

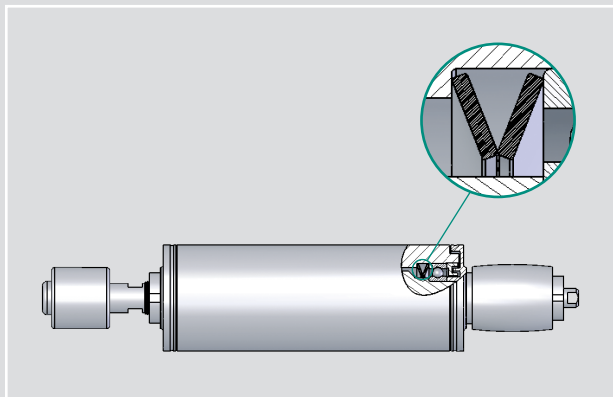
Original SCHNORR® bearing preload spring

The optimal supplement for ball bearings

Two problems continually occupy design engineers using bearings, the reduction in noise and the elimination of play in ball bearings. A solution of both these problems has been achieved by Schnorr working in close cooperation with well-known ball bearings manufacturers. The fitting of a special version of our disc springs effectively reduces both problems and frequently results in simpler designs.

Fitting of bearing preload springs

The drawing illustrates how the outer ring of the ball bearing usually is correctly preloaded using a disc spring "K" series. Depending on the requirements of the design, one or more disc springs can be used. In some cases it is preferable to preload the inner ring of the bearing. That is why the bore holes of disc springs for ball bearings were chosen in such a way that they match the internal diameter of an other ball bearing size. That way, a disc spring suitable for pushing the external ring of the ball bearing 6302, for example, can also be used to pretension the inner rings of the ball bearings 6205 and 6305.



Bearing preload spring

Key advantages speak for bearing preload springs

An important advantage of "K" disc springs is being round. That ensures an equal bearing surface when multiple discs are installed. As with standard disc springs, here it also applies that in alternating arrangement with the constant force the spring deflections add up, while in case of parallel layering (same laying in) with constant spring deflection the loads add up (see figure page 7). As all springs have a strongly digressive spring characteristic (great h_0/t), the spring force continues to be almost constant over a large deflection range.

Apart from the compensation for play, this brings the following advantages:

- The tolerance built up in the assembly can be accommodated without significant change in preload.
- Length variations due to heat impact are absorbed.
- Any subsequent axial movement of the assembly does not alter the preload significantly.



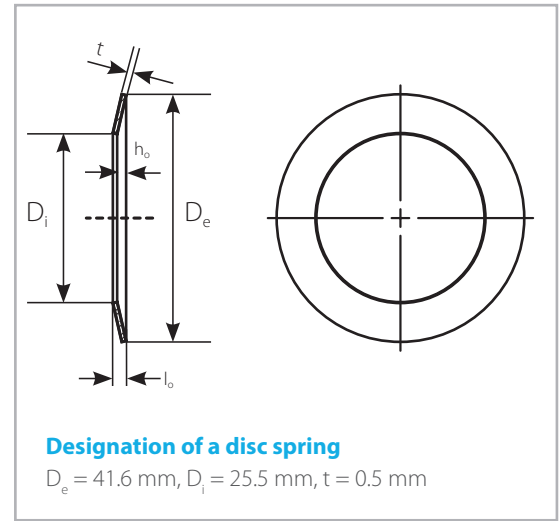
Original SCHNORR® bearing preload springs type “K”, non-slotted

How to order

When ordering “K” disc springs to preload the outer ring of the ball bearing please quote the ball bearing size or the article number. In all other cases, please give application details.

Notes on the table

The “K” disc spring sizes listed in the following tables are our standard production and comply with ball bearing series EL, R, 62 and 63. The load and deflections given are at spring deflection of 75 % of the free height h_0 . This is the recommended preload for installation of the “K” disc springs.



Original SCHNORR® bearing preload springs type „K”, non-slotted Ø 9.8 - 99 mm

Article number / Order reference	Ordering Dimensions									Spring deflection s & force F		Weight per 1000 pieces [lb]	Ball bearing type		Ball bearing		
	D_e [mm]	D_i [mm]	t [mm]	D_e [inch]	D_i [inch]	t [inch]	l_0 [inch]	h_0 [inch]	h_0/t [inch]	s [inch]	F [lbf]				ext. dia [inch]	internal dia [inch]	
241200	9.80	6.20	0.20	0.386	0.244	0.008	0.016	0.008	1.00	0.006	5.171	0.150	623 (EL3)		0.394	0.118	
241400	12.80	7.20	0.25	0.504	0.283	0.010	0.020	0.010	1.00	0.007	6.519	0.368	624 (EL4)		0.512	0.157	
241600	15.80	8.20	0.25	0.622	0.323	0.010	0.022	0.012	1.20	0.009	5.171	0.606	625 (EL5) 634 (R4)		0.630	0.197	0.157
241700	18.80	9.20	0.30	0.740	0.362	0.012	0.026	0.014	1.17	0.010	6.969	1.074	626 (EL6) 635 (R5)		0.630	0.236	0.197
241800	18.80	10.20	0.35	0.740	0.402	0.014	0.028	0.014	1.00	0.010	11.465	1.160	607 (EL7)		0.748	0.276	
241900	21.80	12.30	0.35	0.858	0.484	0.014	0.030	0.016	1.14	0.012	10.341	1.508	608 (EL8) 627 (R7)		0.866	0.315	0.276
242100	23.70	14.30	0.40	0.933	0.563	0.016	0.035	0.020	1.25	0.015	18.210	1.900	609 (EL9)		0.945	0.354	
242200	25.70	14.30	0.40	1.012	0.563	0.016	0.035	0.020	1.25	0.015	14.163	2.436	6000 629 (R9)		1.024	0.394	0.354
242300	27.70	17.30	0.40	1.091	0.681	0.016	0.039	0.024	1.50	0.018	17.985	2.496	6001		1.102	0.472	
242500	29.70	17.40	0.40	1.169	0.685	0.016	0.043	0.028	1.75	0.021	18.659	3.100	6200		1.181		0.394
242600	31.70	20.40	0.40	1.248	0.803	0.016	0.043	0.028	1.75	0.021	18.210	3.135	6002 6201		1.260	0.591	0.472
242800	34.60	20.40	0.40	1.362	0.803	0.016	0.043	0.028	1.75	0.021	13.713	4.176	6300	6300	1.378		0.394
242900	34.60	22.40	0.50	1.362	0.882	0.020	0.047	0.028	1.40	0.021	26.527	4.636	6003 6202		1.378	0.669	0.591
243000	36.60	20.40	0.50	1.441	0.803	0.020	0.051	0.031	1.60	0.024	24.729	6.184	6301	6301	1.457		0.472
243100	39.60	25.50	0.50	1.559	1.004	0.020	0.051	0.031	1.60	0.024	24.729	6.135	6203		1.575		0.669
243200	41.60	25.50	0.50	1.638	1.004	0.020	0.055	0.035	1.80	0.027	25.403	7.236	6004 6302	6302	1.654	0.787	0.591
243300	46.50	30.50	0.60	1.831	1.201	0.024	0.059	0.035	1.50	0.027	34.396	9.890	6005 6204 6303	6303	1.850	0.984	0.787 0.669
243400	51.50	35.50	0.60	2.028	1.398	0.024	0.059	0.035	1.50	0.027	30.349	11.153	6205 6304	6304	2.047		0.984 0.787
243500	54.50	40.50	0.60	2.146	1.594	0.024	0.059	0.035	1.50	0.027	31.698	10.631	6006		2.165	1.181	
243600	61.50	40.50	0.70	2.421	1.594	0.028	0.071	0.043	1.57	0.032	39.566	20.108	6007 6206 6305	6305	2.441	1.378	1.181 0.984
243700	67.50	50.50	0.70	2.657	1.988	0.028	0.067	0.039	1.43	0.030	36.194	18.750	6008		2.677	1.575	
243800	71.50	45.50	0.70	2.815	1.791	0.028	0.083	0.055	2.00	0.041	41.590	28.638	6306	6306	2.835		1.181
243900	71.50	50.50	0.70	2.815	1.988	0.028	0.083	0.055	2.00	0.041	49.008	24.030	6207	6207	2.835		1.378
244000	74.50	55.50	0.80	2.933	2.185	0.031	0.075	0.043	1.38	0.032	47.435	26.433	6009		2.953	1.772	
244100	79.50	50.50	0.80	3.130	1.988	0.031	0.091	0.059	1.88	0.044	51.256	40.565	6307	6307	3.150		1.378
244200	79.50	55.50	0.80	3.130	2.185	0.031	0.091	0.059	1.88	0.044	59.125	34.789	6010 6208	6208	3.150	1.969	1.575
244300	84.50	60.50	0.90	3.327	2.382	0.035	0.098	0.063	1.78	0.047	80.706	41.998	6209	6209	3.346		1.772
244400	89.50	60.50	0.90	3.524	2.382	0.035	0.098	0.063	1.78	0.047	64.745	52.602	6308	6308	3.543		1.575
244500	89.50	65.50	0.90	3.524	2.579	0.035	0.098	0.063	1.78	0.047	75.311	44.886	6011 6210	6210	3.543	2.165	1.969
244600	94.50	75.50	1.00	3.720	2.972	0.039	0.087	0.047	1.20	0.035	73.063	43.144	6012	6012	3.740	2.362	
244700	99.00	65.50	1.00	3.898	2.579	0.039	0.102	0.063	1.60	0.047	65.644	74.163	6309	6309	3.937		1.772
244800	99.00	70.50	1.00	3.898	2.776	0.039	0.102	0.063	1.60	0.047	74.637	64.904	6013 6211	6211	3.937	2.559	2.165

Original SCHNORR® bearing preload springs type „K“, non-slotted

Ø 109 - 358 mm

Article number / Order reference	Ordering Dimensions									Spring deflection s & force F		Weight	Ball bearing type			Ball bearing			
	D _e	D _i	t	D _e	D _i	t	l ₀	h ₀	h ₀ /t	at s = 0.75 h ₀			per 1000 pieces			6310	ext. dia		internal dia
	[mm]	[mm]	[mm]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	s	F	[lb]					[inch]	[inch]	
244900	109.00	70.50	1.25	4.291	2.776	0.049	0.106	0.057	1.16	0.043	80.257	116.404			6310	4.331			1.969
245000	109.00	75.50	1.25	4.291	2.972	0.049	0.106	0.057	1.16	0.043	89.474	103.992	6014	6212		4.331	2.756	2.362	
245100	114.00	90.50	1.25	4.488	3.563	0.049	0.096	0.047	0.96	0.035	89.474	80.447	6015			4.528	2.953		
245200	119.00	75.50	1.25	4.685	2.972	0.049	0.110	0.061	1.24	0.046	71.939	142.661			6311	4.724			2.165
245300	119.00	85.50	1.25	4.685	3.366	0.049	0.110	0.061	1.24	0.046	88.350	115.258		6213		4.724		2.559	
245400	124.00	90.50	1.25	4.882	3.563	0.049	0.118	0.069	1.40	0.052	100.040	120.703	6016	6214		4.921	3.150	2.756	
245500	129.00	85.50	1.25	5.079	3.366	0.049	0.126	0.077	1.56	0.058	91.048	157.145			6312	5.118			2.362
245600	129.00	95.50	1.25	5.079	3.760	0.049	0.126	0.077	1.56	0.058	112.404	126.347	6017	6215		5.118	3.346	2.953	
245700	139.00	90.50	1.25	5.472	3.563	0.049	0.128	0.079	1.60	0.059	79.582	187.635			6313	5.512			2.559
245800	139.00	101.00	1.25	5.472	3.976	0.049	0.128	0.079	1.60	0.059	96.443	153.397	6018	6216		5.512	3.543	3.150	
245900	149.00	95.50	1.50	5.866	3.760	0.059	0.126	0.067	1.13	0.050	85.203	264.775			6314	5.906			2.756
246000	149.00	106.00	1.50	5.866	4.173	0.059	0.126	0.067	1.13	0.050	101.164	221.564	6020	6217		5.906	3.937	3.346	
246100	159.00	101.00	1.50	6.260	3.976	0.059	0.138	0.079	1.33	0.059	92.621	305.340			6315	6.299			2.953
246200	159.00	111.00	1.50	6.260	4.370	0.059	0.138	0.079	1.33	0.059	107.234	262.129	6021	6218		6.299	4.134	3.543	
246300	169.00	111.00	1.50	6.654	4.370	0.059	0.150	0.091	1.53	0.068	105.660	328.929			6316	6.693			3.150
246400	169.00	121.00	1.50	6.654	4.764	0.059	0.150	0.091	1.53	0.068	122.746	281.530	6022	6219		6.693	4.331	3.740	
246500	179.00	121.00	2.00	7.047	4.764	0.079	0.165	0.087	1.10	0.065	194.235	469.805			6317	7.087			3.740
246600	179.00	126.00	2.00	7.047	4.961	0.079	0.165	0.087	1.10	0.065	208.623	436.074	6024	6220		7.087	4.724	3.937	
246700	189.00	121.00	2.00	7.441	4.764	0.079	0.169	0.091	1.15	0.068	170.630	569.453			6318	7.480			3.543
246800	189.00	131.00	2.00	7.441	5.157	0.079	0.169	0.091	1.15	0.068	192.886	500.669		6221		7.480		4.134	
246900	198.00	131.00	2.00	7.795	5.157	0.079	0.177	0.098	1.25	0.074	182.545	595.247			6319	7.874			3.740
247000	198.00	141.00	2.00	7.795	5.551	0.079	0.177	0.098	1.25	0.074	207.499	521.172	6026	6222		7.874	5.118	4.331	
247100	213.00	151.00	2.25	8.386	5.945	0.089	0.177	0.089	1.00	0.066	211.545	685.416		6224	6320	8.465		4.724	3.937
247200	223.00	161.00	2.25	8.780	6.339	0.089	0.181	0.093	1.04	0.069	211.770	723.115	6030		6321	8.858	5.906		4.134
247300	228.00	161.00	2.25	8.976	6.339	0.089	0.195	0.106	1.20	0.080	232.902	791.900		6226		9.055		5.118	
247400	238.00	161.00	2.25	9.370	6.339	0.089	0.207	0.118	1.33	0.089	229.530	934.318	6032		6322	9.449	6.299		4.331
247500	248.00	171.00	2.50	9.764	6.732	0.098	0.197	0.098	1.00	0.074	225.933	1.090.185		6228		9.843		5.512	
247600	258.00	171.00	2.50	10.157	6.732	0.098	0.217	0.118	1.20	0.089	248.639	1.261.484	6034		6324	10.236	6.693		4.724
247700	268.00	181.00	2.50	10.551	7.126	0.098	0.224	0.126	1.28	0.094	259.654	1.319.906		6230		10.630		5.906	
247800	278.00	181.00	2.50	10.945	7.126	0.098	0.236	0.138	1.40	0.103	259.654	1.505.094	6036		6326	11.024	7.087		5.118
247900	288.00	191.00	2.75	11.339	7.520	0.108	0.226	0.118	1.09	0.089	257.406	1.727.761	6038	6232		11.417	7.480	6.299	
248000	298.00	191.00	2.75	11.732	7.520	0.108	0.250	0.142	1.31	0.106	293.825	1.946.679			6328	11.811			5.512
248100	308.00	202.00	3.00	12.126	7.953	0.118	0.240	0.122	1.03	0.092	292.252	2.194.038	6040	6234		12.205	7.874	6.693	
248200	318.00	212.00	3.00	12.520	8.346	0.118	0.244	0.126	1.07	0.094	292.701	2.279.577		6236	6330	12.598		7.087	5.906
248300	338.00	232.00	3.00	13.307	9.134	0.118	0.260	0.142	1.20	0.106	318.105	2.451.537	6044	6238	6332	13.386	8.661	7.480	6.299
248400	358.00	242.00	3.00	14.094	9.528	0.118	0.276	0.157	1.33	0.118	320.128	2.824.118	6048	6240	6334	14.173	9.449	7.874	6.693

Original SCHNORR® bearing preload springs

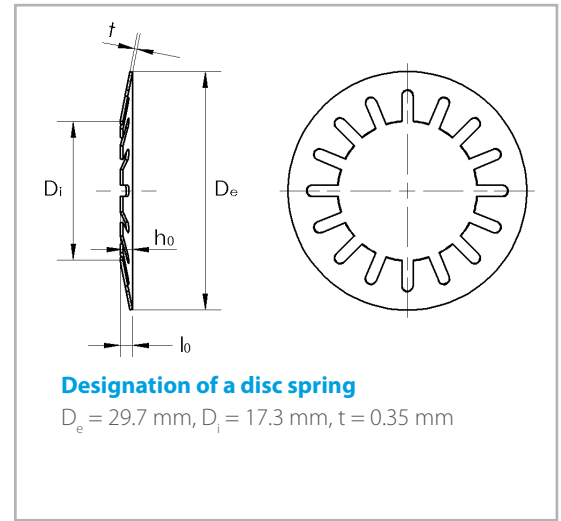
type “K”, with slots

How to order

When ordering these sizes to preload the outer ring of the bearing, please quote the bearing size and the suffix “slotted” or the article number. In all other cases, please give application details.

Slotted version

This special design generates very small loads and accommodates large deflections.



Original SCHNORR® bearing preload springs type „K” slotted

Ø 9.8 - 94.5 mm

Article number / Order reference	Ordering Dimensions									Spring deflection s & force F		Weight per 1000 pieces [lb]	Ball bearing type			Ball bearing		
	D_e [mm]	D_i [mm]	t [mm]	D_e [inch]	D_i [inch]	t [inch]	l_0 [inch]	h_0 [inch]	h_0/t [inch]	s [inch]	F [lbf]					ext. dia [inch]	internal dia [inch]	
241150	9.80	6.20	0.15	0.386	0.244	0.006	0.024	0.018	1.00	0.014	2.923	0.110	623(EL3)			39.370	0.118	
241350	12.80	7.20	0.20	0.504	0.283	0.008	0.026	0.018	0.92	0.014	4.047	0.287	624(EL4)			51.181	0.157	
241650	15.80	8.20	0.25	0.622	0.323	0.010	0.030	0.020	0.74	0.016	4.496	0.617	625(EL5)	634(R4)		62.992	0.197	0.157
241675	18.80	9.20	0.25	0.740	0.362	0.010	0.039	0.030	0.97	0.022	4.496	0.970	626(EL)	635(R5)		62.992	0.236	0.197
241750	18.80	10.20	0.25	0.740	0.402	0.010	0.041	0.031	1.15	0.024	5.395	0.705	607(EL7)			74.803	0.276	
241850	21.80	12.30	0.25	0.858	0.484	0.010	0.049	0.039	1.47	0.030	5.395	0.926	608(EL8)	627(R7)		86.614	0.315	0.276
242050	23.70	14.30	0.30	0.933	0.563	0.012	0.051	0.039	1.21	0.030	5.620	1.455	609(EL9)			94.488	0.354	
242150	25.70	14.30	0.30	1.012	0.563	0.012	0.055	0.043	1.19	0.031	6.295	1.543	6000	629(R9)		102.362	0.394	0.354
242250	27.70	17.30	0.35	1.091	0.681	0.014	0.057	0.043	1.03	0.031	6.969	2.169	6001			110.236	0.472	
242450	29.70	17.30	0.35	1.169	0.681	0.014	0.061	0.047	1.30	0.035	7.194	2.646		6200		118.110		0.394
242550	31.70	20.40	0.35	1.248	0.803	0.014	0.061	0.047	1.30	0.035	7.419	2.800	6002	6201		125.984	0.591	0.472
242750	34.60	20.40	0.40	1.362	0.803	0.016	0.065	0.049	1.10	0.039	7.194	3.638			6300	137.795		0.394
242850	34.60	22.40	0.35	1.362	0.882	0.014	0.061	0.047	1.18	0.035	7.194	3.307	6003	6202		137.795	0.669	0.591
242950	36.60	20.40	0.40	1.441	0.803	0.016	0.075	0.059	1.44	0.043	7.868	5.027			6301	145.669		0.472
243050	39.60	25.50	0.40	1.559	1.004	0.016	0.075	0.059	1.22	0.043	8.318	4.233		6203		157.480		0.669
243150	41.60	25.50	0.45	1.638	1.004	0.018	0.081	0.063	1.13	0.047	8.768	5.512	6004		6302	165.354	0.787	0.591
243250	46.50	30.50	0.45	1.831	1.201	0.018	0.081	0.063	1.11	0.047	9.892	6.261	6005	6204	6303	185.039	0.984	0.787
243350	51.50	35.50	0.45	2.028	1.398	0.018	0.083	0.065	1.26	0.049	10.566	6.768		6205	6304	204.724		0.984
243450	54.50	40.50	0.45	2.146	1.594	0.018	0.085	0.067	1.75	0.051	11.915	7.055	6006			216.535	1.181	
243550	61.50	40.50	0.55	2.421	1.594	0.022	0.100	0.079	1.21	0.059	12.140	13.338	6007	6206	6305	244.094	1.378	1.181
243650	67.50	50.50	0.55	2.657	1.988	0.022	0.102	0.081	1.36	0.063	17.535	12.125	6008			267.717	1.575	
243750	71.50	45.50	0.60	2.815	1.791	0.024	0.114	0.091	1.47	0.067	16.636	21.164			6306	283.465		1.181
243850	71.50	50.50	0.60	2.815	1.988	0.024	0.114	0.091	1.83	0.067	28.551	18.078		6207		283.465		1.378
243950	74.50	55.50	0.60	2.933	2.185	0.024	0.114	0.091	1.31	0.067	20.458	16.711	6009			295.276	1.772	
244125	79.50	50.50	0.70	3.130	1.988	0.028	0.122	0.094	1.36	0.071	18.659	35.847			6307	314.961		1.378
244150	79.50	55.50	0.70	3.130	2.185	0.028	0.114	0.087	1.51	0.065	28.551	31.967	6010	6208		314.961	1.969	1.575
244250	84.50	60.50	0.75	3.327	2.382	0.030	0.124	0.094	0.87	0.071	17.535	28.660		6209		334.646		1.772
244350	89.50	60.50	0.80	3.524	2.382	0.031	0.130	0.098	1.08	0.075	23.380	39.904			6308	354.331		1.575
244450	89.50	65.50	0.80	3.524	2.579	0.031	0.134	0.102	1.35	0.077	42.489	35.274	6011	6210		354.331	2.165	1.969
244550	94.50	75.50	0.80	3.720	2.972	0.031	0.136	0.104	1.39	0.079	46.311	29.321	6012			374.016	2.362	