110-40°	40°	34	35	39,57	275	302
29689	29709	O-ES 90-45°	O-ES 110-45°	45°	34	35	42,89	275	302
29690	29710	O-ES 90-50°	O-ES 110-50°	50°	34	35	47,16	275	302
29691	29711	O-ES 90-55°	O-ES 110-55°	55°	34	36	52,85	275	303
29692	29712	O-ES 90-60°	O-ES 110-60°	60°	33	34	49,24	275	300
29693	29713	O-ES 90-65°	O-ES 110-65°	65°	33	34	46,61	275	300
29694	29714	O-ES 90-70°	O-ES 110-70°	70°	34	35	57,59	275	300
29695	29715	O-ES 90-75°	O-ES 110-75°	75°	34	35	76,10	275	300

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

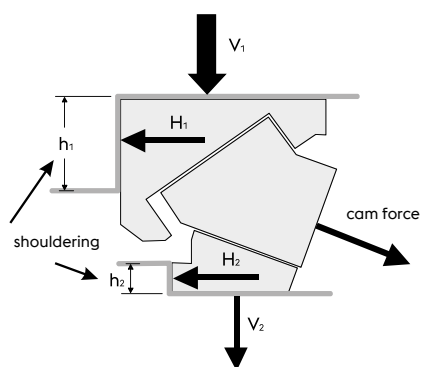
O-ES SIZE 2

PERMISSIBLE CAM FORCES

Cam unit force distribution size 2 O-ES, 300,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	99	83	99	83	0	190	30	6,8
5°	119	93	111	83	7	190	30	7,6
10°	123	123	103	102	18	148	30	6,7
15°	129	121	101	87	24	148	30	7,5
20°	130	147	85	102	37	109	40	6,4
25°	139	147	85	88	41	109	40	7,2
30°	144	118	99	46	26	143	40	12,2
35°	149	118	99	33	23	143	40	16,1
40°	148	136	79	41	35	102	40	11,7
45°	149	134	77	28	28	102	40	15,4
50°	154	136	78	18	21	102	60	16,2
55°	156	136	78	8	11	102	60	16,5
60°	146	154	27	27	46	52	90	11,1
65°	150	153	27	17	36	52	90	14
70°	154	154	27	9	26	52	90	16,2
75°	155	154	27	4	13	52	90	16,2

The cam unit force is distributed as shown in the sketch:



Shouldering: h₁ (top)
h₂ (bottom)
Press: V₁ (vertical)
Cam base: H₁ (horizontal)
Driver: H₂ (horizontal)
V₂ (vertical)

O-ES SIZE 2

O-ES 90-110 | support via cast shoulder

0°								20°								40°								60°								125 mm height
11	21	44	60	44	21	11		14	23	50	84	50	23	14		5	7	14	38	14	7	5		5	7	14	43	14	7	5		
14	27	56	70	56	27	14		20	37	70	100	70	37	20		6	8	24	66	24	8	6		6	9	24	76	24	9	6		
20	50	72	79	72	50	20		22	52	92	116	92	52	22		8	12	49	108	49	12	8		8	13	47	117	47	13	8		
31	49	74	93	74	49	31		23	59	112	127	112	59	23		11	23	89	139	89	23	11		11	23	98	141	98	23	11		
33	46	66	99	66	46	33		24	59	102	130	102	59	24		13	28	97	148	97	28	13		15	33	103	146	103	33	15		
33	44	60	90	60	44	33		33	57	86	128	86	57	33		17	34	91	146	91	34	17		18	38	96	146	96	38	18		
31	40	54	80	54	40	31		36	51	75	117	75	51	36		18	35	79	141	79	35	18		22	39	86	146	86	39	22		
90 mm width							90 mm width							90 mm width							90 mm width											
110 mm width							110 mm width							110 mm width							110 mm width											

5°								25°								45°								65°								125 mm height
11	16	35	58	35	16	11		11	17	39	74	39	17	11		5	6	11	25	11	6	5		5	5	10	11	10	5	5		
14	20	51	73	51	20	14		13	23	61	95	61	23	13		6	7	17	52	17	7	6		5	7	15	18	15	7	5		
20	37	69	81	69	37	20		14	16	85	116	85	16	14		7	9	18	98	18	9	7		7	10	14	108	14	10	7		
26	51	80	112	80	51	26		26	53	109	134	109	53	26		8	14	68	136	68	14	8		8	13	17	140	17	13	8		
28	47	72	119	72	47	28		29	57	101	139	101	57	29		10	18	95	147	95	18	10		11	23	84	149	84	23	11		
29	41	64	104	64	41	29		29	53	90	139	90	53	29		12	21	94	149	94	21	12		13	29	107	150	107	29	13		
28	39	58	86	58	39	28		28	49	78	130	78	49	28		15	27	82	147	82	27	15		16	31	94	150	94	31	16		
90 mm width							90 mm width							90 mm width							90 mm width											
110 mm width							110 mm width							110 mm width							110 mm width											

10°								30°								50°								70°								125 mm height
10	19	47	69	47	19	10		5	6	13	29	13	6	5		3	4	5	14	5	4	3		3	4	6	15	6	4	3		
14	34	61	86	61	34	14		6	8	20	59	20	8	6		4	5	8	35	8	5	4		4	5	11	39	11	5	4		
20	46	82	96	82	46	20		7	11	17	90	17	11	7		4	6	15	77	15	6	4		5	7	11	89	11	7	5		
29	59	88	111	88	59	29		11	21	75	119	75	21	11		6	10	51	120	51	10	6		5	8	48	132	48	8	5		
37	57	86	122	86	57	37		13	27	85	137	85	27	13		9	17	78	148	78	17	9		8	15	88	149	88	15	8		
29	49	76	115	76	49	29		15	31	79	144	79	31	15		11	23	93	154	93	23	11		9	19	99	154	99	19	9		
27	44	65	98	65	44	27		17	33	69	131	69	33	17		13	25	92	152	92	25	13		11	22	95	153	95	22	11		
90 mm width							90 mm width							90 mm width							90 mm width											
110 mm width							110 mm width							110 mm width							110 mm width											

15°								35°								55°								75°								125 mm height
10	16	31	64	31	16	10		4	6	9	12	9	6	4		3	3	4	5	4	3	3		3	3	4	9	4	3	3		
12	22	54	83	54	22	12		5	7	15	22	15	7	5		4	4	7	14	7	4	4		4	4	8	24	8	4	4		
16	27	81	102	81	27	16		7	9	18	81	18	9	7		4	6	16	65	16	6	4		4	6	19	73	19	6	4		
19	28	100	115	100	28	19		7	9	65	117	65	9	7		6	9	32	114	32	9	6		5	8	22	125	22	8	5		
27	45	92	128	92	45	27		8	10	85	142	85	10	8		7	12	63	144	63	12	7		7	13	66	149	66	13	7		
32	50	81	128	81	50	32		11	21	84	149	84	21	11		8	17	77	154	77	17	8		10	16	85	155	85	16	10		
32	44	71	112	71	44	32		15	29	74	140	74	29	15		8	19	82	156	82	19	8		11	16	66	154	66	16	11		
90 mm width							90 mm width							90 mm width							90 mm width											
110 mm width							110 mm width							110 mm width							110 mm width											

rounded values

O-ES SIZE 2

O-ES 90-110 | support via fitting key

0°								20°								40°								60°							
11	20	23	22	23	20	11		14	23	39	39	39	23	14		5	7	14	34	14	7	5		5	7	14	43	14	7	5	
13	24	25	25	25	24	13		20	35	40	37	40	35	20		6	8	24	49	24	8	6		6	9	24	76	24	9	6	
13	24	25	25	25	24	13		19	39	39	40	39	39	19		8	12	47	50	47	12	8		8	13	47	117	47	13	8	
22	24	24	25	24	24	22		18	39	40	40	40	39	18		11	21	48	50	48	21	11		11	23	98	139	98	23	11	
24	23	24	23	24	23	24		19	39	39	40	39	39	19		13	27	47	50	47	27	13		15	33	102	143	102	33	15	
24	24	25	23	25	24	24		28	39	39	40	39	39	28		17	32	46	50	46	32	17		18	38	96	143	96	38	18	
25	25	22	24	22	25	25		33	39	40	40	40	39	33		18	34	46	49	46	34	18		22	39	86	143	86	39	22	
90 mm width								90 mm width								90 mm width								90 mm width							
110 mm width								110 mm width								110 mm width								110 mm width							

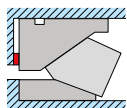
O-ES SIZE 3

FORCE DISTRIBUTION

Cam unit specifications O-ES 125-160

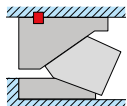
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-ES 125	O-ES 160	size	size		O-ES 125	O-ES 160			
29720	29740	O-ES 125-0°	O-ES 160-0°	0°	58	60	35,35	300	300
29721	29741	O-ES 125-5°	O-ES 160-5°	5°	57	59	35,49	300	298
29722	29742	O-ES 125-10°	O-ES 160-10°	10°	57	59	42,78	300	288
29723	29743	O-ES 125-15°	O-ES 160-15°	15°	57	59	43,62	300	290
29724	29744	O-ES 125-20°	O-ES 160-20°	20°	57	59	46,08	300	301
29725	29745	O-ES 125-25°	O-ES 160-25°	25°	57	59	47,78	300	298
29726	29746	O-ES 125-30°	O-ES 160-30°	30°	54	56	44,23	300	323
29727	29747	O-ES 125-35°	O-ES 160-35°	35°	54	57	46,76	300	322
29728	29748	O-ES 125-40°	O-ES 160-40°	40°	54	56	50,87	300	323
29729	29749	O-ES 125-45°	O-ES 160-45°	45°	54	57	55,11	300	323
29730	29750	O-ES 125-50°	O-ES 160-50°	50°	55	57	48,50	300	323
29731	29751	O-ES 125-55°	O-ES 160-55°	55°	55	58	54,36	300	323
29732	29752	O-ES 125-60°	O-ES 160-60°	60°	55	57	49,24	300	333
29733	29753	O-ES 125-65°	O-ES 160-65°	65°	55	57	46,61	300	328
29734	29754	O-ES 125-70°	O-ES 160-70°	70°	55	57	57,59	300	323
29735	29755	O-ES 125-75°	O-ES 160-75°	75°	55	57	76,10	300	323

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

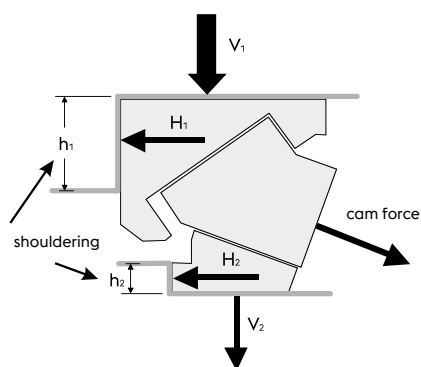
O-ES SIZE 3

PERMISSIBLE CAM FORCES

Cam unit force distribution size 3 O-ES, 300,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	121	101	121	101	0	190	30	9,2
5°	122	96	114	85	8	190	30	10,3
10°	150	150	126	124	22	150	30	9,2
15°	158	148	124	107	29	150	30	10,3
20°	157	177	102	124	45	115	50	8,8
25°	169	178	103	107	50	115	50	9,9
30°	162	132	111	51	30	130	50	17,6
35°	168	133	112	37	26	130	50	18,0
40°	169	156	90	47	40	105	50	16,8
45°	176	158	91	33	33	105	50	18,0
50°	172	151	87	20	23	105	80	18,0
55°	178	155	89	9	13	105	80	18,0
60°	171	180	32	31	54	53	100	14,8
65°	176	180	32	20	43	53	100	18,6
70°	184	184	32	11	30	53	100	19,0
75°	178	176	31	4	15	53	100	19,0

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-ES SIZE 3

O-ES 125-160 | support via cast shoulder

0°								20°								40°								60°							
28	42	70	86	70	42	28		23	32	60	120	60	32	23		5	7	15	41	15	7	5		5	8	17	45	17	8	5	
34	52	85	95	85	52	34		28	44	82	138	82	44	28		6	10	25	77	25	10	6		7	11	28	87	28	11	7	
41	64	100	106	100	64	41		36	58	106	152	106	58	36		8	15	42	128	42	15	8		9	16	43	144	43	16	9	
44	61	90	117	90	61	44		44	67	108	155	108	67	44		12	29	88	162	88	29	12		13	29	85	168	85	29	13	
42	55	78	121	78	55	42		47	69	110	157	110	69	47		16	34	94	169	94	34	16		19	40	109	171	109	40	19	
40	50	68	105	68	50	40		47	64	97	154	97	64	47		21	40	85	164	85	40	21		23	46	103	171	103	46	23	
37	46	59	89	59	46	37		43	58	82	134	82	58	43		24	40	72	139	72	40	24		26	46	88	165	88	46	26	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
5°								25°								45°								65°							
18	25	44	71	44	25	18		19	30	56	118	56	30	19		4	6	11	28	11	6	4		4	6	11	28	11	6	4	
22	32	59	85	59	32	22		24	37	68	143	68	37	24		5	8	21	65	21	8	5		5	8	21	69	21	8	5	
26	43	84	93	84	43	26		28	53	97	160	97	53	28		6	13	45	123	45	13	6		6	13	42	133	42	13	6	
33	58	96	105	96	58	33		36	66	136	169	136	66	36		10	25	85	164	85	25	10		10	24	78	174	78	24	10	
38	54	83	122	83	54	38		43	68	121	168	121	68	43		15	33	92	174	92	33	15		15	35	106	176	106	35	15	
38	50	71	113	71	50	38		44	63	103	166	103	63	44		19	38	88	176	88	38	19		20	41	102	176	102	41	20	
35	46	61	96	61	46	35		41	58	87	146	87	58	41		22	37	76	154	76	37	22		23	41	89	172	89	41	23	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
10°								30°								50°								70°							
23	35	62	99	62	35	23		5	7	15	35	15	7	5		6	18	42	52	42	18	6		3	9	43	52	43	9	3	
27	44	83	113	83	44	27		6	10	25	68	25	10	6		8	19	45	66	45	19	8		3	10	47	75	47	10	3	
34	57	115	127	115	57	34		8	15	42	114	42	15	8		8	20	48	101	48	20	8		4	12	52	106	52	12	4	
43	69	113	137	113	69	43		13	30	94	144	94	30	13		9	21	52	161	52	21	9		6	17	59	173	59	17	6	
46	64	97	150	97	64	46		18	37	90	162	90	37	18		10	25	77	171	77	25	10		8	24	88	183	88	24	8	
44	58	83	134	83	58	44		22	40	80	150	80	40	22		10	26	80	172	80	26	10		10	27	91	184	91	27	10	
39	53	71	112	71	53	39		24	39	67	125	67	39	24		12	27	70	156	70	27	12		13	29	81	176	81	29	13	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							
15°								35°								55°								75°							
19	27	55	98	55	27	19		4	5	9	22	9	5	4		5	9	23	42	23	9	5		4	8	39	59	39	8	4	
23	38	79	119	79	38	23		4	7	18	55	18	7	4		6	11	27	55	27	11	6		4	10	44	74	44	10	4	
27	51	111	133	111	51	27		6	12	40	110	40	12	6		8	16	35	83	35	16	8		6	13	54	86	54	13	6	
38	66	122	146	122	66	38		9	22	72	148	72	22	9		11	24	45	159	45	24	11		8	18	67	166	67	18	8	
42	64	104	158	104	64	42		14	32	86	168	86	32	14		16	34	67	176	67	34	16		13	25	75	177	75	25	13	
42	58	88	146	88	58	42		18	35	78	160	78	35	18		19	42	71	178	71	42	19		16	28	78	178	78	28	16	
40	53	76	123	76	53	40		21	35	66	136	66	35	21		20	43	66	158	66	43	20		19	29	72	159	72	29	19	
125 mm width								125 mm width								125 mm width								125 mm width							
160 mm width								160 mm width								160 mm width								160 mm width							

rounded values

O-ES SIZE 3

O-ES 125-160 | support via fitting key

0°								20°								40°								60°							
30	37	44	45	44	37	30		25	35	59	80	59	35	25		8	12	21	50	21	12	8		9	12	21	52	21	12	9	
35	45	45	45	45	45	35		30	47	72	81	72	47	30		10	15	29	81	29	15	10		10	16	31	91	31	16	10	
38	45	45	45	45	45	38		36	51	80	81	80	51	36		13	22	48	108	48	22	13		14	23	57	142	57	23	14	
41	45	45	45	45	45	41		43	65	81	81	81	65	43		16	31	87	108	87	31	16		17	30	87	166	87	30	17	
40	44	45	45	45	44	40		46	66	81	79	81	66	46		20	37	91	108	91	37	20		22	42	110	167	110	42	22	
39	45	45	45	45	45	39		46	63	81	80	81	63	46		24	42	83	108	83	42	24		27	48	104	168	104	48	27	
37	44	45	45	45	44	37		42	58	76	81	76	58	42		26	42	72	108	72	42	26		30	48	89	162	89	48	30	
125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width							
5°								25°								45°								65°							
20	28	44	50	44	28	20		23	32	53	88	53	32	23		8	10	18	40	18	10	8		8	10	19	42	19	10	8	
22	34	50	50	50	34	22		26	37	67	88	67	37	26		9	13	26	71	26	13	9		9	14	28	77	28	14	9	
27	45	49	50	49	45	27		34	54	88	88	88	54	34		12	20	45	112	45	20	12		12	19	42	132	42	19	12	
34	49	48	50	48	49	34		41	62	88	88	88	62	41		16	30	86	112	86	30	16		16	30	75	170	75	30	16	
38	49	47	50	47	49	38		46	66	88	88	88	66	46		20	37	93	112	93	37	20		20	41	106	172	106	41	20	
38	47	49	50	49	47	38		46	64	88	88	88	64	46		24	40	84	112	84	40	24		24	45	103	173	103	45	24	
35	44	50	49	50	44	35		42	58	82	88	82	58	42		25	40	74	112	74	40	25		26	44	88	170	88	44	26	
125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width							
10°								30°								50°								70°							
26	38	55	58	55	38	26		8	12	20	45	20	12	8		8	18	42	52	42	18	8		5	6	10	19	10	6	5	
34	48	58	57	58	48	34		10	15	28	71	28	15	10		8	19	45	66	45	19	8		6	8	17	46	17	8	6	
36	56	58	58	58	56	36		13	22	49	79	49	22	13		9	20	48	101	48	20	9		7	12	34	108	34	12	7	
42	58	58	58	58	58	42		16	28	77	79	77	28	16		10	20	52	161	52	20	10		10	19	59	173	59	19	10	
44	58	57	57	57	58	44		22	40	79	78	79	40	22		13	25	78	171	78	25	13		13	28	92	180	92	28	13	
43	55	58	58	58	55	43		24	43	74	77	74	43	24		15	26	80	172	80	26	15		16	34	95	180	95	34	16	
40	51	58	57	58	51	40		26	41	66	78	66	41	26		16	27	70	156	70	27	16		18	35	85	172	85	35	18	
125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width							
15°								35°								55°								75°							
23	34	54	64	54	34	23		7	10	17	35	17	10	7		4	5	8	12	8	5	4		4	5	8	12	8	5	4	
26	40	64	64	64	40	26		8	12	24	59	24	12	8		5	7	14	33	14	7	5		5	7	13	33	13	7	5	
33	50	64	64	64	50	33		11	18	38	84	38	18	11		6	10	27	90	27	10	6		6	10	26	94	26	10	6	
42	61	64	64	64	61	42		15	28	74	84	74	28	15		8	16	47	108	47	16	8		8	16	50	164	50	16	8	
44	59	62	63	62	59	44		20	36	82	82	82	36	20		12	24	70	112	70	24	12		11	24	77	173	77	24	11	
43	56	64	64	64	56	43		23	39	74	81	74	39	23		14	28	71	112	71	28	14		14	29	83	174	83	29	14	
39	52	64	63	64	52	39		24	38	64	82	64	38	24		16	28	65	112	65	28	16		16	30	76	160	76	30	16	
125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width								125 mm width 160 mm width							

rounded values

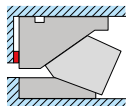
O-ES SIZE 4

FORCE DISTRIBUTION

Cam unit specifications O-ES 175-220

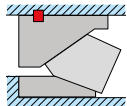
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-ES 175	O-ES 220	Baureihe	Baureihe		O-ES 175	O-ES 220			
29760	29780	O-ES 175-0°	O-ES 220-0°	0°	86	88	41,78	300	300
29761	29781	O-ES 175-5°	O-ES 220-5°	5°	85	88	41,94	300	298
29762	29782	O-ES 175-10°	O-ES 220-10°	10°	84	87	50,56	300	304
29763	29783	O-ES 175-15°	O-ES 220-15°	15°	84	87	51,55	300	310
29764	29784	O-ES 175-20°	O-ES 220-20°	20°	82	85	55,30	300	323
29765	29785	O-ES 175-25°	O-ES 220-25°	25°	82	85	57,33	300	323
29766	29786	O-ES 175-30°	O-ES 220-30°	30°	79	82	53,07	300	306
29767	29787	O-ES 175-35°	O-ES 220-35°	35°	80	83	56,11	300	311
29768	29788	O-ES 175-40°	O-ES 220-40°	40°	79	82	62,18	300	323
29769	29789	O-ES 175-45°	O-ES 220-45°	45°	79	82	67,36	300	323
29770	29790	O-ES 175-50°	O-ES 220-50°	50°	80	83	60,63	300	323
29771	29791	O-ES 175-55°	O-ES 220-55°	55°	80	83	67,94	300	328
29772	29792	O-ES 175-60°	O-ES 220-60°	60°	80	83	68,94	300	323
29773	29793	O-ES 175-65°	O-ES 220-65°	65°	79	82	60,59	300	323
29774	29794	O-ES 175-70°	O-ES 220-70°	70°	80	83	74,86	300	323
29775	29795	O-ES 175-75°	O-ES 220-75°	75°	79	82	76,10	300	323

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

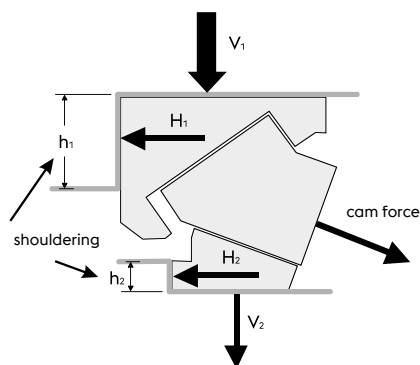
O-ES SIZE 4

PERMISSIBLE CAM FORCES

Cam unit force distribution size 4 O-ES, 300,000 strokes

cam unit angle [degree]	max. cam forc	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	162	136	162	136	0	190	30	15,6
5°	182	143	171	127	11	190	30	17,5
10°	226	226	190	187	33	148	30	15,5
15°	242	227	190	164	44	148	30	17,3
20°	230	260	150	182	66	115	30	14,9
25°	242	256	148	154	72	115	30	16,7
30°	225	183	154	71	41	130	30	23,0
35°	218	173	145	48	33	130	30	23,0
40°	242	223	129	67	57	100	30	25,0
45°	246	221	127	47	47	100	30	26,0
50°	260	229	132	29	35	100	90	28,0
55°	257	224	129	13	18	100	90	28,0
60°	255	267	47	46	80	50	110	25,9
65°	255	260	46	29	62	50	110	26,0
70°	265	265	47	16	44	50	130	27,0
75°	265	262	46	6	22	50	130	27,0

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-ES SIZE 4

O-ES 175-220 | support via cast shoulder

0°							20°							40°							60°							150 mm height
32	26	69	126	69	26	32	35	50	83	171	83	50	35	25	36	64	94	64	36	25	23	32	57	104	57	32	23	
34	31	94	134	94	31	34	39	58	106	192	106	58	39	27	40	70	143	70	40	27	24	36	68	172	68	36	24	
41	44	119	145	119	44	41	42	64	132	208	132	64	42	28	44	81	214	81	44	28	26	41	81	238	81	41	26	
48	55	104	162	104	55	48	48	74	157	226	157	74	48	30	48	105	239	105	48	30	28	44	84	251	84	44	28	
53	58	92	158	92	58	53	51	73	137	230	137	73	51	30	46	95	242	95	46	30	28	46	94	255	94	46	28	
50	54	83	143	83	54	50	50	68	118	229	118	68	50	29	45	90	206	90	45	29	28	45	97	254	97	45	28	
46	50	74	123	74	50	46	48	65	111	200	111	65	48	28	43	80	167	80	43	28	26	42	86	232	86	42	26	
175 mm width							175 mm width							175 mm width							175 mm width							
220 mm width							220 mm width							220 mm width							220 mm width							
5°							25°							45°							65°							150 mm height
30	45	59	101	59	45	30	30	40	70	170	70	40	30	18	22	42	74	42	22	18	18	24	43	63	43	24	18	
35	50	73	94	73	50	35	30	36	73	194	73	36	30	21	30	59	101	59	30	21	19	28	53	90	53	28	19	
38	55	128	152	128	55	38	34	47	125	210	125	47	34	21	27	52	155	52	27	21	21	32	67	190	67	32	21	
43	64	109	162	109	64	43	36	62	129	238	129	62	36	20	22	56	228	56	22	20	24	38	91	240	91	38	24	
38	60	97	182	97	60	38	42	62	134	242	134	62	42	24	34	83	246	83	34	24	25	42	103	255	103	42	25	
40	55	80	160	80	55	40	43	66	122	240	122	66	43	26	39	102	246	102	39	26	27	46	112	253	112	46	27	
40	52	73	132	73	52	40	44	64	107	212	107	64	44	27	42	96	214	96	42	27	28	46	109	252	109	46	28	
175 mm width							175 mm width							175 mm width							175 mm width							
220 mm width							220 mm width							220 mm width							220 mm width							
10°							30°							50°							70°							150 mm height
26	40	80	146	80	40	26	25	36	63	96	63	36	25	16	21	36	55	36	21	16	15	20	34	52	34	20	15	
29	49	102	171	102	49	29	27	39	70	144	70	39	27	18	25	46	65	46	25	18	16	24	42	62	42	24	16	
32	54	138	191	138	54	32	28	39	57	156	57	39	28	19	28	54	74	54	28	19	18	27	51	70	51	27	18	
38	62	125	207	125	62	38	28	42	101	225	101	42	28	21	32	69	213	69	32	21	20	30	67	233	67	30	20	
40	62	110	226	110	62	40	30	46	98	219	98	46	30	23	36	76	248	76	36	23	22	34	79	262	79	34	22	
42	59	96	193	96	59	42	30	44	82	182	82	44	30	25	39	81	260	81	39	25	24	38	85	265	85	38	24	
41	55	84	155	84	55	41	28	41	70	146	70	41	28	26	40	82	237	82	40	26	25	40	83	261	83	40	25	
175 mm width							175 mm width							175 mm width							175 mm width							
220 mm width							220 mm width							220 mm width							220 mm width							
15°							35°							55°							75°							150 mm height
22	35	72	156	72	35	22	12	16	32	69	32	16	12	15	20	34	46	34	20	15	15	20	31	45	31	20	15	
24	40	96	182	96	40	24	13	18	43	117	43	18	13	16	24	43	56	43	24	16	16	22	40	60	40	22	16	
27	47	124	199	124	47	27	14	22	49	178	49	22	14	19	27	48	71	48	27	19	18	26	52	80	52	26	18	
32	58	128	199	128	58	32	15	24	49	214	49	24	15	20	31	63	214	63	31	20	20	30	66	223	66	30	20	
34	56	116	242	116	56	34	17	30	84	218	84	30	17	22	34	76	249	76	34	22	21	33	77	263	77	33	21	
36	56	102	214	102	56	36	18	31	90	213	90	31	18	24	36	68	257	68	36	24	23	36	81	265	81	36	23	
37	54	90	170	90	54	37	19	32	81	190	81	32	19	24	38	78	257	78	38	24	24	36	77	253	77	36	24	
175 mm width							175 mm width							175 mm width							175 mm width							
220 mm width							220 mm width							220 mm width							220 mm width							

rounded values

O-ES SIZE 4

O-ES 175-220 | support via fitting key

0°							20°							40°							60°						
32	26	55	67	55	26	32	35	50	80	108	80	50	35	25	36	64	94	64	36	25	23	32	57	104	57	32	23
34	30	57	73	57	30	34	39	58	101	110	101	58	39	27	40	69	128	69	40	27	24	36	68	172	68	36	24
41	40	64	73	64	40	41	42	63	115	112	115	63	42	28	44	77	119	77	44	28	26	41	81	238	81	41	26
48	51	62	71	62	51	48	48	70	114	112	114	70	48	30	48	100	138	100	48	30	28	44	84	251	84	44	28
53	56	64	70	64	56	53	51	72	114	114	114	72	51	30	46	90	140	90	46	30	28	46	94	255	94	46	28
50	53	69	72	69	53	50	50	68	110	115	110	68	50	29	45	86	142	86	45	29	28	45	97	254	97	45	28
46	49	63	73	63	49	46	48	65	109	114	109	65	48	28	43	79	139	79	43	28	26	42	86	232	86	42	26
175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width						
5°							25°							45°							65°						
30	45	58	72	58	45	30	30	40	68	122	68	40	30	18	22	42	74	42	22	18	18	24	43	63	43	24	18
35	49	64	66	64	49	35	30	36	70	118	70	36	30	21	30	59	100	59	30	21	19	28	53	90	53	28	19
38	50	78	77	78	50	38	34	47	120	110	120	47	34	21	27	52	146	52	27	21	21	32	67	190	67	32	21
43	60	72	72	72	60	43	36	62	124	122	124	62	36	20	22	52	131	52	22	20	24	38	91	240	91	38	24
38	59	76	72	76	59	38	42	62	123	121	123	62	42	24	34	78	141	78	34	24	25	42	103	255	103	42	25
40	54	72	70	72	54	40	43	66	115	122	115	66	43	26	39	98	144	98	39	26	27	46	112	253	112	46	27
40	52	67	78	67	52	40	44	64	103	122	103	64	44	27	42	93	145	93	42	27	28	46	109	252	109	46	28
175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width						
10°							30°							50°							70°						
26	40	74	76	74	40	26	25	36	63	85	63	36	25	16	21	36	55	36	21	16	15	20	34	52	34	20	15
29	48	68	86	68	48	29	27	39	69	110	69	39	27	18	25	46	65	46	25	18	16	24	42	62	42	24	16
32	50	89	86	89	50	32	28	39	55	104	55	39	28	19	28	54	70	54	28	19	18	27	51	70	51	27	18
38	59	88	86	88	59	38	28	42	95	100	95	42	28	21	32	64	113	64	32	21	20	30	67	233	67	30	20
40	60	88	85	88	60	40	30	46	92	108	92	46	30	23	36	71	141	71	36	23	22	34	79	262	79	34	22
42	59	88	85	88	59	42	30	44	78	110	78	44	30	25	39	76	148	76	39	25	24	38	85	265	85	38	24
41	55	82	88	82	55	41	28	41	68	110	68	41	28	26	40	78	148	78	40	26	25	40	83	261	83	40	25
175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width						
15°							35°							55°							75°						
22	35	69	94	69	35	22	12	16	32	69	32	16	12	15	20	34	46	34	20	15	15	20	31	45	31	20	15
24	40	87	94	87	40	24	13	18	42	108	42	18	13	16	24	43	56	43	24	16	16	22	40	60	40	22	16
27	44	86	95	86	44	27	14	22	46	115	46	22	14	19	27	47	67	47	27	19	18	26	52	80	52	26	18
32	55	93	95	93	55	32	15	24	44	98	44	24	15	20	31	59	133	59	31	20	20	30	66	223	66	30	20
34	55	92	86	92	55	34	17	30	79	96	79	30	17	22	34	72	147	72	34	22	21	33	77	263	77	33	21
36	55	92	86	92	55	36	18	31	86	107	86	31	18	24	36	66	224	66	36	24	23	36	81	265	81	36	23
37	54	86	93	86	54	37	19	32	77	113	77	32	19	24	38	78	257	78	38	24	24	36	77	253	77	36	24
175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width							175 mm width 220 mm width						

rounded values

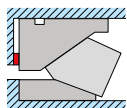
O-ES SIZE 5

FORCE DISTRIBUTION

Cam unit specifications O-ES 260-330

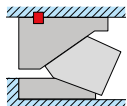
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-ES 260	O-ES 330	size	size		O-ES 260	O-ES 330			
29800	29820	O-ES 260-0°	O-ES 330-0°	0°	152	157	41,78	300	310
29801	29821	O-ES 260-5°	O-ES 330-5°	5°	151	157	42,75	300	305
29802	29822	O-ES 260-10°	O-ES 330-10°	10°	149	154	52,04	300	305
29803	29823	O-ES 260-15°	O-ES 330-15°	15°	149	154	53,68	300	305
29804	29824	O-ES 260-20°	O-ES 330-20°	20°	148	153	57,82	300	311
29805	29825	O-ES 260-25°	O-ES 330-25°	25°	148	153	61,50	300	306
29806	29826	O-ES 260-30°	O-ES 330-30°	30°	142	148	56,61	300	325
29807	29827	O-ES 260-35°	O-ES 330-35°	35°	143	148	60,26	300	325
29808	29828	O-ES 260-40°	O-ES 330-40°	40°	141	146	67,04	300	330
29809	29829	O-ES 260-45°	O-ES 330-45°	45°	141	146	73,32	300	325
29810	29830	O-ES 260-50°	O-ES 330-50°	50°	142	147	64,94	300	325
29811	29831	O-ES 260-55°	O-ES 330-55°	55°	141	147	75,63	300	325
29812	29832	O-ES 260-60°	O-ES 330-60°	60°	143	149	68,94	300	325
29813	29833	O-ES 260-65°	O-ES 330-65°	65°	143	149	60,59	300	325
29814	29834	O-ES 260-70°	O-ES 330-70°	70°	143	149	74,86	300	325
29815	29835	O-ES 260-75°	O-ES 330-75°	75°	143	148	98,93	300	325

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

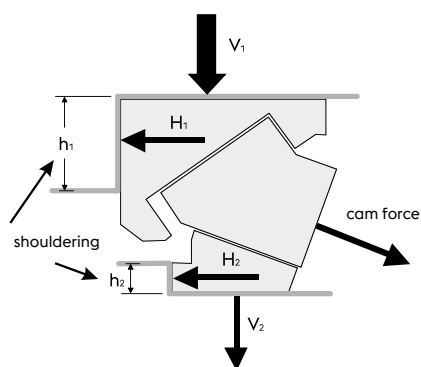
O-ES SIZE 5

PERMISSIBLE CAM FORCES

Cam unit force distribution size 5 O-ES, 300,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	312	262	312	262	0	186	30	30,9
5°	331	260	309	231	20	186	30	34,6
10°	321	321	269	265	47	142	30	30,7
15°	343	321	269	232	62	142	30	34,4
20°	309	350	202	244	89	110	30	29,6
25°	331	350	202	210	98	110	30	33,2
30°	322	263	221	102	59	125	30	35,0
35°	332	263	221	73	51	125	30	35,0
40°	332	306	177	93	78	95	30	35,0
45°	338	303	175	64	64	95	30	35,0
50°	214	189	109	24	29	95	95	30,0
55°	290	252	146	15	21	95	95	30,0
60°	332	348	61	60	105	45	115	34,0
65°	340	346	61	38	82	45	115	36,0
70°	266	266	47	16	44	45	150	40,0
75°	256	253	45	6	22	45	150	40,0

The cam unit force is distributed as shown in the sketch:



Shouldering: h_1 (top)
 h_2 (bottom)
 Press: V_1 (vertical)
 Cam base: H_1 (horizontal)
 Driver: H_2 (horizontal)
 V_2 (vertical)

O-ES SIZE 5

O-ES 260-330 | support via cast shoulder

0°							20°							40°							60°						
35	80	146	221	146	80	35	37	79	138	210	138	79	37	25	34	65	125	65	34	25	25	28	56	115	56	28	25
39	90	174	261	174	90	39	41	88	165	250	165	88	41	28	43	105	195	105	43	28	27	33	72	185	72	33	27
44	102	208	295	208	102	44	46	99	199	286	199	99	46	31	54	153	275	153	54	31	31	40	89	265	89	40	31
49	115	244	311	244	115	49	51	111	233	307	233	111	51	36	65	200	327	200	65	36	35	47	103	321	103	47	35
55	127	274	313	274	127	55	57	123	266	309	266	123	57	40	75	232	332	232	75	40	39	54	114	331	114	54	39
61	139	294	313	294	139	61	63	134	291	309	291	134	63	43	81	237	332	237	81	43	43	60	123	332	123	60	43
66	146	289	313	289	146	66	69	143	291	309	291	143	69	45	79	215	332	215	79	45	45	61	125	332	125	61	45
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
5°							25°							45°							65°						
24	62	110	169	110	62	24	24	64	106	165	106	64	24	21	32	92	70	92	32	21	21	25	34	70	34	25	21
27	72	140	222	140	72	27	27	73	135	212	135	73	27	24	38	110	149	110	38	24	23	33	73	149	73	33	23
30	83	176	277	176	83	30	31	84	170	268	170	84	31	28	46	131	232	131	46	28	26	43	125	233	125	43	26
34	95	216	317	216	95	34	35	96	210	311	210	96	35	31	53	152	304	152	53	31	30	54	173	304	173	54	30
39	108	255	329	255	108	39	40	109	250	328	250	109	40	34	61	170	333	170	61	34	33	63	209	334	209	63	33
44	121	288	331	288	121	44	45	122	286	331	286	122	45	37	67	184	338	184	67	37	35	68	224	340	224	68	35
48	129	294	331	294	129	48	49	132	294	331	294	132	49	39	71	193	338	193	71	39	37	70	213	340	213	70	37
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
10°							30°							50°							70°						
40	89	155	234	155	89	40	23	30	52	101	52	30	23	9	17	73	63	73	17	9	9	14	41	72	41	14	9
44	99	183	271	183	99	44	26	38	90	174	90	38	26	10	22	92	137	92	22	10	9	19	73	126	73	19	9
49	111	218	309	218	111	49	29	49	137	247	137	49	29	12	26	112	168	112	26	12	11	25	112	189	112	25	11
55	124	253	320	253	124	55	33	60	185	306	185	60	33	14	31	132	198	132	31	14	12	31	152	241	152	31	12
60	136	283	321	283	136	60	37	70	220	320	220	70	37	16	36	148	212	148	36	16	13	36	177	262	177	36	13
66	147	301	321	301	147	66	41	77	233	323	233	77	41	18	41	162	215	162	41	18	15	40	188	266	188	40	15
69	148	295	321	295	148	69	43	77	214	323	214	77	43	19	44	172	215	172	44	19	16	40	182	266	182	40	16
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						
15°							35°							55°							75°						
27	75	124	197	124	75	27	20	25	30	61	30	25	20	9	17	75	61	75	17	9	9	14	41	75	41	14	9
30	85	156	250	156	85	30	22	32	69	144	69	32	22	11	22	95	128	95	22	11	9	19	75	141	75	19	9
35	98	194	303	194	98	35	25	42	119	236	119	42	25	13	27	119	201	119	27	13	10	24	117	210	117	24	10
39	111	236	340	236	111	39	28	52	169	307	169	52	28	14	31	137	261	137	31	14	10	28	152	252	152	28	10
43	124	274	343	274	124	43	30	59	203	328	203	59	30	15	34	152	285	152	34	15	10	30	166	256	166	30	10
48	137	305	343	305	137	48	32	63	216	332	216	63	32	16	37	164	290	164	37	16	9	29	167	256	167	29	9
48	135	301	343	301	135	48	32	61	199	332	199	61	32	16	37	167	290	167	37	16	9	27	150	250	150	27	9
260 mm width							260 mm width							260 mm width							260 mm width						
330 mm width							330 mm width							330 mm width							330 mm width						

rounded values

O-ES SIZE 5

O-ES 260-330 | support via fitting key

0°							20°							40°							60°						
26	46	66	89	66	46	26	28	45	62	84	62	45	28	25	31	33	63	33	31	25	25	28	56	115	56	28	25
29	51	78	105	78	51	29	31	50	74	100	74	50	31	28	37	48	88	48	37	28	27	33	72	185	72	33	27
33	58	94	118	94	58	33	35	56	89	114	89	56	35	31	45	69	125	69	45	31	31	40	89	265	89	40	31
37	65	110	124	110	65	37	39	63	105	123	105	63	39	36	53	91	149	91	53	36	35	47	103	321	103	47	35
41	72	124	125	124	72	41	43	70	120	124	120	70	43	40	61	105	151	105	61	40	39	54	114	331	114	54	39
45	78	133	125	133	78	45	48	76	132	124	132	76	48	43	67	108	151	108	67	43	43	60	123	332	123	60	43
50	83	131	125	131	83	50	53	81	131	124	131	81	53	45	67	98	151	98	67	45	45	61	125	332	125	61	45
260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width						
5°							25°							45°							65°						
16	36	50	68	50	36	16	8	34	41	58	41	34	8	21	27	47	34	47	27	21	21	25	34	70	34	25	21
18	41	63	89	63	41	18	9	39	57	81	57	39	9	24	32	50	68	50	32	24	23	33	73	149	73	33	23
21	47	79	111	79	47	21	11	44	74	106	74	44	11	28	38	60	105	60	38	28	26	43	125	233	125	43	26
24	54	97	127	97	54	24	13	50	94	126	94	50	13	31	45	69	138	69	45	31	30	54	173	304	173	54	30
27	61	115	131	115	61	27	15	57	116	132	116	57	15	34	51	77	151	77	51	34	33	63	209	334	209	63	33
31	68	130	132	130	68	31	19	64	135	132	135	64	19	37	56	84	154	84	56	37	35	68	224	340	224	68	35
34	73	133	132	133	73	34	21	70	131	132	131	70	21	39	60	88	154	88	60	39	37	70	213	340	213	70	37
260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width						
10°							30°							50°							70°						
29	51	70	94	70	51	29	19	17	23	40	23	17	19	9	13	37	30	37	13	9	9	14	41	72	41	14	9
32	56	82	109	82	56	32	22	22	41	70	41	22	22	10	16	42	62	42	16	10	9	19	73	126	73	19	9
37	63	98	124	98	63	37	24	27	62	99	62	27	24	12	20	51	77	51	20	12	11	25	112	189	112	25	11
41	70	114	128	114	70	41	28	33	83	122	83	33	28	14	24	60	90	60	24	14	12	31	152	241	152	31	12
45	77	128	128	128	77	45	31	39	99	128	99	39	31	16	27	67	96	67	27	16	13	36	177	262	177	36	13
49	83	136	128	136	83	49	34	43	105	129	105	43	34	18	31	73	98	73	31	18	15	40	188	266	188	40	15
52	84	133	128	133	84	52	36	43	96	129	96	43	36	19	34	78	98	78	34	19	16	40	182	266	182	40	16
260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width						
15°							35°							55°							75°						
19	43	56	79	56	43	19	17	14	14	24	14	14	17	9	17	75	61	75	17	9	9	14	41	75	41	14	9
21	49	70	100	70	49	21	19	18	31	57	31	18	19	11	22	95	128	95	22	11	9	19	75	141	75	19	9
24	56	87	121	87	56	24	21	23	53	94	53	23	21	13	27	119	201	119	27	13	10	24	117	210	117	24	10
27	63	106	136	106	63	27	23	28	76	123	76	28	23	14	31	137	261	137	31	14	10	28	152	252	152	28	10
30	70	124	137	124	70	30	25	32	92	131	92	32	25	15	34	152	285	152	34	15	10	30	166	256	166	30	10
33	77	137	137	137	77	33	26	35	97	133	97	35	26	16	37	164	290	164	37	16	9	29	167	256	167	29	9
34	76	136	137	136	76	34	26	34	90	133	90	34	26	16	37	167	290	167	37	16	9	27	150	250	150	27	9
260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width							260 mm width 330 mm width						

rounded values

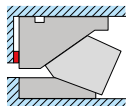
O-ES SIZE 6

FORCE DISTRIBUTION

Cam unit specifications O-ES 400-500

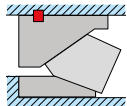
ident. no.		designation		angle [degree]	weight [kg]		stroke [mm]	height cam unit [mm]	length cam unit [mm]
O-ES 400	O-ES 500	size	size		O-ES 400	O-ES 500			
29840	29860	O-ES 400-0°	O-ES 500-0°	0°	309	321	41,78	375	407
29841	29861	O-ES 400-5°	O-ES 500-5°	5°	307	320	42,75	375	407
29842	29862	O-ES 400-10°	O-ES 500-10°	10°	301	313	52,04	375	407
29843	29863	O-ES 400-15°	O-ES 500-15°	15°	300	313	53,68	375	407
29844	29864	O-ES 400-20°	O-ES 500-20°	20°	295	307	57,82	375	406
29845	29865	O-ES 400-25°	O-ES 500-25°	25°	294	307	61,50	375	406
29846	29866	O-ES 400-30°	O-ES 500-30°	30°	284	296	56,61	375	407
29847	29867	O-ES 400-35°	O-ES 500-35°	35°	288	301	60,26	375	407
29848	29868	O-ES 400-40°	O-ES 500-40°	40°	280	293	67,04	375	406
29849	29869	O-ES 400-45°	O-ES 500-45°	45°	287	300	73,32	375	406
29850	29870	O-ES 400-50°	O-ES 500-50°	50°	288	301	64,94	375	406
29851	29871	O-ES 400-55°	O-ES 500-55°	55°	292	304	75,62	375	406
29852	29872	O-ES 400-60°	O-ES 500-60°	60°	280	293	68,94	375	421
29853	29873	O-ES 400-65°	O-ES 500-65°	65°	285	298	60,59	375	426
29854	29874	O-ES 400-70°	O-ES 500-70°	70°	289	302	74,86	375	431
29855	29875	O-ES 400-75°	O-ES 500-75°	75°	289	301	98,93	375	431

Permissible size of the cam forces



Shouldering

Top and bottom support
by shouldering



Fitting key

Top support by fitting key, bottom
support by shouldering

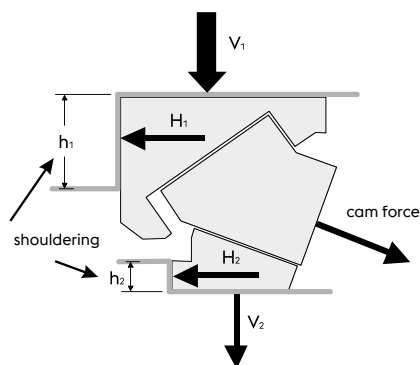
O-ES SIZE 6

PERMISSIBLE CAM FORCES

Cam unit force distribution size 5 O-ES, 300,000 strokes

cam unit angle [degree]	max. cam force	force distribution at max. cam force [kN]				shouldering [mm]		retraction force
	[kN]	V1	H1	V2	H2	h1	h2	[kN]
0°	544	457	544	457	0	228	30	74,5
5°	581	456	544	405	35	228	30	71,4
10°	506	506	424	418	74	179	30	74,5
15°	472	441	370	319	85	179	30	71,4
20°	543	614	355	428	156	135	40	73,1
25°	580	613	354	368	172	135	40	70,2
30°	495	403	338	156	90	157	40	62,8
35°	459	364	306	101	71	157	40	58,0
40°	450	415	239	125	105	120	40	62,1
45°	462	415	239	88	88	120	40	57,4
50°	436	383	221	49	59	120	100	51,6
55°	405	352	203	20	29	120	100	47,5
60°	452	474	84	82	143	59	150	59,2
65°	460	469	83	52	112	59	150	54,2
70°	470	470	83	28	78	59	150	52,9
75°	409	404	71	9	35	59	150	47,2

The cam unit force is distributed as shown in the sketch:



Shouldering: h₁ (top)
h₂ (bottom)
Press: V₁ (vertical)
Cam base: H₁ (horizontal)
Driver: H₂ (horizontal)
V₂ (vertical)

O-ES SIZE 6

O-ES 400-500 | support via cast shoulder

0°							20°							40°							60°						
73	163	232	306	232	163	73	82	144	272	403	272	144	82	30	98	91	161	91	98	30	26	107	161	180	161	107	26
75	173	282	404	282	173	75	87	154	325	498	325	154	87	31	104	162	284	162	104	31	26	110	219	306	219	110	26
72	179	337	499	337	179	72	91	162	373	543	373	162	91	32	109	235	409	235	109	32	26	112	271	424	271	112	26
65	176	387	544	387	176	65	93	171	412	543	412	171	93	32	112	290	450	290	112	32	24	110	306	452	306	110	24
57	163	425	544	425	163	57	91	172	436	542	436	172	91	32	114	311	450	311	114	32	20	106	311	452	311	106	20
49	148	449	544	449	148	49	89	174	441	543	441	174	89	31	112	285	450	285	112	31	16	100	283	452	283	100	16
42	133	402	544	402	133	42	82	164	414	542	414	164	82	26	108	210	429	210	108	26	13	92	223	409	223	92	13
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
5°							25°							45°							65°						
21	102	130	134	130	102	21	42	100	132	134	132	100	42	9	44	64	92	64	44	9	13	76	83	84	83	76	13
22	109	183	248	183	109	22	45	106	180	247	180	106	45	10	81	92	188	92	81	10	13	81	142	187	142	81	13
24	115	238	379	238	115	24	48	114	234	369	234	114	48	10	86	164	332	164	86	10	13	86	203	331	203	86	13
25	119	298	500	298	119	25	52	122	293	499	293	122	52	10	88	224	444	224	88	10	13	89	249	442	249	89	13
22	122	354	577	354	122	22	56	129	351	576	351	129	56	10	87	259	462	259	87	10	14	90	274	460	274	90	14
19	115	398	581	398	115	19	59	137	396	580	396	137	59	9	84	246	462	246	84	9	13	88	266	460	266	88	13
16	104	392	581	392	104	16	61	144	411	580	411	144	61	8	81	189	427	189	81	8	11	85	230	426	230	85	11
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
10°							30°							50°							70°						
67	118	173	209	173	118	67	32	78	104	186	104	78	32	10	59	117	120	117	59	10	10	84	86	88	86	84	10
71	125	219	308	219	125	71	33	84	183	322	183	84	33	10	67	131	274	131	67	10	8	86	149	170	149	86	8
75	134	269	417	269	134	75	34	88	262	450	262	88	34	10	75	144	436	144	75	10	9	87	211	328	211	87	9
79	143	319	489	319	143	79	34	90	324	495	324	90	34	10	82	151	436	151	82	10	9	86	255	451	255	86	9
82	153	364	506	364	153	82	33	91	348	495	348	91	33	11	87	152	436	152	87	11	9	82	271	470	271	82	9
85	162	398	506	398	162	85	32	90	319	495	319	90	32	11	90	152	436	152	90	11	8	76	249	470	249	76	8
83	165	411	506	411	165	83	28	87	234	472	234	87	28	11	91	152	436	152	91	11	8	70	205	416	205	70	8
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
15°							35°							55°							75°						
34	86	77	116	77	86	34	14	54	53	67	53	54	14	10	64	122	132	122	64	10	9	85	86	157	86	85	9
36	93	128	204	128	93	36	15	65	100	166	100	65	14	10	72	142	164	142	72	10	8	83	150	276	150	83	8
40	100	182	292	182	100	40	15	78	153	309	153	78	15	10	80	154	280	154	80	10	7	80	220	382	220	80	7
44	108	237	385	237	108	44	16	85	220	426	220	85	16	11	86	158	376	158	86	11	6	74	256	409	256	74	6
47	117	295	456	295	117	47	16	88	262	459	262	88	16	12	90	158	405	158	90	12	5	68	260	409	260	68	5
50	125	349	472	349	125	50	17	91	261	459	261	91	17	12	91	158	405	158	91	12	4	59	225	409	225	59	4
53	133	381	472	381	133	53	17	91	215	444	215	91	17	12	91	158	405	158	91	12	4	50	176	344	176	50	4
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						

rounded values

O-ES SIZE 6

O-ES 400-500 | support via fitting key

0°							20°							40°							60°						
51	65	58	122	58	65	51	50	58	82	144	82	58	50	28	49	55	134	55	49	28	26	107	161	180	161	107	26
53	69	70	122	70	69	53	52	61	98	144	98	61	52	28	52	97	237	97	52	28	26	110	219	306	219	110	26
50	72	84	122	84	72	50	54	65	112	144	112	65	54	28	55	141	245	141	55	28	26	112	271	424	271	112	26
45	70	97	122	97	70	45	56	68	124	144	124	68	56	29	56	174	245	174	56	29	24	110	306	452	306	110	24
40	65	106	122	106	65	40	55	69	131	144	131	69	55	28	57	186	245	186	57	28	20	106	311	452	311	106	20
34	59	112	122	112	59	34	54	70	132	144	132	70	54	28	56	171	245	171	56	28	16	100	283	452	283	100	16
30	53	101	122	101	53	30	49	66	124	144	124	66	49	24	54	126	245	126	54	24	13	92	223	409	223	92	13
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
5°							25°							45°							65°						
14	41	39	134	39	41	14	38	40	46	132	46	40	38	9	41	43	49	43	41	9	13	76	83	84	83	76	13
15	44	55	134	55	44	15	40	42	63	150	63	42	40	10	49	56	131	56	49	10	13	81	142	187	142	81	13
17	46	72	134	72	46	17	44	46	70	150	70	46	44	10	51	98	233	98	51	10	13	86	203	331	203	86	13
18	48	89	134	89	48	18	47	49	88	150	88	49	47	10	52	135	311	135	52	10	13	89	249	442	249	89	13
15	49	106	134	106	49	15	50	52	105	150	105	52	50	10	52	156	311	156	52	10	14	90	274	460	274	90	14
13	46	120	134	120	46	13	53	55	119	150	119	55	53	9	51	148	311	148	51	9	13	88	266	460	266	88	13
11	42	118	134	118	42	11	55	58	123	150	123	58	55	8	48	114	299	114	48	8	11	85	230	426	230	85	11
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
10°							30°							50°							70°						
24	34	23	116	23	34	24	29	32	42	161	42	32	29	10	47	94	109	94	47	10	10	84	86	88	86	84	10
26	37	38	142	38	37	26	30	34	73	161	73	34	30	10	54	105	249	105	54	10	8	86	149	170	149	86	8
28	40	55	142	55	40	28	30	35	105	161	105	35	30	10	60	116	396	116	60	10	9	87	211	328	211	87	9
30	43	71	142	71	43	30	30	36	130	161	130	36	30	10	65	121	396	121	65	10	9	86	255	451	255	86	9
33	47	88	142	88	47	33	30	36	139	161	139	36	30	11	70	122	396	122	70	11	9	82	271	470	271	82	9
35	50	105	142	105	50	35	29	36	128	161	128	36	29	11	72	122	396	122	72	11	8	76	249	470	249	76	8
37	53	114	142	114	53	37	26	35	94	161	94	35	26	11	73	122	396	122	73	11	8	70	205	416	205	70	8
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						
15°							35°							55°							75°						
50	58	82	144	82	58	50	12	22	22	67	22	22	12	10	64	122	132	122	64	10	9	85	86	157	86	85	9
52	61	98	144	98	61	52	13	26	40	158	40	26	13	10	72	142	164	142	72	10	8	83	150	276	150	83	8
54	65	112	144	112	65	54	14	31	61	164	61	31	14	10	80	154	280	154	80	10	7	80	220	382	220	80	7
56	68	124	144	124	68	56	14	34	88	164	88	34	14	11	86	158	376	158	86	11	6	74	256	409	256	74	6
55	69	131	144	131	69	55	15	36	105	164	105	36	15	12	90	158	405	158	90	12	5	68	260	409	260	68	5
54	70	132	144	132	70	54	15	36	104	164	104	36	15	12	91	158	405	158	91	12	4	59	225	409	225	59	4
49	66	124	144	124	66	49	16	36	86	164	86	36	16	12	91	158	405	158	91	12	4	50	176	344	176	50	4
400 mm width							400 mm width							400 mm width							400 mm width						
500 mm width							500 mm width							500 mm width							500 mm width						

rounded values



PRE-MACHINING

Flexible, accurate and economical

voestalpine Camtec offers various pre-machining options:

- » Individual and flexible adjustment of the work surface width (e.g. from 110 to 105 mm)
- » Pre-machining of threads, fitting holes and milling according to your CAD data set for mounting the add-on parts on the cam units

Our pre-machining will save time and guarantees maximum flexibility and costefficiency.

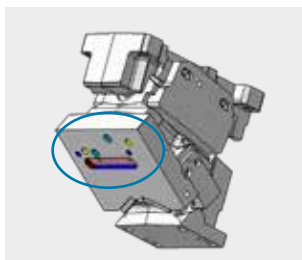
For inquiries about standard cam face machining and our extended processing options, please contact our engineering team at

anarbeitung.camtec@voestalpine.com.

EXAMPLE PRE-MACHINING AT O-KS

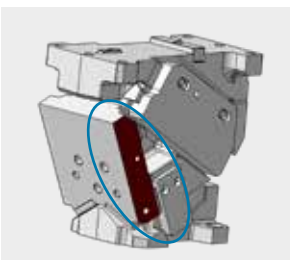
**Pre-machining only
on the work surface**

Standard pre-machining



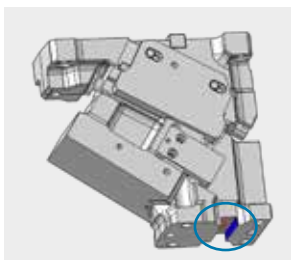
**Pre-machining the
work surface width**

Advanced pre-machining



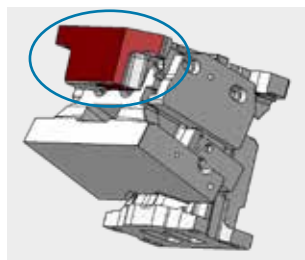
**Pre-machining on the
cam unit (fitting key)**

Advanced pre-machining



**Pre-machining on the
cam base**

Advanced pre-machining





SPECIAL CAM UNITS

Individually manufactured based on your requirements

Individual requirements often require unique design. In addition to our flexible product portfolio, we are pleased to offer customized cam units. We rely on proven standard components and individual solutions.

THERE ARE ALMOST NO LIMITS TO YOUR REQUIREMENTS.

Modifications and individualisation according to your needs:

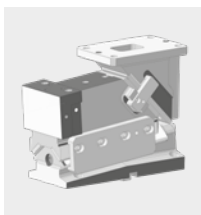
- » Work surface: width, height, angle
- » Cam slider asymmetrical / symmetrical
- » Position of the driver
- » Force direction (Pull/push cam unit)
- » Stroke
- » Forces (retracting & working force)
- » Customised pre-machining

Of course, we also deliver your special cam unit with pre-machining based on your specifications.

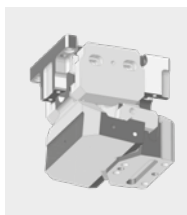
For inquiries about standard processing of the work surface and our extended processing options, please contact our engineering team at

engineering.camtec@voestalpine.com.
<https://www.voestalpine.com/camtec/en/Cam-units/Special-cam-unit>

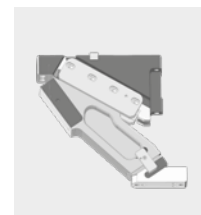
The QR code leads you directly to the special cam units website



Change of cam stroke



Special angles



Driver position



Pull cam



Die mount cam



Bottom cam unit

PARAMETERIZED CAM UNIT ADAPTER

Flexible, precise and economical for more efficiency in construction

The innovative parameterized slide adapter from voestalpine Camtec offers a significant simplification in construction. Once placed in CATIA, slide parameters (e.g. slide model, angle, width) can be easily exchanged using the selection menu. An exchange in the course of the design construction, method planning or similar is therefore no longer necessary - this saves valuable construction time.

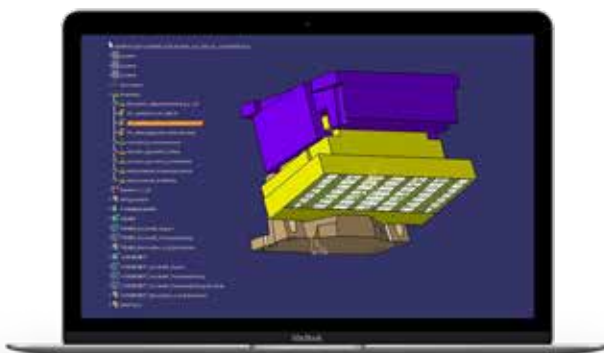
ONE MODEL, 1,000 OPTIONS

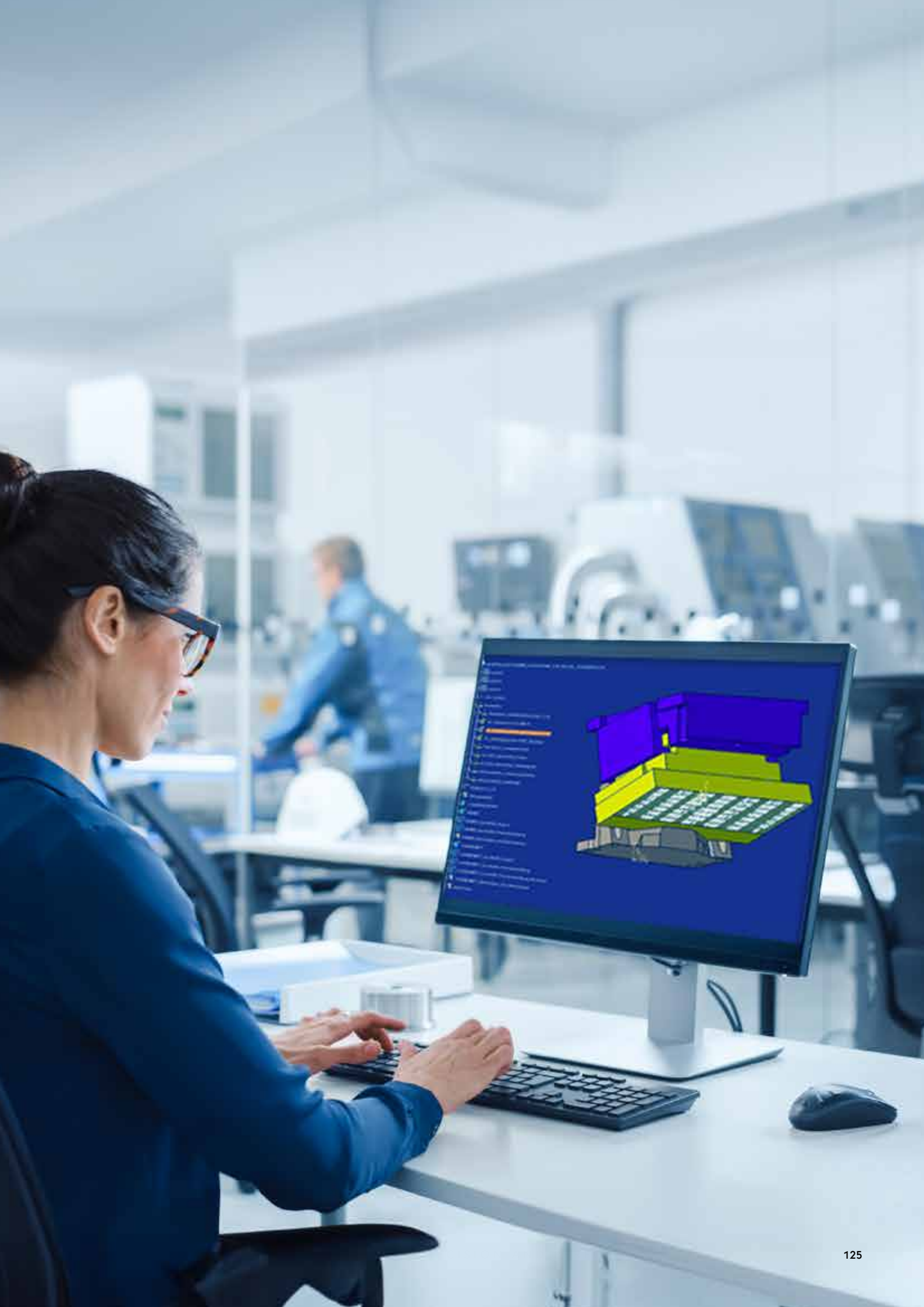
Your advantages:

- » Savings in construction time
 - One cam adapter for all standard OT cams
 - Simple integration into CATIA tool design (suitable for BMW & VW)
 - No need to replace the adapter in the event of changes (width, angle, cam type)
- » Easier handling
 - No external links to customer models required
 - Detailed information on the connection geometry (stop surfaces, threaded & fitting holes, etc.)
 - Features for load time optimization (force fields can be shown & hidden)
 - Simple and individual adaptation of the cam unit configuration
- » Use also in the method planning process possible
 - Representation of rough models without extensive details (installation space)
 - Reduced geometry

The cam unit adapter includes:

- » All angles and widths of the O-series
- » Stroke rate-dependent force fields
- » Cam geometry
 - Incl. information on cast machining, e.g. trigger body for milling, sprue, shouldering
- » Removal chamber of the cam unit
- » Visualization of the pre-machining area
 - For milling, position for threads & pins
- » Information on the mounting geometry: mounting hole, fitting hole
- » Parts list information





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ONE STEP AHEAD.